Bard®
SINCE 1914
Climate Control Solutions

Literature Assembly
911-0799

Contains the following:

2100-034(G)	User's Guide
2100-479	Leak Test, Evacuation, Charging
2100-712(F)	Wall-Mount PKG A/C Manual
2100-713(D)	Multi-Tec A/C Install Instruct
2100-714	Multi-Tec Quick Start Guide
2110-1459(I)	Replacement Parts Manual
7960-810	Supplemental 50HZ Instructions
7960-420	Warranty

USER'S APPLICATION GUIDE AND TECHNICAL PRODUCT OVERVIEW

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

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Bryan, Ohio 43506
www.bardhvac.com

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

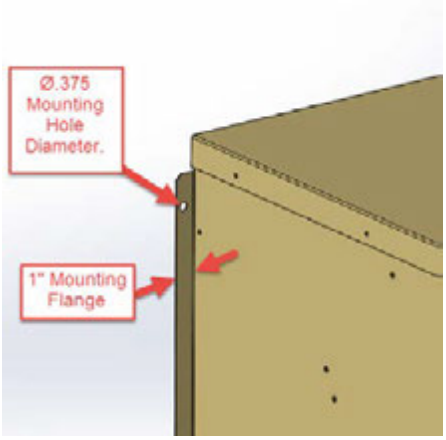
Installation plays a key part in unit functionality, performance and safety. Product securing and placement, duct design and supply/return location, electrical routing and condensate and defrost drainage all play key roles in making sure a unit will perform per the design specifications.

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.

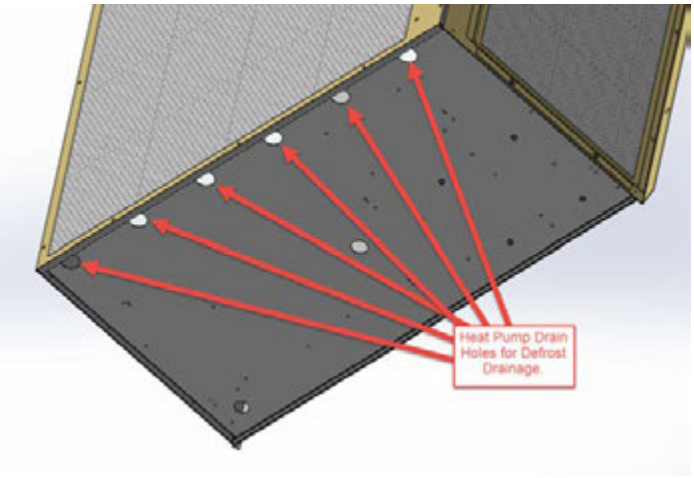
Defrost water drainage from heat pump units needs to be planned before installation. During seasons requiring heating operation, the unit will need to warm the condenser coil to remove frost build-up (defrost). **Outdoor heat pump products include holes in the unit base under the condenser coil for proper 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.

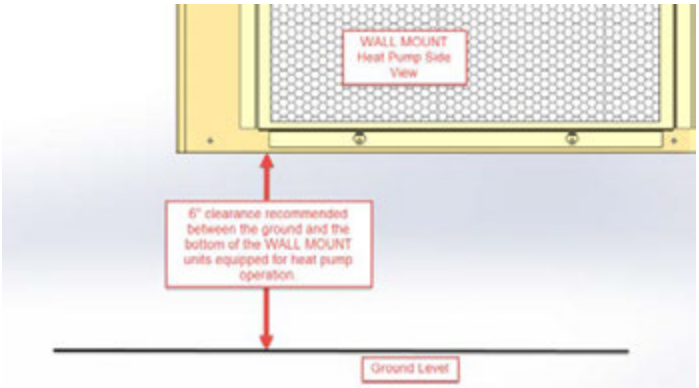
Defrost Water Drainage:

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

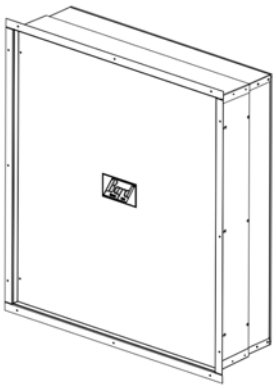
Q-TEC

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.

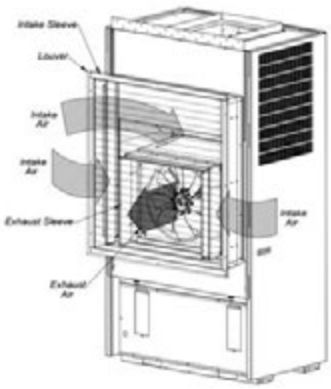
Wall Sleeve:

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

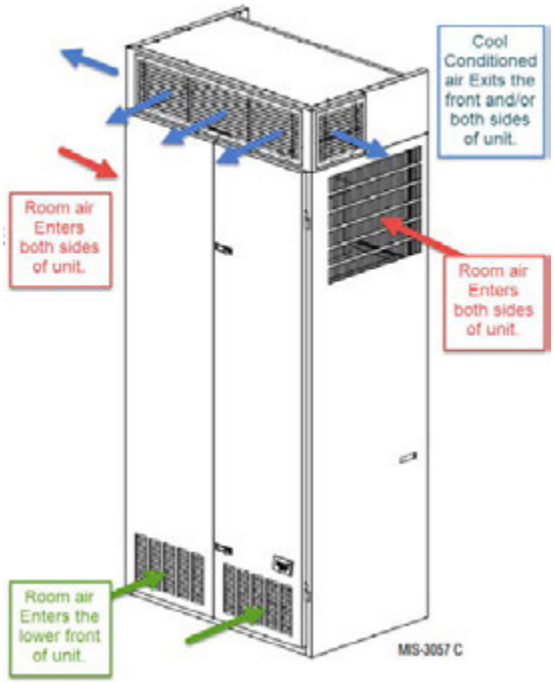
The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects inside the room within 24" of the return (unit air intake) louvers or grille. Avoid placing objects directly in the path of the supply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

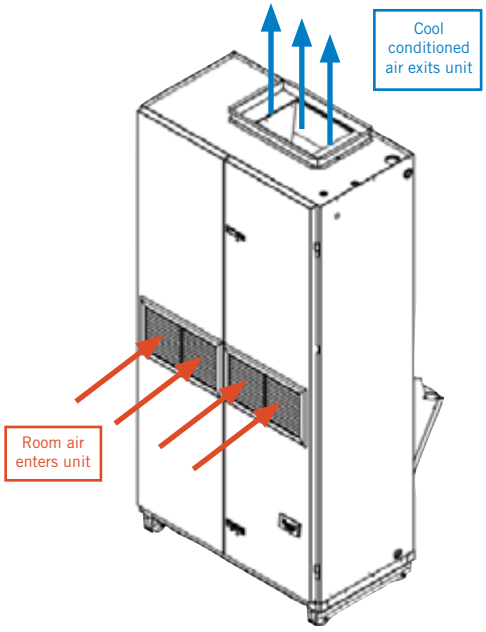
The I-TEC product has been engineered for extremely quiet unit operation and has multiple air paths for air entering and exiting the unit. Room air enters the upper sides to be conditioned (cooled) inside the unit and exits the unit top. The unit will either be ducted to supply registers or have a supply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

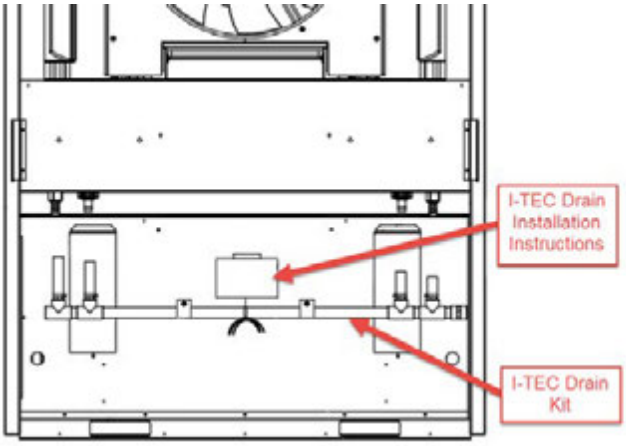
I-TEC and Q-TEC Products – Condensate Drainage

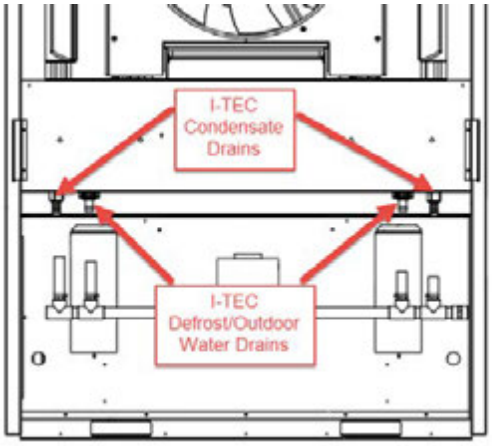
Condensate drainage for Bard indoor cooling units is a very important part of unit installation. During normal air conditioning operation, large amounts of condensate water are generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and needs to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

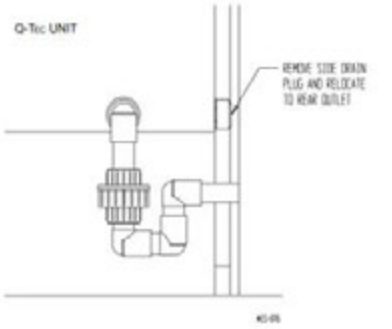
The I-TEC drainage system consists of a manifold drain kit that combines all drains behind the unit to allow connection to the building system.



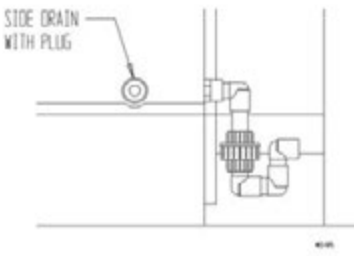


Q-TEC Drain System:

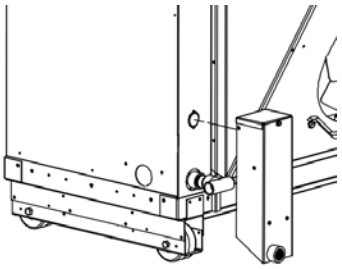
The Q-TEC drainage system consists of a lower right side or lower right rear connection fitting. An optional in-wall drain box may also be purchased as an accessory that allows separate evaporator and defrost water drainage.



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

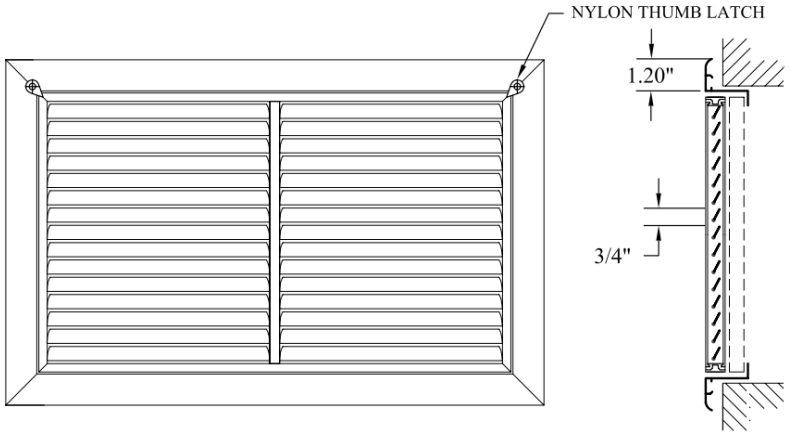
All Products – Filters and Filter Servicing

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.

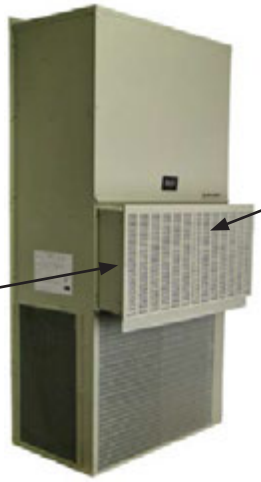
The product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

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.

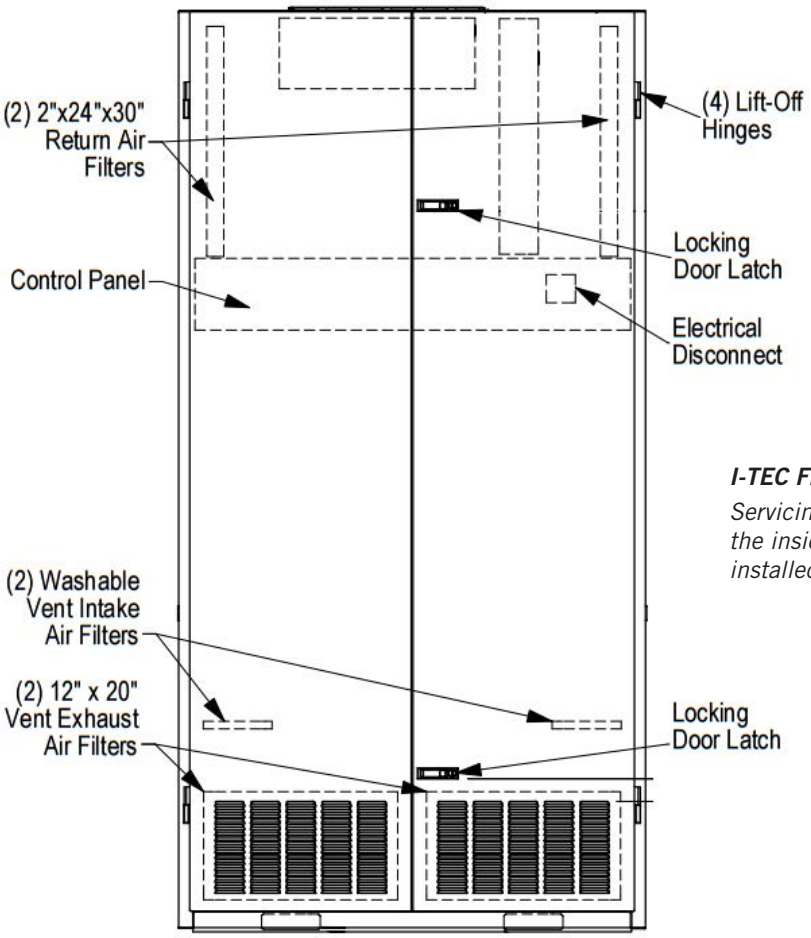
I-TEC Indoor Products – Filters and Filter Servicing

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.

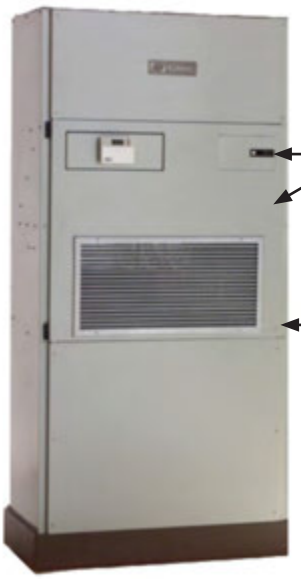
The I-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

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



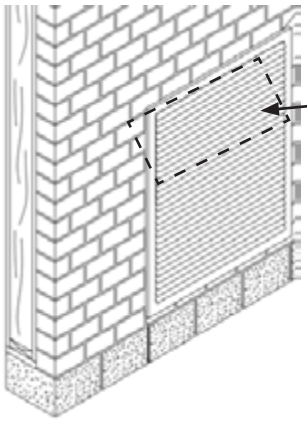
Q-TEC Filter Location:

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.

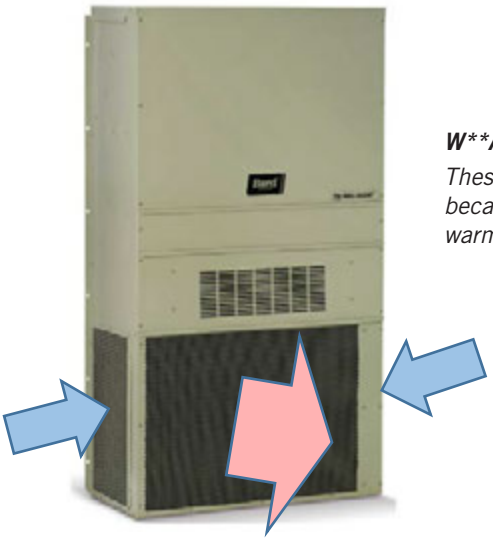
Other conditions that can cause reduction of airflow across the outdoor coil are flowers, shrubbery or other growth too near the outdoor coil air inlet and outlet openings. These living things, especially as they mature and grow, will be just as effective in blocking the airflow and create the same problems 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.

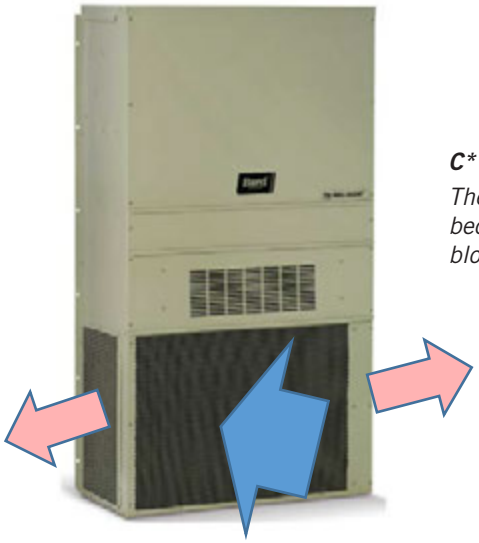
The product installation instructions contain additional information regarding unit coil cleaning. This information may be accessed at www.bardhvac.com.

All Products – Condenser Airflow



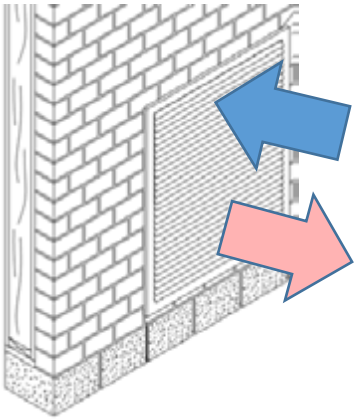
W**A, W**H, T**H, T**S, W*RV Wall Mount Units:

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.

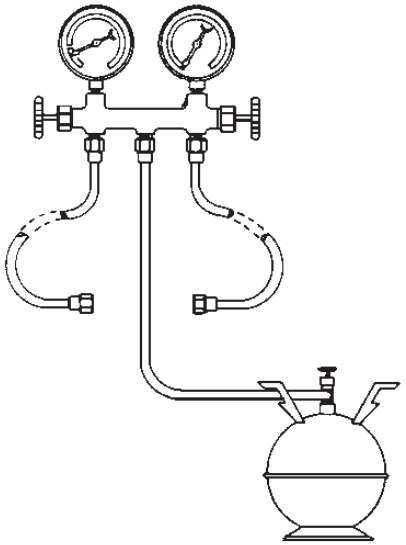
Helpful Hints and Good Operating Practices

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

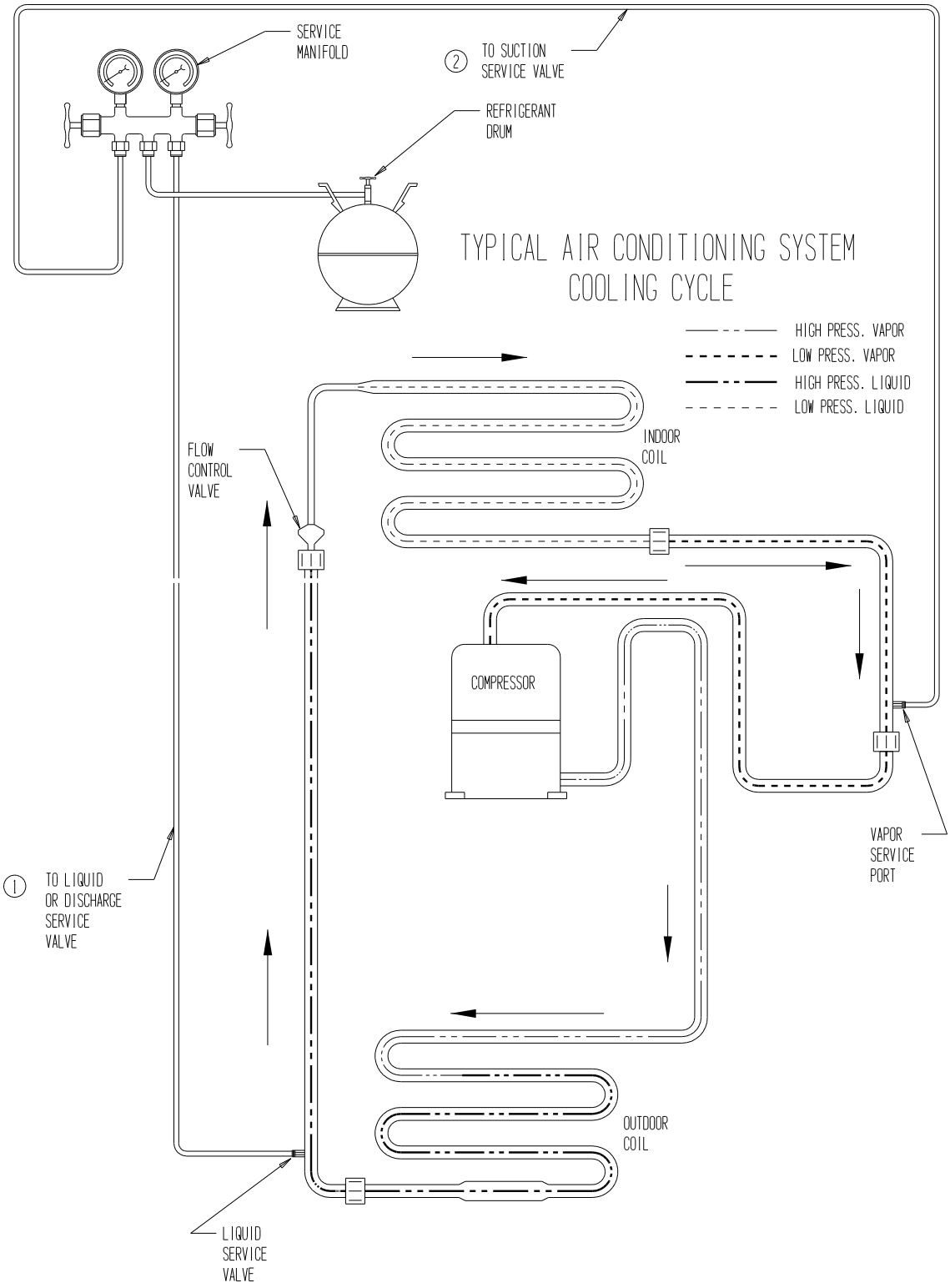
If the system has been open to the atmosphere, the filter dryer should be replaced and then evacuated. Then proceed as follows:

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

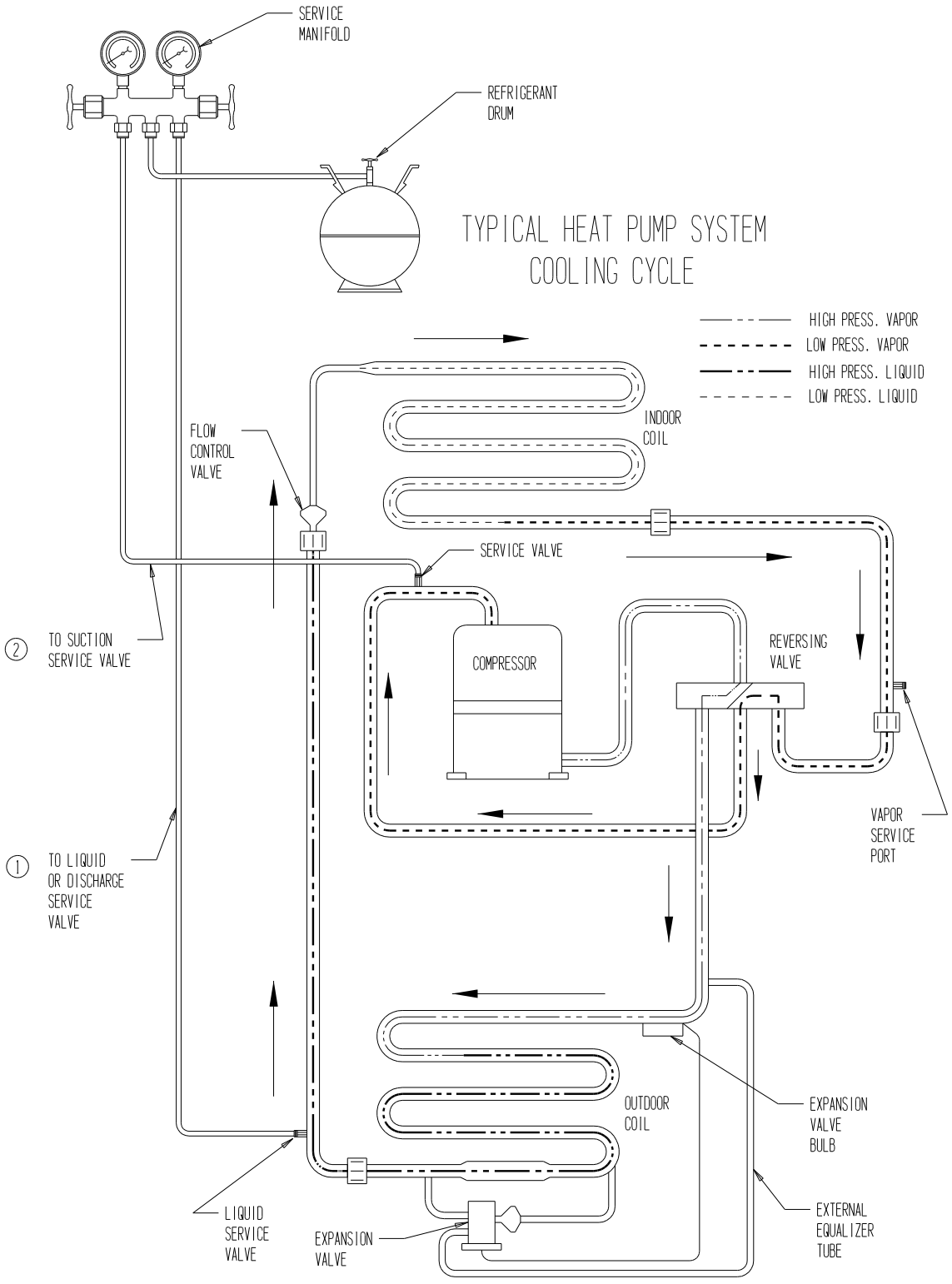
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder liquid valve and allow pressure in system to balance with pressure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

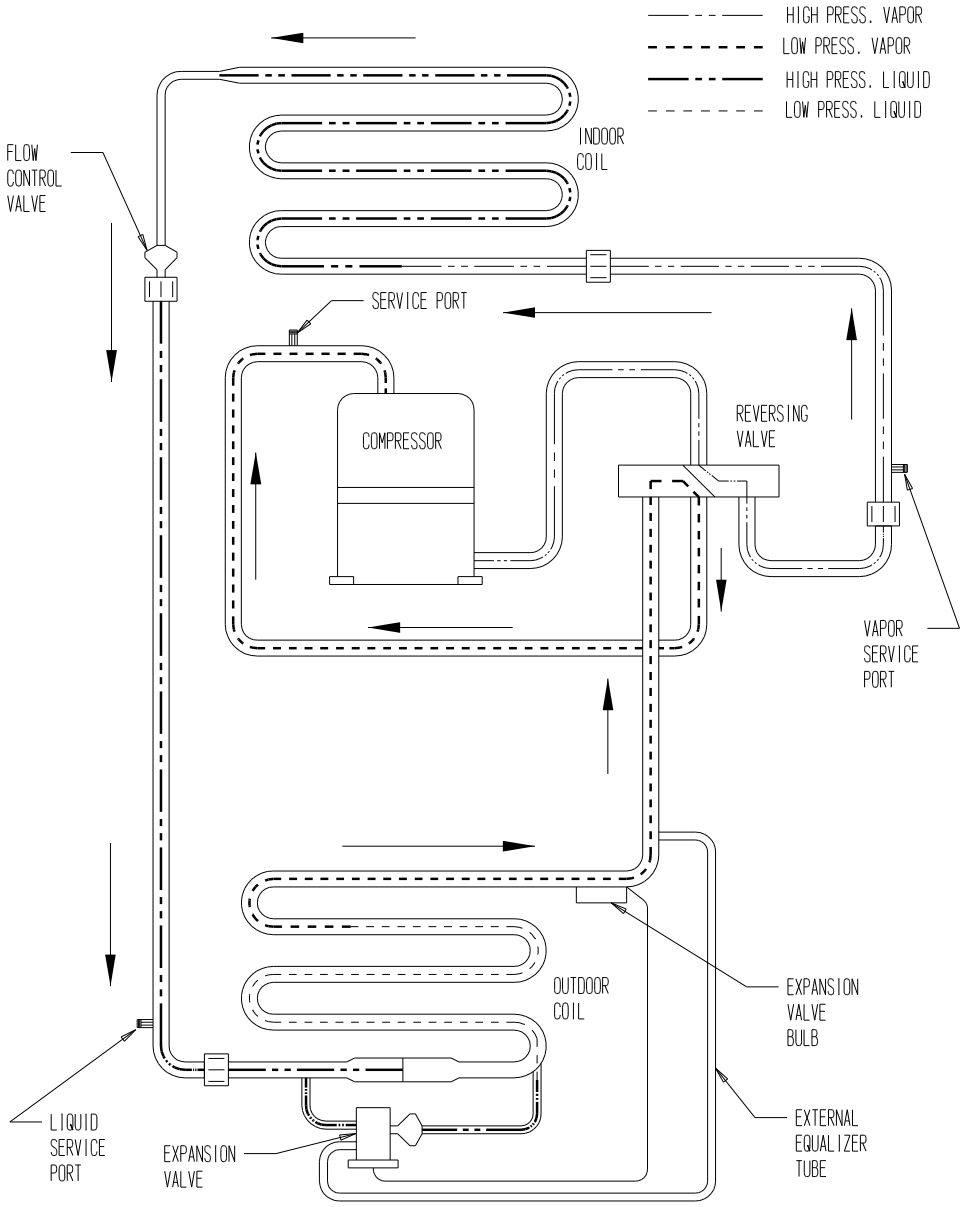


MIS-368

⚠ 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									Motors			
	Control Circuit												
	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
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														
	Compressor						System Operation								
	Hold Down Bolts	Defective Compressor Bearings	Seized Compressor	Defective Compressor Valves	Compressor Oil Level	Open or Short Motor Windings	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
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					Low Side						General					
	Condenser Air					Evaporator Air											
	Condenser Fins Dirty or Plugged	Condenser Fan Belt Slipping	Condenser Air Short Circuiting	Low Condenser Air Volume	Condenser Air Temperature Low	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.

Cycle	Symptom	Power Supply – Line Voltage												Power Supply – Control Circuit							
		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
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate	●	●	●	●		◆	◆	◆	◆				●	●	●	◆	◆	●	●	
Heating or Cooling Cycles	Compressor will not run O.D. fan motor runs			●	●	●	◆	◆		●	●	●	●								
Heating or Cooling Cycles	Compressor "hums" but will not start			●	●	●	●	◆	◆		●	●	●								
Heating or Cooling Cycles	Compressor cycles on overload			●	●	●	◆	◆	◆	●	●	●	●								
Heating or Cooling Cycles	Compressor off on high pressure control																			◆	●
Heating or Cooling Cycles	Compressor noisy																				
Heating or Cooling Cycles	Head pressure too high																				
Heating or Cooling Cycles	Head pressure too low																				
Heating or Cooling Cycles	Suction pressure too high																				
Heating or Cooling Cycles	Suction pressure too low																				
Heating or Cooling Cycles	I.D. blower will not start	●	●	●	●									●	●	●	◆	◆			●
Heating or Cooling Cycles	I.D. coil frosting or icing-																				
Heating or Cooling Cycles	High compressor amps					●															
Cooling Cycle	Compressor runs continuously—no cooling																				
Cooling Cycle	Liquid refrigerant flooding back to compressor																				
Heating Cycle	Compressor runs continuously—no heating																				
Heating Cycle	Defrost cycle initiates no ice on coil																				
Heating Cycle	Reversing valve does not shift			●	●																
Heating Cycle	Ice build up on lower part of O.D. coil																				
Heating Cycle	Liquid refrigerant flooding back to compressor																				
Heating Cycle	Auxiliary heat on I.D. blower off			●	●									●	●			◆			●
Heating Cycle	Excessive operating costs			◆	◆													◆			
Heating Cycle	Excessive ice on O.D. coil			◆	◆																

Cycle	Symptom	Outdoor Section – Compressor					Outdoor Section – Refrigerant System								Defrost Control			Rev. Valve	
		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
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate																		
Heating or Cooling Cycles	Compressor will not run O.D. fan motor runs		◆	●		●								●					
Heating or Cooling Cycles	Compressor "hums" but will not start		●	●		●								●					
Heating or Cooling Cycles	Compressor cycles on overload		◆		◆	◆	●	●	◆		◆		●					◆	
Heating or Cooling Cycles	Compressor off on high pressure control							●					●		◆	●	●		
Heating or Cooling Cycles	Compressor noisy	◆	◆		●														
Heating or Cooling Cycles	Head pressure too high							●					●		◆	◆			◆
Heating or Cooling Cycles	Head pressure too low				●		●					●						●	
Heating or Cooling Cycles	Suction pressure too high				●			●	●									●	
Heating or Cooling Cycles	Suction pressure too low						●			◆									
Heating or Cooling Cycles	I.D. blower will not start																		
Heating or Cooling Cycles	I.D. coil frosting or icing-						●					●							
Heating or Cooling Cycles	High compressor amps		●	●				●	●		●		●						
Cooling Cycle	Compressor runs continuously—no cooling				●		●												
Cooling Cycle	Liquid refrigerant flooding back to compressor							●	●										
Heating Cycle	Compressor runs continuously—no heating				●		●									◆	◆	●	
Heating Cycle	Defrost cycle initiates no ice on coil						◆										●		
Heating Cycle	Reversing valve does not shift						◆			◆									●
Heating Cycle	Ice build up on lower part of O.D. coil						●					◆			●	●	●		
Heating Cycle	Liquid refrigerant flooding back to compressor							●	●										
Heating Cycle	Auxiliary heat on I.D. blower off																		
Heating Cycle	Excessive operating costs						●	●									●	●	●
Heating Cycle	Excessive ice on O.D. coil						●								●	●	●		●

Cycle	Symptom	Outdoor Section – Check Valve		Outdoor Section – Outdoor Fan Motor and Coil						Indoor Section – Indoor Blower Motor and Coil						Indoor Section – Check		Aux. Heat
		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																	
Heating or Cooling Cycles	Compressor will not run O.D. fan motor runs																	
Heating or Cooling Cycles	Compressor "hums" but will not start																	
Heating or Cooling Cycles	Compressor cycles on overload				◆	◆	◆	◆			◆	◆	◆	●	◆			
Heating or Cooling Cycles	Compressor off on high pressure control	●		◆	●	●	●	●		◆	●	●	●	●	●	●		●
Heating or Cooling Cycles	Compressor noisy																	
Heating or Cooling Cycles	Head pressure too high	◆		◆	●	●	◆	●		◆	◆	◆	●	●	◆	◆		●
Heating or Cooling Cycles	Head pressure too low		◆						●								◆	
Heating or Cooling Cycles	Suction pressure too high		◆														◆	
Heating or Cooling Cycles	Suction pressure too low	◆		◆	●	●	◆		◆	◆	●	◆	●	●	◆	◆		
Heating or Cooling Cycles	I.D. blower will not start																	
Heating or Cooling Cycles	I.D. coil frosting or icing-	◆								◆	●	●	●	●	◆			
Heating or Cooling Cycles	High compressor amps	◆									●	●	●	●	◆	◆		
Cooling Cycle	Compressor runs continuously—no cooling				◆	◆	◆	◆	◆		●	●	●	●	◆			
Cooling Cycle	Liquid refrigerant flooding back to compressor										●	●	●	●	◆	◆		
Heating Cycle	Compressor runs continuously—no heating																	
Heating Cycle	Defrost cycle initiates no ice on coil																	
Heating Cycle	Reversing valve does not shift																	
Heating Cycle	Ice build up on lower part of O.D. coil																	
Heating Cycle	Liquid refrigerant flooding back to compressor																	
Heating Cycle	Auxiliary heat on I.D. blower off											●						
Heating Cycle	Excessive operating costs				◆	◆	◆				◆	◆	◆					
Heating Cycle	Excessive ice on O.D. coil																	

INSTALLATION INSTRUCTIONS

Wall Mounted Gas/Electric

Models:

W24G4	W30G4	W36G4	W42G4	W48G4	W60G4
W24G4D	W30G4D	W36G4D	W42G4D	W48G4D	W60G4D

⚠ WARNING

READ ALL INSTRUCTIONS CAREFULLY BEFORE BEGINNING THE INSTALLATION.

THE INSTALLATION MUST COMPLY WITH THESE INSTRUCTIONS AND THE REQUIREMENTS OF ALL GOVERNING CODES AND ORDINANCES FOR THE INSTALLATION LOCATION.

IT IS THE RESPONSIBILITY OF INSTALLER TO KNOW AND UNDERSTAND ALL OF THESE REQUIREMENTS.

FAILURE TO DO SO COULD CREATE A HAZARD RESULTING IN PROPERTY DAMAGE, BODILY INJURY, OR DEATH.

C ETL CM LISTED US
Intertek

Bard® SINCE 1914
Climate Control Solutions

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

Manual No.: 2100-721F
Supersedes: 2100-721E
Date: 4-4-23

CONTENTS

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FIGURES

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TABLES

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 Fuel Gas Code.....ANSI Z223.1/NFPA 54

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

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

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

Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances .....NFPA 211

Load Calculation for Residential Winter and Summer Air Conditioning .....ACCA Manual J

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

Canadian Electrical Code.....CSA C22.1

Canadian Installation Code ..... CAN/CGA B149

For more information, contact these publishers:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Avenue, NW
Washington, DC 20009
Telephone: (202) 483-9370

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

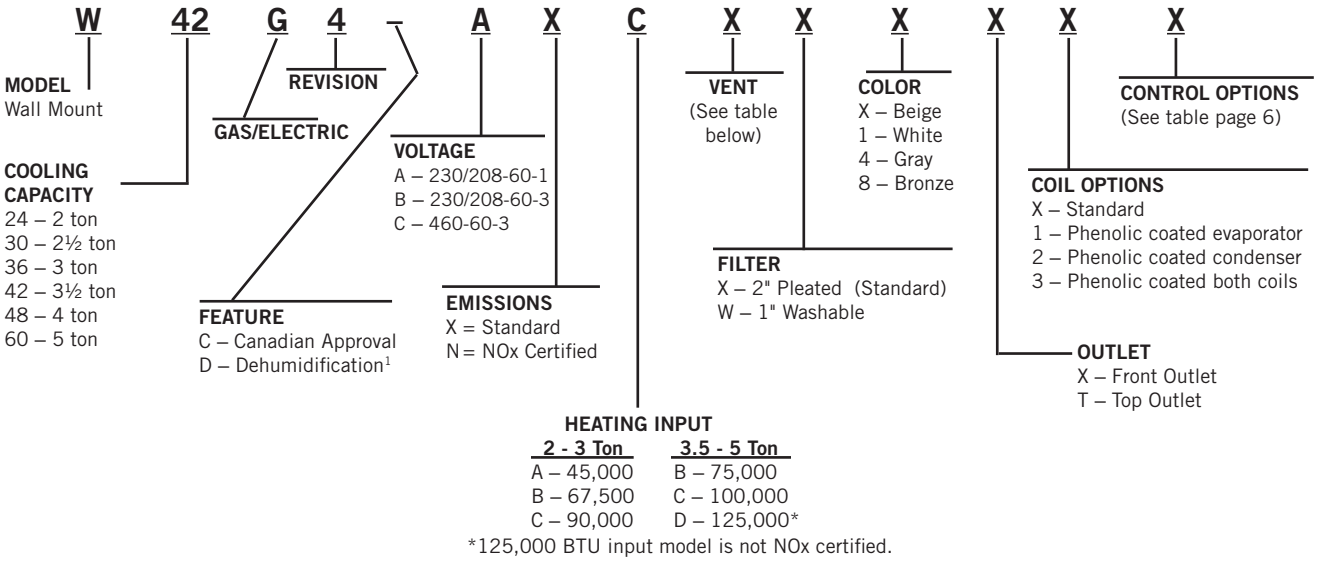
ASHRAE **American Society of Heating Refrigerating, and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, NE.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

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

CSA **Canadian Standards Association**
178 Rexdale Boulevard
Rexdale, Ontario
Canada. M9W 1R3
Telephone: (416) 447-4044

WALL MOUNT GAS/ELECTRIC GENERAL INFORMATION

Model Number Nomenclature



*125,000 BTU input model is not NOx certified.

[1] Reference Supplemental Instructions 7960-867 for dehumidification unit information.

Ventilation Options

		Models	
		W24G, W30G, W36G	W42G, W48G, W60G
Description	Factory Installed Code No.	Field Installed Part No.	Field Installed Part No.
Barometric Fresh Air Damper	X	WGBFAD-3	WGBFAD-5
Blank-Off Plate	B	WGBOP-3	WGBOP-5
Motorized Fresh Air Damper	M	WGMFAD-3A	WGMFAD-5A
Commercial Ventilator – Spring Return	V	WGCRVS-3A	WGCRVS-5A
Commercial Ventilator – Power Return	P	WGCRVP-3A	WGCRVP-5A
Economizer - Fully Modulating ①	E	WGJIFM-3	WGJIFM-5
Energy Recovery Ventilator – 230 Volt	R	WGERV-A3B	WGERV-A5B
Energy Recovery Ventilator – 460 Volt	R	WGERV-C3C	WGERV-C5C

① Low ambient control is required with economizer for low temperature compressor operation.

Air Conditioning Module Options

CCM ①	HPC ②	LPC ③	LAC ④	SK ⑤	Factory Installed Code	Field Installed Part
STD	STD	STD	•		H	CMA-45 (WG4D Units) CMA-46 (WG4 Units)
				•	Field Only	SK111 or CMC-15

STD – Standard equipment.

① CCM Compressor control module has adjustable 30 second to 5 minute delay-on-break timer. On initial power up, or any time the power is interrupted, the delay-on-make will be 2 minutes plus 10% of the delay-on-break setting. There is no delay-on-make during routine operation of the unit. The module also provides the lockout feature (with 1 retry) for high and/or low pressure controls, and a 2-minute timed bypass for low pressure control.

② HPC High pressure control is auto reset. Always used with compressor control module (CCM) which is included. See Note ①.

③ LPC Low pressure control is auto reset. Always used with compressor control module (CCM) which is included. See Note ①.

④ LAC Low ambient control permits cooling operation down to 0°F. (Includes fan cycling control + Freeze Stat)

⑤ SK CMC-15 is PTCR Start Kit can be used with all -A single phase models. Increases starting torque 2-3X. Not used for -B or -C 3-phase models. Do not use if SK111 is used.

⑤ SK SK111 Start Capacitor and Potential Relay Start Kit can be used with all -A single phase models. Increases starting torque 9x. Not used for -B or -C 3-phase models. Do not use if CMC-15 is used.

TABLE 1A
Specifications
W24G4, W30G4 and W36G4 Models

Models	W24G4-A	W24G4-B	W24G4-C	W30G4-A	W30G4-B	W30G4-C	W36G4-A	W36G4-B	W36G4-C
Electrical Rating – 60 Hz	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197-253	187-253	414-506	197-253	187-253	414-506	197-253	187-253	414-506
Minimum Circuit Ampacity	20.6	12.6	8	22.6	16.1	8.6	26.4	19	10.6
* Field Wire Size	10	14	14	10	12	14	8	10	14
Ground Wire Size	10	14	14	10	12	14	10	10	14
** Delay Fuse or Circuit Breaker Max.	30	15	10	30	20	10	35	25	15
Compressor									
Voltage	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	7.6/8.7	4.6/5.3	2.5	9.4/10.7	6/6.9	3.2	12/13.5	7.8/8.7	4.8
Branch Circuit Selection Current	12.9	6.5	3.6	14.2	9	4.2	16.7	10.5	5.8
Lock Rotor Amps	58.3	55.4	28	73	58	28	79	73	38
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor and Condenser									
Fan Motor – HP/RPM/SPD	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1	1/5-1100-1
Fan Motor – Amps	1.4	1.4	0.8	1.4	1.4	0.8	1.4	1.4	0.8
Fan – DIA/CFM	20" - 2100	20" - 2100	20" - 2100	20" - 2100	20" - 2100	20" - 2100	20" - 2000	20" - 2000	20" - 2000
Blower Motor and Evaporator									
Blower Motor – HP/RPM/SPD	1/2-670-5	1/2-670-5	1/2-670-5	1/2-750-5	1/2-750-5	1/2-750-5	1/2-870-5	1/2-870-5	1/2-870-5
Blower Motor – Amps	0.9	0.9	1.2	1.2	1.2	1.2	1.9	1.9	1.2
CFM Cooling and E.S.P.	800 - 0.15	800 - 0.15	800 - 0.15	900 - 0.15	900 - 0.15	900 - 0.15	1100 - 0.15	1100 - 0.15	1100 - 0.15
Filter Size	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2	20 x 25 x 2
Shipping Weight – LBS.	500	500	500	530	530	530	540	540	540
Unit Charge (R-410A lb.)	5.750	5.750	5.750	5.750	5.750	5.750	6.625	6.625	6.625

* 75° C Copper wire size
** Maximum time delay fuse or circuit breaker

TABLE 1B
Specifications
W42G, W48G and W60G Models

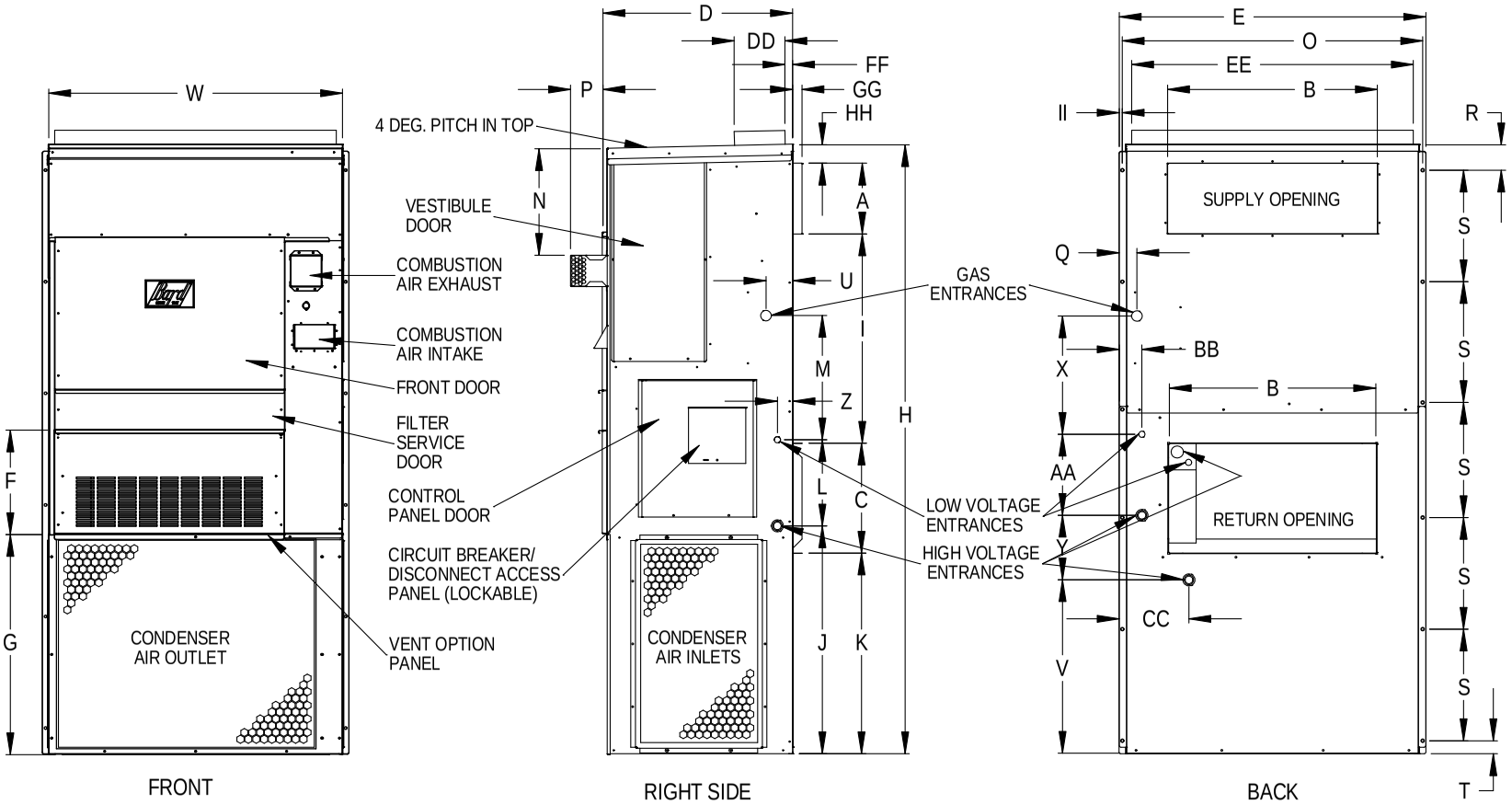
Models	W42G4-A	W42G4-B	W42G4-C	W48G4-A	W48G4-B	W48G4-C	W60G4-A	W60G4-B	W60G4-C
Electrical Rating – 60 Hz	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197-253	187-253	414-506	197-253	187-253	414-506	197-253	187-253	414-506
Minimum Circuit Ampacity	29	23.4	11.5	34.4	24.4	12	40.2	29.7	13.6
* Field Wire Size	8	10	14	8	10	14	8	8	12
Ground Wire Size	10	10	14	10	10	14	10	10	12
** Delay Fuse or Circuit Breaker Max.	40	30	15	50	30	15	50	40	20
Compressor									
Voltage	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	15.5/17.4	11.7/13.2	5.9	16.7/19.5	10.6/12.3	6.5	19.5/21.9	12.9/14.4	7
Branch Circuit Selection Current	18	13.6	6	21.8	13.8	6.5	24.4	16	7.8
Lock Rotor Amps	112	88	44	117	83.1	41	144.2	110	52
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor and Condenser									
Fan Motor – HP/RPM/SPD	1/3-850-1	1/3-850-1	1/3-850-1	1/3-830-1	1/3-830-1	1/3-830-1	1/2-1000-1	1/2-1000-1	1/2-1000-1
Fan Motor – Amps	1.8	1.8	1	1.8	1.8	1	3.8	3.8	2.5
Fan – DIA/CFM	24” - 2900	24” - 2900	24” - 2900	24” - 2700	24” - 2700	24” - 2700	24” - 3400	24” - 3400	24” - 3400
Blower Motor and Evaporator									
Blower Motor – HP/RPM/SPD	3/4-850-5	3/4-850-5	3/4-850-5	3/4-940-5	3/4-940-5	3/4-940-5	3/4-1040-5	3/4-1040-5	3/4-1040-5
Blower Motor – Amps	2.4	2.4	1.7	3.1	3.1	1.7	3.7	3.7	1.7
CFM Cooling and E.S.P.	1300 - 0.15	1300 - 0.15	1300 - 0.15	1450 - 0.20	1450 - 0.20	1450 - 0.20	1650 - 0.20	1650 - 0.20	1650 - 0.20
Filter Size	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2	20 x 30 x 2
Shipping Weight – LBS.	500	500	500	530	530	530	550	550	550
Unit Charge (R-410A lb.)	6.500	6.500	6.500	7.125	7.125	7.125	9.625	9.625	9.625

* 75° C Copper wire size
** Maximum time delay fuse or circuit breaker

FIGURE 1
Unit Dimensions

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
W24G-W30G-W36G	7.88	27.88	13.88	24.25	40	14.88	25.63	81.63	30	27.38	27.5	14.12	15.44	15.31	39.25	4.5	2.5	5.88
W42G-W48G-W60G	9.88	29.88	15.88	27.25	43.81		31.63	87.5		33.38	28.75				42.88			3.75

UNIT	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	
W24G-W30G-W36G	12 - 7 HOLES	3.75	2.88	22.9	38	17.84	4.44	2.25	11.44	3.25	9	7.25	36.25	1.13	1.25	2	0.38	
W42G-W48G-W60G	16 - 6 HOLES		3.88	24.9	42	17.34	8.44		12.19		10		40.25			2.75	0.44	



MIS-3239

⚠ CAUTION

During the initial firing of the burners there will probably be some amount of smoke issued to the circulating air stream as the result of residual oil burning off of the heat exchanger tubes. This oil is required during the forming process of the stainless steel heat exchanger tubes to facilitate the bending. OSHA or the National Toxicology Program does not list the oil as a carcinogen. In vapor form this may be irritating to the eyes or could cause headaches. This is a one-time occurrence, and ventilation of the space may be required depending upon the space being conditioned.

1. Transportation Damage

All units are packed securely in shipping containers. All units should be carefully inspected upon arrival for damage. In the event of damage, the consignee should:

1. Note on delivery receipt of any damage to container.
2. Notify carrier promptly, and request an inspection.
3. In case of concealed damage, the carrier must be notified as soon as possible within 15 days after delivery.
4. Claims for any damage, apparent or concealed, should be filed with the carrier, using the following supporting documents:
   - A. Original Bill of Lading, certified copy or indemnity bond.
   - B. Original paid freight bill of indemnity in lieu thereof.
   - C. Original invoice or certified copy thereof showing trade and other discounts or deductions.
   - D. Copy of the inspection report issued by carrier's representative at the time damage is reported to carrier.

2. Important

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

3. General Information

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

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

These instructions explain the recommended method to install the air cooled self-contained electric air conditioning and gas heating unit and the electrical wiring connections and gas piping to the unit. The refrigerant system is completely assembled and charged. All internal wiring is complete.

These instructions and any instructions packaged with any separate equipment required to make up the entire heating/cooling system should be carefully read before beginning the installation.

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 4 for information on codes and standards.

Size of unit for proposed installation should be based on heat loss/heat gain calculations 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.

4. Application

This is a fan-assisted forced air gas furnace with electric air conditioning for outdoor installation. A fan-assisted furnace is equipped with an integral mechanical means to draw products of combustion through the combustion chamber and heat exchanger. The furnace installation must conform with local building codes and ordinances or, in their absence, with the National Fuel Gas Code ANSI Z223.1 or CAN/CGA-B149.1, latest edition, and the National Electrical Code ANSI/NFPA-7 or CSA C22.1, latest edition. It is the personal responsibility and obligation of the purchaser to contact a qualified installer to assure that installation is adequate and is in conformance with governing codes and ordinances.

5. Duct Work

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

⚠ WARNING

In all cases, there must be a metal duct connection made to the supply air flange, and a 1" clearance to combustibles must be maintained to this duct connection.

For free blow applications, a metal sleeve must be used in the wall opening itself, again maintaining a 1" clearance to combustibles.

Failure to use the sheet metal can cause fire resulting in property damage, injury, or death.

Refer to Tables 12, 13, 14, 15, 16 and 17 for maximum static pressure available for duct design.

See Figures 3A and 3B and clearance information in Section 9 and Table 2 for additional information.

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" clearance to combustible material for the first 3' of duct attached to the outlet air frame is required. See wall mounting instructions and Figures 2A, 2B, 3A and 3B 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 the 5/8" louver criteria may be used. It is recommended that Bard Return Air Grille or Return Filter Grille 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.*

6. High Altitude Applications

Ratings of gas utilization equipment are based on sea level operation and need not be changed for operation at elevations up to 6000'. For operation at elevations above 6000' and in the absence of specific recommendations from the local authority having jurisdiction, equipment ratings shall be reduced as specified in Section 21.

7. Wall Mounting Information

1. Two holes for the supply and return air openings must be cut through the wall as detailed in Figure 4.
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 ensure that they are capable of carrying the weight of the installed unit.

8. 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 is provided for ease of installation but is not required.

⚠ CAUTION

If the bottom bracket is used, be certain the bracket is secured to the outside wall surface in a way sufficient to support the entire weight of the unit during installation until side mounting brackets are secured.

2. The W42G, W48G and W60G models are suitable for 0 clearance on the installation mounting wall and to the top. For all models, the supply air duct flange and the first 3' of supply air duct require a minimum of 1" clearance to combustible material. The W24G, W30G and W36G models are suitable for 0 clearance on the installation mounting wall, but require 1" clearance to the top if combustible material overhang projects above the unit (see Figures 3A and 3B). If a combustible wall, use a minimum of Figure 1 “A” dimension plus 2" and “B” dimension plus 2". See Figures 4 and 5 for details.

⚠ WARNING

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

3. Locate and mark lag bolt locations and bottom mounting bracket location.
4. Mount bottom mounting bracket.
5. Hook top rain flashing under back bend of top. Top rain flashing is shipped secured to the right side of the back.
6. Position unit in opening and secure with 5/16" lag bolts; use 7/8" diameter flat washers on the lag bolts. Use lag bolts long enough to support the unit's weight when mounted to the structure. This length may be dependent on the type of construction.
7. Secure rain flashing to wall and caulk across entire length of top (see Figures 2A and 2B).
8. On side-by-side installations, maintain a minimum of 20" clearance on right side to allow access to control panel and burner compartment, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

FIGURE 2A
Mounting Instructions
for W24G, W30G and W36G

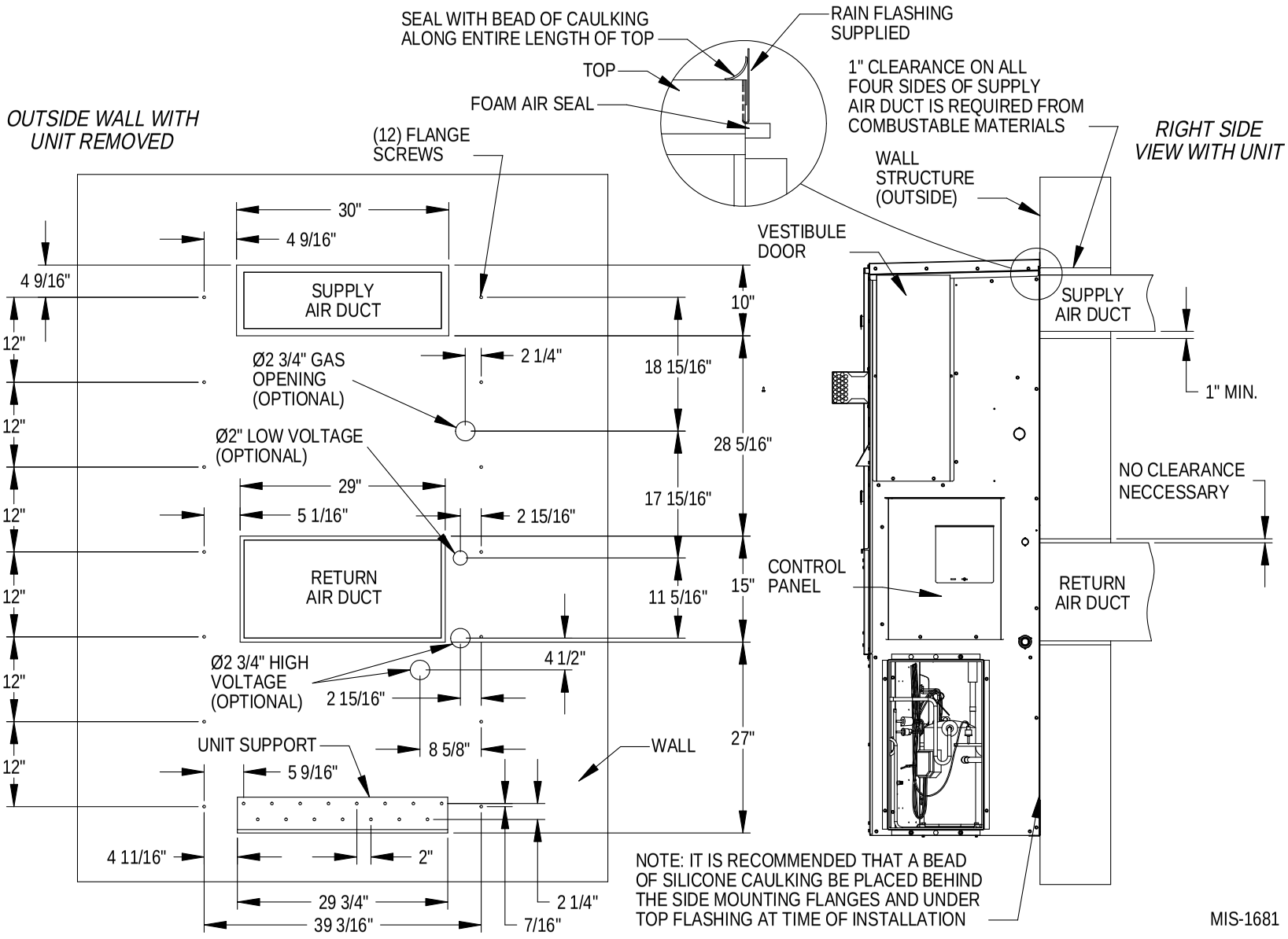


FIGURE 2B
Mounting Instructions
for W42G, W48G and W60G

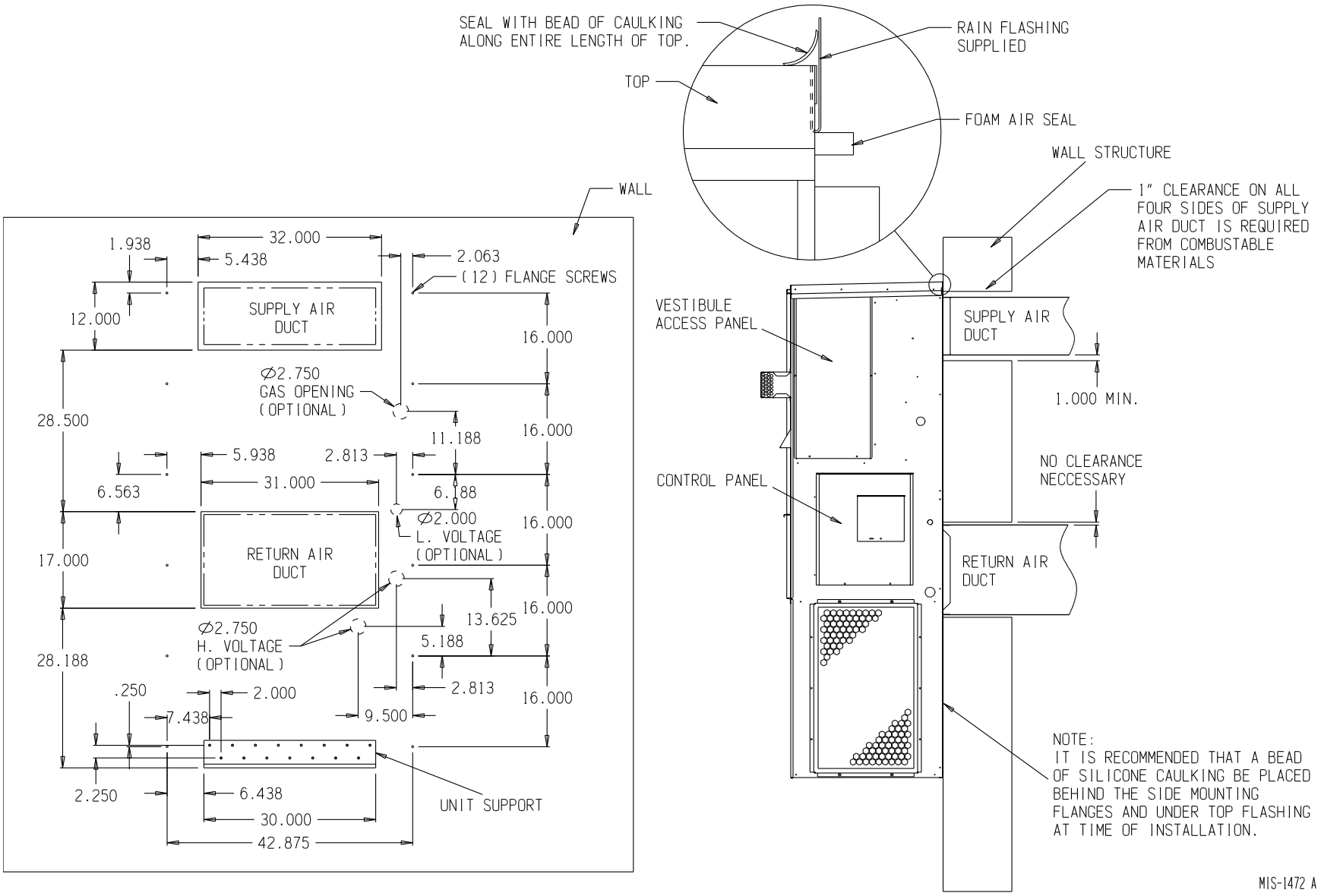
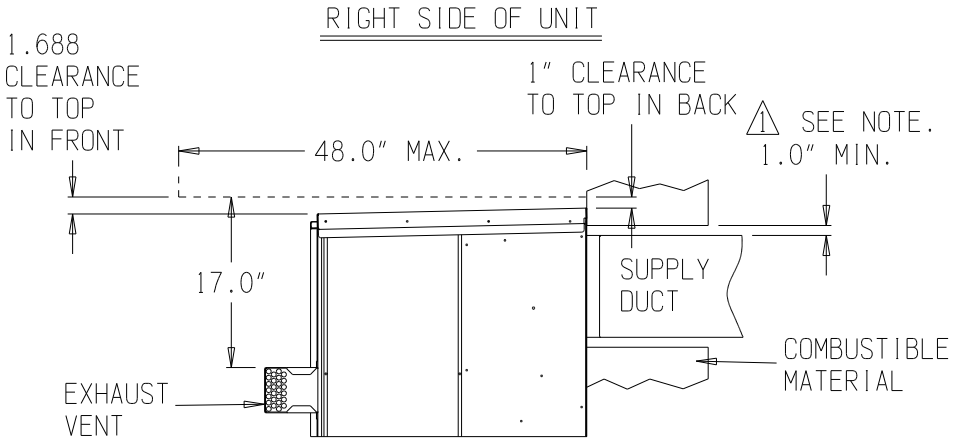


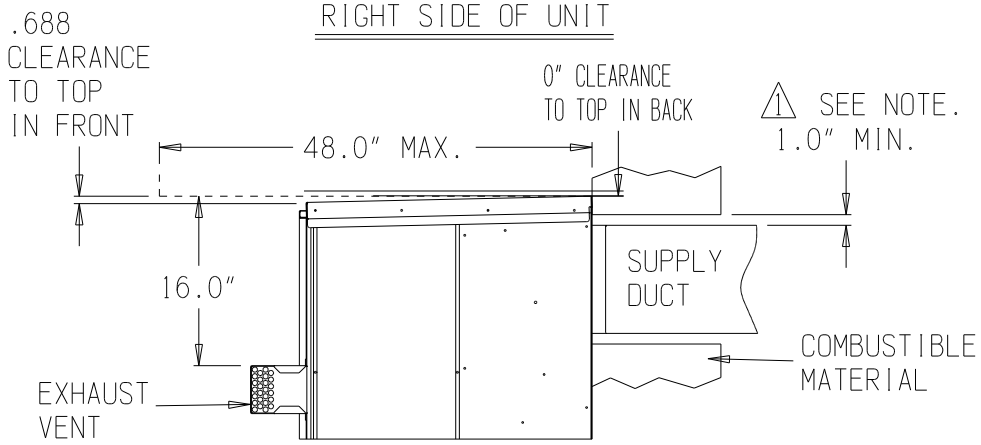
FIGURE 3A
Combustible Clearance
for W24G, W30G and W36G Models



1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-1682

FIGURE 3B
Combustible Clearance
for W42G, W48G and W60G Models



1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-1714

⚠ WARNING

A ***minimum*** of 1" 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 one 1" 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 4
Wall Mounting Instructions

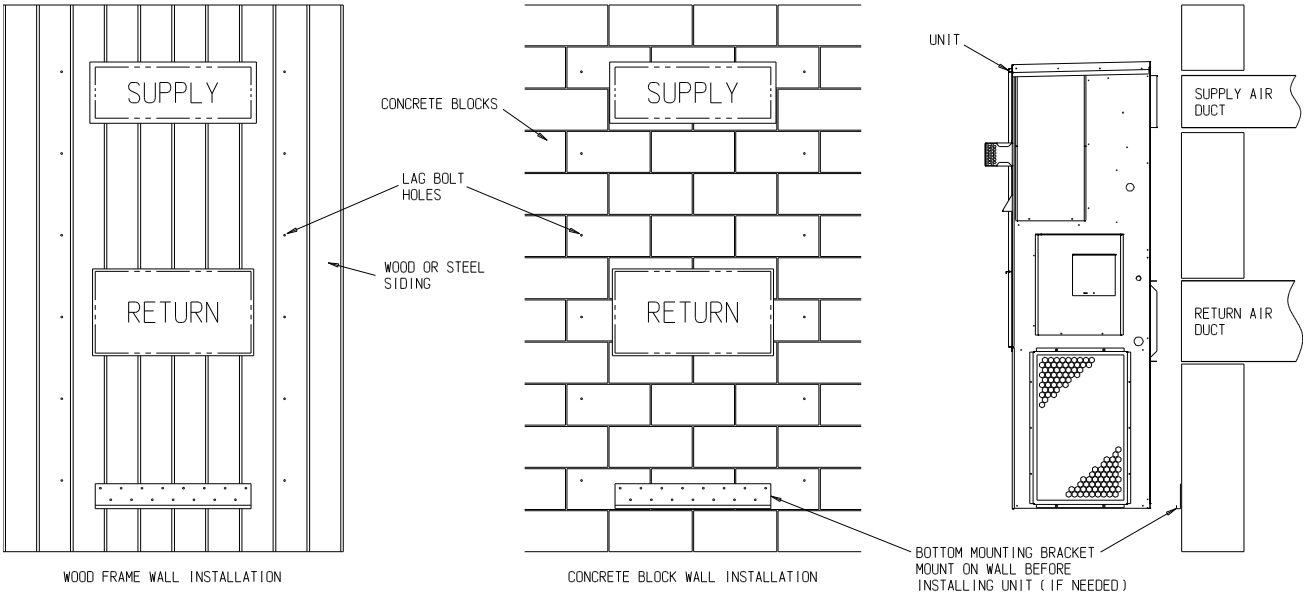


FIGURE 5
Wall Mounting Instructions

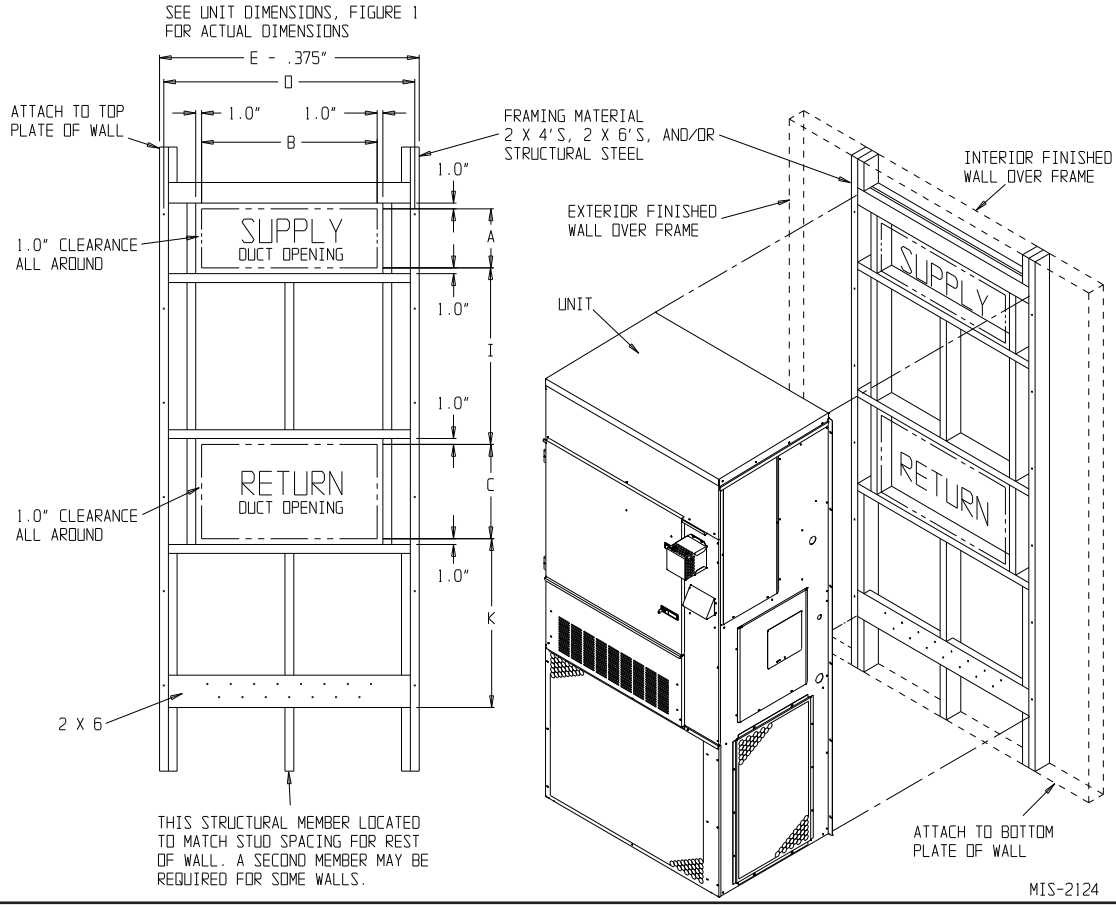
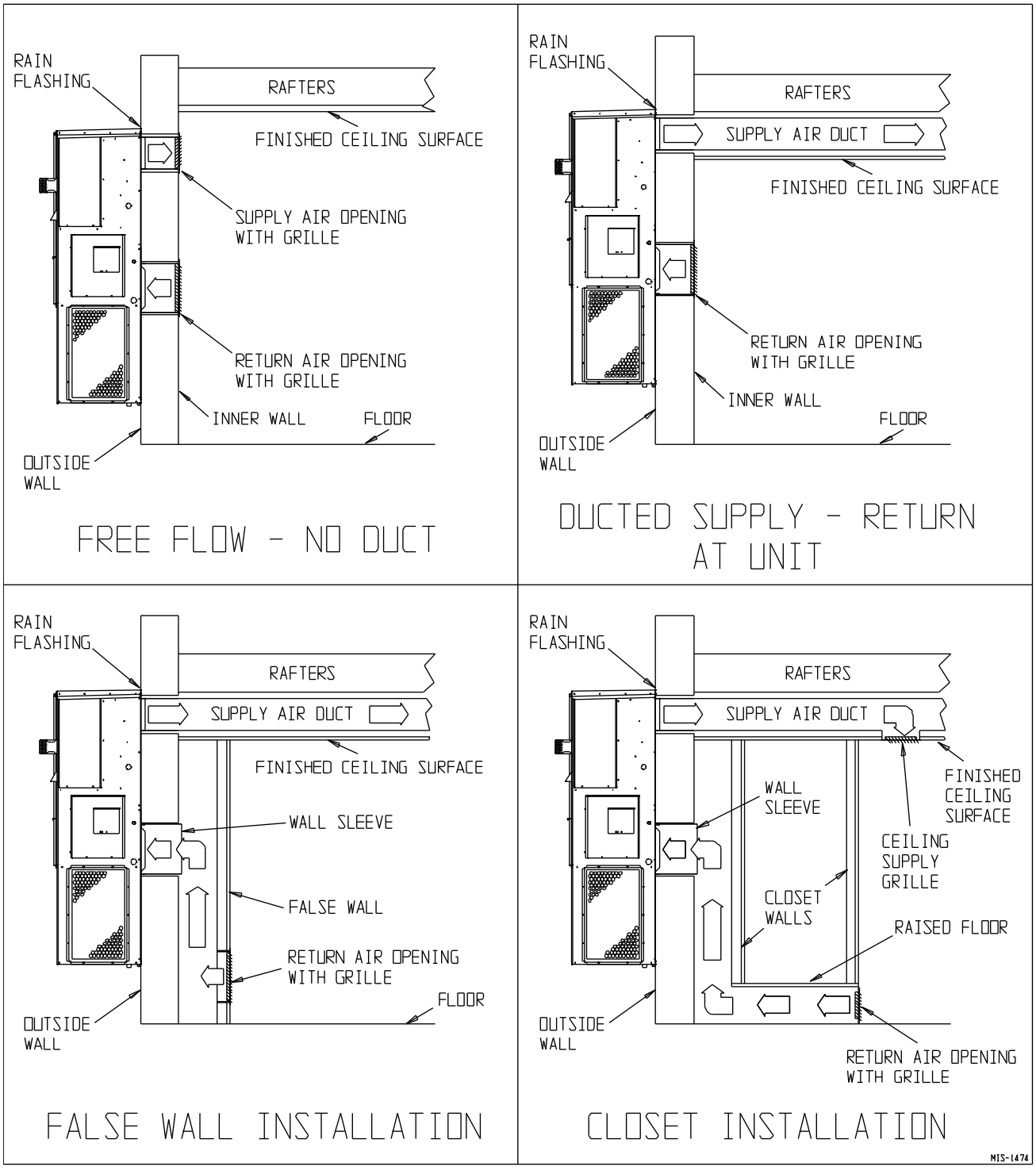


FIGURE 6
Common Wall Mounting Installations



9. Clearances

Minimum clearances, as specified in Table 2, must be maintained from adjacent structures to provide adequate fire protection, adequate combustion air and room for service personnel.

While minimum clearances are acceptable for safety reasons, they may not allow adequate air circulation around the unit for proper operation in the cooling mode. Whenever possible, it is desirable to allow additional clearance, especially around the condenser inlet and discharge openings. **Do not install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.**

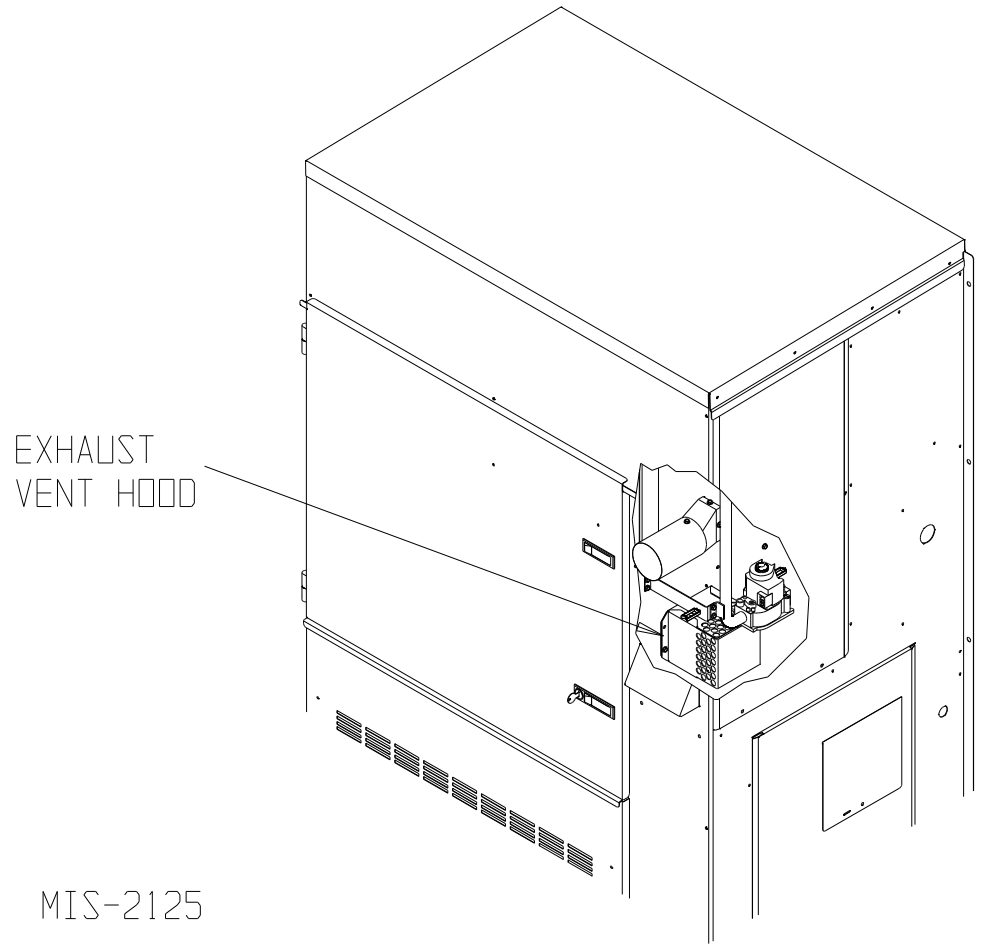
⚠ WARNING

Clearances from combustible materials must be maintained as specified. Failure to maintain clearances could cause fire resulting in property damage, injury or death.

TABLE 2
Minimum Installation Clearances

Outlet Duct (from combustible materials)	1" first 3'
Vent Terminal (from combustible materials)	17"*
Condenser Inlet	20"
Top	See Figures 3A and 3B
Burner Service	20"
Combustible Base (Wood or Class A, B or C roof covering material)	0
* See Figures 3A and 3B	

FIGURE 7
Location of Vent Terminal in Shipping



10. Vent Terminal and Combustion Air Inlet Hood

The vent terminal is shipped in the burner compartment (see Figure 7). Remove the two shipping screws and separate the two-piece assembly. Install the vent terminal by using the four screws provided. **Do not cut or trim gasket. Make sure gasket is in place.** See Figure 8. The combustion air intake vent hood is factory installed.

11. Optional Vertical Venting

With the optional vertical venting kit (VVK-5), this unit may be vented vertically through a roof or overhang. The kit includes a stainless steel transition drain tee, silicone sealant and drain tubing.

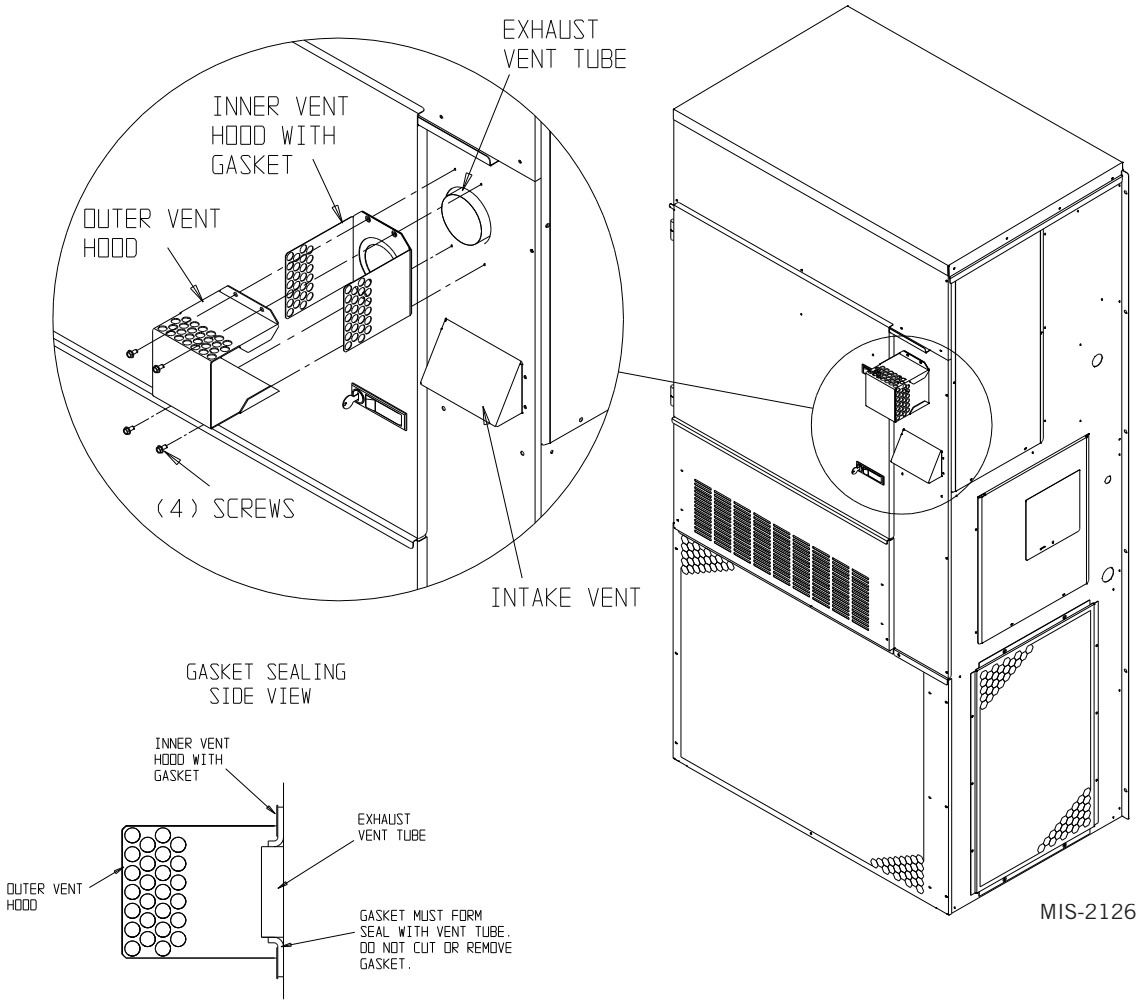
If unit is installed with vertical vent kit, annually inspect the vent system and drain. Replace any portion of the vent system that shows signs of deterioration. Make sure drain is open and free of obstruction.

⚠ CAUTION

Vent terminal must be installed as shown in Figure 8 for proper operation of the heating system.

NOTE: The inner vent hood gasket is designed to stretch over and seal around the combustion air blower outlet. This is a very critical seal to prevent water and flue products from entering the unit. Care must be taken to insure this gasket is in place and sealing properly.

FIGURE 8
Vent Terminal and Combustion Air Intake



12. Vent Resizing Instructions

When an existing furnace is removed from a venting system servicing other appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each of the appliances remaining connected to the common venting system, placed in operation one at a time while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas code, ANSI Z223.1 or the CAN/CGA B149 Installation Codes and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

/3. In so far as is practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

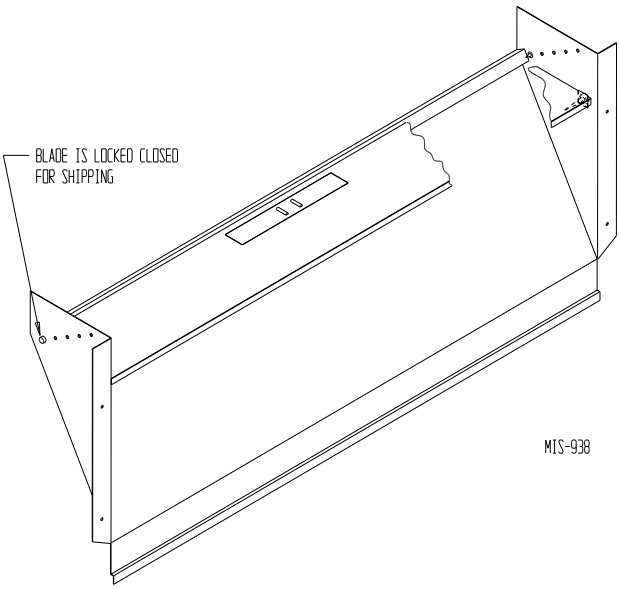
4. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance shall operate continuously.
5. Test for draft hood equipped appliance spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
6. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliances to their previous conditions of use.
7. If improper venting is observed during any of the above tests, the venting system must be corrected.

13. Fresh Air Intake

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

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 9).

FIGURE 9
Fresh Air Damper



All capacity, efficiency and cost of operation information as required for Department of Energy "Energyguide" Fact Sheets 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.

One of several other ventilation options may be installed. Refer to model number and/or supplemental installation instructions.

14. 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.

15. Wiring – Main Power

⚠WARNING

For personal safety, turn off electric power at service entrance panel before making any electrical connections. Failure to do so could result in electric shock or fire.

Refer to 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. 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.

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.

⚠WARNING

Failure to provide an electrical power supply shut off means could result in electric shock or fire.

Electrical Grounding

When installed, the furnace must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA22.1, latest edition. Use a copper wire from green ground wire on the furnace to a grounded connection in the service panel or a properly driven and electrically grounded ground rod. See Tables 1A and 1B for proper ground wire size.

⚠WARNING

Failure to provide a proper electrical ground could result in electric shock or fire.

Field-Installed Equipment

Wiring to be done in the field between the furnace and devices not attached to the furnace, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire {63° F rise (36° C)} when installed in accordance with the manufacturer's instructions.

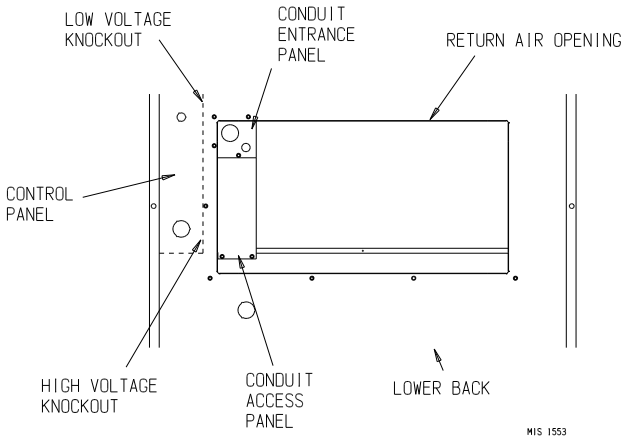
Installation of Flexible Conduit Through Return Air Opening

NOTE: *To allow proper clearance between the control panel and any vent options, 90° conduit fittings must be used on the back of the control panel.*

Installing Conduit (see Figure 10)

1. Remove conduit access panel if required to gain access to area behind control panel.
2. Remove low voltage and high voltage knockouts located in rear of control panel.
3. Run low voltage conduit through 7/8 bushing located in conduit entrance plate and secure to low voltage opening in rear of control panel.
4. Run high voltage conduit through 1-3/4 bushing located in conduit entrance plate and secure to high voltage opening in rear of control panel.
5. Replace conduit access panel if required to complete installation.
6. Seal around conduit in conduit entrance plate.

FIGURE 10
Installation of Flexible Conduit



16. Wiring – Low Voltage Wiring

230/208 Volt Units

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: 240 Range: 253 – 216

Tap: 208 Range: 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).*

For low voltage wiring, an 18 gauge copper, color-coded cable is recommended. See Table 5 for more information.

460 Volt Units

All models are equipped with single primary voltage transformers and no rewiring is required.

Direct Digital Controls (DDC)

For total and proper control using DDC, a total of six controlled outputs are required (five if no ventilation is installed).

TABLE 3
Low Voltage Connections for DDC Control

	Standard Units	Units w/ Economizers
Fan Only	Energize G	Energize G
1st Stage Cooling Mode/ Balanced Climate	Energize Y1, G	Energize Y1, G
2nd Stage Cooling Mode	Energize Y2 to overide Balanced Climate mode when Y1-Y2 jumper is removed	Energize Y1, Y2, G
Gas Heating	Energize B/W1	Energize B/W1
Ventilation	Energize A	Energize A
Dehumidification (if employed)	Energize D	Energize D

Low Voltage (24VAC) Connections

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

C terminal is the *24VAC common and is grounded.*

G terminal is the *indoor blower input*.

Y1 terminal is the *1st Stage cooling input.* Economizer stage when used. Balanced Climate stage when used.

Y2 terminal is the *2nd Stage cooling input.* Compressor cooling stage when economizer or Balanced Climate is used.

B/W1 terminal is the *gas heat*.

A terminal is the *ventilation option input*. This terminal energizes any factory-installed ventilation option and indoor blower.

D terminal is the *dehumidification input*. If installed, this terminal energizes any factory-installed dehumidification option.

L terminal is *24 volt alarm active output*.

Unit Shutdown Feature (Standard on All Models)

The RT terminal is the 24VAC transformer output, and the R terminal is the 24VAC hot terminal for the operation of the equipment. RT and R are connected with a brass jumper bar which can be removed and RT and R connected to an external NC (normally closed) contact such as a fire/smoke detector that will cause shutdown of the equipment upon activation.

Balanced Climate™ Feature (Standard on All Models)

All units are equipped with the capability of running in Balanced Climate mode. This mode is designed to enhance the comfort level by reducing the indoor airflow amount and extending the run time to help extract more humidity during cooling operation. The Y1 terminal is the 24VAC input for Balanced Climate compressor cooling operation. The Y2 terminal is the 24VAC input for compressor cooling standard operation. Y1 and Y2 are connected with a brass jumper bar which can be removed to enable Balanced Climate mode. Units with an economizer will not have the brass jumper installed. Refer to vent manuals for instructions on how Balanced Climate works with each vent.

To operate in Balanced Climate mode, a 2-stage cooling thermostat is required. The lower indoor airflow operation is overridden by utilizing a 2-stage thermostat. If the call for cooling is not satisfied within a given time frame or temperature differential (specified by the thermostat), the thermostat will send a signal to Y2 which then increases the blower speed back to the selected speed. See pages 44 – 45 for blower speed selection options.

In units with an economizer vent installed, Balanced Climate mode should not be used. The Y1 and Y2 jumper must remain installed.

Dehumidification Feature (Optional)

The D terminal is the 24VAC input for dehumidification operation on dehumidification hot gas reheat equipped units. When 24VAC is applied to the D terminal, a 3-way valve solenoid is energized. The reheat coil located behind the evaporator coil is then active to reheat the supply air during cooling mode. This allows humidity to be removed from the air entering the unit without a large amount of sensible cooling capacity. During dehumidification, the indoor blower speed is reduced to help with the humidity removal. A humidity sensing thermostat or humidistat is required to control dehumidification operation. See Supplemental Instructions 7960-867 for additional information on dehumidification unit operation.

Ventilation Features (Optional)

See ventilation instructions provided with unit for low voltage wiring.

Low Ambient Control (LAC)

The low ambient control is a pressure switch that is attached to the liquid line of the system and monitors

high side pressure. Operation of the LAC occurs as outdoor temperatures drop below 60°F. On/Off and modulating controls are used which operate based on pressure changes caused by outdoor temperature changes. On/Off LAC operation cycles the condenser fan on/off to maintain desired liquid pressure while modulating LAC operation is factory adjusted and slows the condenser fan speed (rpm).

Outdoor Temperature Switch and Freeze Protection Thermostat

An outdoor temperature switch and an evaporator freeze protection thermostat is supplied with all units that have a low ambient control. The outdoor switch disables Balanced Climate mode (if enabled) when the temperature drops below 50°F. This prevents potential evaporator coil freeze up issues. The freeze thermostat cuts out compressor operation if the evaporator begins to freeze up.

Balanced Climate Mode

If the application is likely to require air conditioning operation below 60°F outdoor conditions, a low ambient control (LAC) kit must be installed.

If the unit is being installed with any ventilation package, a Bard LAC kit must be installed. Failure to utilize an LAC with any air conditioner can cause coil freeze up. Balanced Climate can readily be applied to duct-free (supply and return air grille) applications. It may also be applied to ducted applications with **limited rated static (total including both supply and return statics)**. Consult Bard Application Engineering for details prior to implementation.

CAUTION: *Balanced Climate is not a replacement for a dehumidification (hot gas reheat) unit for extreme applications, but rather an enhancement feature for limited climates and applications.*

17. Thermostats

TABLE 4
CO_2 Controllers

Part Number	Predominate Features
8403-056	CO_2 ventilation control with digital display. Normally Open SPST (Default: Close at 800ppm)
8403-096	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

TABLE 5
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

TABLE 6
Wall Thermostats

Thermostat	Predominant Features
8403-060 1120-445	3 Stage Cool; 3 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual changeover
8403-082 (VT8600U5500B)	2 stage Cool; 2 stage Heat Programmable/Non-Programmable Electronic HP or Conventional, Auto or Manual changeover with Occupancy Sensor, BACnet
8403-084 (VT8600U5000B)	2 stage Cool; 2 stage Heat Programmable/Non-Programmable Electronic HP or Conventional, Auto or Manual changeover with BACnet
8403-089 (T4 Pro)	1 stage Cool; 1 stage Heat – Heat Pump 1 stage Cool; 1 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover
8403-090 (T6 Pro)	2 stage Cool; 3 stage Heat – Heat Pump 2 stage Cool; 2 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover
8403-091 (T701-FEMA)	1 stage Cool, 1 stage Heat Non-Programmable FEMA use
8403-092 (T6 Pro Wi-Fi)	2 stage Cool, 3 stage Heat – Heat Pump 2 stage Cool, 2 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover Wi-Fi

TABLE 7
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 dehumidstat 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.

FIGURE 11
Low Voltage Wiring
All Units Except Units with Economizers

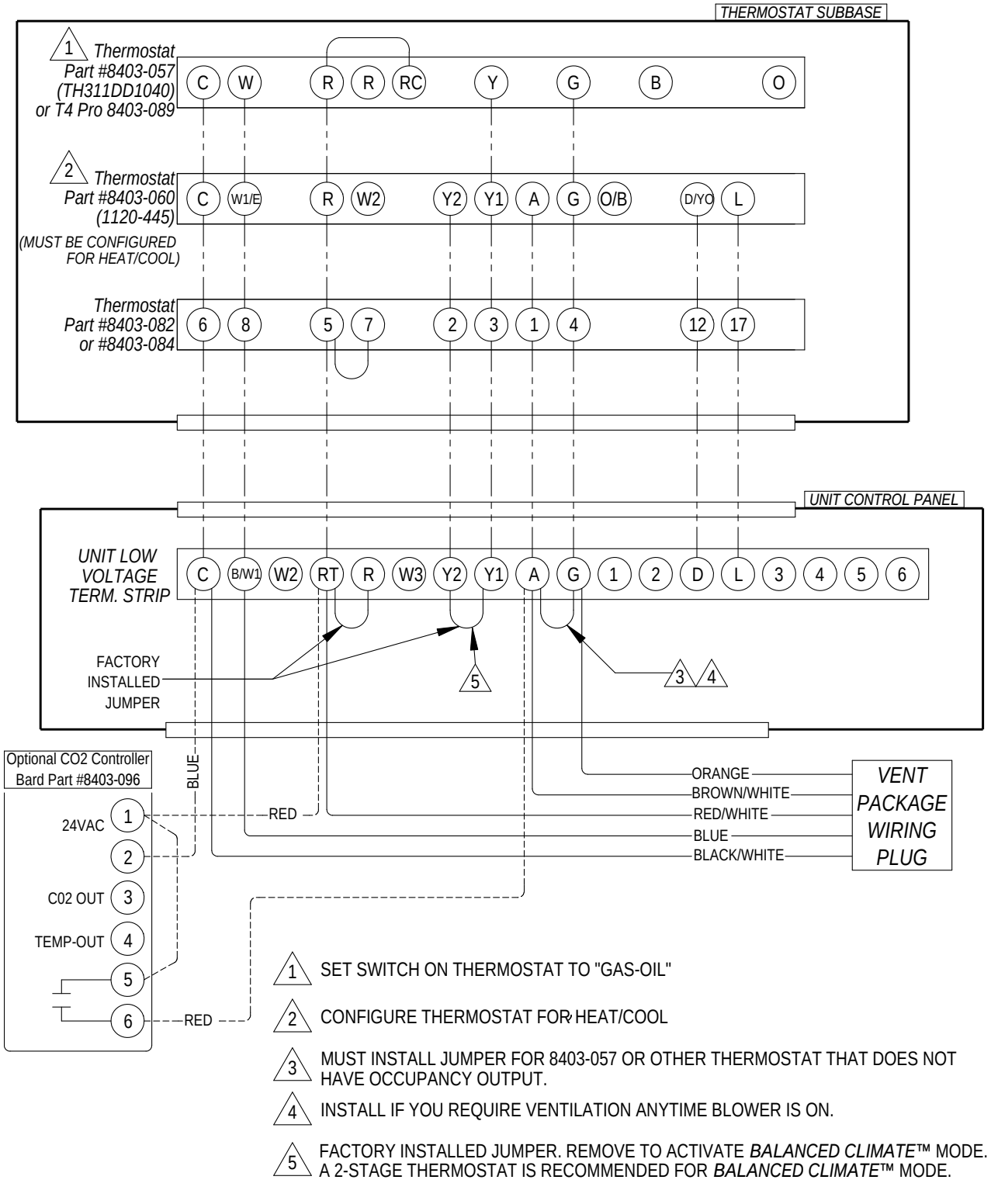


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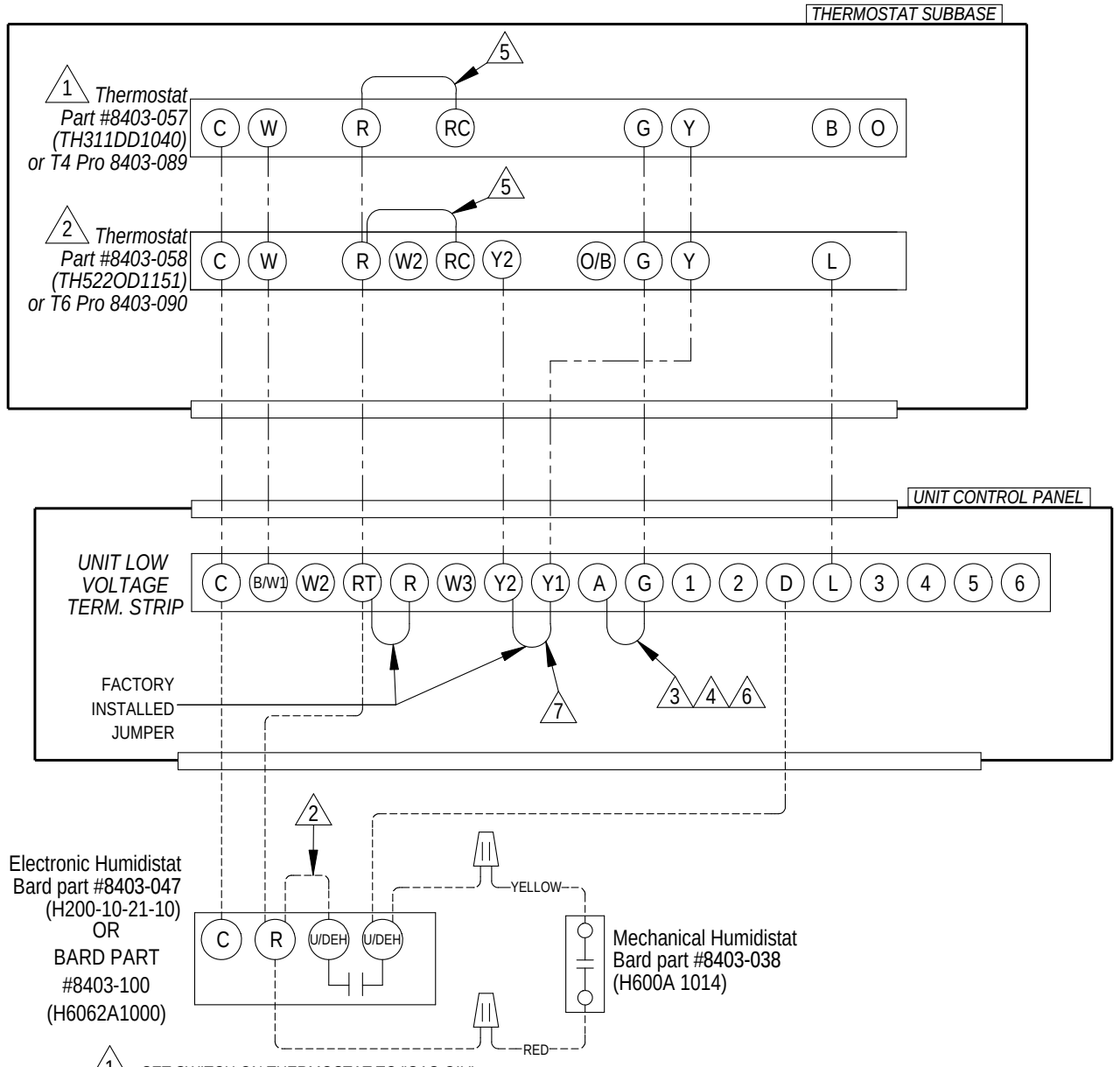
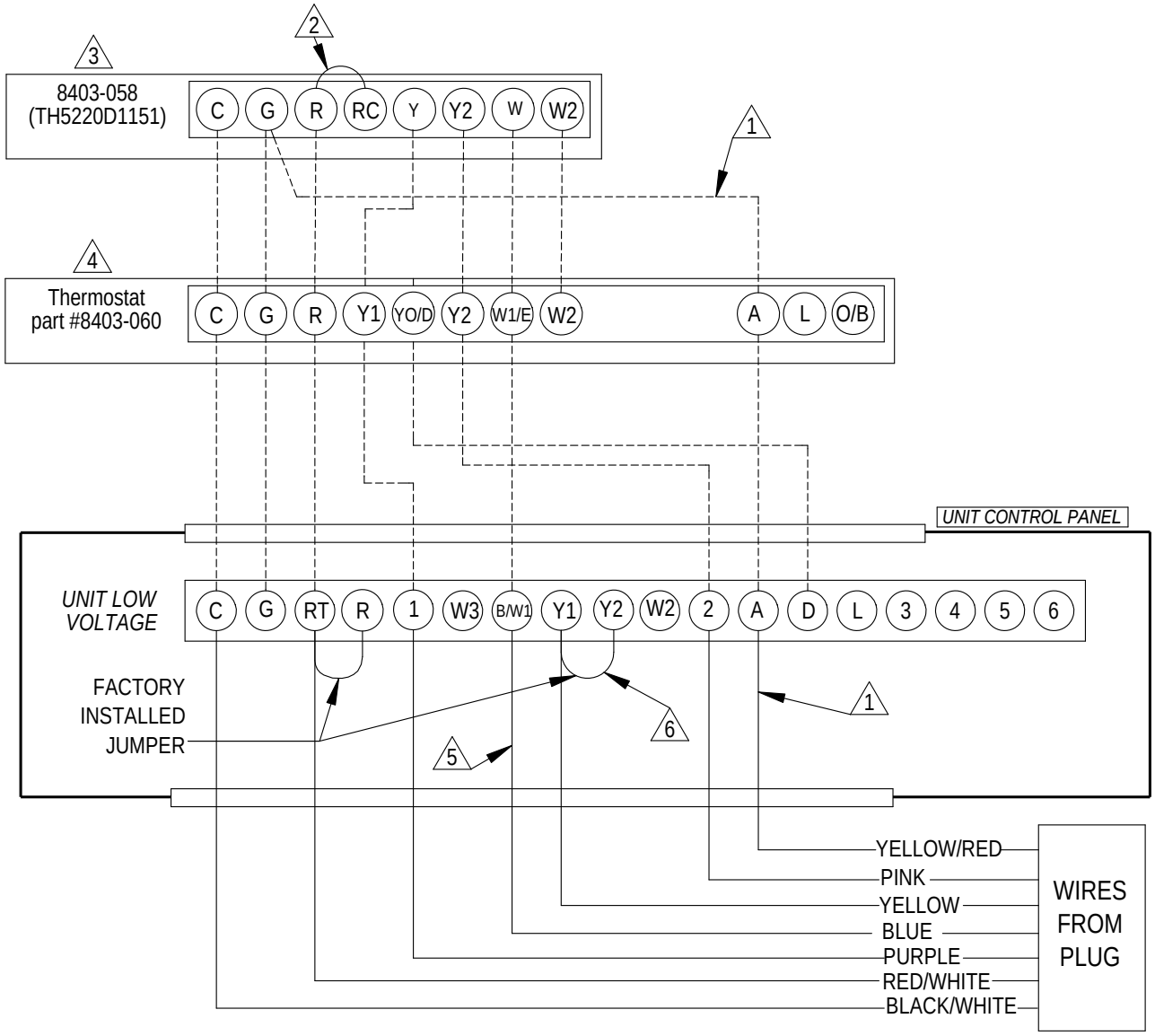
FIGURE 12
Low Voltage Wiring
Thermostat Using Separate Temperature and Humidity Controllers



1. SET SWITCH ON THERMOSTAT TO "GAS-OIL"
2. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).
3. MUST INSTALL JUMPER FOR 8407-057, 8403-058 OR OTHER THERMOSTAT THAT DOES NOT HAVE OCCUPANCY OUTPUT.
4. INSTALL IF YOU REQUIRE VENTILATION ANYTIME BLOWER IS ON.
5. FACTORY INSTALLED JUMPER.
6. IF THIS "A" TO "G" JUMPER IS INSTALLED, YOU MUST INSURE TO REMOVE VENTILATION PACKAGE ORANGE WIRE FROM TERMINAL "G".
7. FACTORY INSTALLED JUMPER. REMOVE TO ACTIVATE *BALANCED CLIMATE*™ MODE. A 2-STAGE THERMOSTAT IS RECOMMENDED FOR *BALANCED CLIMATE*™ MODE.
8. HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

MIS-2788 E

FIGURE 13
Low Voltage Wiring
JIFM Economizer



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 *Factory installed jumper.*

3 *Change "system type", set up function 1, from 5 (2 heat/ 1 cool heat pump) to 6 (2 heat/ 2 cool conventional).*

4 *Change model configuration from heat pump to heat/cool, and must be configured for economizer for YO/D output to be active as first stage cooling.*

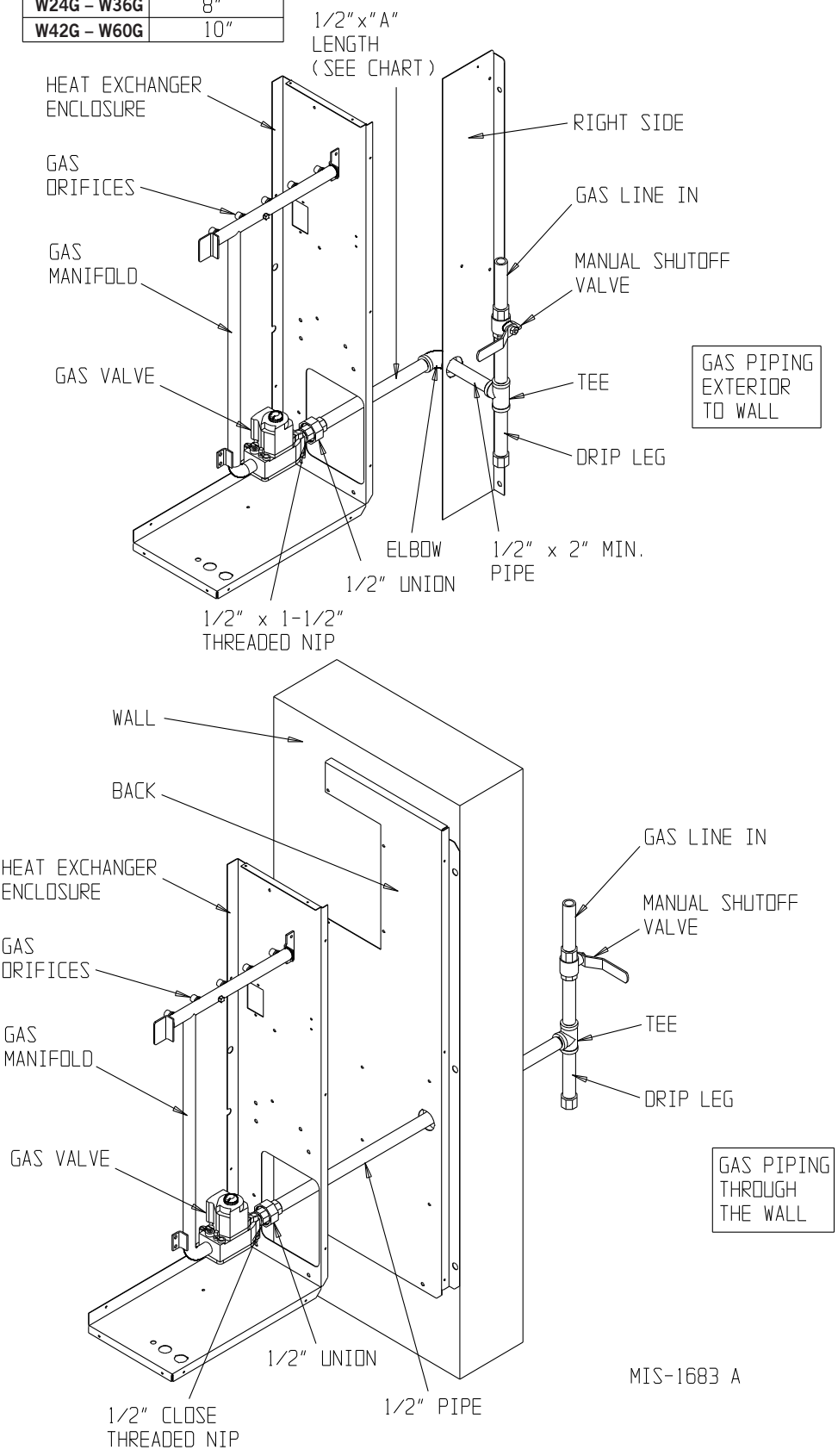
5 *For demand ventilation and/or to disable ventilation on call for heat, move blue wire to "A" terminal.*

6 *Balance Climate is unavailable with economizer. Leave the jumper installed.*

MIS-3349 C

FIGURE 14
Gas Pipe Connection

UNIT	"A" LENGTH
W24G – W36G	8"
W42G – W60G	10"



18. Gas Supply and Piping

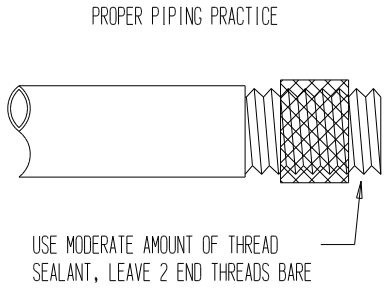
General Recommendations

1. Be sure the gas line complies with the local codes and ordinances, or in their absence with the National Fuel Gas Code, ANSI Z223.1, or Natural Gas Installation Code, CAN/CGA B149.1, or Propane Installation Code B149.2, latest edition.
2. A sediment trap or drip leg must be installed in the supply line to the furnace.
3. A ground joint union shall be installed in the gas line adjacent to and upstream from the gas valve and downstream from the manual shut-off valve.
4. An 1/8" NPT plugged tapping accessible for test gauge connection shall be installed immediately upstream of the gas supply connection to the furnace for the purpose of determining the supply gas pressure. This can be omitted if local codes permit use of plugged tapping in gas valve inlet.
5. Install listed manual shut-off valve in the supply gas line external to and immediately upstream of the furnace (see Figure 14).
6. Use steel or wrought iron pipe and fittings.
7. **Do not thread pipe too far.** Valve distortion or malfunction may result from excess pipe within the control. Use pipe joint compound resistant to the action of liquefied petroleum gases on male threads only. **Do not use Teflon tape.** See Table 8 and Figure 15.

TABLE 8
Length of Standard Pipe Threads (Inches)

Pipe Size	Effective Length of Thread	Overall Length of Thread
3/8	1/2	9/16
3/4	1/2 – 9/16	13/16
1	9/16	1

FIGURE 15
Proper Piping Practice



MIS-897

8. Refer to Table 9 for gas pipe sizes for natural gas. If more than one appliance is supplied from a single line size, capacity must equal or exceed the combined input to all appliances, and the branch lines feeding the individual appliances properly sized for each input.

This product must be gas piped by a licensed plumber or gas fitter in the commonwealth of Massachusetts.

TABLE 9
Gas Pipe Sizes – Natural Gas

Length of Pipe - Feet	Pipe Capacity - BTU per Hour Input Pipe Size			
	1/2"	3/4"	1"	1-1/4"
10	132,000	278,000	520,000	1,050,000
20	92,000	190,000	350,000	730,000
30	73,000	152,000	285,000	590,000
40	63,000	130,000	245,000	500,000
50	56,000	115,000	215,000	440,000
60	50,000	105,000	195,000	400,000
70	46,000	96,000	180,000	370,000
80	43,000	90,000	170,000	350,000
100	38,000	79,000	150,000	305,000

Checking the Gas Piping

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic foot test dial, allowing 4 minutes to show any movement, soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs immediately and repeat the above test. The furnace must be isolated from the gas supply piping system by closing the manual shut-off valve on the combination gas control valve during pressure testing of the gas supply piping system at pressures up to 1/2 PSIG. The furnace and its individual shut-off valve must be disconnected from supply piping and supply piping capped during any pressure testing of supply piping system at test pressures in excess of 1/2 PSIG.

Defective pipes or fittings should be replaced and not repaired. Never use a flame or fire in any form to locate gas leaks; use a soap solution.

After the piping and meter have been checked completely, purge the system of air. **Do not bleed air inside the furnace. Be sure to check and relight all the gas pilots on other appliances that may have been extinguished because of interrupted gas supply.**

PROPANE (LP) GAS CONVERSION

This unit may be converted in the field for use with propane (LP) gas. Propane gas conversion kit number WGCK-1 is designed for conversions of units installed from 0 – 6000' elevations. Propane gas conversion kit number WGCK-2 is designed for conversions of units installed from 6001' – 10,000' elevations. These kits may be purchased from the local distributor.

⚠ WARNING

When converting from propane (LP) gas to natural gas, the gas orifice spuds and gas valve spring must be replaced and the gas valve regulator pressure must be adjusted correctly. Failure to do so can result in fire, injury or death. Refer to Tables 11A and 11B for proper orifice sizing.

Natural gas spring kit, part number 5603-007, can be purchased through the local distributor.

19. Manifold Pressure Adjustment

A 0 to 15" water manometer with 0.1" resolution and a 1/8" NPT manual shut-off valve is needed to measure actual manifold pressure.

⚠ WARNING

Correct manifold pressure is necessary for proper ignition and burner operation. Failure to accurately adjust pressure could cause heat exchanger failure.

1. Turn off gas at equipment shut-off valve in gas supply line just ahead of furnace.
2. Remove plug from outlet pressure tap in gas control or gas manifold.
3. Install 1/8" NPT manual shut-off valve in hole vacated by plug. Make sure shut-off valve is in OFF position.
4. Attach manometer to 1/8" NPT manual shut-off valve just installed.
5. Slowly open equipment shut-off valve in gas supply line just ahead of furnace. Start furnace following "Operating Instructions" on front door.
6. Slowly open 1/8" NPT manual shut-off valve leading to manometer.
7. Read manifold pressure on manometer.
8. Adjust manifold pressure by turning gas control regulator adjusting screw clockwise to increase pressure or turning counterclockwise to decrease pressure. Manifold pressure must be within allowable range as follows:
   - Natural gas manifold pressure must be between 3.2" and 3.8" W.C. Rated pressure is 3.5" W.C.
   - Propane gas (LP) manifold pressure must be between 9.7" and 10.3" W.C. Rated pressure is 10" W.C.

NOTE: *For natural gas, if gas flow rate can't be properly set within these pressure ranges, the main burner orifices must be changed to obtain proper gas flow rate.*

9. Shut off furnace. Turn off gas at equipment shut-off valve in gas supply line just ahead of furnace. Install outlet pressure tap plug in gas control. Turn on gas.
10. Check regulator adjustment cover screw and gas control plug for gas leaks. Use a commercial soap solution made for leak detection.

20. Checking Gas Input Rate

It is the installer's responsibility to see that the BTU input rate of the furnace is properly adjusted. Under-firing could cause inadequate heat, excessive condensation or ignition problems. Overfiring could cause sooting, flame impingement or overheating of heat exchanger.

⚠ WARNING

Failure to adjust furnace to the proper firing rate could cause heat exchanger failure.

Depending on local gas heating value and elevation, the manifold pressure may need to be adjusted or the orifices changed to get proper gas input rate. Check with the local gas supplier to determine heating value (BTU/cu. ft.) of natural gas in the area.

NOTE: *If furnace is being installed at an altitude of more than 6000' above sea level, the furnace must be derated. See Section 21 "Standard Orifice Sizing and High Altitude Derate".*

Natural Gas Input Rate

Natural gas heating value (BTU/cu. ft.) can vary significantly. Before starting natural gas input check, obtain gas heating value at the location from local supplier. A stopwatch will be needed to measure actual gas input.

1. Gas supply pressure must be between 5" and 7" W.C. for natural gas.
2. Turn off all other gas appliances. The pilots may be left on.
3. Start furnace following "Operating Instructions" on front door.
4. Let furnace warm up for 6 minutes.
5. Locate gas meter. Determine which dial has the least cubic feet of gas and how many cubic feet per revolution it represents. This is usually one-half, one or two cubic feet per revolution.
6. With stopwatch, measure time it takes to consume two cubic feet of gas.
   - If dial is one-half cubic foot per revolution, measure time for four revolutions.
   - If dial is one cubic foot per revolution, measure time for two revolutions.
   - If dial is two cubic feet per revolution, measure time for one revolution.
7. Divide this time by two. This gives average time for one cubic foot of gas to flow through meter. Example: If it took 58 seconds for two cubic feet to flow, it would take 29 seconds for one cubic foot to flow.
8. Calculate gas input using this formula:

$$\text{Gas input} = \frac{\text{Gas Heating Value (BTU/cu. ft.)} \times 3600 \text{ sec/hr}}{\text{Time (Seconds for one cubic foot of gas)}} = \text{BTU/hour}$$

   Example:

   Assume it took 29 seconds for one cubic foot of gas to flow and heating value of 1,000 BTU/cu. ft.

$$\text{Gas input} = \frac{1{,}000 \times 3{,}600}{29} = 124{,}138 \text{ BTU}$$

   If no other pilots were left on, this is the furnace gas input.
9. If the water heater, dryer or range pilots were left on, allow for them in calculating correct furnace gas input. A quick way is to allow 1000 BTU per hour for a water heater, 500 BTU per hour for dryer and 500 BTU per hour for each range burner pilot.

   Example:

   If the gas water heater, dryer, two range burner pilots and one oven pilot were left on, allow:

Water heater pilot	1000 BTU per hour
Dryer pilot	500 BTU per hour
2 range burner pilots	1000 BTU per hour
1 range oven pilot	500 BTU per hour
	3000 BTU per hour

   Subtracting 3000 BTU per hour from 124,138 BTU per hour measured above equals 121,138 BTU per hour. This would be the correct furnace gas input after allowing for pilots left on.
10. Manifold pressure may be adjusted within the range of 3.2" W.C. to 3.8" W.C. to get rated input ± 2 percent. See Section 19, "Manifold Pressure Adjustment." If rated input with manifold pressure cannot be gotten within the allowable range, orifices must be changed.

Propane (LP) Gas Input Rate

⚠WARNING

Propane (LP) gas installations do not have gas meters to double check input rate. Measure manifold pressure adjustment with an accurate manometer. Failure to accurately adjust pressure could cause heat exchanger failure, asphyxiation, fire or explosion, resulting in damage, injury or death.

1. Make the main burner orifices are correct.
2. Gas supply pressure must be between 11" and 13" W.C. for propane (LP) gas.
3. Start furnace following "Operating Instructions" on front door.
4. Let furnace warm up for 6 minutes.
5. Adjust manifold pressure to 10.0" W.C. ± 0.3". See Section 19, "Manifold Pressure Adjustment".

⚠WARNING

Do not set propane (LP) manifold pressure at 11.0" W.C. It could cause heat exchanger failure.

21. Standard Orifice Sizing and High Altitude Derate

This furnace is shipped with fixed gas orifices for use with natural gas and sized for 1000 BTU/cubic foot gas. Make sure actual gas input does not exceed rating plate input. The orifices may need to changed to get the correct gas input. Whether they need changed or not depends on input and the gas heat value at standard conditions and elevation. Consult the local gas supplier for gas heat value and any special derating requirements. See Section 20 for more information.

At higher altitudes, the density of the air is reduced. Therefore, for proper combustion, the quantity of gas burned in the furnace must also be reduced. This is called derating. This unit must be derated when installed at altitudes greater than 6000' above sea level. A high altitude pressure switch must also be installed for operation above 6000'. High Altitude Pressure Switch Kit number 8620-189 is designed for this application.

It is the installer's responsibility to see that the furnace input rate is adjusted properly. Derating must be achieved by reducing the size of the main burner orifices. Derating the furnace by adjusting the manifold pressure lower than the range specified in the Section 19, "Manifold Pressure Adjustment" is considered to be an improper procedure.

Above 6000' elevation orifice changes are required, and capacity reductions are a function of altitude impact and orifice change. Pressure switch change is required above 6000' elevation. For natural gas, see Altitude Table 10 below and Orifice Tables 11A and 11B on following pages.

TABLE 10
Natural Gas Derate Capacities
for All Models

W**G Rated Input	Sea Level	1000	2000	3000	4000	5000	6000	7000	8000	9000	10,000
41,000	40,500	39,204	37,908	36,612	35,640	34,992	34,182	33,696	33,048	32,643	32,076
45,000	45,000	43,560	42,120	40,680	39,600	38,880	37,980	37,440	36,720	36,270	35,640
61,000	60,750	58,806	56,862	54,918	53,460	52,488	51,273	50,544	49,572	48,965	48,114
68,000	67,500	65,340	63,180	61,020	59,400	58,320	56,970	56,160	55,080	54,405	53,460
75,000	75,000	72,600	70,200	67,800	66,000	64,800	63,300	62,400	61,200	60,450	59,400
81,000	81,000	78,408	75,816	73,224	71,280	69,984	68,364	67,392	66,096	65,286	64,152
90,000	90,000	87,120	84,240	81,360	79,200	77,760	75,960	74,880	73,440	72,540	71,280
100,000	100,000	96,800	93,600	90,400	88,000	86,400	84,400	83,200	81,600	80,600	79,200
113,000	112,500	108,900	105,300	101,700	99,000	97,200	94,950	93,600	91,800	90,675	89,100
125,000	125,000	121,000	117,000	113,000	110,000	108,000	105,500	104,000	102,000	100,750	99,000

TABLE 11A
Natural Gas Orifice Tables for Models *W24G, W30G and W36G*

Factory Standard Input	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
25000 BTU Per Burner	700-749	2.75	2.70	2.60
	750-799	2.70	2.60	2.50
	800-849	2.60	2.50	2.45
	850-899	2.50	2.45	2.35
	900-949	2.45	2.35	**(2.30)**
	950-999	2.35	**(2.30)**	2.25
	1000-1049**	**(2.30)**	2.25	**[2.20]**
	1050-1100	2.25	**[2.20]**	2.15
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
(2.30) is the standard factory-installed orifice size			**[2.20] orifices are shipped with the unit for field-installed optional 10% derate**	

Optional 10% Field-Converted Derate	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
22250 BTU Per Burner	700-749	2.60	2.50	2.45
	750-799	2.50	2.45	2.40
	800-849	2.45	2.40	**(2.30)**
	850-899	2.40	**(2.30)**	2.25
	900-949	**(2.30)**	2.25	**[2.20]**
	950-999	2.25	**[2.20]**	2.15
	1000-1049**	**[2.20]**	2.15	2.10
	1050-1100	2.15	2.15	2.10
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
[2.20] orifices are shipped with the unit for field-installed optional 10% input rate			**(2.30) is the factory-installed orifice size for full rated input**	

* At standard conditions: 30.00 inches Mercury, 60F, saturated, .60 specific gravity.
** All Natural Gas factory orifice sizing and standard input ratings based on nominal 1025 BTU/cu. ft. gas and sea level conditions

All other orifice sizes shown are available as individual field-supplied items. See orifice tables below for specifications and number required.

Orifice Size (mm)	Orifice Diameter
2.10	0.0826
2.15	0.0846
2.20	0.0866
2.25	0.0885
2.30	0.0905
2.35	0.0925
2.40	0.0945

Orifice Size (mm)	Orifice Diameter
2.45	0.0964
2.50	0.0984
2.60	0.1024
2.70	0.1063
2.75	0.1082
2.80	0.1102
2.90	0.1142

No. of Orifices Required Based on Unit Input Rating
41,000 (2)
45,000 (2)
61,000 (3)
68,000 (3)
75,000 (3)
81,000 (4)
90,000 (4)
100,000 (4)
113,000 (5)
125,000 (5)

TABLE 11B
Natural Gas Orifice Tables for Models *W42G, W48G and W60G*

Factory Standard Input	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
25000 BTU Per Burner	700-749	2.90	2.80	2.70
	750-799	2.80	2.70	2.60
	800-849	2.70	2.60	2.50
	850-899	2.60	2.50	2.45
	900-949	2.50	2.45	**(2.40)**
	950-999	2.45	**(2.40)**	2.35
	1000-1049**	**(2.40)**	2.35	**[2.30]**
	1050-1100	**[2.30]**	2.25	2.20
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
(2.40) is the standard factory-installed orifice size			**[2.30] orifices are shipped with the unit for field-installed optional 10% derate**	

Optional 10% Field Converted Derate	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
22250 BTU Per Burner	700-749	2.75	2.70	2.60
	750-799	2.70	2.60	2.50
	800-849	2.60	2.50	
	850-899	2.50	2.45	**(2.40)**
	900-949	**(2.40)**	2.35	**[2.30]**
	950-999	2.35	**[2.30]**	2.25
	1000-1049**	**[2.30]**	2.25	2.20
	1050-1100	2.25	2.25	2.20
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
[2.30] orifices are shipped with the unit for field-installed optional 10% input rate			**(2.40) is the factory-installed orifice size for full rated input**	

* At standard conditions: 30.00 inches Mercury, 60F, saturated, .60 specific gravity.
** All Natural Gas factory orifice sizing and standard input ratings based on nominal 1025 BTU/cu. ft. gas and sea level conditions

All other orifice sizes shown are available as individual items. See orifice tables on page 32 for part numbers and number required.

22. Conversion of Gas Input BTUH from High to Low Rating

All the derated WG series units are produced with maximum BTUH input orifices installed. To field convert input, a change to main burner orifices is required.

NOTE: *No change to air orifices is necessary. A set of low input orifices is shipped with every unit. They will be found packaged in a bag behind the burner door. Refer to the unit rating plate to confirm the proper orifice size.*

Proper installation of the orifices is detailed as follows:

1. Shut off electrical supply to the unit.
2. Shut off gas supply to the unit.
3. Remove burner access panel.
4. Disconnect gas valve from gas supply piping.
5. Disconnect the two wires from the gas valve.
6. Remove the manifold assembly so that orifices are now accessible and remove orifices.
7. Apply a modest amount of pipe compound to the new orifices and screw them into the manifold.
8. To assemble burner, reverse Steps 1 through 7.

⚠WARNING

Failure to follow these instructions could create a hazard resulting in property damage, bodily injury or death.

23. Measuring Air Temperature Rise

Air temperature rise (supply air temperature minus return air temperature) must be within allowable air temperature rise range specified on furnace rating plate.

Two thermometers with 1° resolution capable of reading up to 200°F will be needed. Check thermometers to make sure they agree, or compensate accordingly.

Follow this procedure:

1. Open supply air registers and return air grilles. Make sure the registers and grilles are free of obstruction from rugs, carpets, drapes or furniture.
2. Set balancing dampers in supply duct system.
3. Check duct work for obstructions or leaks.
4. Make sure filters are clean and in place.
5. Place one thermometer in supply air plenum approximately 2' from furnace. Locate thermometer tip in center of plenum to ensure proper temperature measurement.
6. Place second thermometer in return air duct approximately 2' from furnace. Locate thermometer tip in center of duct to ensure proper temperature measurement.
7. Set room thermostat on highest temperature setting. Operate furnace 10 minutes. Record supply air and return air temperatures.
8. Calculate air temperature rise by subtracting return air temperature from supply air temperature.
   - If air temperature rise is above the temperature rise range on rating plate, furnace is overfired or has insufficient airflow. Check gas input following the instructions in Section 20, “Checking Gas Input Rate”. If air temperature rise is still above temperature rise range specified, more heating airflow is needed. Check duct work and grilles to make sure all are properly sized.
   - If air temperature rise is below the temperature rise range on rating plate, furnace is underfired or has too much airflow. Check gas input following the instructions in Section 20, “Checking Gas Input Rate”. If air temperature rise is still below temperature rise range specified, less heating airflow is needed. Adjust dampers or grilles as needed.
   - After making adjustments, check air temperature rise to verify that resulting air temperature rise is within allowable range. If air temperature rise is still outside the temperature rise range specified on rating plate, check duct system design with a qualified heating engineer. It may be necessary to re-size the duct work. Recheck air temperature rise after revising duct systems.
9. Set room thermostat to desired setting.
10. Remove thermometers and seal duct work holes.

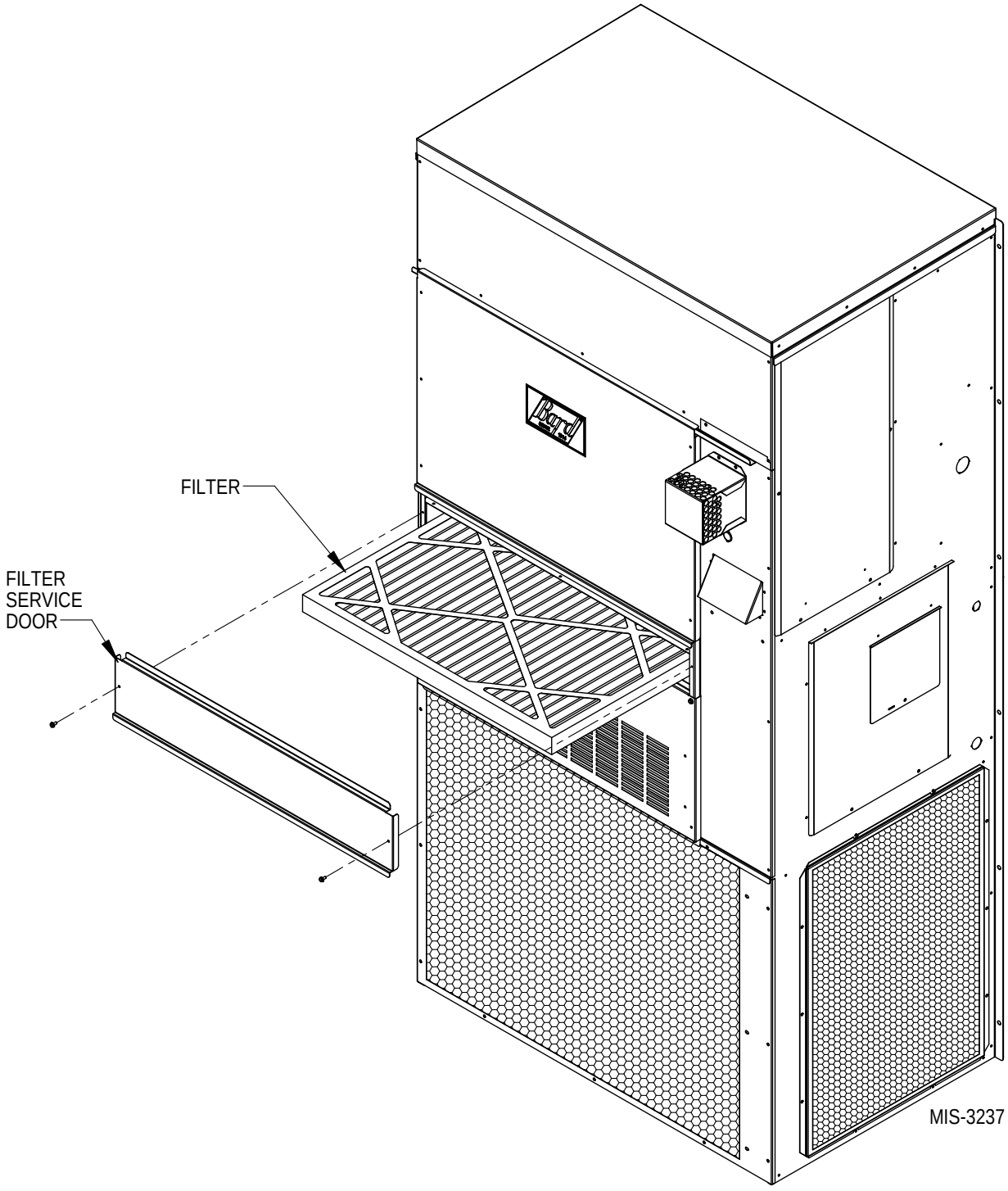
NOTE: *Failure to seal holes could result in reduced system performance.*

24. Filters

A 2" thick throwaway filter is supplied with each unit. This filter is installed by opening the filter service door (see Figure 16).

Replacement filters are available through the dealer.

FIGURE 16
Access Internal Filter Through Upper Service Door



25. Compressor Control Module

The compressor control module is standard on models covered by this manual.

Features

Delay-on-Make Timer
Short Cycle Protection/Delay-on-Break
High Pressure Detection
Low Pressure Detection
LPC and HPC Status LED
Test Mode
Brownout Protection with Adjustment

Delay-on-Make Timer

A delay-on-make timer is included to be able to delay startup of the compressor. This is desired when more than one unit is on a structure so that all of the units do not start at the same time which could happen after a power loss or building shutdown. The delay-on-make time period is 2 minutes plus 10% of the delay-on-break time period. To ensure that all of the units do not start at the same time, adjust the delay-on-break timer on each unit to a slightly different delay time.

Short Cycle Protection/Delay-on-Break

An anti-short cycle timer is included to prevent short cycling the compressor. This is adjustable from 30 seconds to 5 minutes via the adjustment knob. Once a compressor call is lost, the time period must expire before a new call will be initiated.

Low Pressure Detection

Low pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the low pressure switch remains open for more than 2 minutes, the CCM will de-energize the compressor for the delay-on-break time. If the switch closes again, it will then restart the compressor. If the switch trips again during the same Y call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The blue LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

High Pressure Detection

High pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the high pressure switch opens, the CCM will de-energize the compressor. If the switch closes again, it will then restart the compressor after the delay-on-break setting has expired on the device. If the switch trips again during the same thermostat call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The red LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

Test Mode

By rapidly rotating the potentiometer (POT) clockwise (see Figure 17), all timing functions will be removed for testing.

The conditions needed for the unit to enter test mode are as follows: POT must start at a time less than or equal to the 40 second mark. The POT must then be rapidly rotated to a position greater than or equal to the 280 second mark in less than ¼ second. Normal operation will resume after power is reset or after the unit has been in test mode for at least 5 minutes.

Brownout Protection with Adjustment

Brownout protection may be necessary if the utility power or generator power has inadequate power to prevent the voltage from dropping when the compressor starts. This is rare but can happen if the generator is undersized at the site or if the site is in a remote location far from the main power grid. Under normal circumstances, allowing the brownout to be ignored for a time period should not be needed. The 8201-171 is shipped in “0” do not ignore position, with all the DIP switches off (see Figure 17).

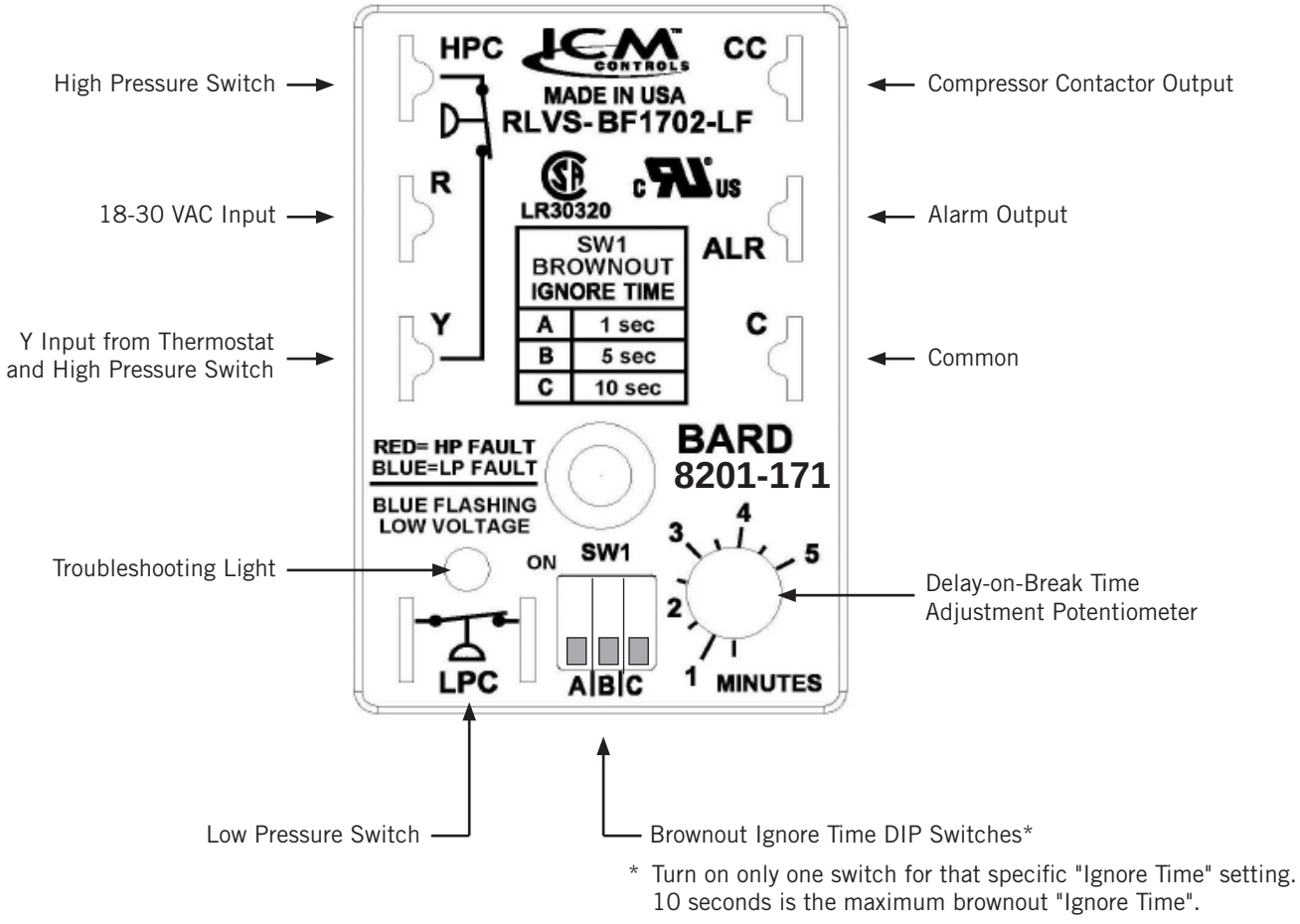
If ignoring the brownout is needed because of the above conditions, three preset timers can be set by DIP switches in order to delay signaling a power brownout for a specific length of time after compressor contactor is energized. This allows the compressor a time period to start even if the voltage has dropped and allows the voltage to recover. This delay only happens when the CC terminal energizes. The delay can be set to 1 second ("A" DIP switch), 5 seconds ("B" DIP switch) or 10 seconds ("C" DIP switch); time is not cumulative—only the longest setting will apply. If the voltage recovers during the brownout delay period, the compressor will continue running.

If a brownout condition is detected by the 8201-171 at any point while there is a cooling call or power is on at Y, the troubleshooting light will flash blue. The light will continue to flash until the cooling call is satisfied or power is removed from the Y terminal. This condition does not prevent operation, it only indicates that a brownout condition was present at some point during the call. If a brownout condition is detected while CC has an output, CC will be de-energized and will retry after the delay-on-break timer is satisfied, honoring any DIP switch timer chosen when the CC output is re-energized; this process will continue until call is satisfied.

If inadequate utility or generator power continues after the Delay-on-Make or Delay-on-Break timer is fulfilled, the CC output will not energize. This could lead to the compressor never starting. The control will see the brownout immediately and not start.

A common scenario and one that has been seen in the field is when a unit or units switches from utility power to generator power. With slower transfer switches, the

FIGURE 17
8201-171 COMPRESSOR CONTROL MODULE



* Turn on only one switch for that specific "Ignore Time" setting. 10 seconds is the maximum brownout "Ignore Time".

time delay between the utility power and generator power didn't cause a problem. The units lost power, shut off and came back on line normally. With the introduction of almost instantaneous transfer switches, the power glitch may be enough that the compressor will start to run backwards.

26. 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.

27. Lighting and Shutdown Instructions

FIGURE 18
Lighting and Shutdown Instruction Label

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

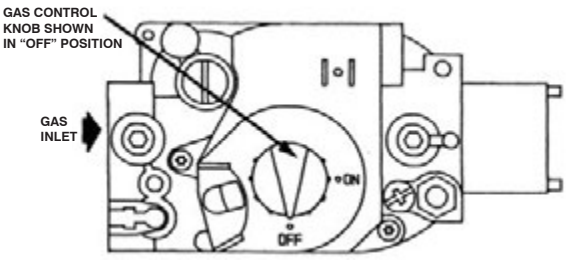
* Do not try to light any appliance.
* Do not touch any electric switch; do not use any phone in your building.
* Immediately call your supplier from a neighbor's phone. Follow the gas supplier's instructions.
* If you cannot reach your gas supplier; call the fire department.

C. Use only your hand to push in or move the gas control lever. Never use tools. If the lever will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.



5. Remove control access panel.
6. Push in gas control knob slightly and turn clockwise to "OFF".

   NOTE: Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise to "ON".
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Push in gas control lever slightly and move to "OFF". Do not force.
5. Replace control access panel.

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28. Service Agency Procedures

⚠CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠WARNING

Follow these procedures before inspecting furnace.

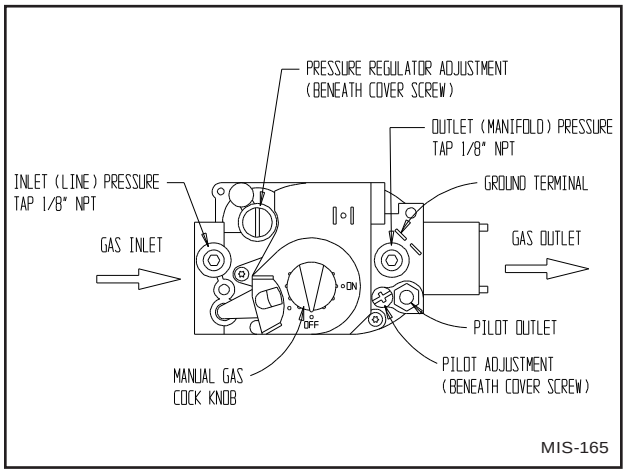
- Turn room thermostat to its lowest or off setting.
- Turn off manual gas shut-off valve.
- Wait at least 5 minutes for furnace to cool if it was recently operating.
- Turn off furnace electrical power; failure to do so could result in injury or death.

Main Burner

Observe the main burners in operation. The flame should be mostly "blue" with possibly a little orange (not yellow) at the tips of the flame. The flames should be in the center of the heat exchanger tubes and not impinging on the heat exchanger surfaces themselves.

Observe the fire until the blower starts (there is a normal delay period until the heat exchanger warms up). There should be no change in the size or shape of the flame. If there is any wavering or blowing of the flame on blower start-up, it is an indication of a possible leak in the heat exchanger.

FIGURE 19
Top View of Gas Control



Burners/Heat Exchanger/Flue Gas Passage Ways

The burners, heat exchanger and interior flue gas passages may be inspected using a light on small mirror or an extension handle. Remove the screws securing the inducer and collector box. Now inspect the upper tubes of the heat exchanger.

Check the exterior of the heat exchanger and the interior flue gas passages for any evidence of deterioration due to corrosion, cracking or other causes. If signs of sooting exist, remove the burners and clean the heat exchanger, as required.

29. Maintaining Unit in Good Working Order

The unit should be inspected annually by a qualified service agency.

⚠WARNING

Use replacement parts listed in the Replacement Parts list only. The use of incorrect parts could cause improper unit operation, resulting in damage, injury or death.

⚠WARNING

Disconnect electrical power before servicing unit. Failure to do so could result in electrical shock or death.

Annual Maintenance

Routine inspection and maintenance procedures are the responsibility of the user and are outlined below.

1. Before inspecting unit:
   A. Turn room thermostat to lowest or off setting.
   B. Turn off equipment gas shut-off valve.
   C. Wait for unit to cool if it was recently operating.
   D. Turn off electrical power to unit.
2. Inspect the following:
   A. Vent terminal and combustion air intake terminal. Make sure both are free from obstructions.
   B. Vertical vent applications: Inspect venting system. Make sure system has no holes, is physically sound and free from obstructions.
   C. Make sure the supply and return air flange sleeves or duct work are securely fastened to unit and physically sound.
   D. Supply and return grilles must be open and free from obstructions.
   E. Inspect to make sure the unit is securely fastened to the wall. Seal any possible leaks between unit and wall with appropriate exterior sealing material.
   F. Inspect burners, heat exchanger, induced draft blower and induced draft blower collector box. There must be no obvious signs of deterioration.
   G. Inspect all electrical connections and wiring.
   H. Check all gas piping for leaks with soap solution used to detect leaks.
   I. Inspect, clean and repair as needed the entire blower assembly, air filters, draft inducer, cooling coils and vent options (if installed).

Routine Maintenance

1. Air Filters: Check the condition at least monthly when the unit is in use, and replace as necessary.
2. Lubrication Requirements: The indoor circulating air blower motor and outdoor circulating air fan motor are permanently lubricated and require no re-oiling. The combustion air blower motor requires no re-oiling.

⚠WARNING

Turn off electrical power supply to prevent injury from moving parts or electric shock.

Routine Inspection

1. Inspect the physical support of the unit annually to make sure it is securely fastened to the building. Also look for any obvious signs of deterioration.
2. Inspect the main burners at the beginning of each heating season and clean as necessary.
3. Inspect the vent terminal and combustion air intake hood for any obvious deterioration, to make sure it is free and clear of any obstructions.

30. Troubleshooting NIDEC SelecTech Series ECM Motors

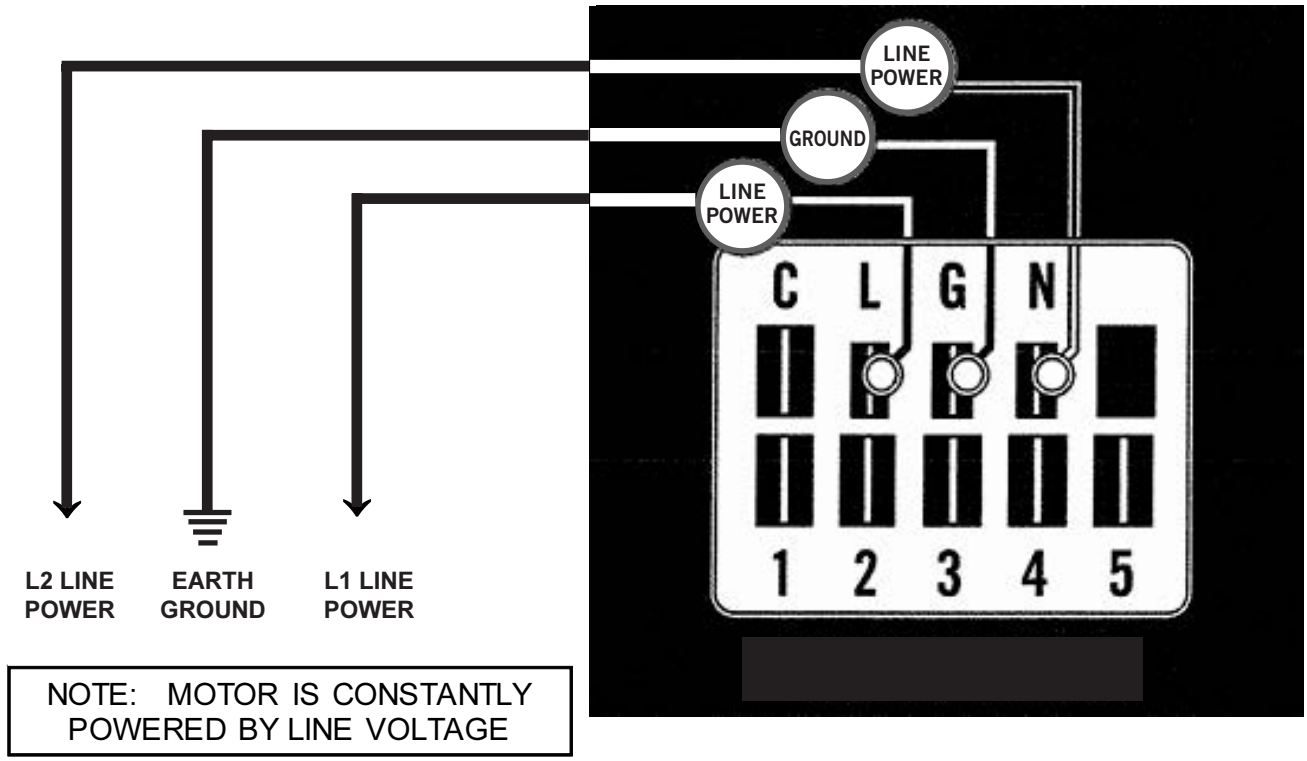
If the Motor Is Running

1. It is normal for the motor to rock back and forth on start up. Do not replace the motor if this is the only problem identified.
2. If the system is excessively noisy, does not appear to change speeds in response to a demand (Heat, Cool, Other) or is having symptoms during the cycle such as tripping limit or freezing coil, check the following:
   A. Wait for programmed delays to time out.
   B. Make sure that the motors control inputs are wired as shown in the factory-supplied wiring diagram to ensure motor is getting proper control signals and sequencing.
   C. Remove the filter and check that all dampers, registers and grilles are open and free flowing. If removing the filters corrects the problem, clean or replace with a less restrictive filter. Also check and clean the blower wheel or coil as necessary.
   D. Check the external static pressure (total of both supply and return) to ensure it is within the range as listed on the unit serial plate. If higher than allowed, additional duct work is needed.
   E. If the motor does not shut off at the end of the cycle, wait for any programmed delays to time out (no more than 90 seconds). Also make sure that there is no call for “Continuous Fan” on the G terminal.
   F. If the above diagnostics do not solve the problem, confirm the voltage checks in the next section below, then continue with the **Model SelecTech Communication Diagnostics**.

If the Motor Is Not Running

1. Check for proper high voltage and ground at the L/L1, G, N/L2 connections at the motor (see Figure 20). Correct any voltage issues before proceeding to the next step. The SelecTech motor is voltage specific. Only the correct voltage should be applied to the proper motor. Input voltage within plus

FIGURE 20
Motor Connections



or minus 10% of the nominal line power VAC is acceptable.

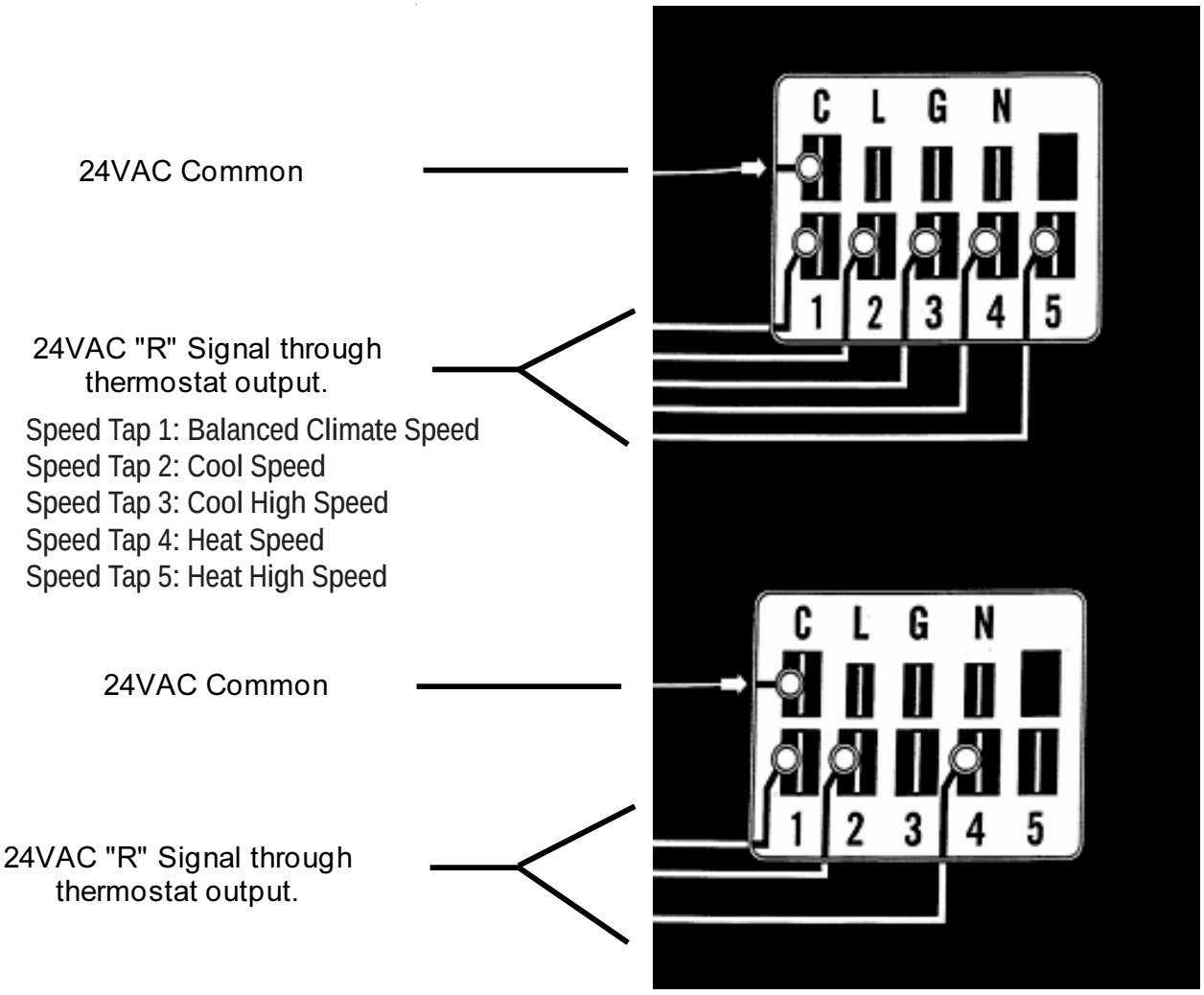
2. If the motor has proper high voltage and ground at the L/L1, G, N/L2 connections, then continue with the **Model SelecTech Communication Diagnostics**.

Model SelecTech Communication Diagnostics

The SelecTech motor is communicated through 24 VAC low voltage (thermostat control circuit wiring).

1. Start with unit wiring diagram to confirm proper connections and voltage (see Figure 21 on page 42).
2. Initiate a demand from the thermostat and check the voltage between the common and the appropriate motor terminal (1-5). (G input is typically on terminal #1, but always refer to wiring diagram.)
   A. If the low voltage communication is not present, check the demand from the thermostat. Also check the output terminal and wire(s) from the terminal strip or control relay(s) to the motor.
   B. If the motor has proper high voltage (verified in Step 1 of **If the Motor Is Not Running**), proper low voltage to a programmed terminal and is not operating, the motor is failed and will require replacement.

FIGURE 21
Motor Connections



31. Replacement Parts

⚠WARNING

Use replacement parts listed in Replacement Parts list. Failure to do so could cause improper furnace operation, resulting in property damage, personal injury or death.

Replacement parts for the gas/electric units are available through local distributors.

A replacement parts list manual is supplied with each unit. When ordering parts or making inquires pertaining to any of the units covered by these instructions, it is very important to always supply the ***complete*** model number and serial number of the unit. This is necessary to assure that the correct parts (or an approved alternate part) are issued to the service agency.

32. Sequence of Operation – Heating

On a call for heat from the thermostat, the induced draft blower is energized. Once sufficient draft is established, the pressure switch contacts close and the ignition system is energized. The direct spark igniter will be energized allowing gas to flow. At the same time the main valve is energized, a 30-second blower delay timer is activated.

After this delay, the heating speed blower relay energizes. The blower will begin operating and remain in operation until the set delay time after the call for heat has been satisfied. This timing sequence guarantees blower on, blower off operation.

This unit is equipped with a flame roll-out switch, which is wired in series with the control circuit. This is a manual reset switch and is used for the purpose of preventing possible fire hazard in the event of a system malfunction. If this switch has opened the control circuit, there could be a possible system malfunction. Some of the conditions that might cause a roll-out to occur are blockage or sooting of primary heat exchanger, overfiring of furnace due to improper main burner orifices or incorrect manifold pressure, insufficient combustion air or installation deficiencies with respect to return air duct design or sizing.

Once the problem has been resolved, reset the switch by pressing down on the reset button on top of the switch. See Figure 22 for additional information.

33. Sequence of Operation – Cooling

On a call for cooling from the room thermostat, the blower relay will be energized as well as the compressor contactor. Following termination of the cooling cycle, the blower motor will continue to run for one minute.

See Figure 22 for additional information.

The unit may be equipped with a low ambient control for lower outdoor temperature operation in the cooling mode. If equipped with this optional control, the condenser fan will not operate immediately upon compressor start-up, and will cycle on and off until the condensing pressure remains above 180 PSIG. Low ambient control energizes the fan motor at 280 PSIG, de-energizes at 180 PSIG.

FIGURE 22
Sequence of Operation
Electronic Blower Control

Action	System Response
Thermostat calls for heat (W terminal is energized).	• Combustion air blower is energized. • Air proving switch makes. Airflow is established. • Ignition system is energized. • Gas valve opens and main burner lights. • Heat fan on delay timing begins. When timing is complete, the circulating fan is energized at heat speed.
Thermostat ends call for heat.	• Ignition system is de-energized and gas valve closes. • Combustion air blower is de-energized after postpurge timing. • Heat fan off delay timing begins. When timing is complete, the circulating fan is de-energized.
Thermostat begins call for cool (G and Y terminals energized).	• Cooling contactor is energized. • Circulating fan is energized on cool speed after cool fan on delay timing.
Thermostat begins call for fan (G terminal is energized).	• Circulating fan is energized.
Limit (flame rollout) opens.	• Thermostat and ignition system are de-energized and gas valve closes. • Combustion air blower and circulating fan heat speed are energized.
Limit (auto reset) or flame rollout (manual reset) circuit closed.	• Combustion air blower remains energized for postpurge timing. • The circulation fan remains energized for the selected delay off timing. • Normal operation resumes.

34. Setting Unit Airflow

All models have multiple speed direct drive blower motors. If supply and return ducts are connected to the unit, the ducts must be of adequate size. Refer to the appropriate blower tables. See Tables 12, 13, 14, 15, 16 and 17 for maximum static pressures acceptable. Note the minimum CFM for heating and cooling operation.

The unit is set from the factory at the default speed. W**G units have three (3) selectable speeds for cooling and two (2) selectable speeds for heating. First set the airflow for heating. For high static applications, the speed should be set to high. When in doubt, note the allowable air temperature rise listed on the name plate and using the procedure listed in Section 23, "Measuring Air Temperature Rise", measure the air temperature rise. If the temperature rise is above allowable range, the heating airflow must be increased.

To increase the heating airflow speed:

- First disconnect power to the unit.
- Open the control panel and find the furnace control board (see Figure 23).
- Remove the black wire from the unused terminal and then remove the red wire from the heat terminal.
- Install the red wire on the unused terminal and the black wire on the heat terminal.
- Close the control panel and repeat the air temperature rise test.
- To reduce the heating airflow speed from high to standard, move the black wire from the heat terminal to the unused terminal and the red wire from the unused terminal to the heat terminal.

The default speed for cooling is the rated cooling speed that is listed in Tables 12, 13, 14, 15, 16 and 17. The higher cooling speed tap can be used for higher duct static applications or to increase the sensible cooling capacity. The higher speeds can also be used when higher sensible cooling is desired.

To increase the cooling airflow speed:

- First disconnect power to the unit.
- Open the control panel and find the terminal block above the blower relay (see Figure 24.

FIGURE 23
Increasing Heating Speed

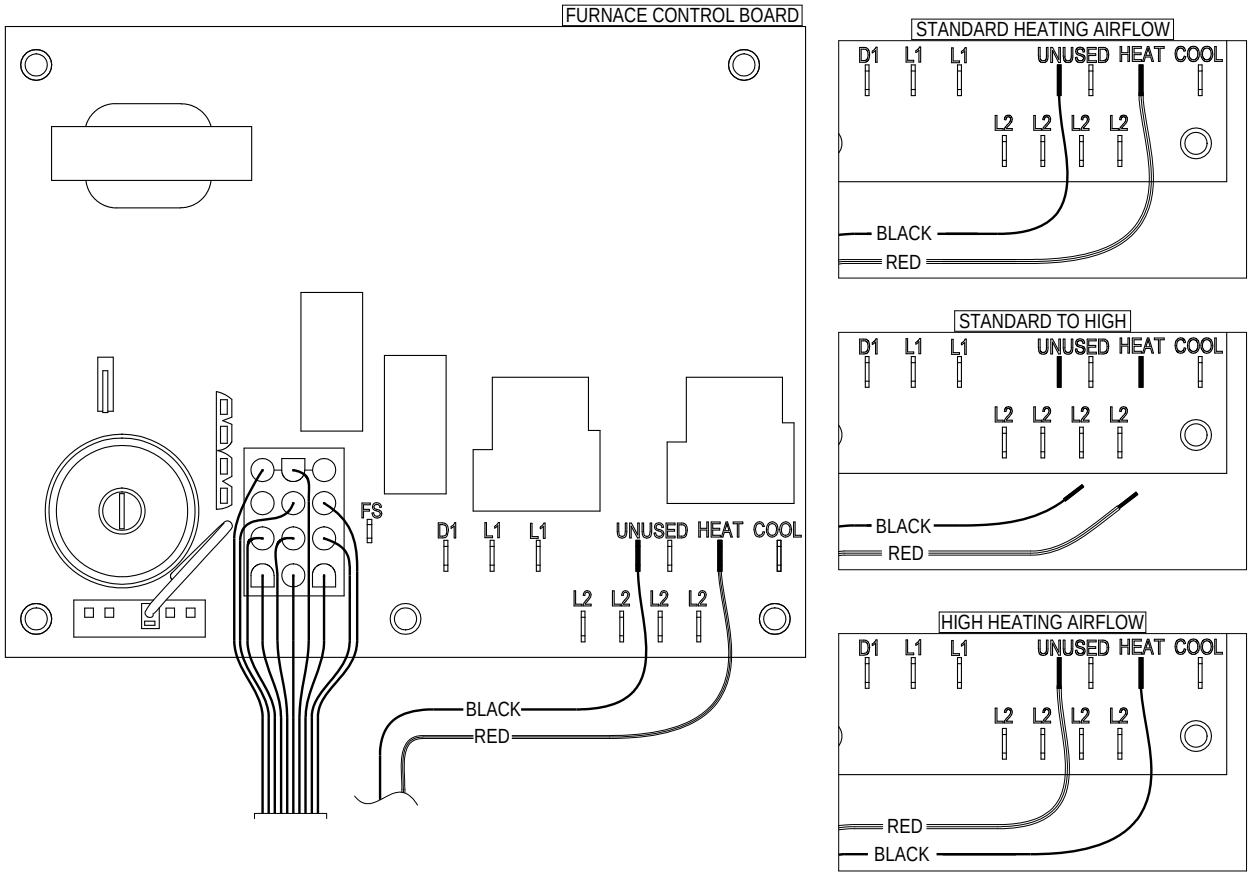


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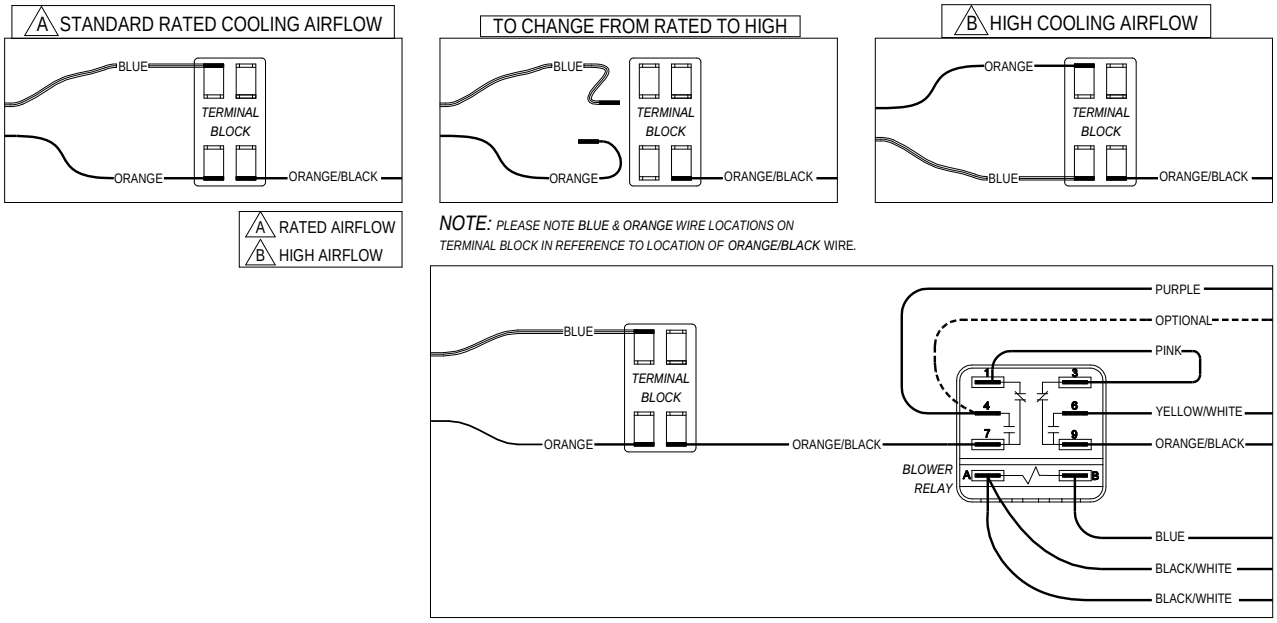
FIGURE 24
Increasing Cooling Speed



MIS-4139

- Locate the orange and blue wires on the terminal block below the furnace control board.
- Switch the terminal landings on the terminal block.
- Close the control panel.
- To reduce the cooling airflow speed from high to rated, reverse the blue and orange wires on the terminal block below the furnace control board.

NOTE: *Be sure to adjust the system static or blower speed to maintain airflows above the minimum recommendations to prevent freeze up conditions if Balanced Climate mode is activated.*

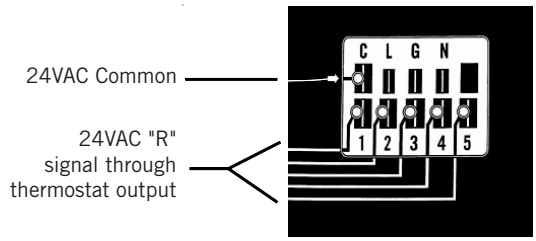
Do not operate the unit in Balanced Climate mode if running high static applications as indicated in the blower performance table. If Balanced Climate mode is activated as described on page 22, the unit will run in this mode at all times unless there is a call for ventilation, electric heat or 2nd stage cooling from a 2-stage thermostat. At that time, the unit will automatically activate a higher speed tap.

Blower Speeds

Five factory programmed speed taps (torque settings) are available for the motor, and are selected through different unit modes of operation. These modes are energized by 24VAC signals from the low voltage terminal block located inside the control panel by a thermostat or other controlling device. Each speed tap is programmed by Bard at the factory to different motor torque settings (see Figure 25).

Multiple motor speed taps may be energized simultaneously by 24VAC power during different modes of operation. The highest number speed tap energized takes priority with 5 being the highest and 1 being the lowest.

FIGURE 25
Speed Taps



Speed Tap 1: Balanced Climate Speed
Speed Tap 2: Cool Speed
Speed Tap 3: Cool High Speed
Speed Tap 4: Heat Speed
Speed Tap 5: Heat High Speed

TABLE 12
W24G4 Indoor Blower Performance @ 230 and 460 VOLTS

Recommended W24G cooling airflow range at rated 800 CFM @ 0.10 ESP (WC) is 700 - 910 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			90,000 BTU Input		81,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	670	928	1213				
0.1	598	851	1141	1361			
0.2	511	760	1055	1288	1373	1288	
0.3	417	662	962	1214	1324	1214	
0.4	323	564	870	1143	1278	1143	
0.5	235	473	784	1077	1237	1077	1237

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			68,000 BTU Input		61,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	670	928	1213				
0.1	598	851	1141				
0.2	511	760	1055	1288			
0.3	417	662	962	1214			
0.4	323	564	870	1143	1278	1143	
0.5	235	473	784	1077	1237	1077	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			45,000 BTU Input		41,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	670	928	1213				
0.1	598	851	1141	1361			
0.2	511	760	1055	1288			
0.3	417	662	962	1214	1324		
0.4	323	564	870	1143	1278	1143	
0.5	235	473	784	1077	1237	1077	

SG-3, RG-3, non-ducted application adjustment – Reduce airflow by 100 CFM for SG-3 and RG-3 installations

TABLE 13
W30G4 Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended W30G cooling airflow range at rated 900 CFM @ 0.15 ESP (WC) is 750 - 1150 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			90,000 BTU Input		81,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	850	1022	1157	1281			
0.1	769	953	1098	1237	1375	1237	
0.2	688	883	1038	1188	1329	1188	
0.3	606	812	975	1134	1279	1134	
0.4	523	739	910	1075	1225	1075	1225
0.5	439	664	843	1011	1168	1011	1168

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			68,000 BTU Input		61,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	850	1022	1157	1281			
0.1	769	953	1098	1237			
0.2	688	883	1038	1188			
0.3	606	812	975	1134	1279	1134	
0.4	523	739	910	1075	1225	1075	
0.5	439	664	843	1011	1168	1011	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			45,000 BTU Input		41,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	850	1022	1157	1281			
0.1	769	953	1098	1237			
0.2	688	883	1038	1188	1329	1188	
0.3	606	812	975	1134	1279	1134	
0.4	523	739	910	1075	1225	1075	
0.5	439	664	843	1011	1168	1011	1168

Dehumidification coil adjustment – Reduce airflow by 35 CFM for dehumidification coil installed
SG-3, RG-3, non-ducted application adjustment – Reduce airflow by 100 CFM for SG-3 and RG-3 installations

TABLE 14
W36G4 Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended W36G cooling airflow range at rated 1100 CFM @ 0.10 ESP (WC) is 940 - 1250 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			90,000 BTU Input		81,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	932	1202	1281	1281			
0.1	855	1148	1238	1237	1375	1237	
0.2	776	1091	1190	1188	1329	1188	
0.3	695	1030	1139	1134	1279	1134	
0.4	614	966	1083	1075	1225	1075	1225
0.5	530	898	1022	1011	1168	1011	1168

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			68,000 BTU Input		61,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	932	1202	1281	1281			
0.1	855	1148	1238	1237			
0.2	776	1091	1190	1188			
0.3	695	1030	1139	1134	1279	1134	
0.4	614	966	1083	1075	1225	1075	
0.5	530	898	1022	1011	1168	1011	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			45,000 BTU Input		41,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	932	1202	1281	1281			
0.1	855	1148	1238	1237			
0.2	776	1091	1190	1188	1329	1188	
0.3	695	1030	1139	1134	1279	1134	
0.4	614	966	1083	1075	1225	1075	
0.5	530	898	1022	1011	1168	1011	1168

SG-3, RG-3, non-ducted application adjustment – Reduce airflow by 100 CFM for SG-3 and RG-3 installations

TABLE 15
W42G4 Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended W42G cooling airflow range at rated 1300 CFM @ .15 ESP (WC) is 1030 - 1480 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			125,000 BTU Input		113,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1084	1394	1552	1788			
0.1	1011	1335	1498	1734			
0.2	930	1270	1439	1678		1678	
0.3	840	1198	1374	1618		1618	
0.4	741	1119	1305	1557	1811	1557	
0.5	633	1034	1230	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			100,000 BTU Input		90,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1084	1394	1552	1788			
0.1	1011	1335	1498	1734		1734	
0.2	930	1270	1439	1678		1678	
0.3	840	1198	1374	1618	1870	1618	
0.4	741	1119	1305	1557	1811	1557	
0.5	633	1034	1230	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			75,000 BTU Input		68,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1084	1394	1552	1788			
0.1	1011	1335	1498	1734			
0.2	930	1270	1439	1678		1678	
0.3	840	1198	1374	1618	1870	1618	
0.4	741	1119	1305	1557	1811	1557	
0.5	633	1034	1230	1492	1754	1492	

SG-5, RG-5, non-ducted application adjustment – Reduce airflow by 170 CFM for SG-5 and RG-5 installations

TABLE 16
W48G4 Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended W48G cooling airflow range at rated 1450 CFM @ .20 ESP (WC) is 1150 - 1680 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			125,000 BTU Input		113,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1185	1501	1668	1788			
0.1	1118	1445	1616	1734			
0.2	1042	1384	1560	1678		1678	
0.3	958	1317	1500	1618		1618	
0.4	866	1245	1436	1557	1811	1557	
0.5	766	1167	1368	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			100,000 BTU Input		90,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1185	1501	1668	1788			
0.1	1118	1445	1616	1734		1734	
0.2	1042	1384	1560	1678		1678	
0.3	958	1317	1500	1618	1870	1618	
0.4	866	1245	1436	1557	1811	1557	
0.5	766	1167	1368	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			75,000 BTU Input		68,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1185	1501	1668	1788			
0.1	1118	1445	1616	1734			
0.2	1042	1384	1560	1678		1678	
0.3	958	1317	1500	1618	1870	1618	
0.4	866	1245	1436	1557	1811	1557	
0.5	766	1167	1368	1492	1754	1492	

SG-5, RG-5, non-ducted application adjustment – Reduce airflow by 170 CFM for SG-5 and RG-5 installations

TABLE 17
W60G4 Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended W60G cooling airflow range at rated 1650 CFM @ .20 ESP (WC) is 1360 - 1850 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			125,000 BTU Input		113,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1347	1771	1881	1743			
0.1	1272	1708	1823	1682			
0.2	1199	1646	1766	1619	1843	1619	
0.3	1128	1584	1709	1554	1783	1554	
0.4	1060	1523	1652	1486	1721	1486	
0.5	994	1462	1596	1417	1657	1417	1657

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			100,000 BTU Input		90,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1347	1771	1881	1743			
0.1	1272	1708	1823	1682		1682	
0.2	1199	1646	1766	1619	1843	1619	
0.3	1128	1584	1709	1554	1783	1554	
0.4	1060	1523	1652	1486	1721	1486	1721
0.5	994	1462	1596	1417	1657	1417	1657

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			75,000 BTU Input		68,000 BTU Input	
	Balanced	**Rated**	High	**Medium**	High	**Medium**	High
0	1347	1771	1881	1743			
0.1	1272	1708	1823	1682		1682	
0.2	1199	1646	1766	1619	1843	1619	
0.3	1128	1584	1709	1554	1783	1554	
0.4	1060	1523	1652	1486	1721	1486	1721
0.5	994	1462	1596	1417	1657	1417	1657

SG-5, RG-5, non-ducted application adjustment – Reduce airflow by 170 CFM for SG-5 and RG-5 installations

TABLE 18
Integrated Furnace and Blower Control Operation

IGNITION SEQUENCE CONTROL

Ignition Source	24 VAC DSI
Flame Sensing	Remote
Timings	
- Prepurge	15 seconds
- Postpurge	30 seconds (0 if cycle terminated before valve "on")
- Inter-trial purge	15 seconds
- Pressure switch proving period	60 seconds
- Trials for ignition	3 per ignition sequence
- Trial for ignition	7 seconds total time to prove flame
- Ignition sequence lockout	60 minutes (after 3 trials for ignition), auto reset – can be reset during the 60-minute lockout period by opening thermostat circuit for 3 seconds or more
- Heat blower on - delay	30 seconds (timing starts when ignitor cycles off)
- Heat blower off - delay	90, 120, 150 seconds selectable; factory set at 120
- Cool blower on - delay	7 seconds
- Cool blower off - delay	60 seconds
- Manual fan operations	Operates on selected heating speed and cycles off during ignition or burner start-up sequence.
- High limit control operation	Automatic reset, ignition sequence restart. See Note 1.
- Flame rollout switch operation	Manual reset, igniton sequence initiated after switch is manually reset. See Note 1.

NOTE 1: After the fourth limit trip on a given call for heat, there will be a 1-hour delay before the ignition sequence will restart. After either high limit switch or flame rollout switch actuation, the inducer will operate for the 30-second postpurge and the comfort air blower will operate for the selected off delay. If on Manual Fan operation, the comfort air blower will continue to operate.

SAFETY UNITS

High limit/Rollout	SPST in 24 Volt
Pressure switch	SPST, safe start check

COMFORT FAN CONTROL

Heating Speed Fan	
Normal operation	
- ON delay	30 seconds fixed. Timing starts when igniter de-energized.
- OFF delay	3 selectable timings – 120 seconds standard can be changed to 90 or 150 seconds.
Limit Operation	ON when limit OPEN OFF after OFF delay when limit CLOSES
Flame Sense	ON if flame is sensed *and* there is no call for heat.
Cooling Speed Fan	
- ON delay	7 seconds
- OFF delay	60 seconds
Manual Fan	ON continuously on HEATING speed. When call for cool, the fan switches to COOLING speed. Then when thermostat satisfied, the fan switches back to HEATING speed after COOLING OFF delay.

DIAGNOSTIC INDICATOR

A red LED is provided to indicate system faults as follows:

Steady ON - Control okay in standby, call for heat, cool or fan modes
Steady OFF - Internal control fault or no power. Also check 3A fuse on control.
1 flash - Lockout due to failed ignition or flame dropouts
2 flashes - Pressure switch open with inducer on
3 flashes - Pressure switch is closed with inducer off
4 flashes - Limit switch is open
5 flashes - Flame detected with gas valve closed
6 flashes - Compressor output delayed from short cycle/staging timer
The flash rate is 0.25 seconds on, 0.25 seconds off with 2.0 seconds pause between flash codes.

35. Pressure Service Ports

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Table 19 outlines expected pressures at various indoor and outdoor temperatures.

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

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

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

TABLE 19
Cooling Pressure Table

Model	Return Air Temperature	Pressure	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
W24G4	75° DB 62° WB	Low Side High Side	119.7 298.0	122.6 318.5	125.3 340.2	127.9 363.0	130.3 386.9	132.8 411.8	135.0 438.0	137.2 465.3	139.1 493.6	141.0 523.2	142.8 553.8
	80° DB 67° WB	Low Side High Side	128.0 305.6	131.1 326.7	134.0 348.9	136.8 372.3	139.4 396.8	142.0 422.4	144.4 449.2	146.7 477.2	148.8 506.3	150.8 536.6	152.7 568.0
	85° DB 72° WB	Low Side High Side	132.5 316.3	135.7 338.1	138.7 361.1	141.6 385.3	144.3 410.7	147.0 437.2	149.5 464.9	151.8 493.9	154.0 524.0	156.1 555.4	158.0 587.9
W30G4	75° DB 62° WB	Low Side High Side	120.1 297.7	122.7 318.0	125.2 339.5	127.6 362.0	130.0 385.5	132.3 410.0	134.5 435.5	136.8 462.2	138.9 489.7	141.0 518.4	143.1 548.1
	80° DB 67° WB	Low Side High Side	128.5 305.3	131.2 326.2	133.9 348.2	136.5 371.3	139.0 395.4	141.5 420.5	143.9 446.7	146.3 474.0	148.6 502.3	150.8 531.7	153.0 562.2
	85° DB 72° WB	Low Side High Side	133.0 316.0	135.8 337.6	138.6 360.4	141.3 384.3	143.9 409.2	146.5 435.2	148.9 462.3	151.4 490.6	153.8 519.9	156.1 550.3	158.4 581.9
W36G4	75° DB 62° WB	Low Side High Side	124.4 312.6	126.8 334.9	129.1 357.9	131.3 381.6	133.4 405.9	135.4 431.0	137.4 456.7	139.1 483.1	140.9 510.2	142.6 538.0	144.2 566.5
	80° DB 67° WB	Low Side High Side	133.1 320.6	135.6 343.5	138.1 367.1	140.4 391.4	142.7 416.3	144.8 442.0	146.9 468.4	148.8 495.5	150.7 523.3	152.5 551.8	154.2 581.0
	85° DB 72° WB	Low Side High Side	137.8 331.8	140.3 355.5	142.9 379.9	145.3 405.1	147.7 430.9	149.9 457.5	152.0 484.9	154.0 512.8	156.0 541.6	157.8 571.1	159.6 601.3
W42G4	75° DB 62° WB	Low Side High Side	124.7 328.7	127.4 350.3	130.0 373.0	132.3 396.7	134.6 421.4	136.7 447.1	138.8 473.8	140.6 501.4	142.3 530.1	143.9 559.7	145.4 590.4
	80° DB 67° WB	Low Side High Side	133.4 337.1	136.3 359.3	139.0 382.6	141.5 406.9	144.0 432.2	146.2 458.6	148.4 485.9	150.4 514.3	152.2 543.7	153.9 574.1	155.5 605.5
	85° DB 72° WB	Low Side High Side	138.1 348.9	141.1 371.9	143.9 396.0	146.5 421.1	149.0 447.3	151.3 474.7	153.6 502.9	155.7 532.3	157.5 562.7	159.3 594.2	
W48G4	75° DB 62° WB	Low Side High Side	124.9 325.9	126.8 347.5	128.7 369.8	130.4 392.9	132.2 416.9	134.0 441.7	135.8 467.2	137.5 493.6	139.3 520.8	141.0 548.9	142.7 577.8
	80° DB 67° WB	Low Side High Side	133.6 334.3	135.6 356.4	137.6 379.3	139.5 403.0	141.4 427.6	143.3 453.0	145.2 479.2	147.1 506.3	149.0 534.2	150.8 563.0	152.6 592.6
	85° DB 72° WB	Low Side High Side	138.3 346.0	140.3 368.9	142.4 392.6	144.4 417.1	146.3 442.6	148.3 468.9	150.3 496.0	152.2 524.0	154.2 552.9	156.1 582.7	157.9 613.3
W60G4	75° DB 62° WB	Low Side High Side	123.3 309.0	125.1 329.6	127.0 351.4	128.8 374.2	130.6 398.2	132.5 423.3	134.3 449.6	136.1 477.0	137.9 505.5	139.8 535.2	141.6 566.0
	80° DB 67° WB	Low Side High Side	131.9 316.9	133.8 338.1	135.8 360.4	137.8 383.8	139.7 408.4	141.7 434.2	143.6 461.1	145.6 489.2	147.5 518.5	149.5 548.9	151.4 580.5
	85° DB 72° WB	Low Side High Side	136.5 328.0	138.5 349.9	140.6 373.0	142.6 397.2	144.6 422.7	146.7 449.4	148.6 477.2	150.7 506.3	152.7 536.6	154.7 568.1	156.7 600.8

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

Tables 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 reclaimed, and the system evacuated and recharged to serial plate instruction.

36. 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.

Table 19 shows 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.

37. Fan Blade Setting Dimensions

The correct fan blade setting dimension for proper air delivery across the outdoor coil is shown in Figure 26.

FIGURE 26
Fan Blade

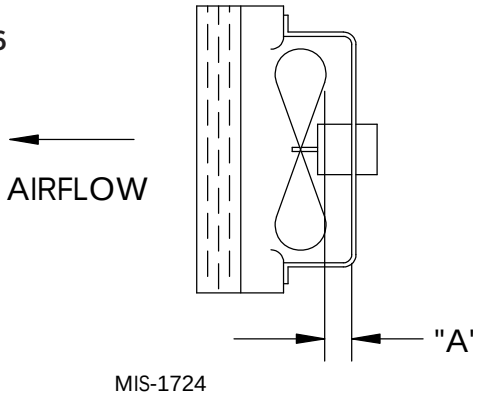


TABLE 20
Fan Blade Dimension

Model	Dimension A
W24G	1.25
W30G	1.25
W36G	1.25
W42G	1.75
W48G	1.75
W60G	1.75

38. Low-NOx Burner Assembly "N" Suffix Models Only – U.S. Installations Only

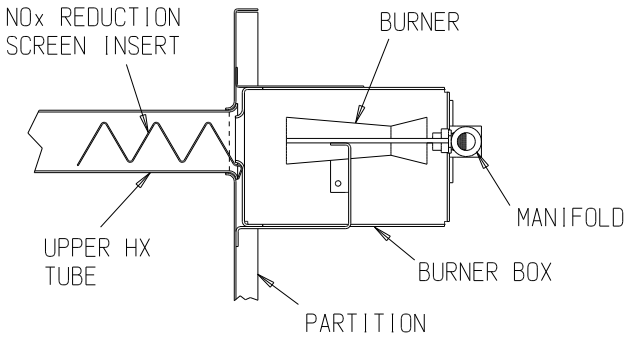
Natural Gas Models Only

Model numbers designated with an "N" are designed for low NOx emissions which comply with all California Air Quality Management District regulations for nitrogen oxide emission levels. Refer to Figure 27 for NOx insert information.

*** * IMPORTANT * ***

For propane (LP) conversions, the NOx reduction screen inserts shown below must be removed. This is accomplished by removing the burner box assembly and removing the NOx screens. Reassemble unit properly before firing. Failure to remove the NOx screens can result in improper operation and malfunction of the burner system.

FIGURE 27
Low NOx Insert



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Wiring Diagrams

Unit Model No.	Basic Wiring Diagram
W24G4-A	4085-177
W24G4-B	4085-277
W24G4-C	4085-400
W30G4-A	4085-177
W30G4-B	4085-277
W30G4-C	4085-400
W36G4-A	4085-177
W36G4-B	4085-277
W36G4-C	4085-400
W42G4-A	4085-177
W42G4-B	4085-277
W42G4-C	4085-400
W48G4-A	4085-177
W48G4-B	4085-277
W48G4-C	4085-400
W60G4-A	4085-175
W60G4-B	4085-275
W60G4-C	4085-398

INSTALLATION INSTRUCTIONS

Bard Air Conditioning System

MULTI-TEC®
W18-36A/LB
Wall-Mount
Air Conditioner

LC6000-200
Supervisory
Controller

Bard® SINCE 1914
Climate Control Solutions

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

Manual: 2100-713D
Supersedes: 2100-713C
Date: 10-22-21

CONTENTS

FIGURES AND TABLES

Air Conditioning System

This Bard air conditioning system is composed of MULTI-TEC wall-mounted air conditioners matched with an LC6000 supervisory controller, th-Tune single-unit controller or PGD stand-alone display. If only one wall-mounted air conditioner is being used, it can be matched with either the LC6000 supervisory controller, th-Tune or PGD (see **Single Unit Operation** on page 3 for information on the th-Tune and PGD). If more than one wall mount is installed, the LC6000 controller must be matched with the air conditioning units. The wall-mount units are specifically engineered for telecom/motor control center rooms.

NOTE: *The LC6000 supervisory controller and MULTI-TEC wall-mount units are designed specifically to work together. The controller cannot run other brands of systems, nor can other controllers run the MULTI-TEC wall-mount units. They are a complete system, and must be used together.*

Controller

LC6000 controller and accessories shown below.

LC6000-200 Series Controller and Accessories Included with Controller

(1) LC6000 Programmable Logic Controller

(1) TEC-EYE™ Hand-Held Diagnostic Tool
Bard P/N 8301-059

(1) Remote Temperature/Humidity Sensor[1]
Bard P/N 8403-079

(1) 35' 5-Wire 18 Gauge Shielded Cable

(2) Communication EMI Filters
Bard P/N 8301-055

Optional Sensors:

Outside Air
Temperature/Humidity Sensor
Bard P/N 8301-090

Remote
Temperature/Humidity Sensor[1]
Bard P/N 8403-079

Remote
Temperature Only Sensor
Bard P/N 8301-058

[1] One remote temperature/humidity sensor is included with the LC6000 controller. If the site in which the LC6000 controller will be used has more than one zone (maximum three zones per LC6000), additional remote temperature/humidity sensors (one sensor per zone) will need to be purchased and installed in the additional zones. One additional temperature-only sensor (Bard P/N 8301-058) may also be used in Zone 1 but will also need to be purchased separately. Additional temperature/humidity sensors require field-supplied 5-wire 18 gauge shielded cable. Temperature-only sensors require field-supplied 2-wire 18 gauge shielded cable.

Wall-Mount Air Conditioner Units

The MULTI-TEC units will supply 100% of rated cooling airflow in free cooling mode with ability to exhaust the same amount through the unit itself without any additional relief openings in the shelter.

MULTI-TEC units are fully charged with refrigerant and have optional electric heat.

Single Unit Operation

A PGD stand-alone display (Bard P/N 8620-306 or 8620-307) or th-Tune single-unit controller (Bard P/N 8403-088) can be used in place of the LC6000 controller when only one MULTI-TEC wall-mount air conditioner is being installed. If using a PGD or th-Tune instead of the LC6000 controller, the alarm logging and remote communication capabilities of the LC6000 controller will not be available. See PGD manual 2100-734 or th-Tune manual 2100-678 for information on installing and setting up a PGD or th-Tune for single unit operation. A TEC-EYE hand-held diagnostic tool is required to program the wall-mount unit for PGD or th-Tune operation. The th-Tune and TEC-EYE diagnostic tool are available as a kit (Bard P/N 8620-264).

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 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 **Additional Publications** for information on codes and standards.

Sizing of systems for proposed installation should be based on heat loss and heat gain calculations made according to methods of Air Conditioning Contractors of America (ACCA). The supply flange 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.

Shipping Damage

Upon receipt of equipment, the cartons 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.

These units must remain in upright position at all times.

Additional Publications

These publications can help when installing the air conditioner. 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 of Air Conditioning and Ventilating Systems .....ANSI/NFPA 90A

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

Load Calculation for Residential Winter and Summer Air Conditioning ..... ACCA Manual J

For more information, contact these publishers:

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

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

American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE)
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400 Fax: (404) 321-5478

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

ANSI Z535.5 Definitions:

DANGER: Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury. The signal word “DANGER” is to be limited to the most extreme situations. DANGER [signs] should not be used for property damage hazards unless personal injury risk appropriate to these levels is also involved.

WARNING: Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury. WARNING [signs] should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.

CAUTION: Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION [signs] without a safety alert symbol may be used to alert against unsafe practices that can result in property damage only.

NOTICE: [this header is] preferred to address practices not related to personal injury. The safety alert symbol shall not be used with this signal word. As an alternative to “NOTICE” the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

⚠ WARNING

Electrical shock hazard.

Have a properly trained individual perform these tasks.

Failure to do so could result in electric shock or death.

⚠ WARNING

Fire hazard.

Maintain minimum 1/4" clearance between the supply air duct and combustible materials in the first 3' of ducting.

Failure to do so could result in fire causing damage, injury or death.

⚠ WARNING

Heavy item hazard.

Use more than one person to handle unit.

Failure to do so could result in unit damage or serious injury.

⚠ CAUTION

Sharp metallic edges.

Take care and wear appropriate protective devices to avoid accidental contact with sharp edges.

Failure to do so can result in personal injury.

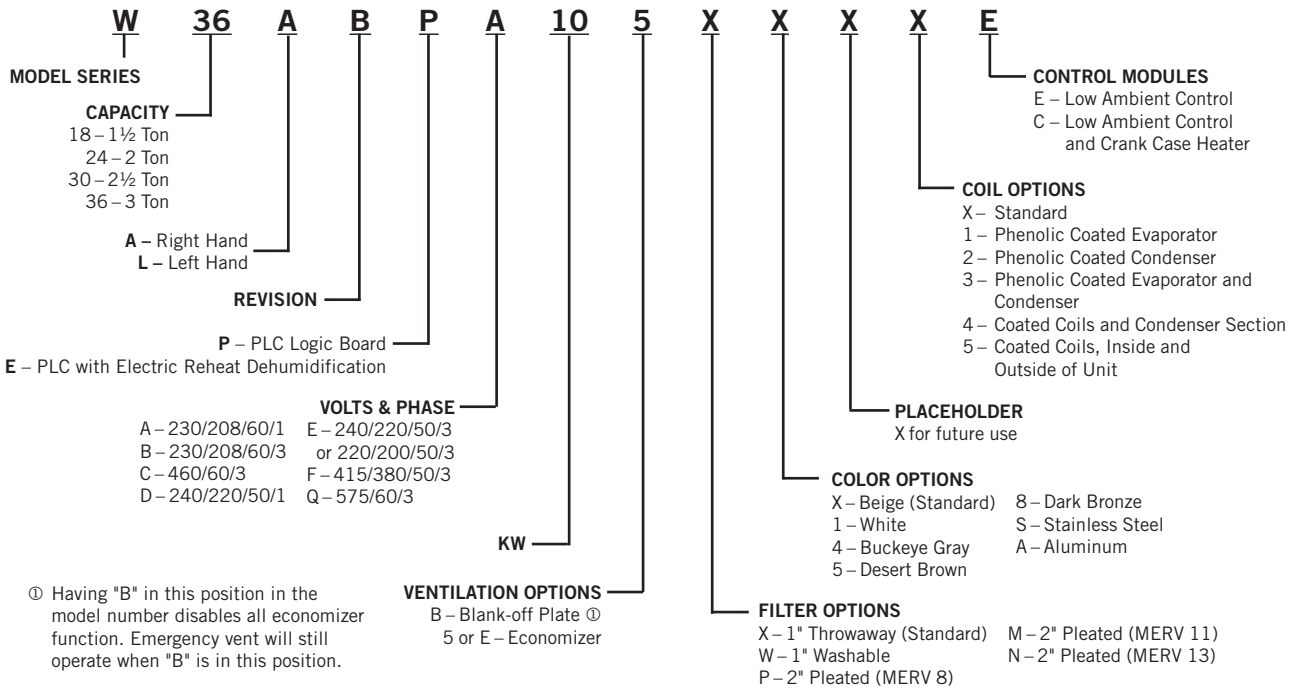
LIST OF NECESSARY MATERIALS/TOOLS

Additional hardware and miscellaneous supplies are needed for installation. These items are field supplied and must be sourced before installation. This list also includes tools needed for installation.

List of Materials/Tools

- Personal protective equipment/safety devices/anti-static wrist straps
- Supply and return grilles
- Field-fabricated sleeves (if necessary)
- Fasteners sufficient for mounting the units such as 5/16" diameter anchor/lag bolts
- 7/8" diameter washers
- Fasteners appropriate for the shelter wall construction to attach the controller to the wall
- Commercial grade outdoor silicone sealant
- Miscellaneous hand and power tools and jobsite or shop materials
- Lifting equipment with the necessary capacity and rigging to safely move/install the systems
- Electrical supplies
  - Various size circuit breakers for the shelter AC breaker box (see Electrical Specification tables on pages 16, 17 and 18)
  - High-voltage wire of various gauges (see tables on pages 16, 17 and 18)
  - 16 gauge minimum, 14 gauge maximum power wire to connect controller to shelter power source
  - 5-wire, 18 gauge shielded cable for remote temperature and humidity sensors (2-wire, 18 gauge shielded cable for temperature-only sensors)
  - Communication wire: 2-wire, 18 gauge, shielded with drain
  - 18 gauge non-shielded wire for connecting emergency off, emergency vent and/or generator, if applicable, to controller
  - CAT 6 Ethernet cable of field-determined length (for remote communication, if applicable)
  - 2 hole grounding lug (to be used with supplied 1/4" bolts and nuts for grounding controller box)
  - Miscellaneous electrical supplies including rigid/flexible conduit and fittings, 2" x 4" junction boxes (one per temperature/humidity sensor), wire connectors and supports

FIGURE 1
MULTI-TEC W18-36A/LB Wall-Mount Unit Model Nomenclature



Model Identification

Identify the specific model using the model nomenclature information found in Figure 1 and the model/serial tag found on the unit. See Figure 2 on page 8 for dimensions and critical installation requirements.

New Shelter Installation vs. Retrofit Installation

These installation instructions cover both new shelter installations and retrofit installations. Each installation is unique and may require special accommodations and modifications. Although Bard Manufacturing follows a long-established tradition of manufacturing equipment using industry standard dimensions for building penetration, it is occasionally necessary to move or enlarge supply and return openings when replacing non-standardized equipment in a retrofit application.

Minimum Clearance

Wall-mount air conditioners are available in both right-hand access models and left-hand access models. Right-hand access models have the heat strip access panel, external circuit breakers access panel and internal controls access panel on the right side of the unit. Left-hand access models are a mirror image of the right-hand access models, and allow two wall-mount units to be placed in relatively close proximity and yet still allow complete access for maintenance and repair.

On side-by-side installations, maintain a minimum of 20" clearance on control side to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. For installations where units are installed with both control panels facing each other (inward), maintain a minimum of 36" clearance to allow access. Additional clearance may be required to meet local or national codes.

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 blow through condensers, such as these wall-mount units, it is recommended there be a minimum distance of 10' 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	DISCHARGE SIDE
W18A, W24A, W30A, W36A	15"	20"	10'
W18L, W24L, W30L, W36L	20"	15"	10'

NOTE: *For side-by-side installation of two units there must be 20" between units. This can be reduced to 15" by using a W**L model (left side compressor and controls) for the left unit and W**A (right side compressor and controls) for right unit.*

See Specifications Sheets S3595 or S3610.

Clearance to Combustibles

⚠ WARNING

Fire hazard.

Maintain minimum 1/4" clearance between the supply air duct and combustible materials in the first 3' of ducting.

Failure to do so could result in fire causing damage, injury or death.

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 Figures 4A and 4B on pages 10 and 11 for details on opening sizes.

Minimum Clearances Required to Combustible Materials

MODELS	SUPPLY AIR DUCT FIRST 3'	CABINET
W18A, L W24A, L	0"	0"
W30A, L W36A, L	1/4"	0"

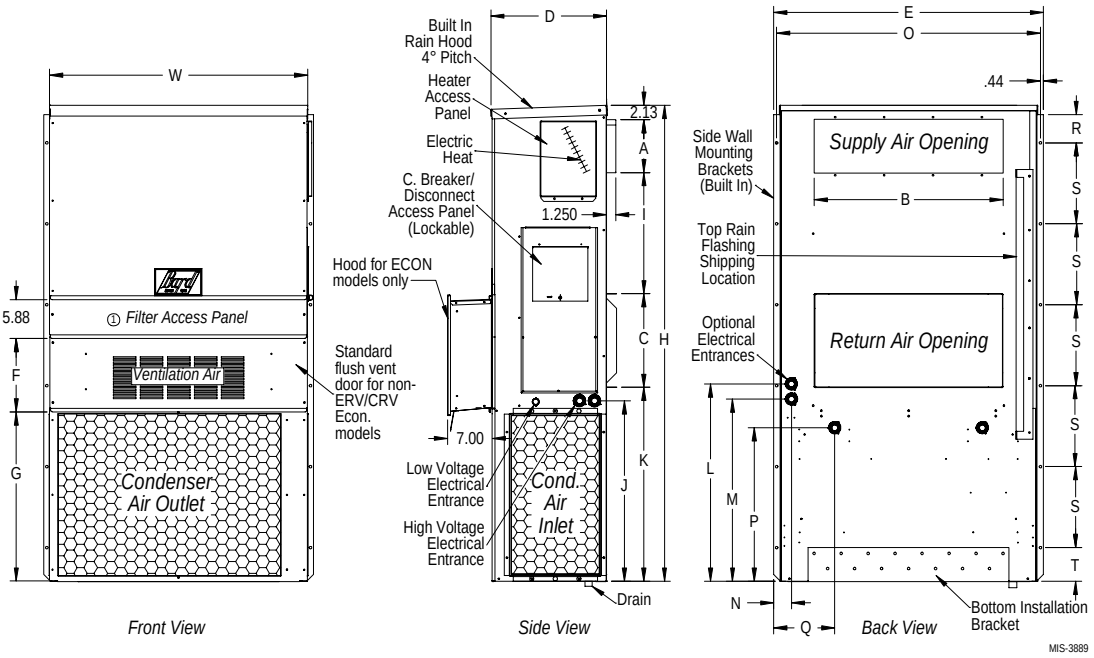
FIGURE 2

Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN																
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	P	Q	R	S	T
W18*B W24*B	33.300	17.125	74.563	7.88	19.88	11.88	19.88	35.00	10.88	29.75	20.56	30.75	32.06	33.25	31.00	2.63	34.13	26.06	10.55	4.19	12.00	9.00
W30*B W36*B	38.200	17.125	74.563	7.88	27.88	13.88	27.88	40.00	10.88	29.75	17.93	30.75	32.75	33.25	31.00	2.75	39.13	26.75	9.14	4.19	12.00	9.00

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

WA RIGHT UNIT**



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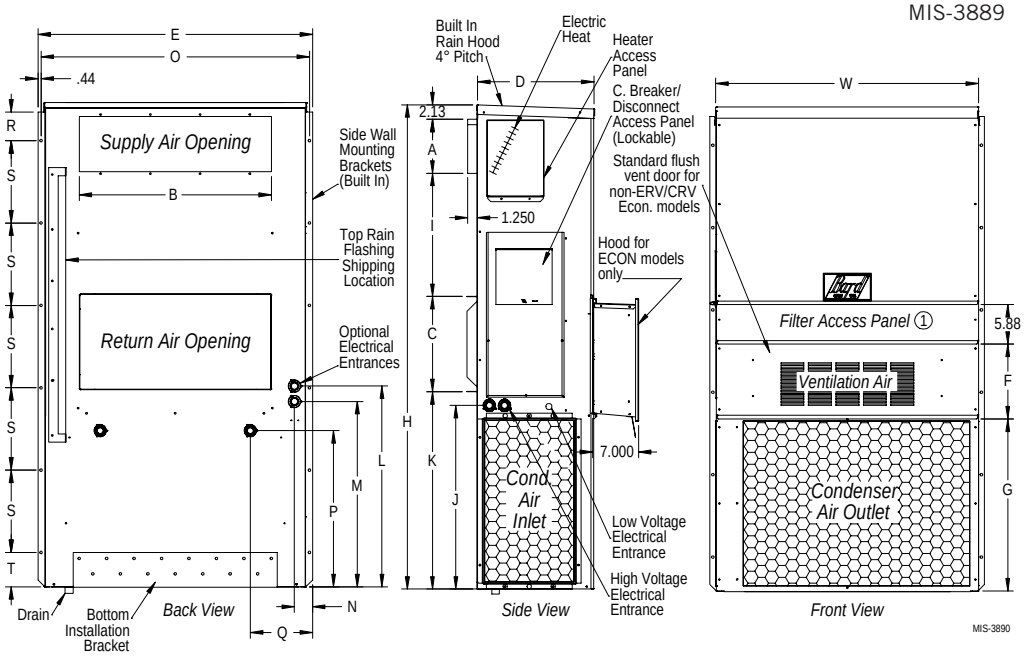
WL LEFT UNIT**



MIS-3890

Mounting the Units

⚠ WARNING

Heavy item hazard.

Use more than one person to handle unit.

Failure to do so could result in unit damage or serious injury.

NOTE: *It may be best to spot some electrical knockouts (such as those located on the back of the wall-mount unit) before units are mounted and access is unavailable or limited (see Figure 2 to locate pre-punched knockouts).*

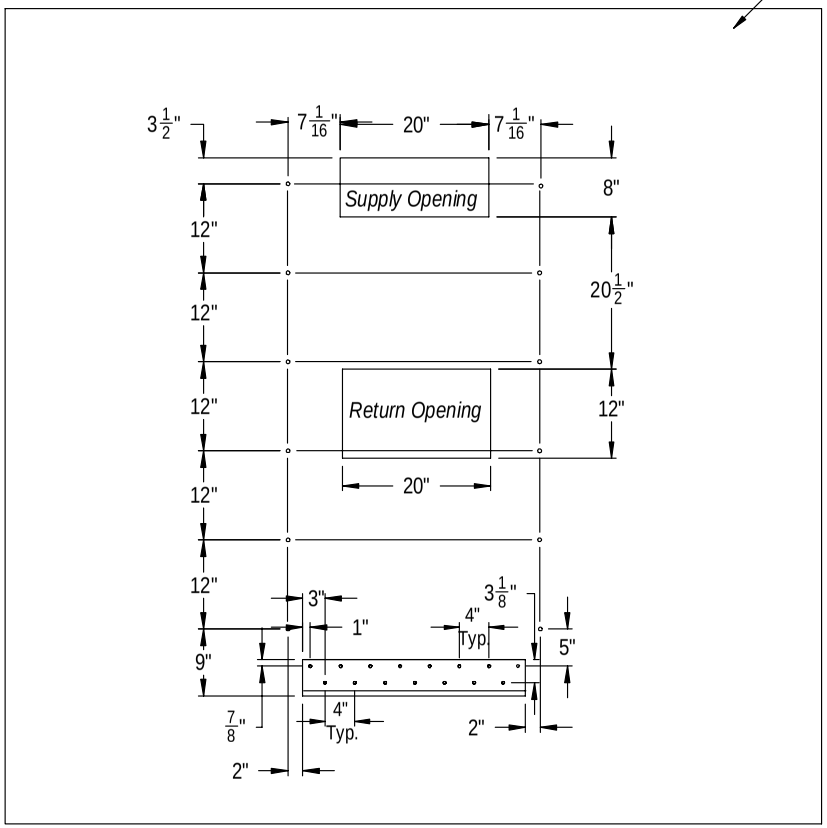
Two holes for the supply and return air openings must be cut through the wall as shown in Figures 4A and 4B on pages 10 and 11. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration. All walls must be thoroughly inspected to ensure that they are capable of carrying the weight of the installed unit.

In retrofit (unit replacement) installations, the openings cut for the original equipment may not line up exactly with needs of this installation. Modifications may need to be made, such as increasing or decreasing the size of the wall cutouts. The existing bolt placement may not line up in which case the original bolts would need to be removed or cut away.

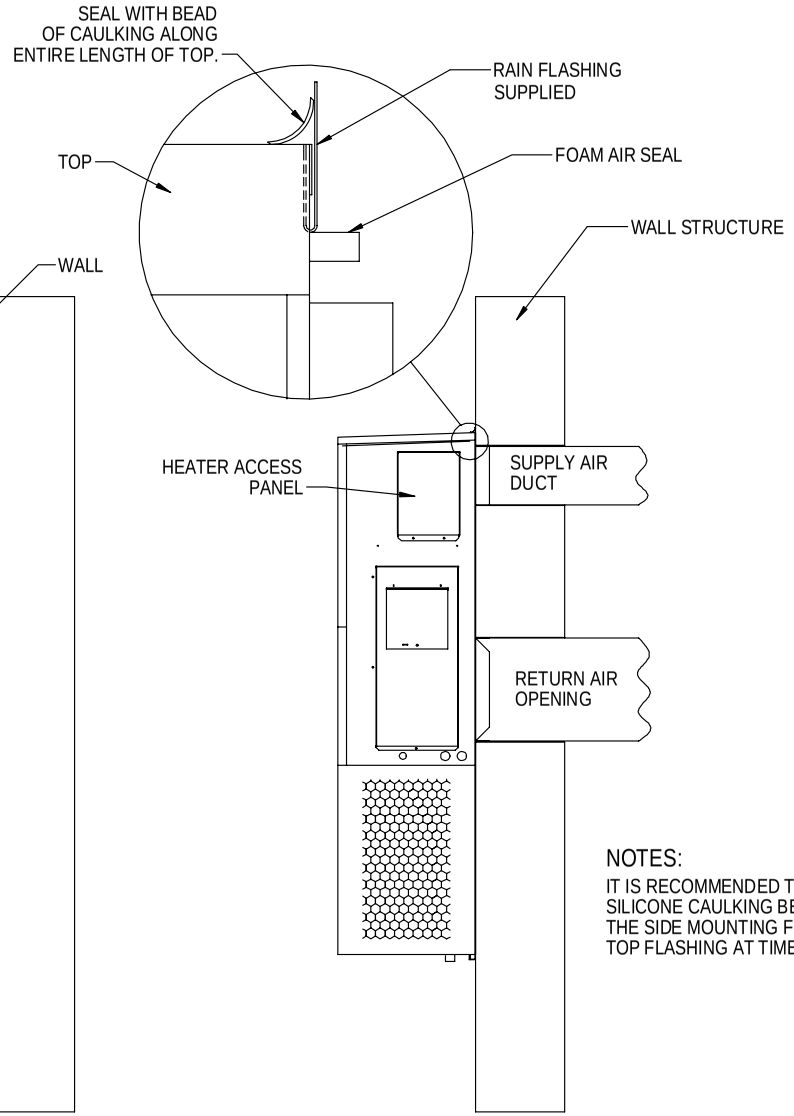
1. These units are secured by full-length mounting flanges built into the cabinet on each side which secure the unit to the outside wall surface. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The unit itself is suitable for 0" 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 Figures 4A and 4B for details on opening sizes.
3. Locate and mark lag bolt locations and location for optional bottom mounting bracket, if desired (see Figures 4A and 4B).
4. Mount bottom mounting bracket (if used).
5. If desired, 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 fasteners sufficient for the application such as 5/16" lag/anchor/carriage bolts; use 7/8" diameter flat washers on the lag bolts. It is recommended that a bead of silicone caulking be placed behind the side mounting flanges.
7. Secure optional rain flashing to wall and caulk across entire length of top (see Figures 4A and 4B).
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.
9. 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.
10. Install outdoor temperature/humidity sensor (see Figure 3). Remove grommet from base and sensor. Discard shipping bracket. Place sensor extension through hole in base under condenser fan and secure to base with screw.

FIGURE 3
Outdoor Sensor Installation

FIGURE 4A
W18A, W18L, W24A, W24L
Mounting Instructions



Wall Opening and Hole Location View



Right Side View

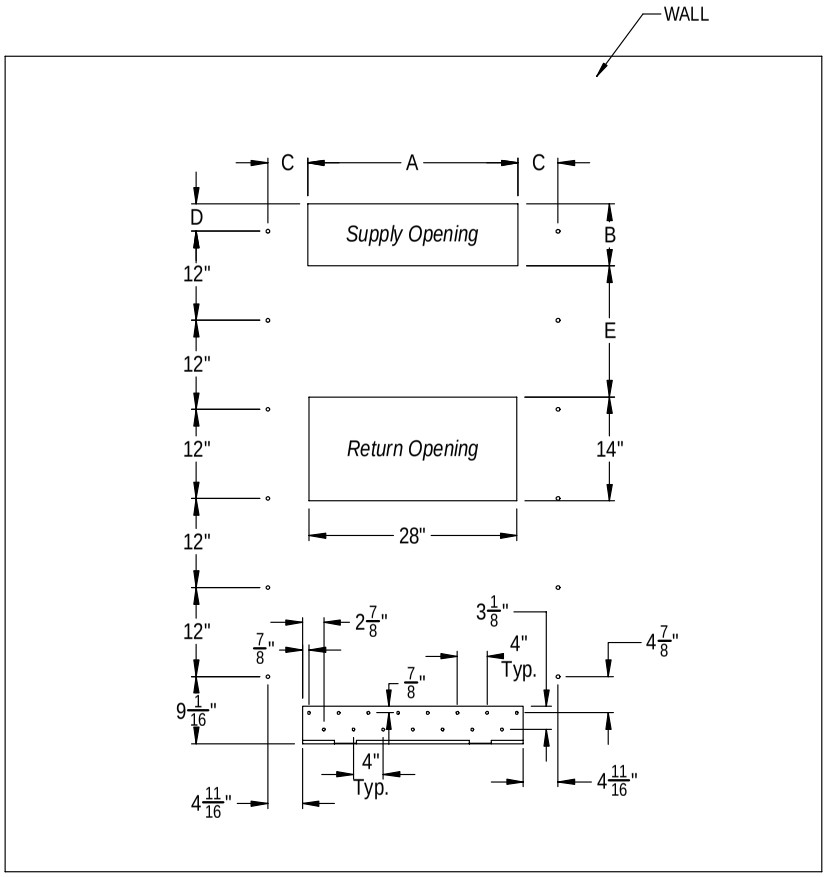
NOTES:

IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER TOP FLASHING AT TIME OF INSTALLATION.

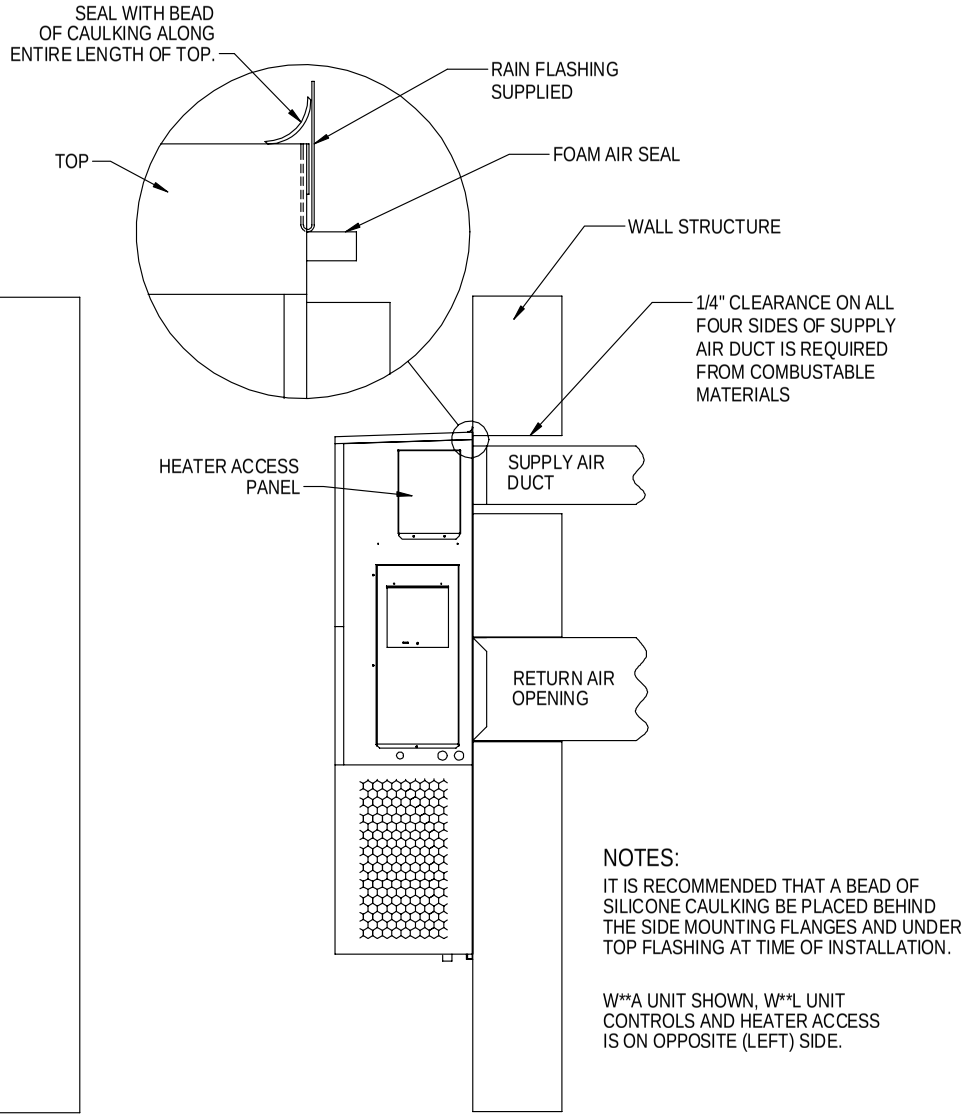
MIS-3157 A

FIGURE 4B
W30A, W30L, W36A, W36L
Mounting Instructions

	A	B	C	D	E
REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	28 3/8	8 3/8	5 3/8	3 11/16	17 5/8
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	29 7/8	9 7/8	4 5/8	4 7/16	16 7/8



Wall Opening and Hole Location View



Right Side View

NOTES:

IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER TOP FLASHING AT TIME OF INSTALLATION.

W**A UNIT SHOWN, W**L UNIT CONTROLS AND HEATER ACCESS IS ON OPPOSITE (LEFT) SIDE.

MIS-3820

FIGURE 5
Electric Heat Clearance

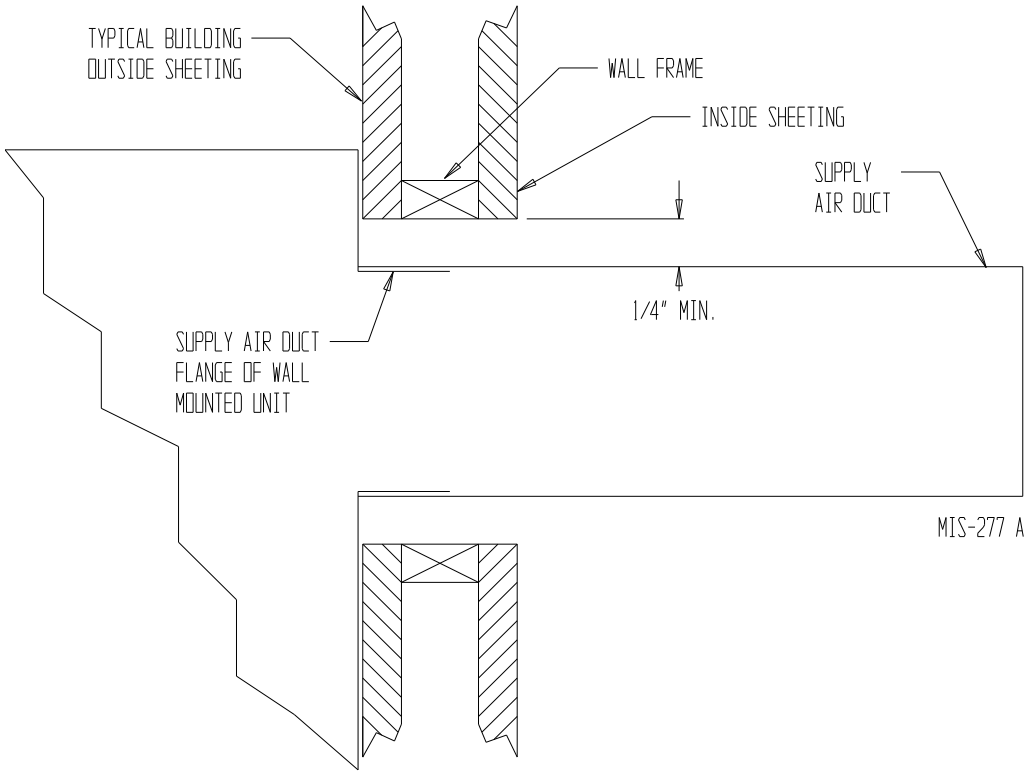
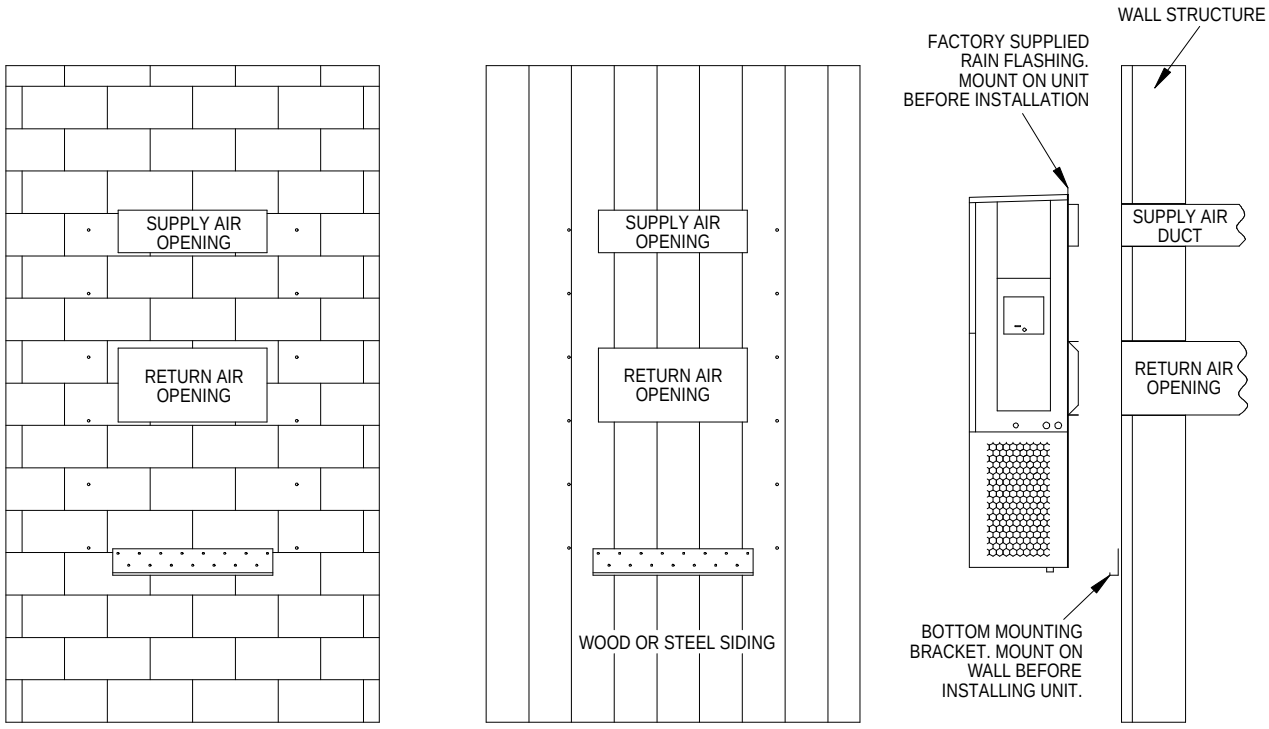


FIGURE 6
Wall Mounting Instructions



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

FIGURE 7
Wall Mounting Instructions

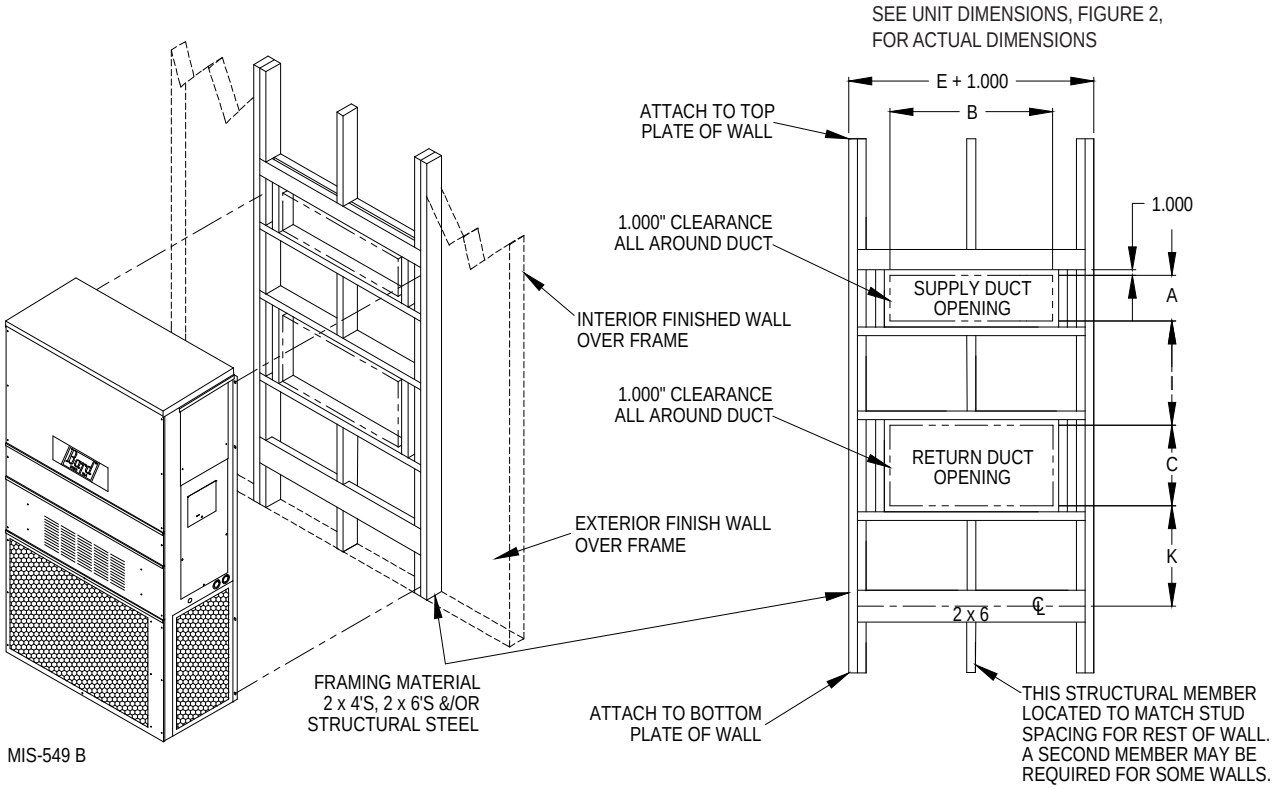
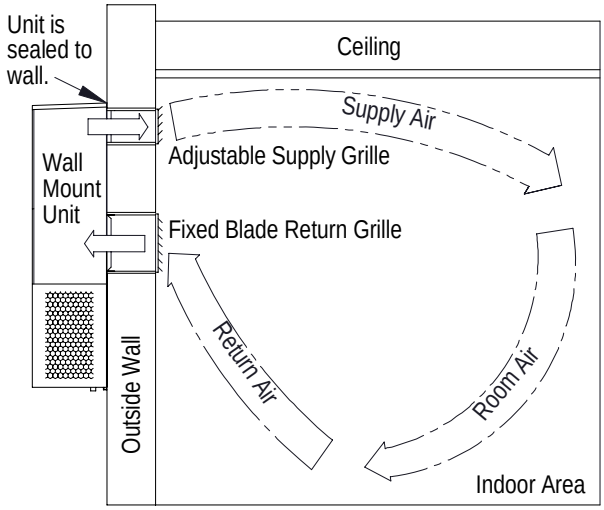


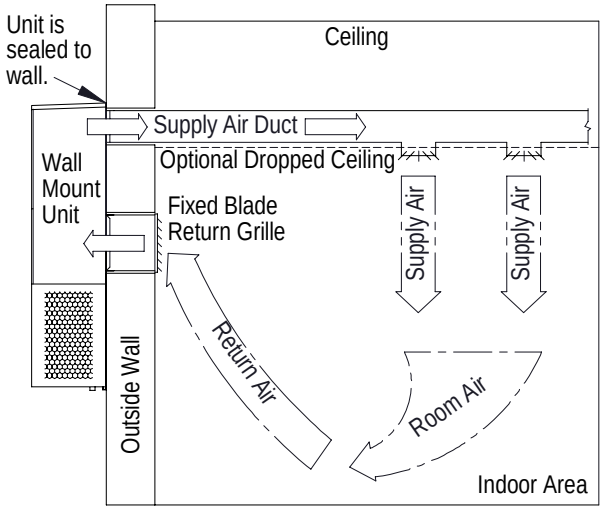
FIGURE 8
Common Wall Mounting Installations

Non-Ducted Installations



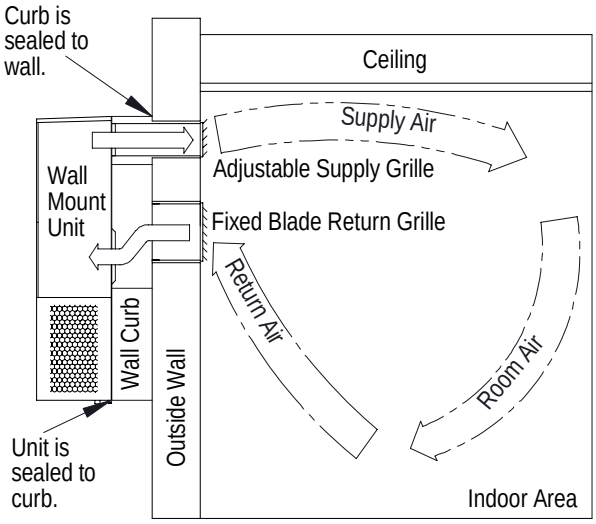
Non-ducted installations supply conditioned air into indoor room areas without extensive duct work. The supply airstream is directed by adjusting the 4-way supply grille to reach areas being conditioned. The supply air mixes with the room air and cools or heats occupants and/or equipment in the area. Unconditioned room air is returned to the unit through the return grille. Avoid supply air leaving supply grille and re-entering the unit return grille without mixing with room air.

Ducted Installations



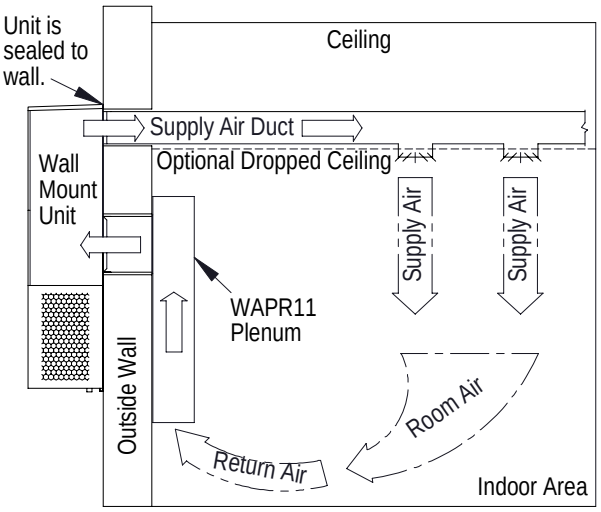
Ducted installations supply conditioned air into indoor room areas using solid or flexible ducts. The supply air is distributed throughout a single area or multiple areas. The supply air mixes with the room air and cools or heats occupants and/or equipment. Unconditioned room air is returned to the unit through a return grille or return duct work. Avoid using restrictive duct work to provide the best unit performance and efficiency. Review duct static pressure requirements provided in this manual.

Outdoor Wall Curb Installations



Outdoor Wall curbs are installed between the wall mount unit and the outer wall surface. Wall curb use may avoid resizing supply and return openings that are currently in an existing wall. Wall curbs may also provide sound isolation and indoor area sound reduction. Various curb options are available, and it is important to select a curb that will meet the application requirements and also be the correct size for the unit. Unit duct static requirements cannot be exceeded when using a wall curb. Follow all instructions provided with the wall curb when installing the product.

WAPR11 Indoor Sound Plenum Installations



Indoor sound plenums are installed inside the room over the unit return air opening. Plenum use can provide sound isolation and indoor area sound reduction. The WAPR11 sound plenum provides a single solution for all unit tonnage sizes. The WAPR11 may be installed horizontally or vertically in the room. Unit duct static requirements cannot be exceeded when using a sound plenum. Follow all instructions provided with the sound plenum when installing the product.

MIS-550 D

Main Power Wiring

⚠ WARNING

Electrical shock hazard.

Do not operate this equipment without an earth ground attached and always disconnect the remote electric power supplies before servicing.

Electrical shock can result in serious injury or death.

Refer to the unit rating plate or Tables 1, 2 or 3 (pages 16-18) for wire sizing information and maximum fuse or circuit breaker size. Each outdoor unit is marked with a "Minimum Circuit Ampacity". 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 rating 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 unit rating plate and Tables 1, 2 and 3 list 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 circuit breaker or fuse 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.

Route all field wires to the right of the wire shield as shown in the circuit routing label found in Figure 9 (and also on the wall-mount units).

See Figure 10 to reference VAC landing points.

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.

FIGURE 9
Circuit Routing Label

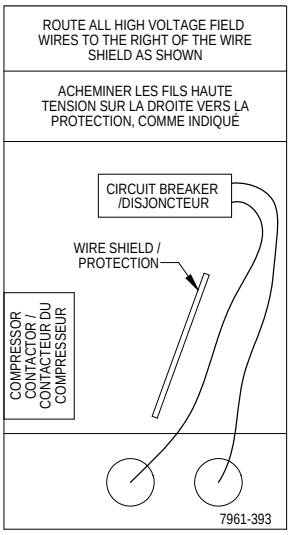
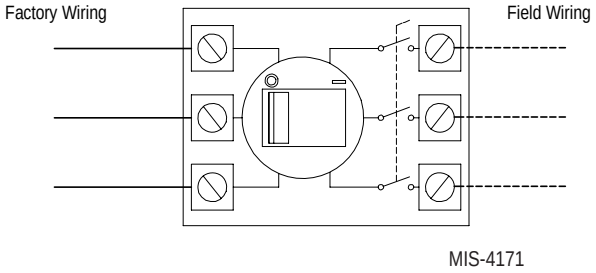


FIGURE 10
VAC Supply Wiring Landing Points



NOTE: Right-hand access model wiring landing points are shown here; left-hand access models will mirror this image.

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. **It is very important that the correct voltage tap is used.** For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are: 240V Tap (253 – 216) and 208 Tap (220 – 197).

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 low voltage wiring, an 18 gauge copper, color-coded cable is recommended.

TABLE 1A
Electrical Specifications – W**ABP Series – 60Hz Units

Model	Rated Volts & Phase	No. 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
W18ABPA00, A0Z	230/208-1	1	16	20	12	12								
A05		1	30	30	10	10								
A08		1	45	45	8	10								
A10		1	56	60	6	10								
W24ABPA00, A0Z	230/208-1	1	21	30	10	10								
A05		1	30	30	8	10								
A08		1	46	50	8	10								
A10		1	57	60	6	10								
W24ABPB00, B0Z	230/208-3	1	15	20	12	14								
B06		1	23	25	10	10								
W24ABPC00, C0Z	460-3	1	8	10	14	14								
C06		1	12	15	14	14								
W30ABPA00, A0Z	230/208-1	1	23	35	8	10								
A05		1	31	35	8	10								
A08		1	47	50	8	10								
A10		1	57	60	6	10								
A15		1 or 2	83	90	4	8	57	26	60	30	6	10	10	10
W30ABPB00, B0Z	230/208-3	1	17	20	12	12								
B06		1	23	25	10	10								
B09		1	32	35	8	10								
B15		1	50	50	8	10								
W30ABPC00, C0Z	460-3	1	9	10	14	14								
C06		1	12	15	14	14								
C09		1	16	20	12	12								
C12		1	20	20	12	12								
C15		1	25	25	10	10								
W36ABPA00, A0Z	230/208-1	1	27	35	8	10								
A05		1	32	35	8	10								
A08		1	48	50	8	10								
A10		1	58	60	6	10								
A15		1 or 2	84	90	4	8	58	26	60	30	6	10	10	10
W36ABPB00, B0Z	230/208-3	1	20	25	10	10								
B06		1	24	25	10	10								
B09		1	33	35	8	10								
B15		1	51	60	6	10								
W36ABPC00, C0Z	460-3	1	9	10	14	14								
C06		1	11	15	14	14								
C09		1	15	15	14	14								
C15		1	24	25	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.

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.*

TABLE 1B
Electrical Specifications – W**LBP Series – 60Hz Units

Model	Rated Volts & Phase	No. 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
W18LBPA00, A0Z	230/208-1	1	16	20	12	12								
A05		1	30	30	10	10								
A08		1	45	50	8	10								
A10		1	56	60	6	10								
W24LBPA00, A0Z	230/208-1	1	21	25	10	10								
A05		1	30	35	8	10								
A08		1	46	50	8	10								
A10		1	56	60	6	10								
W24LBPB00, B0Z	230/208-3	1	15	20	12	14								
B06		1	23	25	10	10								
W30LBPA00, A0Z	230/208-1	1	23	35	8	10								
A05		1	31	35	8	10								
A08		1	46	50	8	10								
A10		1	57	60	6	10								
A15		1 or 2	83	90	4	8	57	26	60	30	6	10	10	10
W30LBPB00, B0Z	230/208-3	1	17	20	12	12								
B09		1	32	35	8	10								
B15		1	50	50	8	10								
W30LBPC00, C0Z	460-3	1	9	10	14	14								
C09		1	16	20	12	12								
C15		1	25	25	10	10								
W36LBPA00, A0Z	230/208-1	1	27	40	8	10								
A05		1	32	40	8	10								
A10		1	58	60	6	10								
A15		1 or 2	84	90	4	8	58	26	60	30	6	10	10	10
W36LBPB00, B0Z	230/208-3	1	20	25	10	10								
B09		1	33	35	8	10								
B15		1	51	60	6	10								
W36LBPC00, C0Z	460-3	1	9	10	14	14								
C09		1	15	15	14	14								
C15		1	24	25	10	10								

TABLE 2
Electrical Specifications – W**ABE Series

Model	Rated Volts & Phase	No. 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
W36ABE, A15	230/208-1	1 or 2	103	110	2	6	52	51	60	60	6	6	10	10
B15	230/208-3	2	N/A	N/A	N/A	N/A	45	18	50	20	8	12	10	12
C15	460-3	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) 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.

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.*

TABLE 3A
Electrical Specifications – W**ABP Series – 50Hz Units

Model	Rated Volts & Phase	Operating Voltage Range	No. Field Power Circuits	Single Circuit	
				① Minimum Circuit Ampacity	② Maximum External Fuse or Ckt. Brkr.
W24ABPD00, D0Z	240/220-1	254-198	1	15	20
D05			1	28	30
D08			1	44	45
W24ABPF00, F0Z	415/380-3 ③	456-342	1	10	15
F05			1	11	15
W30ABPD00, D0Z	240/220-1	254-198	1	15	20
D05			1	28	30
D10			1	54	60
W30ABPF00, F0Z	415/380-3 ③	456-342	1	10	15
F07			1	16	20
F12			1	26	30
W36ABPD00, D0Z	240/220-1	254-198	1	17	25
D05			1	28	30
D10			1	54	60
W36ABPE00, E0Z	230/200-3	242-180	1	17	25
E06			1	21	25
E12			1	39	40
W36ABPF00, F0Z	415/380-3 ③	456-342	1	10	15
F07			1	14	15
F12			1	22	25

TABLE 3B
Electrical Specifications – W**LBP Series – 50Hz Units

Model	Rated Volts & Phase	Operating Voltage Range	No. Field Power Circuits	Single Circuit	
				① Minimum Circuit Ampacity	② Maximum External Fuse or Ckt. Brkr.
W24LBPF00, F0Z	415/380-3 ③	456-342	1	10	15
F05			1	11	15
W30LBPF00, F0Z	415/380-3 ③	456-342	1	10	15
F07			1	16	20
F12			1	26	30
W36LBPF00, F0Z	415/380-3 ③	456-342	1	10	15
F07			1	14	15
F12			1	22	25

① These “Minimum Circuit Amp” values are to be used for sizing the field power conductors.

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

③ 415/380-3 Electrical Ratings are 3-phase wye (star) systems requiring three (3) phase legs plus neutral and ground. ***NOTE:*** *The indoor and outdoor motors and 24V transformer primary are connected at 240V derived from one (1) phase leg to neutral. This is internally connected and no field wiring required.*

NOTE: *All wiring must conform to NIC/EIC latest edition.*

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.*

Running in Orphan Mode

With the AC breakers turned on, each MULTI-TEC wall-mount unit has the capability to run without the LC6000 controller or PGD connected—this feature is called orphan mode. This keeps the shelter between 60°F and 77°F (factory default settings) by the use of the factory-installed return air sensor in each wall-mount unit. In orphan mode, the wall unit uses a continuous blower setting to circulate room air into the return air inlet and uses the return air temperature sensor to control room temperature.

The wall-mount unit can be turned on and off with the TEC-EYE hand-held diagnostic tool. When ON is chosen, the wall-mount unit will heat or cool. When set to OFF using the TEC-EYE, the wall-mount unit will not heat, cool or ventilate.

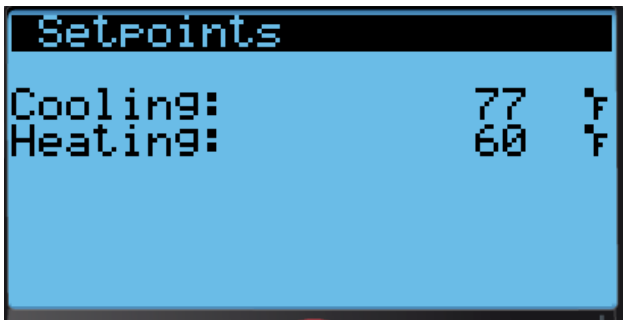
To turn the unit on or off with TEC-EYE:

1. Connect the TEC-EYE diagnostic tool to the control board located in the unit.
2. Press MENU key to go to the Main Menu screen.
3. Press UP or DOWN keys and ENTER key to enter USER password 2000.
4. Press UP or DOWN keys to scroll to **On/Off**; press ENTER key.
5. Press UP or DOWN keys to change value from On to Off or from Off to On.
6. Press ESCAPE key several times to return to Main Menu screen.

To verify or change the wall-mount unit cooling and heating setpoints in orphan mode:

1. Connect the TEC-EYE diagnostic tool to the control board located in the unit.
2. From the Status screen, press UP or DOWN key until Quick Menu displays Setpoints (SET) icon. Press ENTER key.
3. Press ENTER key to scroll to the selected choice (see Figure 11).
4. Press UP or DOWN key on desired value until value displays correctly.
5. Press ENTER key to save and scroll to next parameter.
6. Press ESCAPE key until Main Menu screen is displayed.

FIGURE 11
Cooling and Heating Setpoints

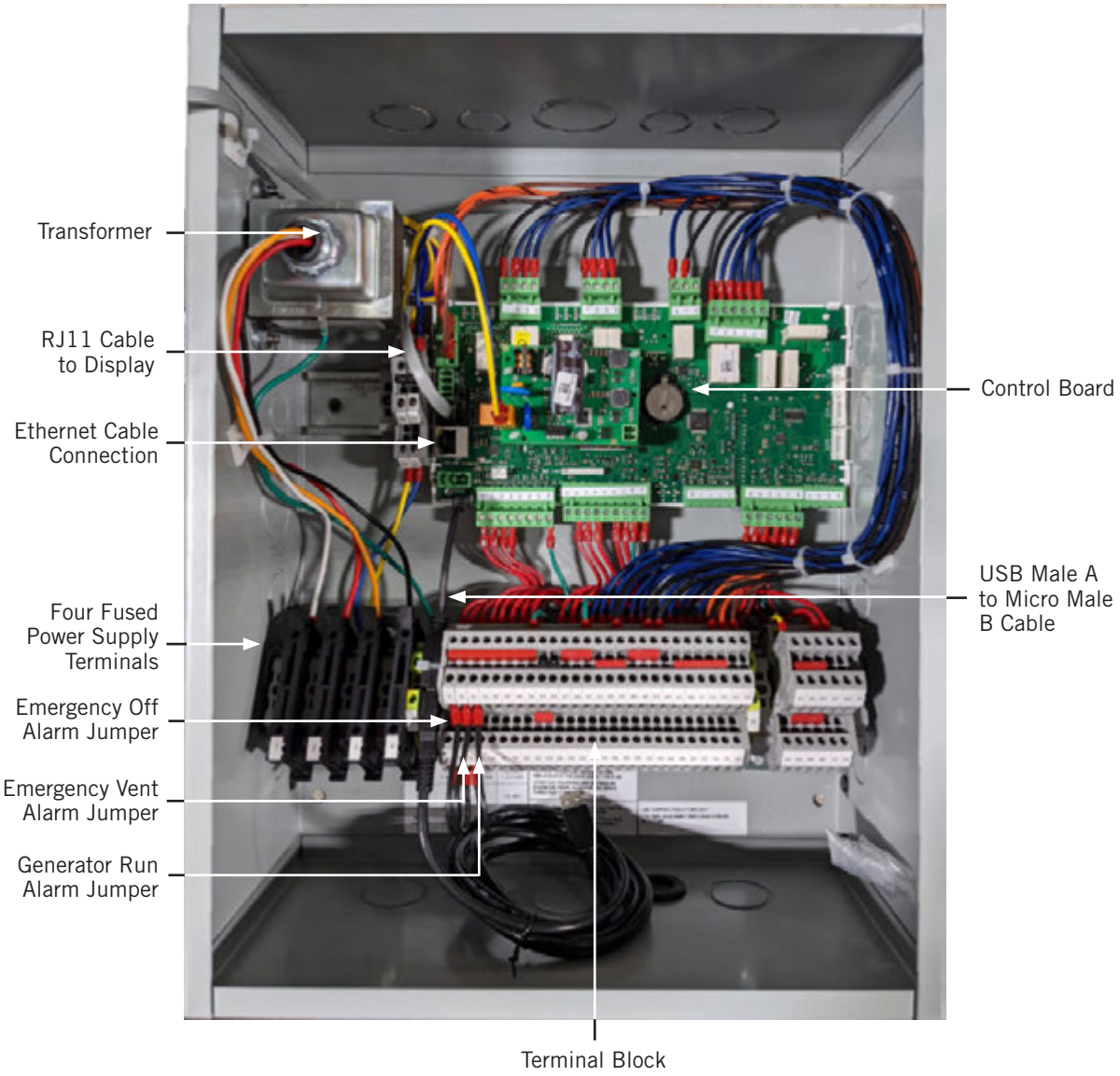


During installation, the ability to run in orphan mode allows deactivation of one of the existing, older wall-mount units, while keeping the shelter cool with the other unit still operating. Once the first of the Bard MULTI-TEC wall-mount units is installed, orphan mode can be enabled early in the installation—keeping the climate inside the shelter stable and the installers comfortable while the remainder of the older equipment is removed and the remaining Bard MULTI-TEC wall-mount units and LC6000 controller are installed.

Additionally, should any or all of the MULTI-TEC wall-mount units lose communication with the LC6000 controller (such as during maintenance), they will continue to serve the shelter's needs until a repair can be made.

NOTE: *Screenshots shown in this manual reflect default settings (when applicable).*

FIGURE 12
Typical LC6000-200 Component Location



⚠ WARNING

Electrical shock hazard.

Disconnect VAC power supplies before servicing.

Failure to do so could result in electric shock or death.

IMPORTANT: *When working with circuit board components, Bard recommends the use of an anti-static wrist strap to prevent static electricity shorts to electronic controls.*

LC6000 Controller

The LC6000 controller is part of this air conditioning system. It is used to control up to 14 wall-mount air conditioners from one controller. The microprocessor control provides an easy-to-read interface with large LCD graphical display. It provides control for redundancy for the structure and equal wear on all units.

Conduit is recommended for all wiring. Route communication wiring and power supply wiring in their own separate conduits.

The LC6000 controller is not weatherproof and is intended for use in a weathertight structure.

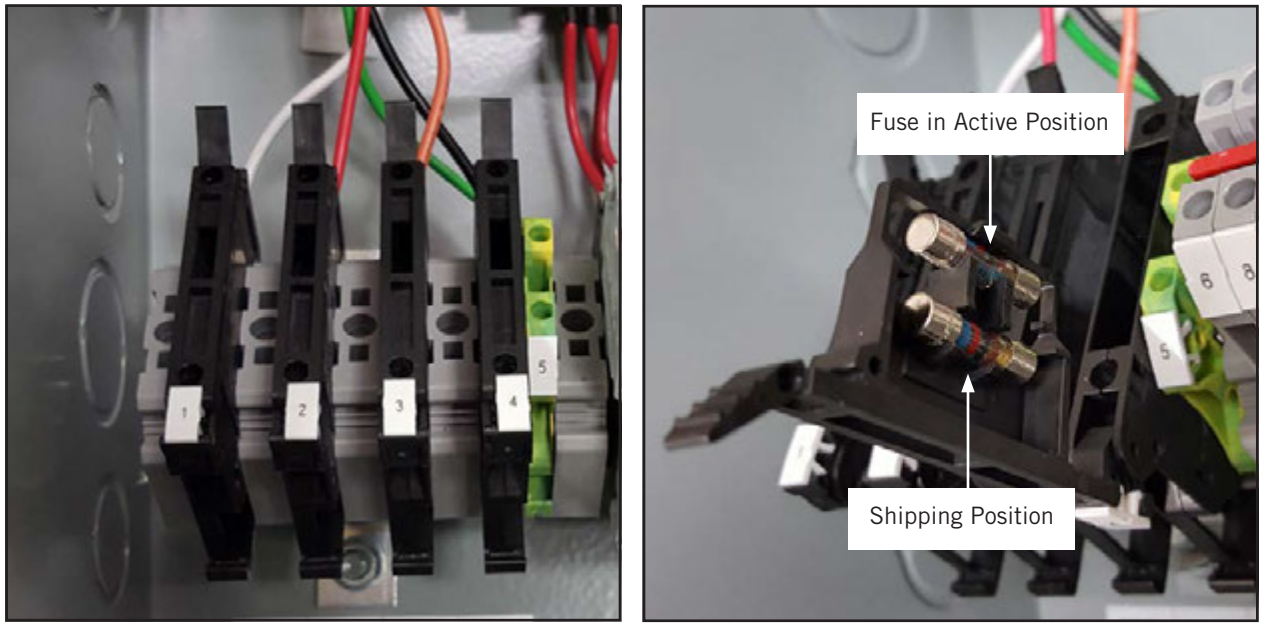
Mounting the LC6000 Controller

The dimensions of the LC controller are 16" x 12" x 6".

Because the LC6000 controller utilizes a remote temperature sensor as opposed to one located in the controller box, the controller itself can be installed in any indoor location that is suitable, preferably at eye level. Four (4) mounting holes are provided for mounting to the wall and holes for conduit connections are provided in the base, sides and top of the controller.

The LC6000 controller includes four fused power supply terminals in the terminal block. Before connecting wires to the terminal block, confirm that the fuse in each of the four fuse holders is in the proper position (active) as shown in Figure 13.

FIGURE 13
LC6000 Fused Power Supply Terminal



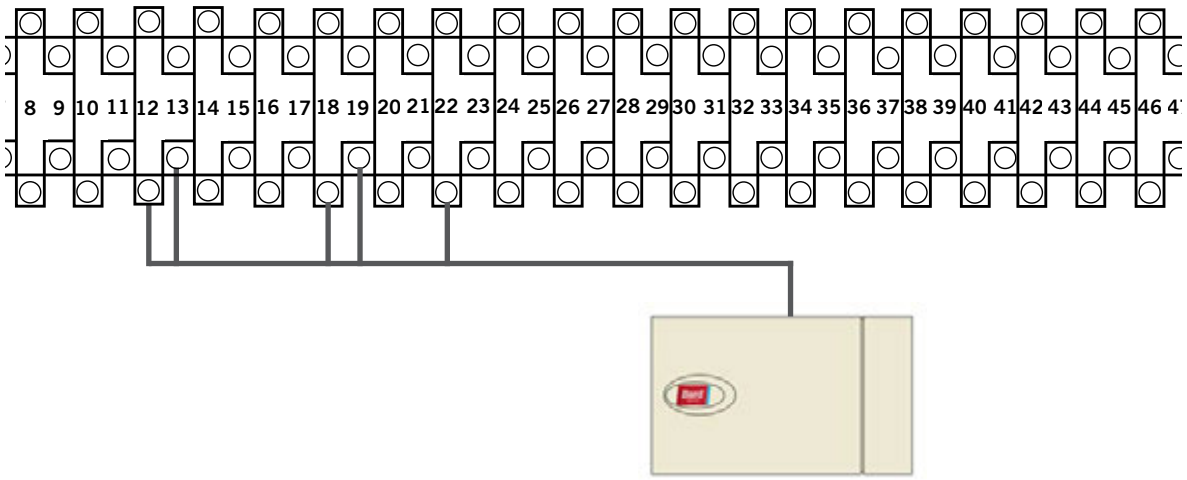
Installing Remote Indoor Temperature/Humidity Sensor(s)

One remote indoor temperature/humidity sensor and 35' of 18 gauge 5-conductor shielded cable is included with the controller. This sensor must be installed for proper operation. Mount the temperature/humidity sensor in a location least likely to be affected by open doors, rack-mounted fans, radiant heat sources, etc. Locating the sensor between both return grilles is often the best location, but every installation is unique. Location height should be approximately 60" above the floor. The sensor should be installed on a 2" x 4" junction box to allow for control wire conduit. Use shielded cable to connect to controller. The maximum cable length to connect the temperature/humidity sensor to the LC6000 is 98'.

FIGURE 14
Remote Indoor Temperature/Humidity Sensor Installation

1. Connect wires from the 18 gauge shielded cable to terminals #12, #13, #18, #19 and #22.

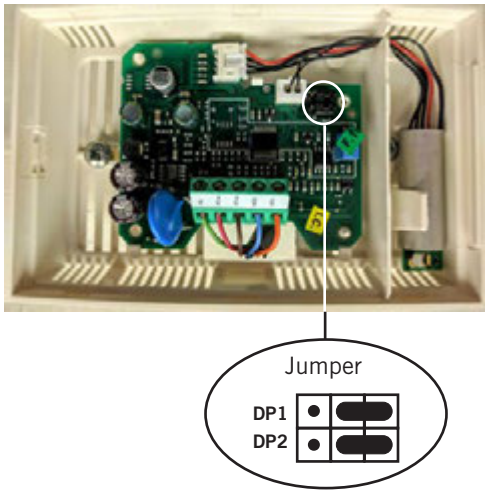
TB#	Wire Mark	Sensor	Description
18	B6	NTC OUT	Indoor Remote Sensor (Zone 1)
19	GND	NTC OUT	Ground
12	B2	OUT H	Remote Indoor Humidity Sensor: 0-1 VDC (Zone 1)
13	GND	M (GO)	Ground
22	+VDC	+ (G)	Power for B2

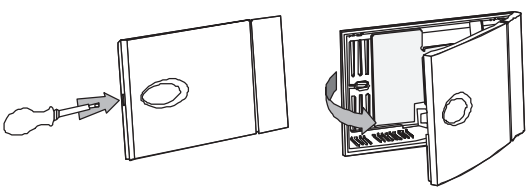


2. Connect the other end of the shielded cable to the sensor terminals. Be sure wires are connected to proper terminals as shown in table above.

   Sensor jumpers need to be positioned for 0-1 V. With sensor oriented as shown in image to right, move both jumpers to right position (DP1 and DP2 set to OFF). **This applies to all indoor temperature/humidity sensors connected to the LC controller.** See illustration mounted inside of sensor cover for further detail on jumper position.

   Earlier versions of this sensor may be mounted in a different orientation which would affect the positioning of the sensor jumpers. See page 44 for additional information on sensor orientation.





For proper operation, the remote indoor temperature/humidity sensor (and any additional sensors) must be configured properly with the controller as shown in Step 2 on page 22. An additional remote indoor temperature-only sensor can be purchased and installed in Zone 1. If the site in which the LC6000 controller will be used has more than one zone (maximum three zones per LC6000), additional remote temperature/humidity sensors (one per zone) will need to be purchased and installed in the additional zones. All installed sensors must be enabled in the controller menu (see **Configure Sensors** beginning on page 37).

FIGURE 15
Additional Remote Temperature and Temperature/Humidity Sensor Installation

One additional temperature sensor can be added to Zone 1 and additional temperature/humidity sensors may be added to Zones 2 and 3 (one per zone). **Be sure the sensors are connected to the proper terminals on the terminal block and sensor as listed below.** The maximum cable length to connect temperature or temperature/humidity sensors to the LC6000 is 98'.

Zone 1:
Optional Remote
Temperature Sensor
Terminals 20 & 21*

TB#	Wire Mark	Description
20	B7	Indoor Remote Sensor (Zone 1 – optional)
21	GND	Ground

* The two wire connections for the optional remote temperature sensor are not polarity sensitive.

Zone 2:
Optional Remote
Temperature/Humidity Sensor
Terminals 26, 27, 14, 15 & 23
IMPORTANT: *Note jumper position in Figure 14*

TB#	Wire Mark	Sensor	Description
26	B8	NTC OUT	Indoor Remote Sensor (Zone 2)
27	GND	NTC OUT	Ground
14	B3	OUT H	Remote Indoor Humidity Sensor: 0-1 VDC (Zone 2)
15	GND	M (GO)	Ground
23	+VDC	+ (G)	Power for B3

Zone 3:
Optional Remote
Temperature/Humidity Sensor
Terminals 28, 29, 16, 17 & 24
IMPORTANT: *Note jumper position in Figure 14*

TB#	Wire Mark	Sensor	Description
28	B9	NTC OUT	Indoor Remote Sensor (Zone 3)
29	GND	NTC OUT	Ground
16	B4	OUT H	Remote Indoor Humidity Sensor: 0-1 VDC (Zone 3)
17	GND	M (GO)	Ground
24	+VDC	+ (G)	Power for B4

Zones 2 and 3 can also use temperature-only sensors in place of the temperature/humidity sensors. Zone 2 will connect to TB# 26 and 27. Zone 3 will connect to TB# 28 and 29. The wire connections for the temperature-only sensors are not polarity sensitive.

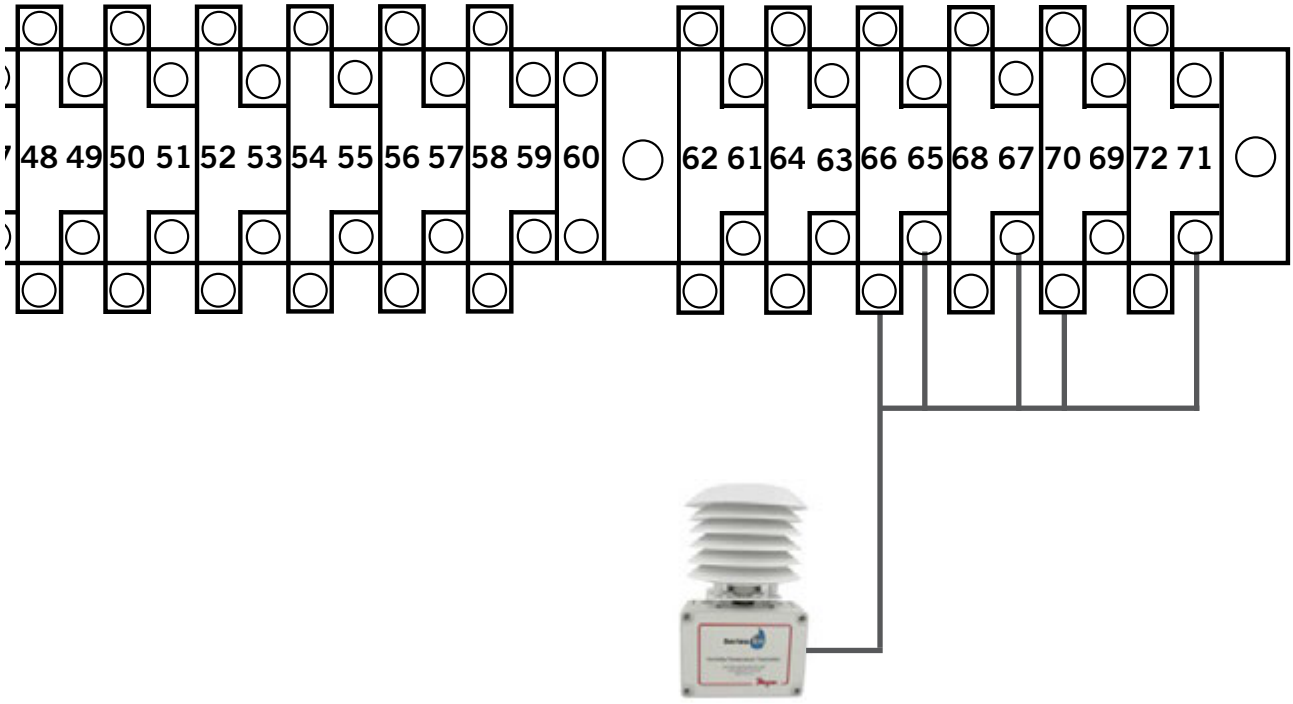
Installing Optional Outdoor Temperature/Humidity Sensor

One optional outdoor temperature/humidity sensor (8301-090) can be installed. Follow the manufacturer's mounting instructions. Use 18 gauge 5-conductor shielded cable to connect to controller. The maximum cable length to connect the temperature/humidity sensor to the LC6000 is 98'.

FIGURE 16
Remote Outdoor Temperature/Humidity Sensor Installation

1. Connect wires from the 18 gauge shielded cable to terminals #65, #66, #67, #70 and #71.

TB#	Wire Mark	Sensor	Description
70	B12	4	Remote Outdoor Temperature Sensor
71	ND	5	Ground
67	B11	1	Remote Outdoor Humidity Sensor: 0-10 VDC
66	GND	3	Ground
65	+VDC	2	+VDC

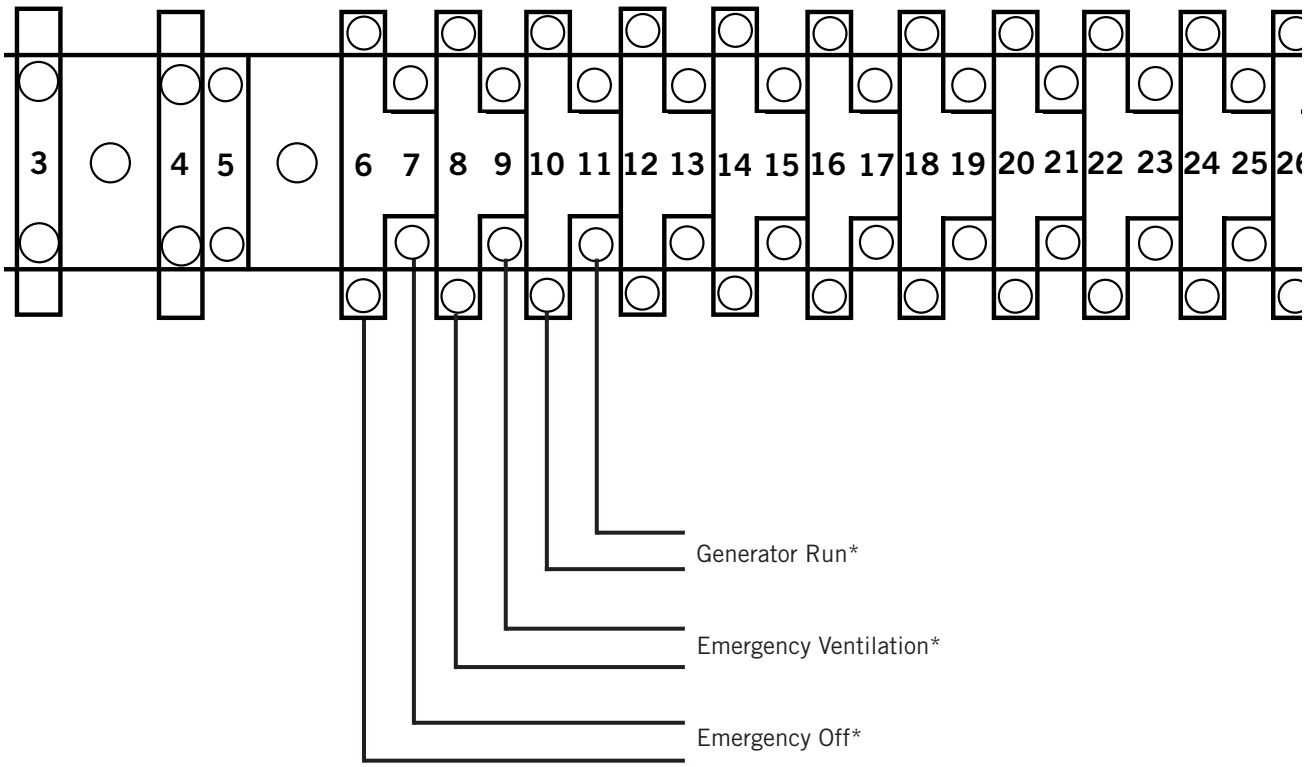


2. Connect the other end of the shielded cable to the sensor terminals. Be sure wires are connected to proper terminals as shown in table above.

Emergency Off, Emergency Ventilation and Generator Run Connections

The LC6000-200 controller is shipped with emergency off, emergency ventilation and generator run contacts. There are factory-installed jumpers across terminals #6 and #7 (emergency off), #8 and #9 (emergency ventilation) and #10 and #11 (generator run). Remove the factory-installed jumpers before making the connections.

FIGURE 17
LC6000-200 Series Connection for Emergency Off, Emergency Ventilation and Generator Run (If Applicable)



* Normally closed (NC) contacts required.

By default:
Closed = No Alarm
Open = Alarm

Communication Wiring

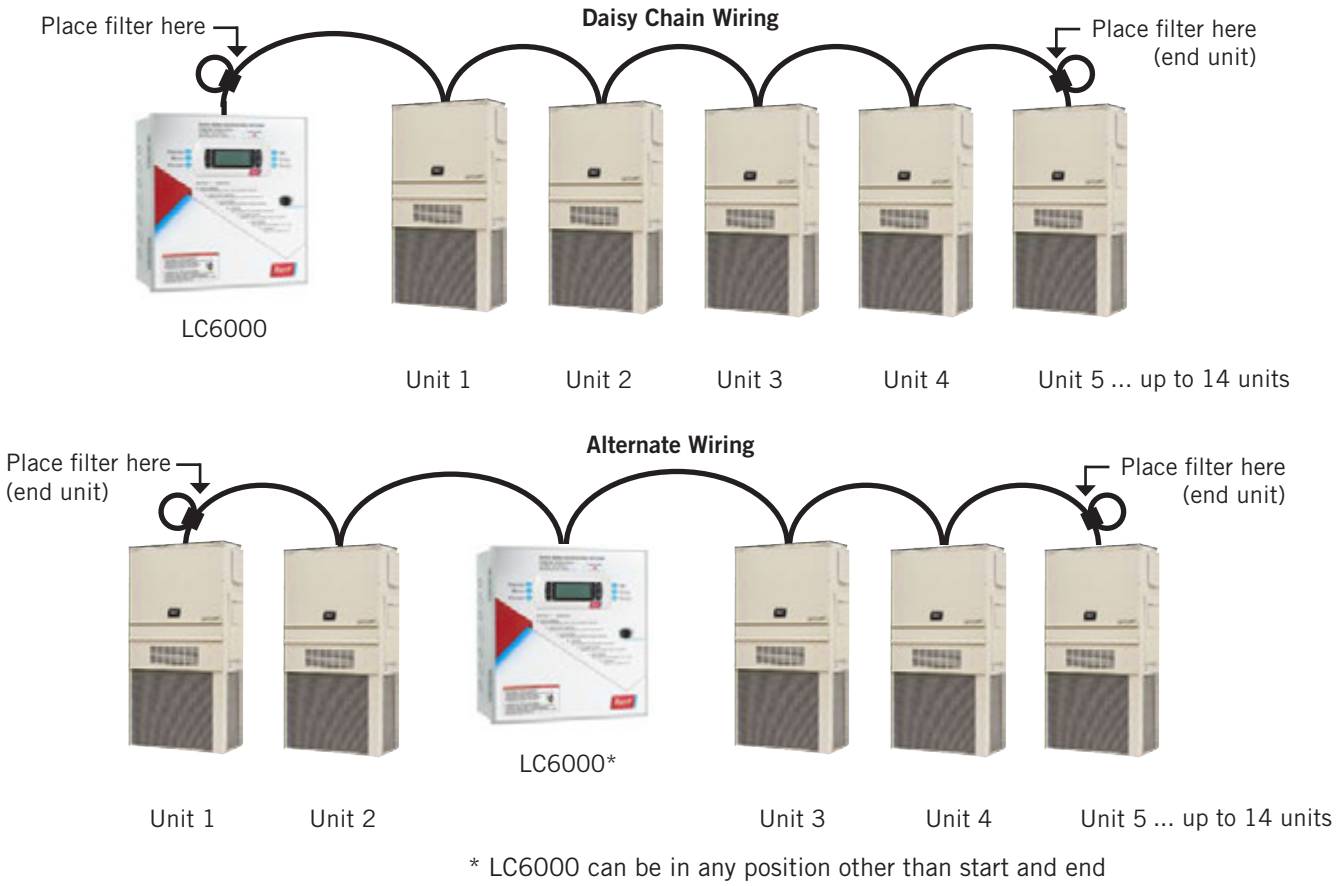
Connect the communication wiring from the wall-mount units to the controller in the manner shown in Figures 18, 19 or 20. **The daisy chain does not need to follow the addressing order.** The communication wire should be 2-wire, 18 gauge shielded cable with drain. Any color can be used. Be sure to match "+" and "-" symbols on controller terminal blocks to prewired unit control terminal block (see Figures 22 and 23 on pages 29 and 30). Attach communication wire filters as shown in Figures 18, 19 or 20. **Do not run communication wiring in same conduit as supply wiring. Route communication wiring and power supply wiring in their own separate conduits.**

FIGURE 18
Communication Wiring (Daisy Chain Method)

In addition to the "daisy chain" method of connecting the communication wiring shown in Figure 18, the wall-mount units can also be connected in the manner shown in Figure 19. If connecting wall-units this way, be sure to place the communication wire filters in the positions shown in Figure 19. See Figure 20 for more information on the correct placement of the communication wire filters depending on the wiring method used.

FIGURE 19
Communication Wiring (Alternate Method)

FIGURE 20
Placement of Communication Wire Filters (Daisy Chain and Alternate Methods)



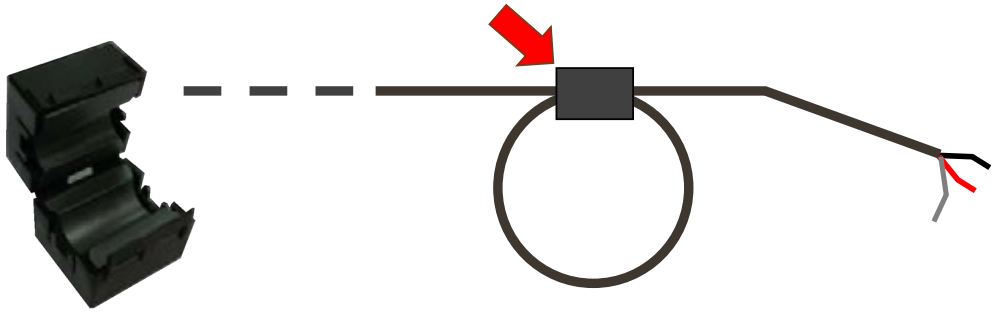
* LC6000 can be in any position other than start and end

NOTE: *Line filters can be on either the unit or controller, whichever device is on the end of the chain. No matter how many units there are, the two end devices will only have ONE communication cable, whereas the center devices will all have TWO (as shown above). Maximum two wires in each terminal. Filters go inside the unit or controller; shown out of unit above for identification only.*

The steps outlined on the following pages show how to connect the communication wiring using the daisy chain method shown in Figure 18. If using the alternate method (as shown in Figure 19), the connections to the controller and each wall-mount unit will be the same but the filters need to be placed in the positions shown in Figure 20.

FIGURE 21
Communication Wiring: Termination at the Controller

1. Using the field-provided shielded cable, make a small service loop after entering the controller and attach the provided EMI filter at the intersection of the loop.



2. Connect one wire to terminal #56 (negative), the other wire to terminal #57 (positive) and the drain wire to ground terminal #60.

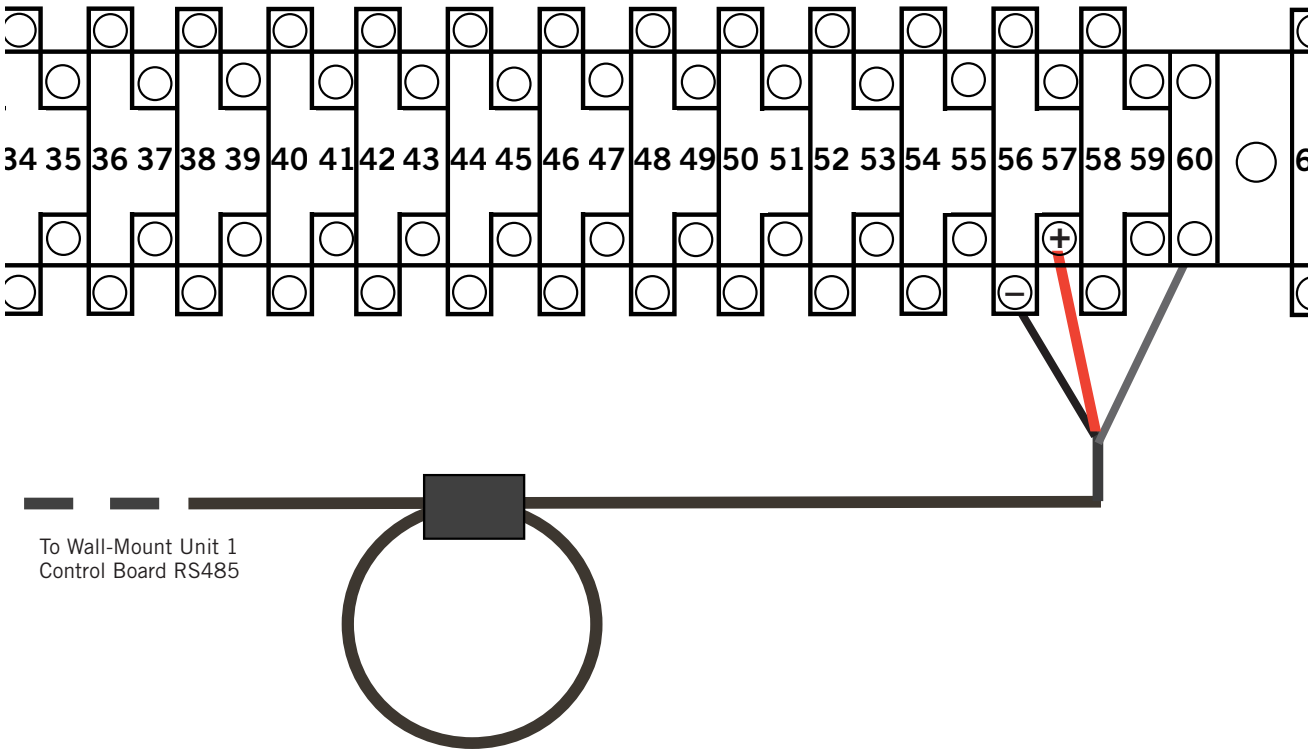
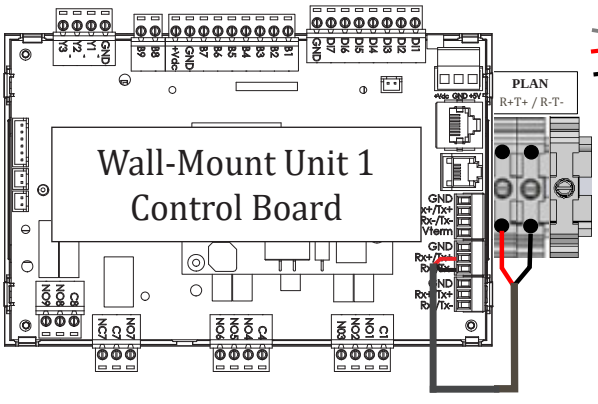
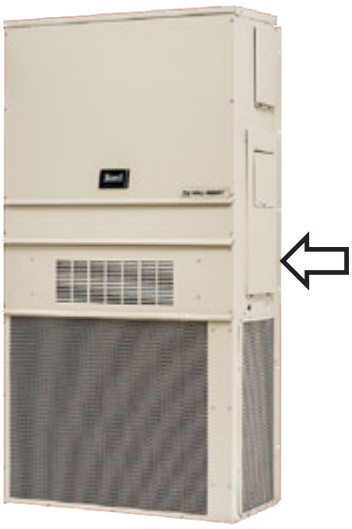


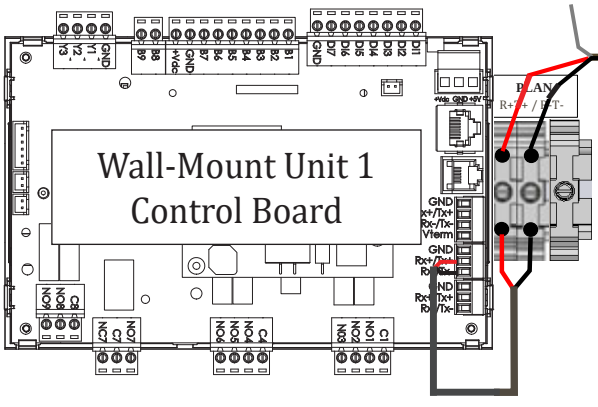
FIGURE 22
Communication Wiring: Termination at the First Wall-Mount Unit



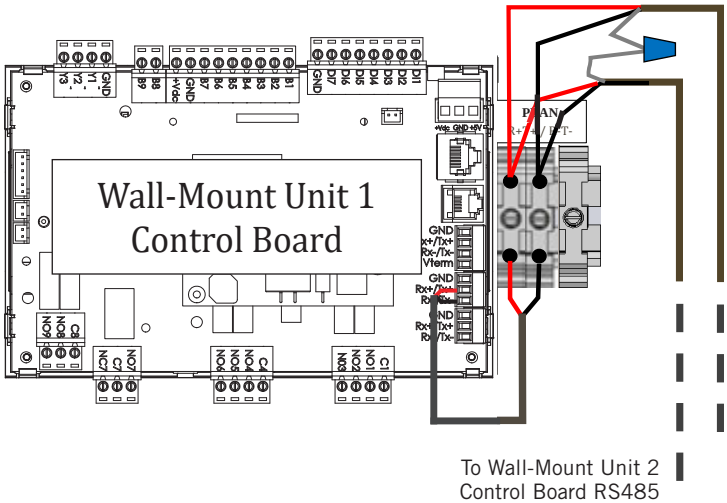


1. From the controller, extend the shielded cable through a separate conduit and route to the provided terminal block next to the wall-mount control board.

   Note that the terminal block label is clearly marked “+” and “-”. These connections are polarity-sensitive. Two-wire communication from control board is prewired to terminal block. Make sure to match "+" and "-" symbols on controller terminal blocks.

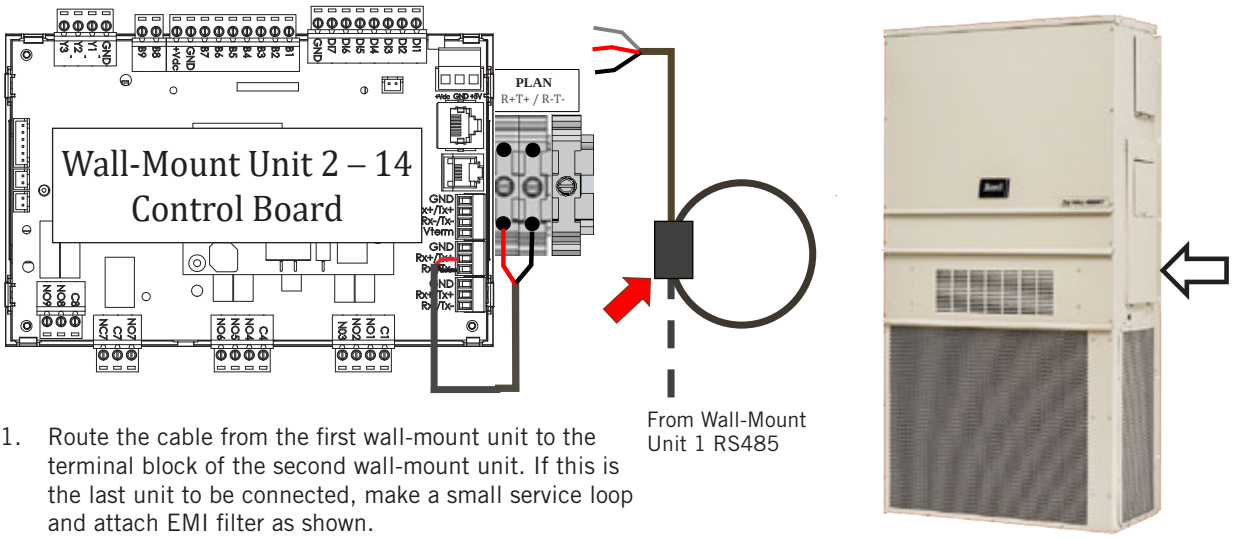


2. Connect the wires matching the terminal designations (+/-) of the controller terminals. Leave the drain wire loose.

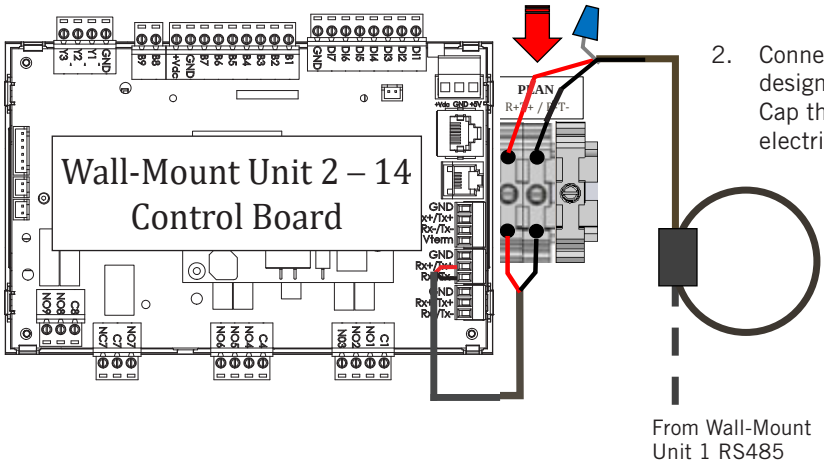


3. Connect another cable in a similar fashion (“daisy chain”) to route in conduit to the second wall-mount unit. Connect both drain wires with wire nut. Maximum two wires per terminal.

FIGURE 23
Communication Wiring: Termination at Additional Wall-Mount Units



1. Route the cable from the first wall-mount unit to the terminal block of the second wall-mount unit. If this is the last unit to be connected, make a small service loop and attach EMI filter as shown.



2. Connect the wires matching the terminal designations (+/-) of the controller terminals. Cap the loose drain with a wire nut or electrical tape.

3. Continue daisy chaining units by connecting "+" to "+", "-" to "-" and wire nutting drain together until last unit which is capped with a wire nut. Attach EMI filter as shown above at last unit. Up to 14 wall-mount units can be connected and controlled by one LC6000 controller.

Supply Wiring

The LC6000 controller is powered by 120, 208 or 240 volts from the shelter. Field-supplied supply wiring should be minimum 16 gauge, maximum 14 gauge (see Figure 24). A reliable earth ground must be connected in addition to any grounding from conduit. Grounding bolts and nuts are included with the controller for this purpose; a 2 hole grounding lug must be field supplied. Install as shown in Figure 25. **Failing to ground the controller box properly could result in damage to the equipment.**

FIGURE 24
LC6000 Controller Circuit Install

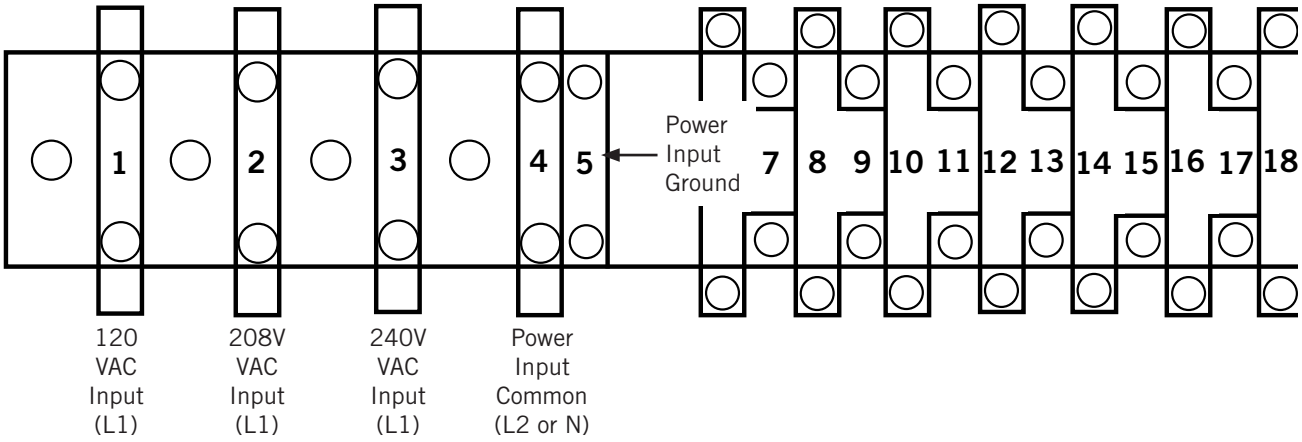
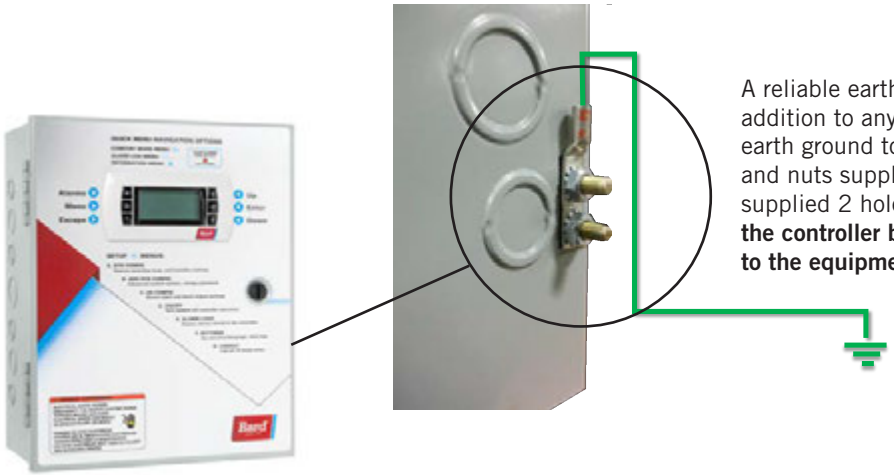


FIGURE 25
Controller Grounding Posts



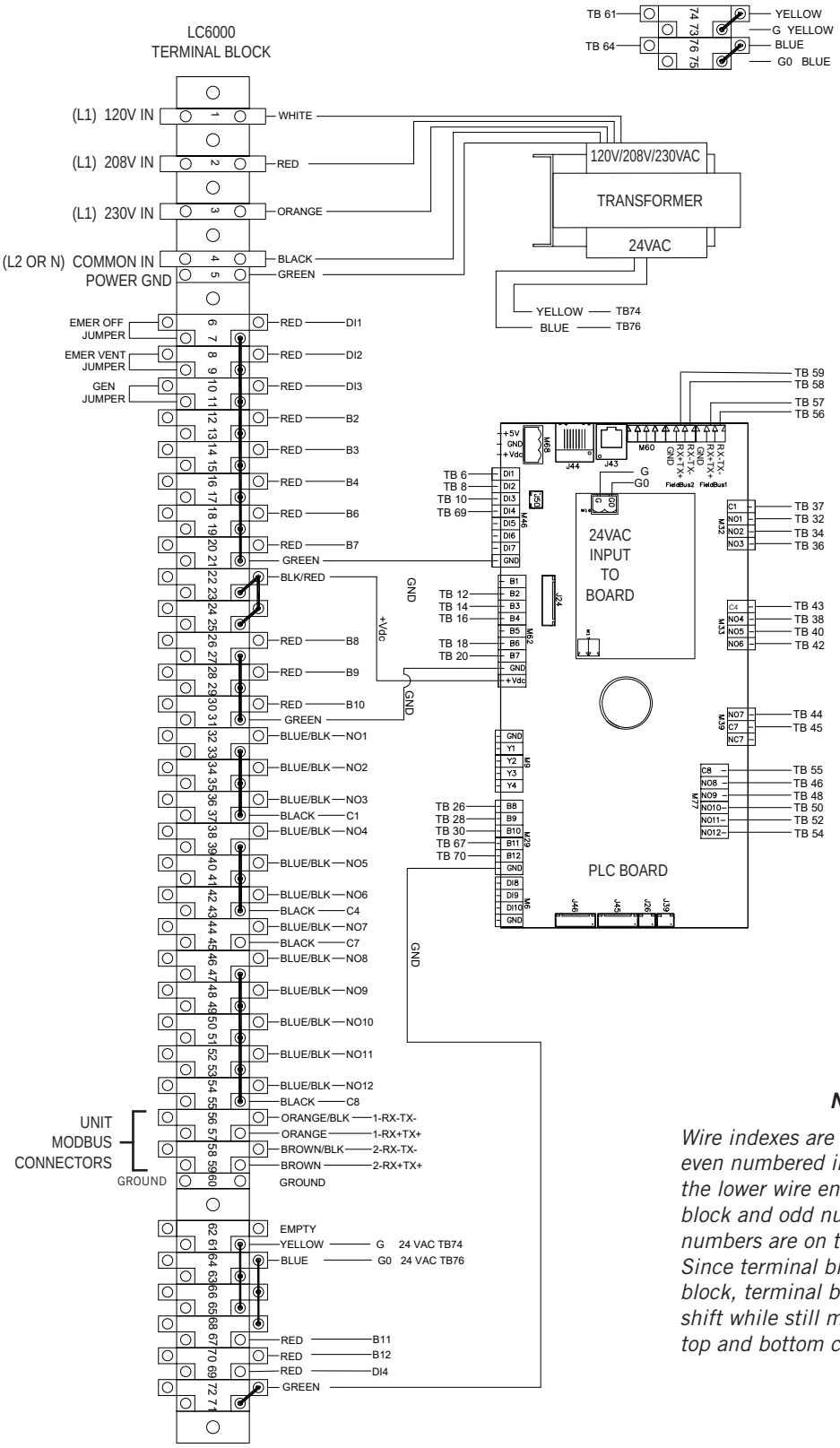
A reliable earth ground must be connected in addition to any grounding from conduit. Attach earth ground to side of controller box using bolts and nuts supplied with controller and field-supplied 2 hole grounding lug. **Failing to ground the controller box properly could result in damage to the equipment.**

TABLE 4
LC6000-200 Terminal Block Index

TB#	Wire Mark	Description
1	-	120 VAC Input
2	-	208 VAC Input
3	-	230 VAC Input
4	-	Power Input Common
5	-	Power Input Ground
6	DI1	Emergency Off Input
7	GND	Emergency Off Common
8	DI2	Emergency Vent Input
9	GND	Emergency Vent Common
10	DI3	Generator Run Input
11	GND	Generator Run Common
12	B2	Zone 1 Indoor Remote Humidity Sensor
13	GND	Ground
14	B3	Zone 2 Indoor Remote Humidity Sensor
15	GND	Ground
16	B4	Zone 3 Indoor Remote Humidity Sensor
17	GND	Ground
18	B6	Zone 1 Indoor Temperature Sensor
19	GND	Ground
20	B7	Zone 1 Indoor Remote Temperature Sensor
21	GND	Ground
22	VDC+	Power for B2 (Z1 Humidity)
23	VDC+	Power for B3 (Z2 Humidity)
24	VDC+	Power for B4 (Z3 Humidity)
25	VDC+	Power for B10 (Pressure)
26	B8	Zone 2 Indoor Remote Temperature Sensor
27	GND	Ground
28	B9	Zone 3 Indoor Remote Temperature Sensor
29	GND	Ground
30	B10	Indoor Space Pressure
31	GND	Ground
32	NO1	Humidifier 1
33	C1	Common
34	NO2	Humidifier 2
35	C1	Common
36	NO3	Humidifier 3
37	C1	Common
38	NO4	Emergency Off Alarm

TB#	Wire Mark	Description
39	C4	Common
40	NO5	Emergency Vent Alarm
41	C4	Common
42	NO6	Generator Run Alarm
43	C4	Common
44	NO7	Indoor Humidity Alarm
45	C7	Common
46	NO8	High Indoor Temperature Alarm
47	C8	Common
48	NO9	Low Indoor Temperature Alarm
49	C8	Common
50	NO10	Zone 1 Unit Alarm
51	C8	Common
52	NO11	Zone 2 Unit Alarm
53	C8	Common
54	NO12	Zone 3 Unit Alarm
55	C8	Common
56	FB1R-	RS485 RX- / TX- (Fieldbus 1) ***UNIT CONNECTION***
57	FB1R+	RS485 RX+ / TX- (Fieldbus 1) ***UNIT CONNECTION***
58	FB2R-	RS485 RX- / TX- (Fieldbus 2)
59	FB2R+	RS485 RX+ / TX- (Fieldbus 2)
60	--	Power Input Ground
61	24 VAC+	24 VAC Supply
62	--	Not Used
63	24 VAC+	24 VAC Supply
64	24 VAC-	24 VAC Ground
65	24 VAC+	24 VAC Supply for Outdoor Humidity Sensor
66	24 VAC-	24 VAC Ground for Outdoor Humidity Sensor
67	B11	Signal for Outdoor Humidity Sensor
68	24 VAC+	24 VAC Supply
69	D14	Bard Guard Alarm Signal
70	B12	Signal for Outdoor Temperature Sensor
71	GND	Ground for Outdoor Temperature Sensor
72	GND	Ground for Bard Guard Alarm Signal
73	G	Orange Power Connector
74	24 VAC+	24 VAC Supply
75	G0	Orange Power Connector
76	24 VAC-	24 VAC Ground

FIGURE 26
LC6000-200 Wiring Diagram



NOTE:

Wire indexes are identified such that even numbered index numbers are on the lower wire entries of the terminal block and odd numbered index numbers are on the top wire entries. Since terminal block 60 is a ground block, terminal blocks 61 thru 72 shift while still maintaining the same top and bottom configuration.

NOTE: *Screenshots shown in this manual reflect default settings (when applicable).*

The LC6000 controller and TEC-EYE hand-held diagnostic tool will both be used to set up the Bard air conditioning system (the TEC-EYE is only used to set up the wall-mount units). If installing a single MULTI-TEC wall-mount unit with a PGD stand-alone display or th-Tune single-unit controller, refer to PGD manual 2100-734 or th-Tune manual 2100-678 for information on setting up a PGD or th-Tune for single unit operation.

TABLE 5
LC6000/TEC-EYE Passwords (Defaults)

User	2000
Technician	1313
Engineer	9254
Use UP or DOWN keys and ENTER key to enter password	

TEC-EYE Hand-Held Diagnostic Tool

The microprocessor control used in the MULTI-TEC wall-mount air conditioners allows for complete control and monitoring through the use of the provided TEC-EYE hand-held monitor.

The menu driven interface provides users the ability to scroll through two menu levels: Quick Menu and Main Menu. The menus permit the user to easily view, control and configure the unit. See the latest version of MULTI-TEC Service Manual 2100-712 for more information on using the TEC-EYE.

The TEC-EYE connects to the wall-mount unit control board via an RJ11 modular connector as shown in Figure 27.

When not being used, the TEC-EYE hand-held diagnostic tool should be stored inside or near the LC6000 controller. Do not let the TEC-EYE leave the shelter.

FIGURE 27
TEC-EYE Connection to Unit Control

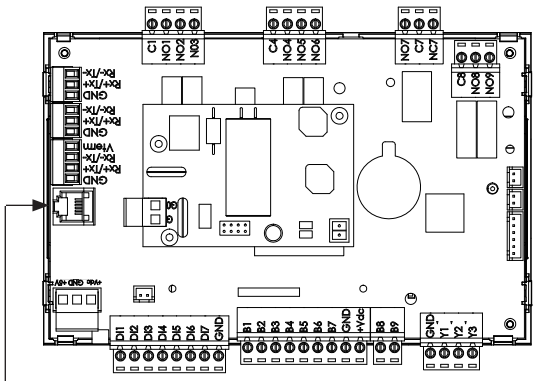


FIGURE 28
TEC-EYE (Bard P/N 8301-059) Display and Interface (Status Screen Shown)

ALARM KEY
Allows viewing of active alarms
Silences audible alarms
Resets active alarms

MENU KEY
Allows entry to Main Menu

ESCAPE KEY
Returns to previous menu level
Cancels a changed entry

UP KEY
Steps to next screen in the display menu
Changes (increases) the value of a modifiable field

ENTER KEY
Accepts current value of a modifiable field
Advances cursor

DOWN KEY
Steps back to previous screen in the display menu
Changes (decreases) the value of a modifiable field

TEC-EYE Status Screen

The Status screen is the default start-up screen and also the return screen after 5 minutes of no activity. The screen can be accessed any time by pressing the ESCAPE key repeatedly.

The wall-mount unit address is displayed in the upper right corner on the Status screen (see Figure 28). The Status screen also shows the current date, time, return air temperature, mixed air temperature, outdoor air temperature, outdoor humidity and outdoor dew point conditions. Blower, damper and unit status are also displayed. See Table 6 on page 43 for wall-mount unit status messages.

NOTICE

It is important to check the software version during installation to ensure that the latest version has been installed. Current software versions and installation instructions are available on the Bard website at http://www.bardhvac.com/software-download/

Setting Up Wall-Mount Units for Operation

The TEC-EYE hand-held diagnostic tool is needed to set up the wall-mount unit(s).

1. **Address Each Wall-Mount Unit**

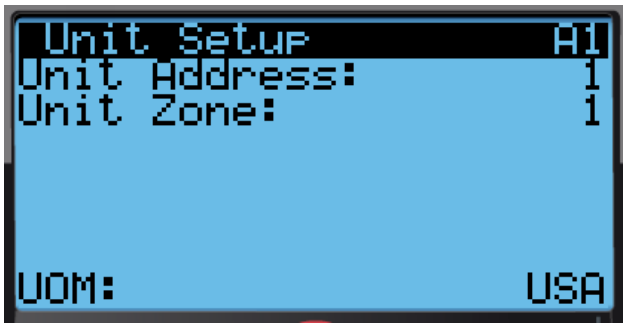
   Each unit must have a unique address for the system to operate correctly with the LC controller (*Ex: 1, 2, 3, ...14 depending on the number of units*). The unit only needs the address to be changed for the communication to work properly. The wall-mount unit address is displayed in the upper right corner on the Status screen on the TEC-EYE display (see Figure 28).

   To change the unit address:

   1) Press MENU key to access the Main Menu screen.
   2) Press UP or DOWN keys and ENTER key to enter USER password 2000.
   3) Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
   4) Press ENTER key to scroll to **Unit Address (**see Figure 29).
   5) Press UP or DOWN keys to change the address to a value between 1 and 14.

NOTE: *Each unit must have a unique address for the communication to work properly. Bard also recommends physically labeling each unit for ease in identification.*

FIGURE 29
Unit Configuration



In addition to setting up the address, the user may also want to set the unit zone and unit of measure. Unit addresses can only be used once per LC6000 regardless of number of zones.

To change these settings:

1) Press MENU key to access the Main Menu screen.
2) Press UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4) Press ENTER key to scroll to **Unit Zone** (see Figure 29).
5) If desired, press UP or DOWN keys to change value to desired zone.
6) Press ENTER scroll to **UOM**.
7) If desired, press UP or DOWN keys to change the value from **USA** to **SI**, **NC**, **LON**, **CAN** or **UK**. Units are preconfigured for each selection.
8) Press ENTER key to save.

Basic wall unit parameter settings are now set and the unit is ready to communicate with the LC.

2. **Execute a Run Test on Each Unit**

   Execute a run test on each unit to verify the equipment is functioning correctly. The run test parameters are not adjustable.

   1) Press MENU key to access the Main Menu screen.
   2) Press UP or DOWN keys and ENTER key to enter USER password 2000.
   3) Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
   4) Press UP or DOWN keys to scroll to **Run Test A11** screen.

5) Press ENTER key to scroll to **Run Test Enable** parameter (see Figure 30).

6) Press UP or DOWN key to change value to **ON**. The run test will begin.

FIGURE 30
Executing Run Test

Step	Action	Time Required
A	Open economizer damper	Damper Time (150s)
B	Close economizer Damper	Damper Time (150s)
C	Turn on compressor	Heat/Cool Time (60s)
D	Enable second stage	Heat/Cool Time (60s)
E	Open reheat valve	Heat/Cool Time (60s)
F	Turn all cooling off	--
G	Turn on electric heat	Heat/Cool Time (60s)
H	Turn on electric heat stage 2	Heat/Cool Time (60s)
I	Turn off all heating	--

Parameter Description

Damper Time: This is the time (in seconds) allowed for both the opening sequence and closing sequence.

Heat/Cool Time: This is the time (in seconds) allowed for cooling sequence and heating sequence.

Status: This will display what the unit is doing as the run test progresses. The following messages may appear:

1. Not Active
2. Opening Damper
3. Closing Damper
4. Compressor Stage 1
5. Compressor Stage 2
6. Reheat Valve Open
7. Cooling Off
8. Electric Heat Stage 1
9. Electric Heat Stage 2
10. Heating Off
11. Run Test Stop

The unit will determine which items to test based on the unit model number.

3. Clear Unit Alarm Logs on Each Unit

Units may have alarms logged due to testing. Unit alarm logs must be cleared at time of installation.

To clear the wall-mount unit alarm logs:

1) Press MENU key to go to the Main Menu screen.

2) Use UP or DOWN keys and ENTER key to enter TECHNICIAN password 1313.

3) Press UP or DOWN keys to scroll to **Settings**; press ENTER key.

4) Press UP or DOWN keys to scroll to **Initialization**; press ENTER key.

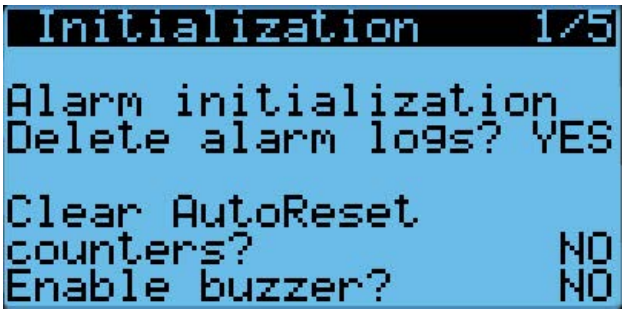
5) Press UP or DOWN keys to scroll to **Initialization 1/5**; press ENTER key.

6) Press ENTER key to scroll to **Delete alarm logs?** (see Figure 31).

7) Press UP or DOWN key to change **NO** to **YES**.

8) Press ENTER key to clear all alarm logs.

FIGURE 31
Clearing Unit Alarm Logs



After each of the wall-mount units have been addressed, had a run test performed and had the alarm logs cleared, the rest of the system set up can proceed.

Setting Up LC6000 for Operation

The LC6000 controller will be used for the remaining steps in the set up process.

LC6000 Status Screen

The Status screen is the default start-up screen and also the return screen after 5 minutes of no activity on the LC6000. The screen can be accessed any time by pressing the ESCAPE key repeatedly.

The Status screen on the LC6000 displays the current date, time, unit displayed, zones and system status (see Figure 34).

4. Set LC Controller Date and Time

1) Press MENU key to access the Main Menu screen.

2) Use UP or DOWN keys and ENTER key to enter USER password 2000.

3) Press the UP or DOWN keys to scroll to the **Settings** menu; press ENTER key.

4) Press UP or DOWN keys to scroll to **Date/Time** menu; press ENTER key.

5) Press UP or DOWN keys to scroll to **Date/Time change**.

6) Press ENTER key to scroll to the desired value to be changed (see Figure 32).

7) Press UP or DOWN keys to change the value.

8) Press ENTER key to save and to scroll to top of screen.

9) Press UP or DOWN keys to scroll to **Timezone** (if applicable). Follow steps 6-8 to change timezone.

10) Press ESCAPE key several times to return to Main Menu screen.

NOTE: *The LC6000 will sync the time and date configured to each of the wall-mount units once communication is established.*

FIGURE 32
Setting Controller Date and Time

5. Configure Sensors

The system will need to be configured for the number of temperature and humidity sensors installed. The system is shipped with one combination temperature and humidity sensor.

Additional combination sensors may be purchased or alternatively, temperature-only sensors may be purchased instead. The LC is capable of utilizing five temperature sensors and four humidity sensors. The system will need to be configured for the various configurations.

If necessary, the sensors could be calibrated at this time too. For information on calibrating the sensors (adjusting the offset), see page 42.

To enable/disable **Zone 1 Indoor Humidity**:

1) Press MENU key to go to the Main Menu screen.

2) Press UP or DOWN keys and ENTER key to enter USER password 2000.

3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.

4) Press UP or DOWN keys to scroll to **Z1 Indoor Hum C4**.

5) Press ENTER key to scroll to **Enable** (see Figure 33).

6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 33
Enable/Disable Zone 1 Indoor Humidity Sensor

FIGURE 34
LC6000 Controller Display and Interface (Status Screen Shown)

LC6000 interface key functions are the same as those shown for the TEC-EYE in Figure 28 on page 34.

To enable/disable **Zone 2 Indoor Humidity**:

1) Press MENU key to go to the Main Menu screen.
2) Press UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z2 Indoor Hum C5**.
5) Press ENTER key to scroll to **Enable** (see Figure 35).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 35
Enable/Disable Zone 2 Indoor Humidity Sensor

To enable/disable **Zone 3 Indoor Humidity:**

1) Press MENU key to go to the Main Menu screen.
2) Press UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z3 Indoor Hum C6**.
5) Press ENTER key to scroll to **Enable** (see Figure 36).

FIGURE 36
Enable/Disable Zone 3 Indoor Humidity Sensor

6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

To enable/disable **Zone 1 Indoor Temperature**:

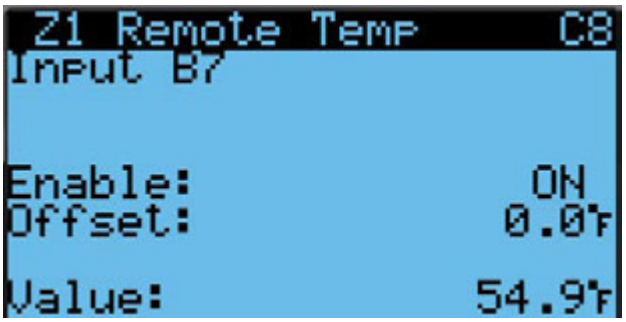
1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z1 Indoor Temp C7**.
5) Press ENTER key to scroll to **Enable** (see Figure 37).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 37
Enable/Disable Zone 1 Indoor Temperature Sensor

To enable/disable **Zone 1 Remote Temperature**:

1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z1 Remote Temp C8**.
5) Press ENTER key to scroll to **Enable** (see Figure 38).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

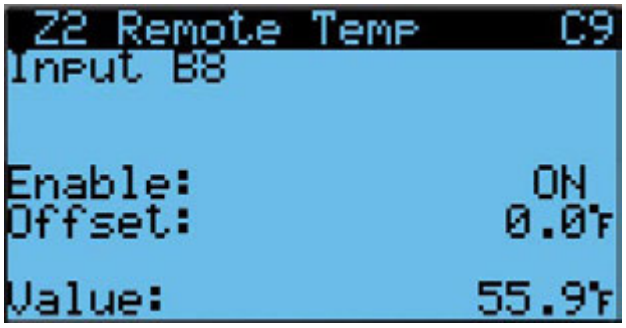
FIGURE 38
Enable/Disable Zone 1 Remote Temperature Sensor



To enable/disable **Zone 2 Remote Temperature**:

1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z2 Remote Temp C9**.
5) Press ENTER key to scroll to **Enable** (see Figure 39).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

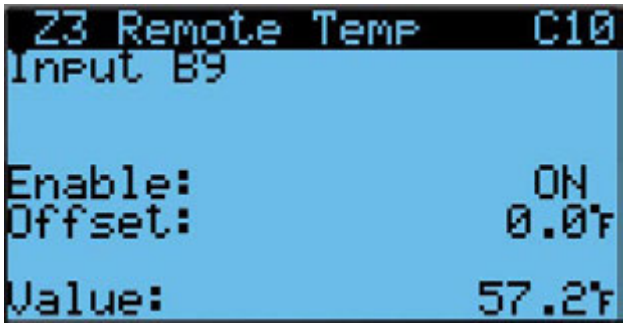
FIGURE 39
Enable/Disable Zone 2 Remote Temperature Sensor



To enable/disable **Zone 3 Remote Temperature**:

1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z3 Remote Temp C10**.
5) Press ENTER key to scroll to **Enable** (see Figure 40).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 40
Enable/Disable Zone 3 Remote Temperature Sensor



To enable/disable **Outdoor Air Humidity**:

1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Outdoor Air Humid C11**.
5) Press ENTER key to scroll to **Enable** (see Figure 41).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 41
Enable/Disable Outdoor Air Humidity Sensor

To enable/disable **Outdoor Air Temperature**:

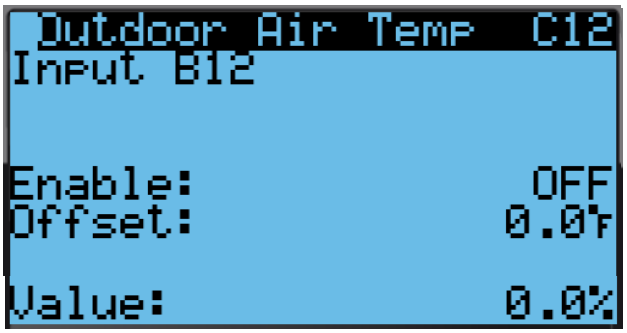
1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.

4) Press UP or DOWN keys to scroll to **Outdoor Air Temp C12**.

5) Press ENTER key to scroll to **Enable** (see Figure 42).

6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 42
Enable/Disable Outdoor Air Temperature



6. Enter Total Number of Units

1) Press MENU key to go to the Main Menu screen.

2) Press UP or DOWN keys and ENTER key to enter USER password 2000.

3) Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.

4) Press UP or DOWN keys to scroll to **General**; press enter key.

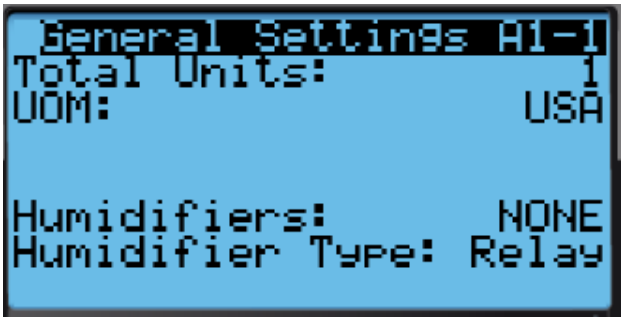
5) Press ENTER key to scroll to **Total Units** (see Figure 43).

6) Press UP or DOWN keys to adjust value to correct number of units.

7) Press ENTER key to save value.

8) Press the ESCAPE key several times to return to Main Menu screen.

FIGURE 43
Total Units Displayed



7. Verify Units Are Online

Once a unit is uniquely addressed, communication can be verified at the LC controller.

With the correct number of units set at the LC controller, each unit can be remotely viewed from the controller information screen.

To view these screens:

1) Press ESCAPE key to view the Status screen. (May need to be pressed more than once.)

2) Press UP or DOWN key until the Quick Menu in the lower right corner of the screen displays the Information icon ( ); press ENTER key.

3) Press UP or DOWN keys to scroll through the Information screens until the desired unit Information screen appears.

In addition to being able to remotely view the units, an alarm will be generated on the LC controller for units not communicating.

8. Select Economizer Type for Each Zone

Each zone can be configured to operate the economizers with different considerations. For more information on the different economizer choices, reference the most recent version of MULTI-TEC Service Instructions 2100-712.

The type of consideration can be set to none, dry bulb, temperature and humidity or enthalpy. These settings will be communicated to the wall units while connected to the LC6000 to ensure all units operate the same.

To select economizer type for each zone:

1) Press MENU key to go to the Main Menu screen.

2) Use UP or DOWN keys and ENTER key to enter password 1313.

3) Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.

4) Press UP or DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.

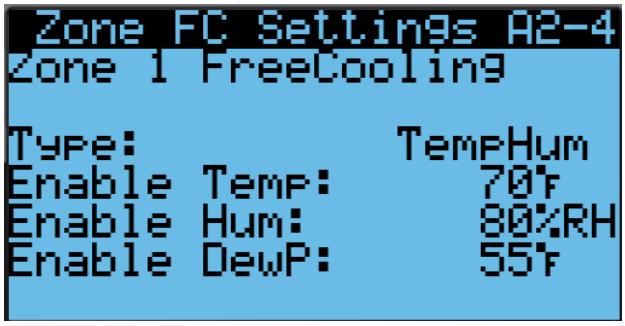
5) Press UP or DOWN keys to scroll to **Zone FC Settings A2-4** (Zone 1), **Zone FC Settings A3-4** (Zone 2) or **Zone FC Settings A4-4** (Zone 3).

6) Press ENTER key to scroll to **Type** (see Figure 44).

7) Press UP or DOWN keys to change economizer type to **None**, **Drybulb**, **TempHum** or **Enthalpy**.

8) Press ENTER key to save.

FIGURE 44
Selecting Economizer Type



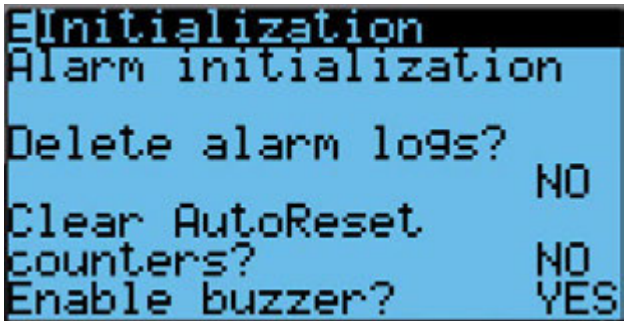
9. Clear Controller Alarm Logs

The LC6000 controller may have alarms logged due to bench testing. Controller alarm logs must be cleared at time of installation.

To clear the LC controller alarm logs:

1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **Settings**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Initialization**; press ENTER key.
5) Press ENTER key to scroll to **Delete alarm logs?** (see Figure 45).
6) Press UP or DOWN key to value to **YES**; press ENTER key.
7) Press ESCAPE key several times to return to Main Menu screen.

FIGURE 45
Clearing LC6000 Alarm Logs



10. Complete Installation

Once all the installation steps have been completed, all alarms and alarm logs have been cleared and system verification and run test results were satisfactory, the installation can now be considered “complete".

Additional programming information can be found in MULTI-TEC Service Instructions 2100-712 and LC6000 Service Instructions 2100-669.

Menu Screens and Password Levels

MULTI-TEC Wall-Mount Units

A System Config: User (2000)

B Adv Sys Config: Technician (1313)

C I-O Config: Technician (1313)

D On/Off: User (2000)

E Alarm Logs: User (2000)

F Settings

Date/Time: Technician (1313)

Language: User (2000)

Network Config: Technician (1313)

Serial Ports: Technician (1313)

Initialization

Clear Logs: User (2000)

System Default: Engineer (9254)

Restart: User (2000)

Parameter Config: Engineer (9254)

Alarm Export: User (2000)

G Logout: Used to log out of the current password level. Entering back into the menu requires password.

LC6000 Controller

A System Config

General: User (2000)

Zone 1: User (2000)

Zone 2: User (2000)

Zone 3: User (2000)

B Adv Sys Config: B1-B13 Technician (1313)

C I-O Config: C1-C10 Technician (1313)

D On/Off: User (2000)

E Alarm Logs: User (2000)

F Settings

Date/Time: Technician (1313)

Language: User (2000)

Network Config: Technician (1313)

Serial Ports: Technician (1313)

Initialization

Clear Logs: User (2000)

System Default: Engineer (9254)

Restart: User (2000)

Parameter Config: Engineer (9254)

Alarm Export: User (2000)

G Logout: Used to log out of the current password level. Entering back into the menu requires password.

Setpoints

The *LC6000 setpoints* will be utilized as the cooling and heating setpoints when *communicating with the wall-mount units*. The *unit cooling and heating setpoints* will be used for temperature control when in *orphan mode*. LC6000 setpoints will sync to the wall-mount unit once communication with the LC6000 is established.

If at any time the unit(s) loses communication with the LC6000 controller, the unit(s) will go into orphan mode.

Calibrating Sensors

1. Press MENU key on LC controller interface to go to the Main Menu screen.
2. Use UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **I/O Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to sensor to be adjusted.
5. Press ENTER key to scroll to **Offset** (see Figure 46).
6. Press UP or DOWN keys to add or subtract to the sensor offset value.
7. Press ENTER key to save.

FIGURE 46
Adjusting Sensor Offset Value

TABLE 6
Wall-Mount Unit Status Messages

Message	Description
Invalid Model #	Unit disabled due to faulty model number.
Orphan Mode	Unit is not currently communicating with an LC6000 or th_Tune device.
th-Tune Online	Communication with th_Tune device is established; unit in standby (no current calls).
LC Online	Communication with LC6000 is established; unit in standby (no current calls).
Cont. Blower	Continuous blower is active.
Off by th-Tune	Unit has been commanded off by the th_Tune.
Freecooling	Economizer is active.
Optimized Cool	Economizer and mechanical cooling are active.
Cooling	Mechanical cooling is active.
Heating	Electric or mechanical heat is active.
Active Dehum	Mechanical dehumidification or electric reheat dehumidification is active.
Passive Dehum	Humidity is above the passive set point; economizer disabled/blower speed reduced. See **Balanced Climate Mode** in MULTI-TEC Service Instructions 2100-712.
Run Test	Run test in operation.
Off by Alarm	All functions/modes of operation are disabled by one the following alarms: Return Air, Emergency Off, Unit Disable or Valid Model #.
Off by BMS	Unit has been set to off by BMS system (Modbus); all functions/ modes of operation are disabled.
Off by LC	Unit is commanded off by LC6000; all functions/modes of operation are disabled.
Off by Keypad	Unit has been turned off in TEC-EYE menu; all functions/modes of operation are disabled.
Emergency Vent	Emergency vent mode is active. See LC manual 2100-669.
Emergency Cool	Emergency cooling mode is active.
Emergency Off	Emergency off mode is active. See LC manual 2100-669.

TABLE 7
LC6000 Status Messages

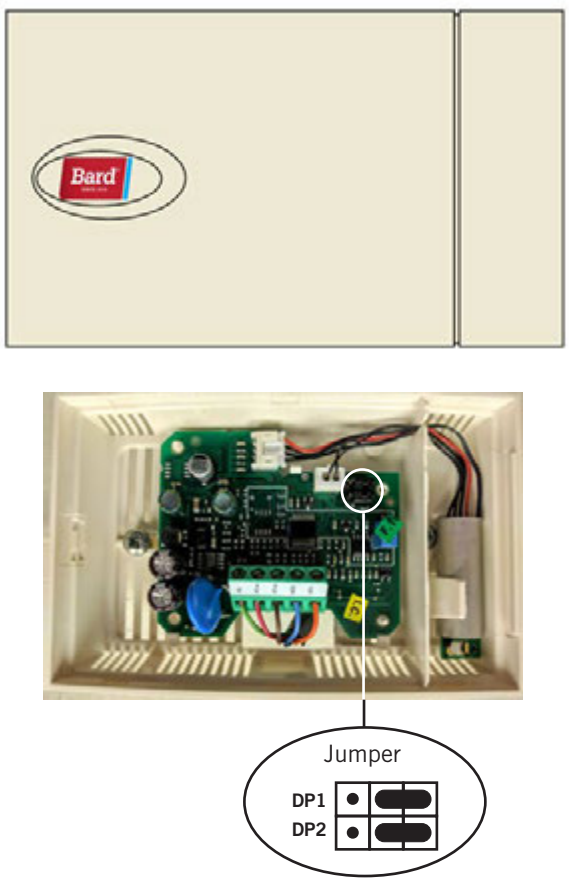
Message	Description
On	The LC6000 is ready and functioning properly.
Off by BMS	The LC6000 is being turned off by the Building Management System through Modbus TCP/IP.
Off by Keyboard	The LC6000 is turned off using the (D. On/Off) Menu on the PGD. All communicating units will be inactive.
Comfort Mode	The LC6000 is set to Comfort Mode. This mode is used to temporarily override heating/cooling setpoints and maintain a default temperature of 72°F for 60 minutes.
Emergency Cooling	A high temperature has been sensed in one or more zones. All available units in that zone are sent a command for emergency cooling. (Refer to unit manual 2100-712 for emergency cooling sequence.)
Emergency Vent	Input signal from an external device at terminal DI2 (e.g., hydrogen detector). Units that are equipped with a ventilation option and configured will open the dampers at 100% with the blower at full speed. (Refer to LC manual 2100-669 for emergency vent sequence.)

Remote Indoor Temperature/Humidity Sensor Orientation

Current versions of the remote indoor temperature/ humidity sensor need to be installed with the shielded cable wires entering the bottom of the back of the sensor to connect to the sensor terminals (see Figure 47). Earlier versions of this sensor were installed so that the sensor wires entered through the top of the back of the sensor (see Figure 48). **The orientation of the sensor affects the position of the DP1/DP2 jumpers. Depending on how the sensor is installed, be sure to confirm that the jumpers are in the proper position for the 0-1 V setting as shown in the figures below.**

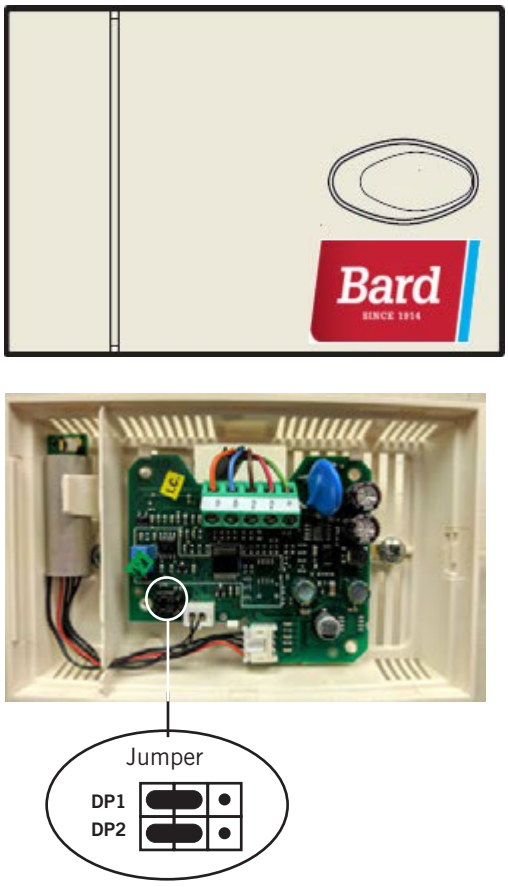
This applies to all indoor temperature/humidity sensors connected to the LC controller. See illustration mounted inside of sensor cover for further detail on jumper position.

FIGURE 47
Current Sensor Orientation
(Shielded Cable Wires Enter from Bottom)



DP1 and DP2 Jumpers
Positioned for 0-1V
(Current Orientation)

FIGURE 48
Earlier Sensor Orientation
(Shielded Cable Wires Enter from Top)



DP1 and DP2 Jumpers
Positioned for 0-1V
(Earlier Orientation)

REPLACEMENT PARTS MANUAL

MULTI-TEC® Wall-Mount Air Conditioner

Models:

W30LBPA W30LBPC W36LBPA W36LBPC
W30LBPB W30LBPF W36LBPB W36LBPF

Contents

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 contents section.

Important

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

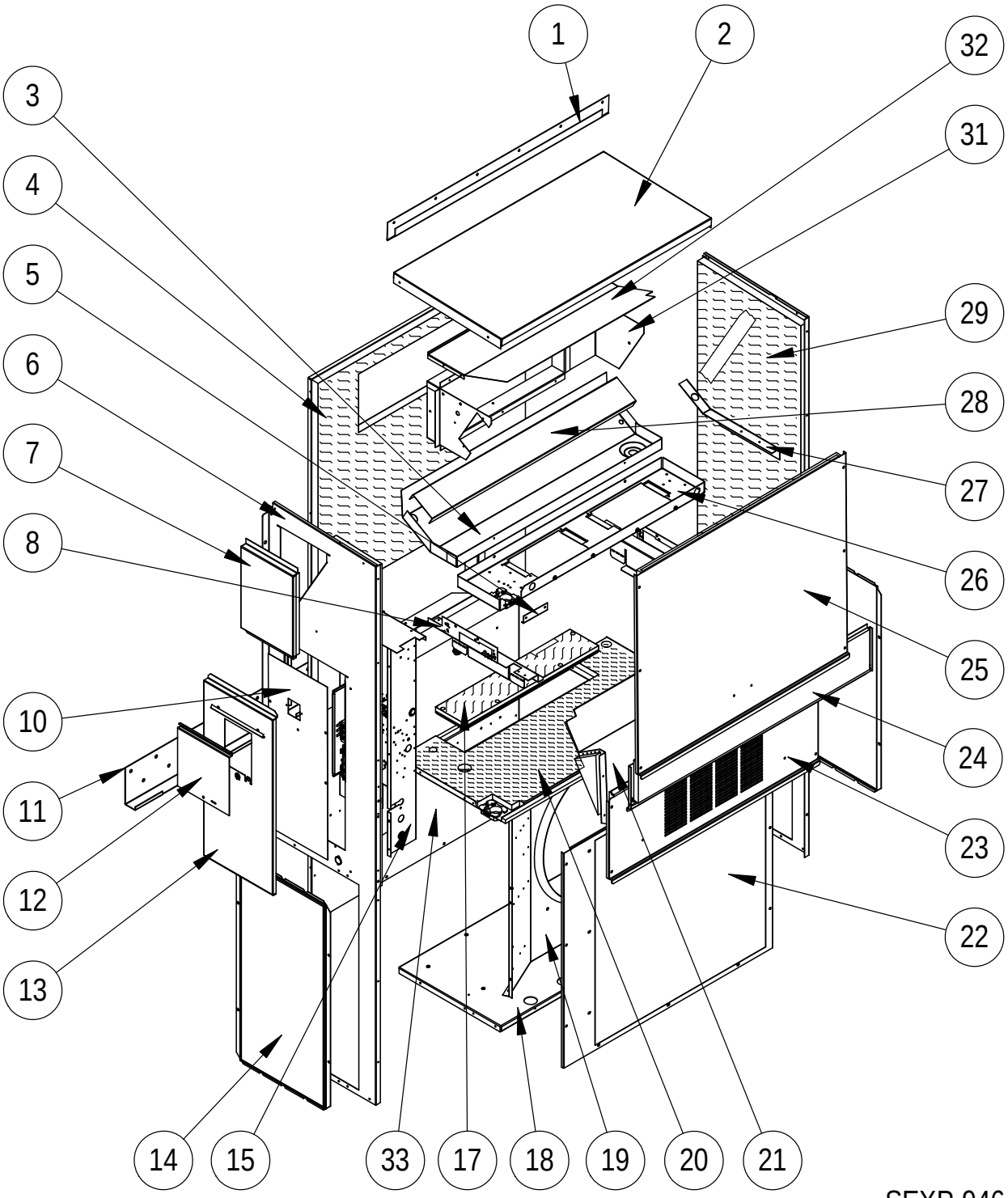
Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual: 2110-1459I
Supersedes: 2110-1459H
Date: 5-2-23

CABINET COMPONENTS



SEXP-946 B

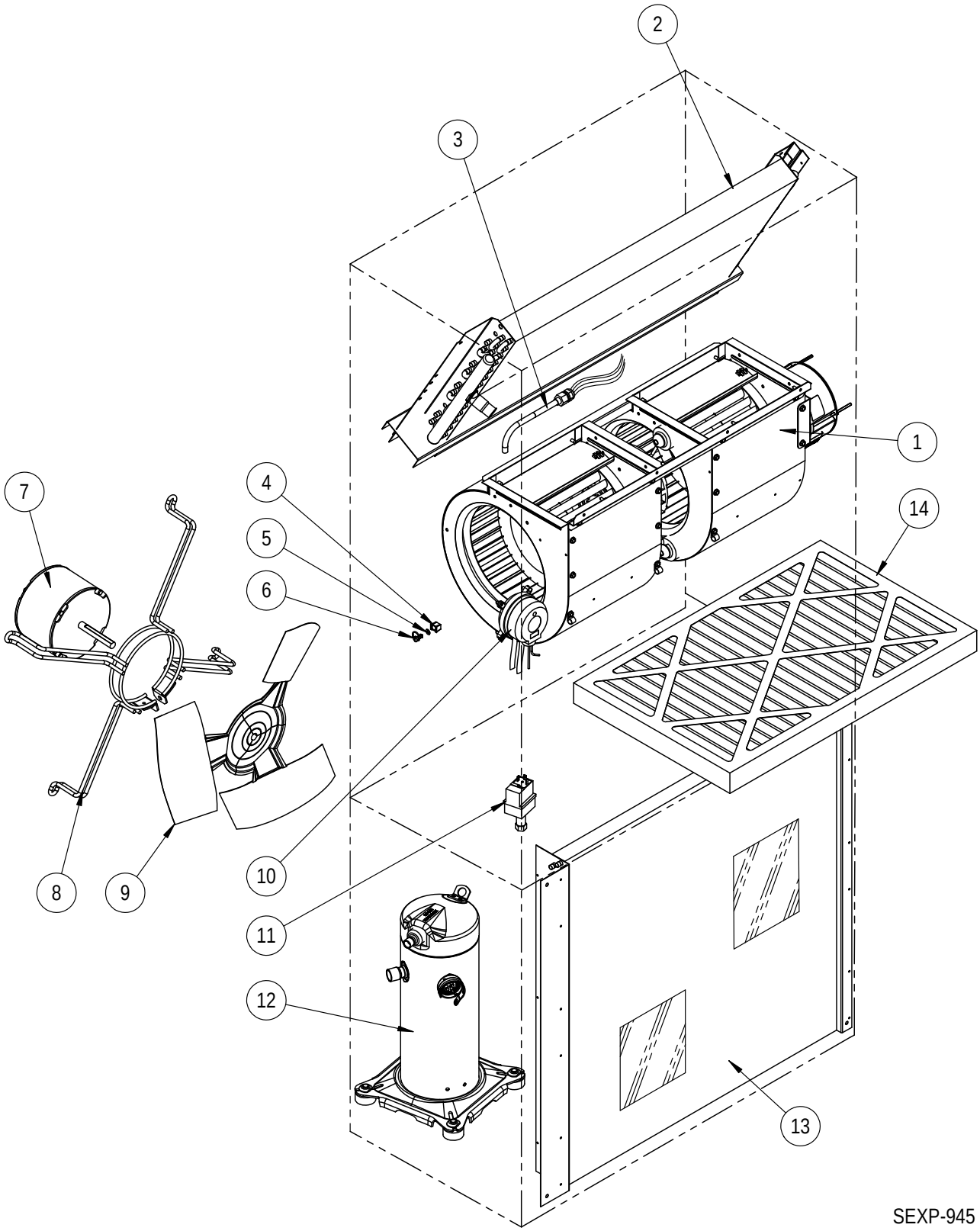
Dwg No.	Part Number	Description	W30LBPA, B	W30LBPC	W30LBPF	W36LBPA, B	W36LBPC	W36LBPF
1	113-149-* ①	Top Rain Flashing	X	X	X	X	X	X
1	113-360 ②	Top Rain Flashing	X	X	X	X	X	X
1	113-149-4 ③	Top Rain Flashing	X	X	X	X	X	X
2	S507-308-* ①	Top	X	X	X	X	X	X
2	S507-319 ②	Top	X	X	X	X	X	X
2	S507-320 ③	Top	X	X	X	X	X	X
3	S123-130	Drain Pan	X	X	X	X	X	X
3	S123-143 ②③	Drain Pan	X	X	X	X	X	X
4	S509-451	Upper Back	X	X	X	X	X	X
4	S509-455 ②	Upper Back	X	X	X	X	X	X
4	S509-453 ③	Upper Back	X	X	X	X	X	X
5	105-1302	Grommet Retainer	X	X	X	X	X	X
6	S501-935-* ①	Right Side	X	X	X	X	X	X
6	S501-998 ②	Right Side	X	X	X	X	X	X
6	S501-943 ③	Right Side	X	X	X	X	X	X
7	S543-175-* ①	Right Side Cover Plate (Outer)	X	X	X	X	X	X
7	S543-185 ②	Right Side Cover Plate (Outer)	X	X	X	X	X	X
7	S543-184 ③	Right Side Cover Plate (Outer)	X	X	X	X	X	X
8	113Y480	Filter Bracket	2	2	2	2	2	2
9	137-259	Fill Plate	X	X	X	X	X	X
10	S132-104	Control Panel Cover (Inner)	X			X		
10	S132-172	Control Panel Cover (Inner)		X	X		X	X
11	113-140	Bottom Mounting Bracket	X	X	X	X	X	X
12	S153-218 ①	Disconnect Access Door	X	X	X	X	X	X
12	S153-405 ②	Disconnect Access Door	X	X	X	X	X	X
12	S153-387 ③	Disconnect Access Door	X	X	X	X	X	X
13	S533-228 ①	Control Panel Cover (Outer)	X	X	X	X	X	X
13	S533-235 ②	Control Panel Cover (Outer)	X	X	X	X	X	X
13	S533-236 ③	Control Panel Cover (Outer)	X	X	X	X	X	X
14	118-124-* ①	Side Grille	2	2	2	2	2	2
14	118-140 ②	Side Grille	2	2	2	2	2	2
14	118-139 ③	Side Grille	2	2	2	2	2	2
15	Control Panel Assembly	See Control Panel Assy. Drawing & Parts List Assy.	X	X	X	X	X	X
17	S536-498	Cond. Partition Block Off Plate	X	X	X	X	X	X
17	S536-877 ②	Cond. Partition Block Off Plate	X	X	X	X	X	X
18	S127-472	Lower Base	X	X	X	X	X	X
18	S127-533 ②	Lower Base	X	X	X	X	X	X
19	125-081	Fan Shroud	X	X	X	X	X	X
19	125-083 ②	Fan Shroud	X	X	X	X	X	X
20	S521Y527	Condenser Partition	X	X	X	X	X	X
20	S521*-561 ②	Condenser Partition	X	X	X	X	X	X
22	118-104-* ①	Condenser Grille	X	X	X	X	X	X
22	118-109 ②	Condenser Grille	X	X	X	X	X	X
22	118-114 ③	Condenser Grille	X	X	X	X	X	X
23	S553-523-* ①	Vent Option Door	X	X	X	X	X	X
23	S553-549 ②	Vent Option Door	X	X	X	X	X	X
23	S553-550 ③	Vent Option Door	X	X	X	X	X	X
24	S553-524-* ①	Filter Door	X	X	X	X	X	X
24	S553-553 ②	Filter Door	X	X	X	X	X	X
24	S553-554 ③	Filter Door	X	X	X	X	X	X
25	S514-241-* ①	Upper Front	X	X	X	X	X	X
25	S514-238 ②	Upper Front	X	X	X	X	X	X
25	S514-239 ③	Upper Front	X	X	X	X	X	X
26	121Y467	Blower Partition	X	X	X	X	X	X
27	105Y850	Side Support	X	X	X	X	X	X
28	137-685	Bottom Evaporator Fill	X	X	X	X	X	X
29	S501-936-* ①	Left Side	X	X	X	X	X	X
29	S501-999 ②	Left Side	X	X	X	X	X	X
29	S501-946 ③	Left Side	X	X	X	X	X	X
30	147-044	Evaporator Support	X	X	X	X	X	X
31	S111Y030	Outlet Air Frame Assembly	X	X	X	X	X	X
32	135Y123	Heat Shield	X	X	X	X	X	X
33	109-450	Lower Back	X	X	X	X	X	X
33	109-454 ②	Lower Back	X	X	X	X	X	X
33	109-452 ③	Lower Back	X	X	X	X	X	X
NS	135-329	Air Baffle	X	X	X	X	X	X
NS	BOP-3	Blank Off Plate	X	X	X	X	X	X
NS	5252-033	Bard Nameplate	X	X	X	X	X	X

① Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, include the complete model and serial number of the unit for which cabinet parts are being ordered.

② Exterior cabinet parts are manufactured from stainless steel Code "S"

③ Exterior cabinet parts are manufactured from aluminum Code "A"

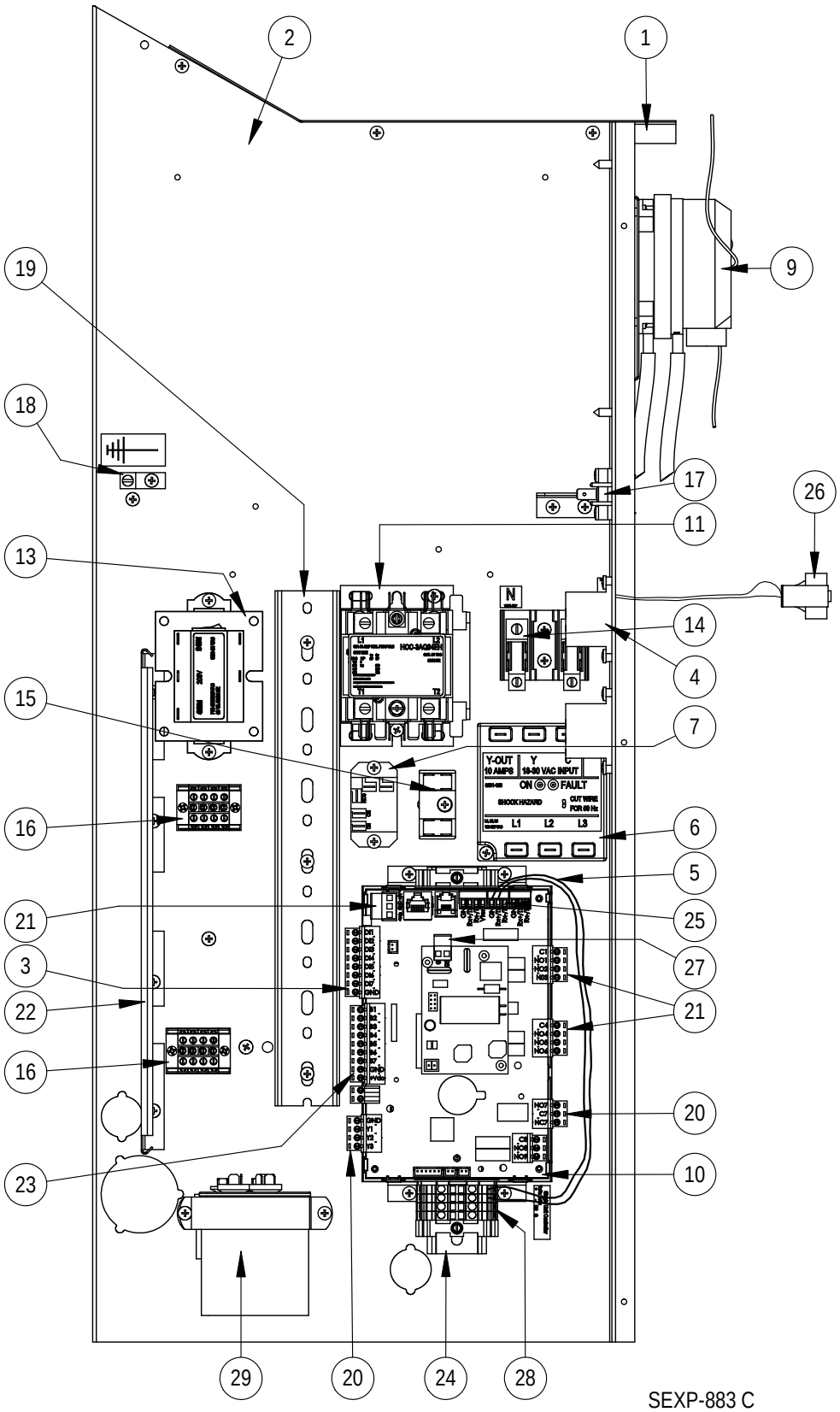
FUNCTIONAL COMPONENTS



Dwg No.	Part Number	Description	W30LBPA	W30LBPB	W30LBPC	W30LBPF	W36LBPA	W36LBPB	W36LBPC	W36ABPF
1	S900-364-001	Blower Assembly	X	X		X				
1	S900-365-001	Blower Assembly			X					
1	900-364-002	Blower Assembly					X	X		X
1	900-365-002	Blower Assembly							X	
2	917-0355	Evaporator Coil w/Distributor Assy.	X	X	X	X				
2	917-0356	Evaporator Coil – Coated w/Distributor Assy.	X	X	X	X				
2	917-0357	Evaporator Coil w/Distributor Assy.					X	X	X	X
2	917-0358	Evaporator Coil – Coated w/Distributor Assy.					X	X	X	X
3	800-0456	Distributor Assembly					X	X	X	X
3	800-0479	Distributor Assembly	X	X	X	X				
4	1171-023	1/4" Receptacle	X	X	X	X	X	X	X	X
5	1171-024	1/4" Turn Retainer	X	X	X	X	X	X	X	X
6	1171-022	1/4" Turn Fastener	X	X	X	X	X	X	X	X
7	8103-029	Condenser Motor	X	X		X	X	X		X
7	8103-030	Condenser Motor			X				X	
8	8200-001	Fan Motor Mount	X	X	X	X	X	X	X	X
8	8200-050 ①	Stainless Steel Fan Motor Mount	X	X	X	X	X	X	X	X
9	S5151-045	Fan Blade	X	X	X	X	X	X	X	X
9	S5151C045 ①	Coated Fan Blade	X	X	X	X	X	X	X	X
10	CMA-31	Dirty Filter Switch Kit	X	X	X	X	X	X	X	X
11	CMA-39	Low Ambient Control (Screw On) ②	X	X	X	X	X	X	X	X
12	8000-277	Compressor	X							
12	8000-365	Compressor		X						
12	8000-366	Compressor			X	X				
12	8000-278	Compressor					X			
12	8000-283	Compressor						X		
12	8000-342	Compressor							X	X
13	5051-203BX	Condenser Coil	X	X	X	X				
13	5054-203BX	Condenser Coil – Coated	X	X	X	X				
13	5051-202BX	Condenser Coil					X	X	X	X
13	5054-202BX	Condenser Coil – Coated					X	X	X	X
14	7004-019	Air Filter 1" Throw-Away (16x30x1)	X	X	X	X	X	X	X	X
14	7003-031	Air Filter 1" Washable ② (16x30x1)	X	X	X	X	X	X	X	X
14	7004-026	Air Filter 2" Pleated ② (16x30x2)	X	X	X	X	X	X	X	X
14	7004-048	Air Filter 2" Pleated – MERV 11 ② (16x30x2)	X	X	X	X	X	X	X	X
14	7004-062	Air Filter 2" Pleated – MERV 13 ② (16x30x2)	X	X	X	X	X	X	X	X
NS	8406-142	High Pressure Switch (Screw On)	X	X	X	X	X	X	X	X
NS	8406-140	Low Pressure Switch (Screw On)	X	X	X	X	X	X	X	X
NS	5201-021	Filter Drier	X	X	X	X	X	X	X	X
NS	5451-024	Tubing Isolation Grommet	X	X	X	X	X	X	X	X
NS	6031-009	Coremax Valve Core	X	X	X	X	X	X	X	X
NS	1171-070	Filter Door Clip	X	X	X	X	X	X	X	X
NS	1171-068	Filter Door Screw	X	X	X	X	X	X	X	X
NS	1171-069	Filter Door Screw Retainer	X	X	X	X	X	X	X	X

NS – Not Shown
① – Used with stainless steel cabinet option
② – Optional on these models

CONTROL PANEL



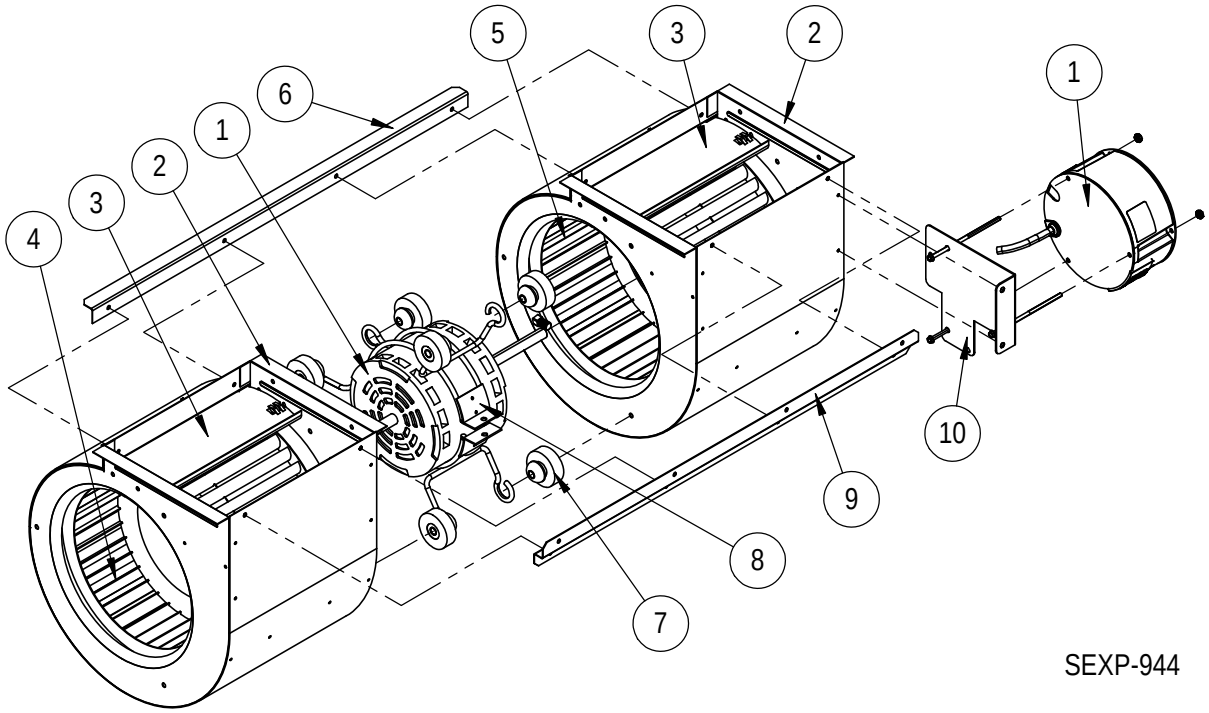
Dwg No.	Part Number	Description	W30LBPA	W30LBPB	W30LBPC	W30LBPF	W36LBPA	W36LBPB	W36LBPC	W36LBPF
1	117Y137	Control Panel Top	X	X	X	X	X	X	X	X
2	117Y395	Control Panel	X	X	X	X	X	X	X	X
3	135-122	Wire Shield	X	X	X	X	X	X	X	X
4	8201-130	Blower Relay	X	X	X	X	X	X	X	X
5	3020-004	Communications Sheathed Cable	X	X	X	X	X	X	X	X
6	8201-174BX	3 Phase Line Monitor 50/60 Hz		X	X	X		X	X	X
7	8201-130	Alarm Relay	X	X	X	X	X	X	X	X
8	8201-171BX	Compressor Control Module	X	X	X	X	X	X	X	X
9	8301-057	Filter Switch w/Adjustment	X	X	X	X	X	X	X	X
10	8301-096-002*	UPC3-C2 MULTI-TEC	X	X	X	X	X	X	X	X
11	8401-037	Contactor 3-Pole 30 Amp w/Aux. Contact		X	X	X		X	X	X
11	8401-038	Contactor 2-Pole 40 Amp w/Aux. Contact	X				X			
13	8407-048	Transformer 208/240-24 75VA	X	X		X	X	X		X
13	8407-050	Transformer 480/24VAC 75VA			X				X	
14	8607-013	Terminal Block 2 Term. 240V				X				X
15	8607-017	Terminal Block 240V 2 Terminal	X	X	X	X	X	X	X	X
16	8607-037	Terminal Block 4 Position	X	X	X	X	X	X	X	X
17	8607-041	Park Terminal	X	X	X	X	X	X	X	X
18	8611-006	Ground Terminal	X	X	X	X	X	X	X	X
19	8611-140-1200	2-1/4" x 1" Cable Duct x 12"	X	X	X	X	X	X	X	X
20	8611-147	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
21	8611-148	4-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
22	8611-149	9-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
23	8611-185	8-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
24	8611-189	35MM DIN Rail 9"	X	X	X	X	X	X	X	X
25	8611-192	Small 3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
26	910-1935	Evap. Temp. Sensor Assembly	X	X	X	X	X	X	X	X
27	8611-183	2-Pin Circuit Board Connector	X	X	X	X	X	X	X	X
28	8611-150	DIN Rail Terminal Block	X	X	X	X	X	X	X	X
29	8552-052	Compressor Capacitor	X				X			
29	8552-002	Outdoor Motor Capacitor		X	X	X		X	X	X
NS	3000-1224	Compressor Plug/Harness	X				X			
NS	3000-1231	Compressor Plug/Harness		X	X	X		X	X	X
NS	8615-038	Circuit Breaker 35A 2 Pole (Opt.) ①	X				X			
NS	8615-054	Circuit Breaker 20A 3 Pole (Opt.) ①		X						
NS	8615-052	Circuit Breaker 30A 3 Pole (Opt.) ①						X		
NS	8615-067	Toggle Disconnect (Opt.) ①			X	X			X	X
NS	4207-108	Wiring Diagram	X				X			
NS	4207-207	Wiring Diagram		X				X		
NS	4207-307	Wiring Diagram			X				X	
NS	4207-602	Wiring Diagram				X				X
NS	8301-075	USB Micro Cable Female to Male	X	X	X	X	X	X	X	X

* Replacement part will have a letter attached to the end of the part number to designate software version (Example: 8301-096-002**A**). A software upgrade of all PLCs onsite (units and controllers) should accompany any PLC replacement. Latest revisions of software, change log and instructions are available on the Bard website at http://www.bardhvac.com/software-download/

① Circuit breakers listed are for units without electric heat, "0Z" models. Hot gas bypass models not available without electric heat. See heater replacement parts manual for units with electric heat.

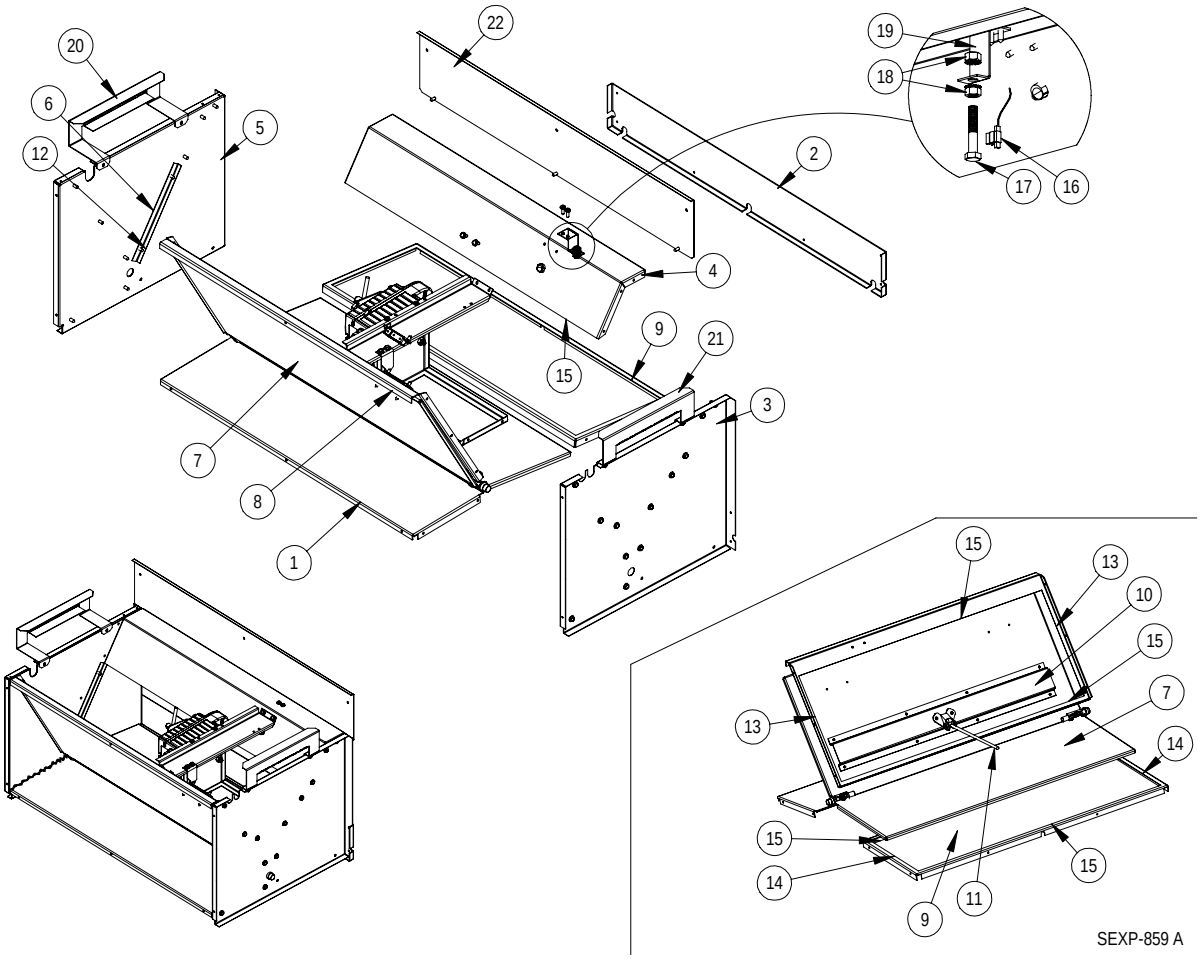
NS = Not Shown

BLOWER ASSEMBLY



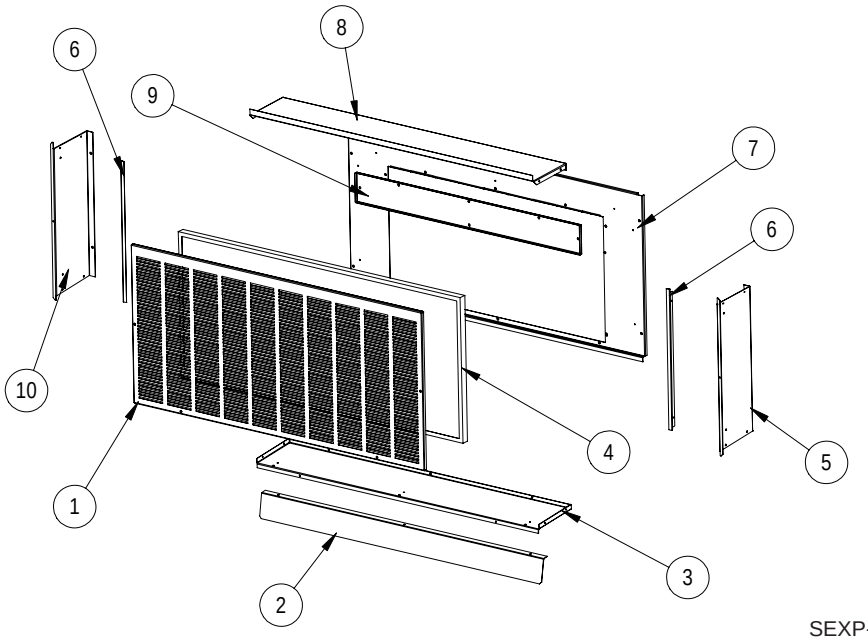
SEXP-944

Dwg No.	Part Number	Description	S900-364-001	S900-364-002	S900-365-001	S900-365-002
1	S8106-068-0150	Programmed Blower Motor & Control (230/208V)	X			
1	S8106-068-0152	Programmed Blower Motor & Control (230/208V)		X		
1	S8106-069-0151	Programmed Blower Motor & Control (460V)			X	
1	S8106-069-0153	Programmed Blower Motor & Control (460V)				X
1	C8106-068-0150	Programmed Control Only (230/208V)	O			
1	C8106-068-0152	Programmed Control Only (230/208V)		O		
1	C8106-069-0151	Programmed Control Only (460V)			O	
1	C8106-069-0153	Programmed Control Only (460V)				O
2	151-111	Housing	2	2	2	2
3	144-174	Diffuser	2	2	2	2
4	5152-090	Wheel CW	X	X	X	X
5	5152-091	Wheel CCW	X	X	X	X
6	105-870	Back Brace	X	X	X	X
7	5451-011	Grommets	6	6	6	6
8	8200-031	Motor Mount	X	X	X	X
9	103-401	Front Brace	X	X	X	X
10	113-761	Motor Control Bracket	X	X	X	X



Dwg. No.	Part Number	Description
1	137-738	Lower Front Partition
2	137-745	Lower Rear Fill
3	S101-979	Right Side
4	S137-865	Upper Rear Partition
5	S101-978	Left Side
6	S105-1344	Blade Seal Angle
7	S139-324	Blade
8	S137-867	Upper Front Partition
9	S137-740	Lower Rear Partition
10	141-430	Blade Support
11	8602-044	1/4 x 9" Rod
12	S1921-067-0800	29-9/16" Damper Blade Seal
13	S1921-067-1004	13" Damper Blade Seal
14	S1921-067-0802	10-11/16" Damper Blade Seal
15	S1921-067-2504	29-3/8" Damper Blade Seal
16	8408-044	Sensor 10K Ohm Curve J w/ 5/16" Clip
17	1012-052	Hex Head Bolt 5/16 - 18x1-3/4" 0.0005 Zinc w/ Yellow Chromate
18	1012-210	5/16" Nut 0.0005 Zinc w/ Yellow Chromate
19	113-541	Sensor Bracket
20	113-542	Filter Bracket
21	113-543	Filter Bracket
22	137-746	Upper Rear Fill
23	8602-040	Rod Bracket
NS	537-751	Condenser Cover Plate Assembly

FREECOOLING AIR HOOD



SEXP-752A

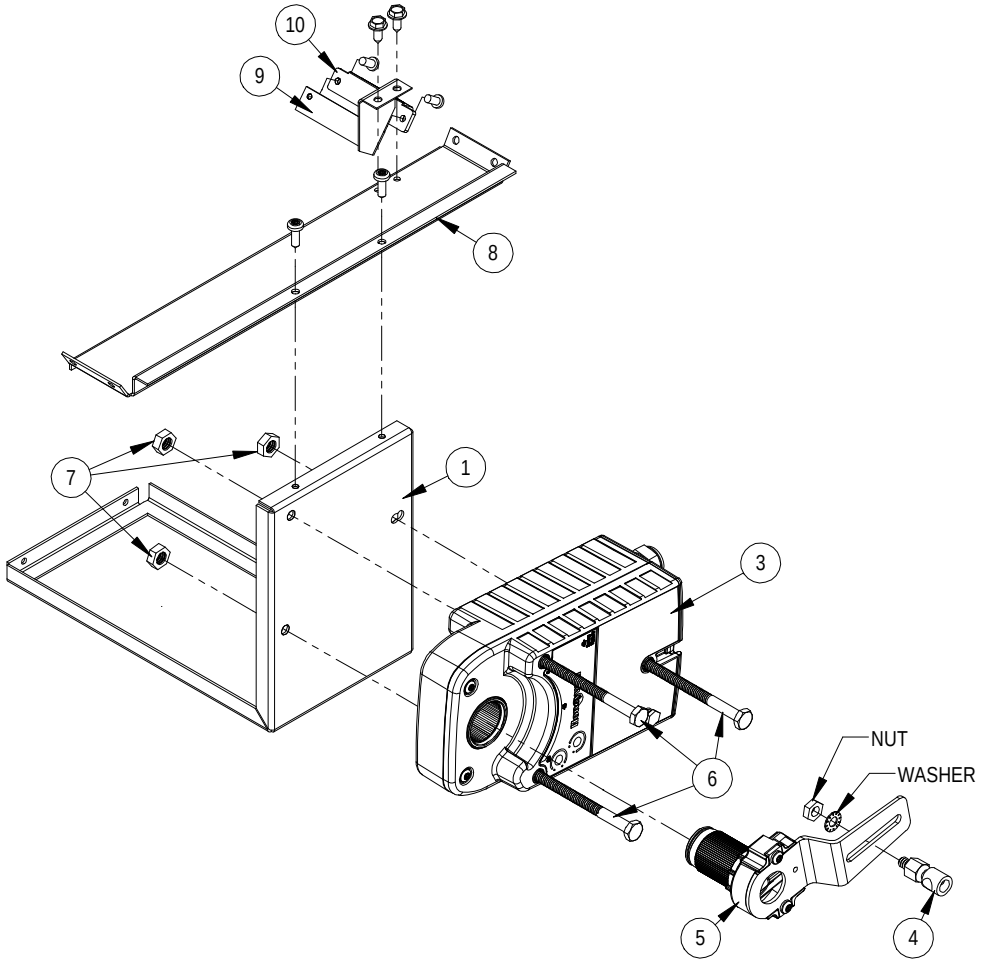
Dwg. No.	Part Number	Description
1	115-284-* ①	Hooded Front Door
1	115-291 ②	Hooded Front Door
1	115-290 ③	Hooded Front Door
2	113-538-* ①	Bottom Divider Bracket
2	113-568 ②	Bottom Divider Bracket
2	113-571 ③	Bottom Divider Bracket
3	S127-495-* ①	Hood Bottom
4	7003-079	Mist Filter 36-1/4" x 15-7/8" x 7/8"
5	S101-984-* ①	Right Side
5	S101-1033 ②	Right Side
5	S101-1013 ③	Right Side
6	105-1346	Side Filter Angle
6	105-1346 ②	Side Filter Angle
6	105-1370 ③	Side Filter Angle
7	553-660-* ①	Hood Mounting Door
7	553-712 ②	Hood Mounting Door
7	553-703 ③	Hood Mounting Door
8	S107-346-* ①	Hood Top
8	S107-354 ②	Hood Top
8	S107-353 ③	Hood Top
9	553-613	Filter Door
9	553-632 ②	Filter Door
9	553-636 ③	Filter Door
10	S101-873-* ①	Left Side
10	S101-997 ②	Left Side
10	S101-882 ③	Left Side
	920-0375	Complete Hood Assembly - Beige
	920-0376	Complete Hood Assembly - White
	920-0377	Complete Hood Assembly - Buckeye Gray
	920-0422	Complete Hood Assembly - Stainless Steel
	920-0411	Complete Hood Assembly - Aluminum

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

Beige -X Buckeye Gray -4 White -1

② Exterior cabinet parts are manufactured from stainless steel Code "S"

③ Exterior cabinet parts are manufactured from aluminum Code "A"



SEXP-879

Dwg. No.	Part Number	Description
1	141-466	Actuator Support Plate
3	8602-067	Direct Coupled Actuator
4	8602-008	Ball Joint
5	8602-068	Belimo Actuator Crank Arm 1/2"
6	1012-174	1/4" - 20x3 - 1/4 Hex Cap Screws
7	1012-201	1/4-20 Steel Keps Hex Nut Zinc
8	141-464	Actuator Support Bar
9	113-655	Blade Switch Bracket
10	8406-150	Lever Switch SPDT Sealed Pilot Duty
11	1012-178	4-40 x 5/8" Phillips Pan Head Machine Screw, Zinc Plated
12	1012-231	4-40 Steel Keps Hex Nut Zinc
NS	910-2014	Outdoor Temperature Sensor

SUPPLEMENTAL INSTRUCTIONS

50 HZ ELECTRICAL DATA

Model	Rated Volts and Phases	Operating Voltage Range	No. Field Power Circuits	① Minimum Circuit Ampacity	② Maximum External Fuse or Ckt. Brkr.	③ Field Power Wire Size	③ Ground Wire Size
W24AB-D0Z	240/220-1	198 - 254	1	15	20	12	12
D05	240/220-1		1	28	30	10	10
D08	240/220-1		1	44	45	8	10
W24A/LB-F0Z	415/380-3	342 - 456	1	10	15	14	14
F05			1	11	15	14	14
W30AB-D0Z	240/220-1	198 - 254	1	15	20	12	12
D05			1	28	30	10	10
D10			1	54	60	6	10
W30AB-F0Z	415/380-3	342 - 456	1	10	15	14	14
F07			1	16	20	12	12
F12			1	26	30	10	10
W36AB-D0Z	240/220-1	198 - 254	1	17	25	8	10
D05			1	28	30	8	10
D10			1	54	60	6	10
W36AB-E0Z	240/220-3	198 - 254	1	17	25	10	10
E06			1	21	25	10	10
E12			1	39	40	8	10
W36A/LB-F0Z	415/380-3	342 - 456	1	10	15	14	14
F07			1	14	15	12	12
F12			1	22	25	10	10
W42AC-E0Z	240/220-3	198 - 254	1	21	30	10	10
E09			1	30	30	8	10
E15			1	48	50	8	10
W42A/LC-F0Z	415/380-3	342 - 456	1	12	15	14	14
F07			1	16	20	12	12
* F14			1	29	30	10	10
W48AC-E0Z	240/220-3	198 - 254	1	23	35	8	10
E09			1	31	35	8	10
E15			1	50	50	8	10
W48A/LC-F0Z	415/380-3	342 - 456	1	12	15	14	14
F07			1	17	20	12	12
* F14			1	31	35	8	10
W60AC-E0Z	240/220-3	198 - 254	1	25	35	8	10
E09			1	32	35	8	10
E15			1	50	50	8	10
W60A/LC-F00	415/380-3	342 - 456	1	15	15	12	12
F07			1	18	20	12	12
* F14			1	31	35	8	10
W72A/LC-F00	400/380-3	342 - 440	1	21	25	10	10
F07			1	21	25	10	10
F14			1	32	35	8	10

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electric Code (latest version), Article 310 for power conductor sizing.
② Maximum size of the time delay fuse or "D" type circuit breaker for protection of field wiring conductors.
③ Based on 75°C copper wire. All wiring must conform to all local and national electrical codes.

* F14 only offered on W**A units.

CAUTION: *When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attentionto Note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three conductors are in a raceway.*

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 all existing local codes.

Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual: 7960-810
Supersedes: ***NEW***
Date: 3-1-19

OUTDOOR FAN MOTOR – 50 HZ

Models W42AC-E, W42AC-F, W48AC-E, W48AC-F, W60AC-E and W60AC-F have a condenser fan motor with a red and black speed tap. These units are shipped from the factory with the red lead connected. At no time is the black lead to be connected for 50HZ application.

WIRING – MAIN POWER

The disconnect means must have contact separation of 3 mm or greater in all poles.

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. 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 us; improper installation (including over or under sizing), improper repairs, or servicing; or improper parts and accessories not supplied by us.
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 We Will Do About A Defect:
We 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 and a properly completed Bard parts warranty form must be returned to a Bard distributor for submitting to Bard to be eligible for a warranty credit or replacement. Credits are issued to the Bard distributor.

We 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
This is the only warranty that we make. 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.

Other Rights
This warranty gives you specific legal rights and you may have other rights which vary from state to state.

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

Model Number Series: Includes all Models in each Series and which may have additional characters. (Example: W12-72A includes W36A w/additional characters.)	— 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
EQUIPMENT SHELTER UNITS MULTI-TEC, MEGA-TEC, FUSION-TEC	5	5	1	N/A
GEOTHERMAL/WATER SOURCE HEAT PUMPS QW2S, QW3S, QW4S, QW5S	5	5	5	N/A
CHILLED WATER QC50 (No Compressor)	N/A	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	N/A	N/A	5	N/A
Bard branded Thermostats/Temperature Controllers, UV-C LED Light Kits	N/A	N/A	5	N/A
LC6000, LV1000, MC4002, DC3003, TEC40, BG1000, PGD, PGDX, MC5300, MC5600	N/A	N/A	1	N/A
Humidistats, CO_2 Controllers and all other field-installed accessories not listed separately	N/A	N/A	1	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, 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, 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.***