Literature Assembly
911-0813-1
BOOK 1 OF 2

Contains the following:

2100-034(G)	Users Guide
2100-479	Leak Test Evacuation Charging
2110-1464(N)	Replacement Parts Manual
7960-810	Supplemental 50H Instructions
7960-864(C)	Supplemental Instructions
7960-420	Warranty

USER'S APPLICATION GUIDE AND TECHNICAL PRODUCT OVERVIEW

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

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

Bard®
SINCE 1914

BARDHVAC.COM

Climate Control Solutions

General Information

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

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

Contents

Overview

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

WALL MOUNT
Air Conditioners
and Heat Pumps

I-TEC®
Air Conditioners
and Heat Pumps

Q-TEC™
Air Conditioners
and Heat Pumps

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

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

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

Documentation

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

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

Unit Literature Assembly – Documentation Provided with Your Unit

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

Shipped literature includes the following:

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

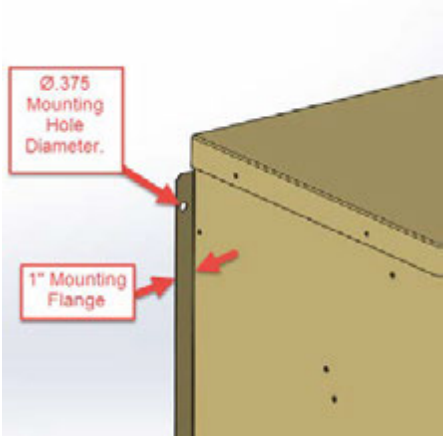
Installation plays a key part in unit functionality, performance and safety. Product securing and placement, duct design and supply/return location, electrical routing and condensate and defrost drainage all play key roles in making sure a unit will perform per the design specifications.

WALL MOUNT Products – Mounting the Product on a Wall Surface

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

Built-In Mounting Flange Detail:

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



Specification Sheets:

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

Specification Sheet Example

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

WALL MOUNT Products – Clearances for Outdoor Condenser Fan Airflow

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

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

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

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

WALL MOUNT Products – Clearances for Indoor Supply and Return Airflow

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

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

WALL MOUNT Products – Condensate and Defrost Drainage

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

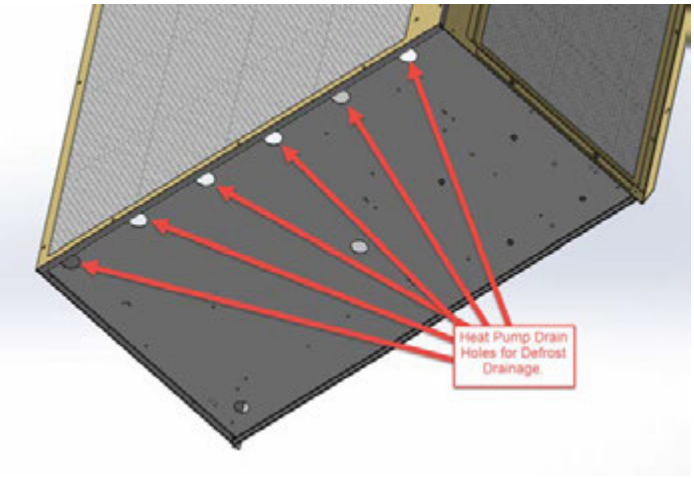
Defrost water drainage from heat pump units needs to be planned before installation. During seasons requiring heating operation, the unit will need to warm the condenser coil to remove frost build-up (defrost). **Outdoor heat pump products include holes in the unit base under the condenser coil for proper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

Condensate Water Drainage:

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

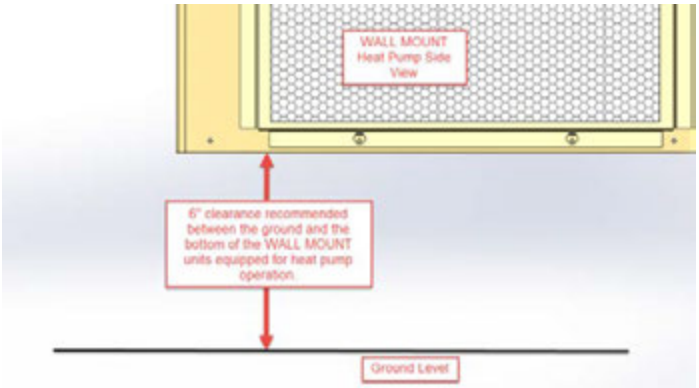
Defrost Water Drainage:

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



Defrost Water Drainage:

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



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

I-TEC

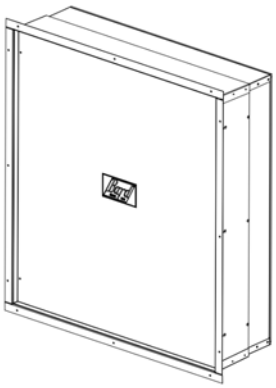
Q-TEC

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

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

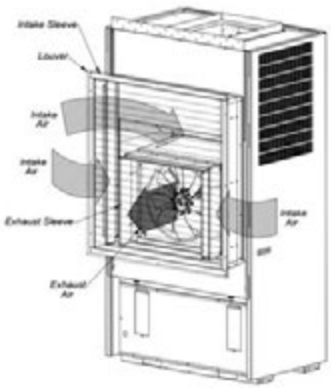
Wall Sleeve:

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



Air Paths:

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



Louver Installation:

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

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

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

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

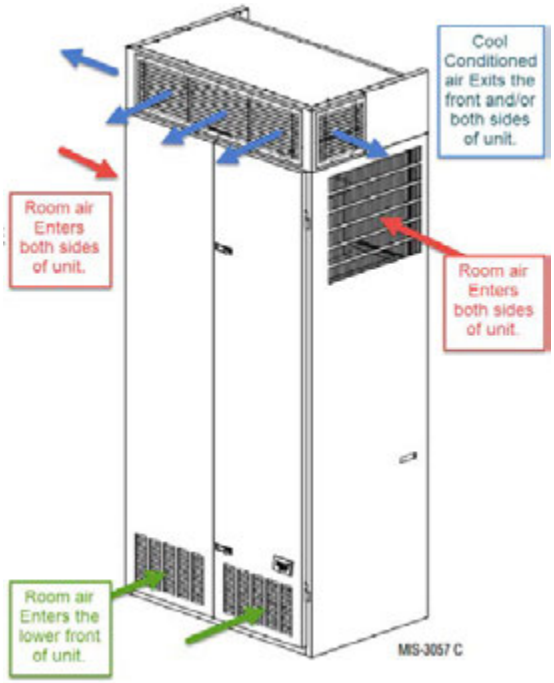
The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects inside the room within 24" of the return (unit air intake) louvers or grille. Avoid placing objects directly in the path of the supply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

I-TEC Air Path

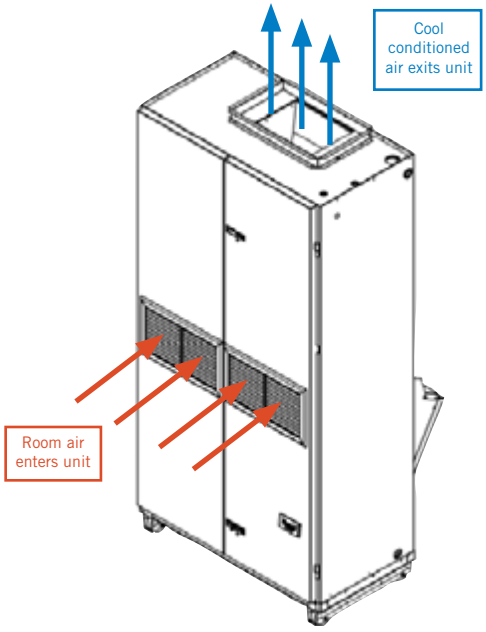
The I-TEC product has been engineered for extremely quiet unit operation and has multiple air paths for air entering and exiting the unit. Room air enters the upper sides to be conditioned (cooled) inside the unit and exits the unit top. The unit will either be ducted to supply registers or have a supply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

Q-TEC Air Path

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



Typical I-TEC Installation



Typical Q-TEC Installation

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

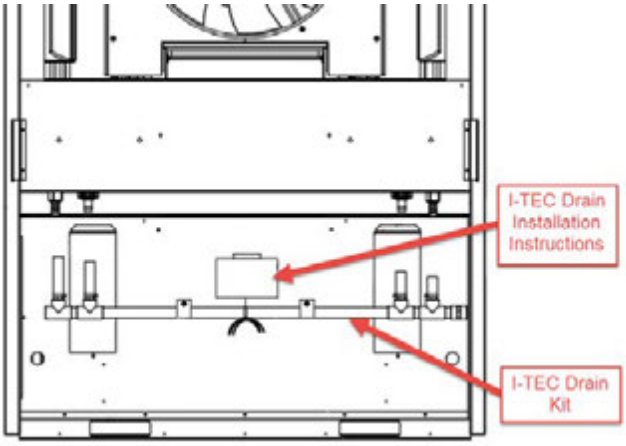
I-TEC and Q-TEC Products – Condensate Drainage

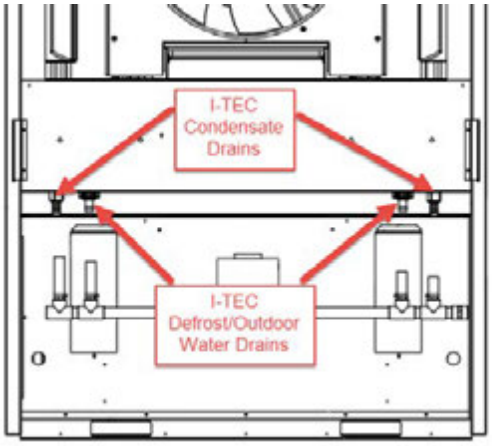
Condensate drainage for Bard indoor cooling units is a very important part of unit installation. During normal air conditioning operation, large amounts of condensate water are generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and needs to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

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

I-TEC Drain System:

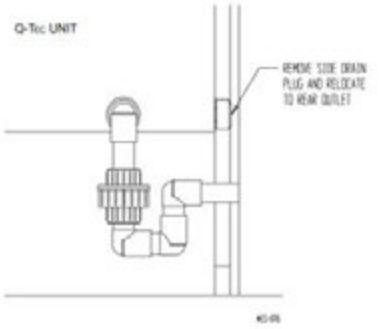
The I-TEC drainage system consists of a manifold drain kit that combines all drains behind the unit to allow connection to the building system.



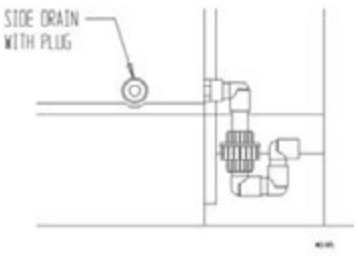


Q-TEC Drain System:

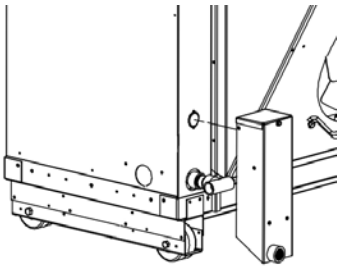
The Q-TEC drainage system consists of a lower right side or lower right rear connection fitting. An optional in-wall drain box may also be purchased as an accessory that allows separate evaporator and defrost water drainage.



Lower Right Side Drain



Lower Right Rear Drain



Optional In-Wall Drain Box

All Products – Power Supply Verification

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

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

Field-Supplied Voltage

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

Single and Three Phase Power

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

Hertz (Frequency)

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

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

Unit Maintenance

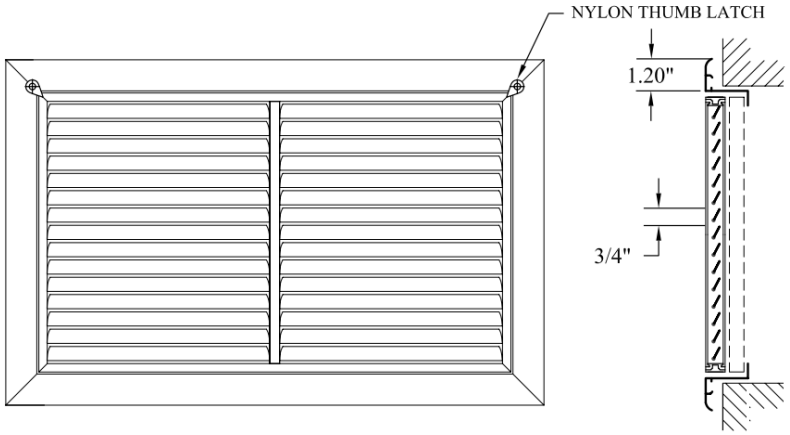
All Products – Filters and Filter Servicing

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

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

Outdoor Unit Wall Mount Room Air Filters

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



Return Air Filter Grille:

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

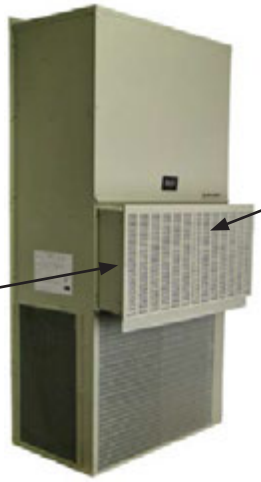
The product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

WALL MOUNT Products – Filters and Filter Servicing

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

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

Vent Intake Panel



Vent Intake Panel

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

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

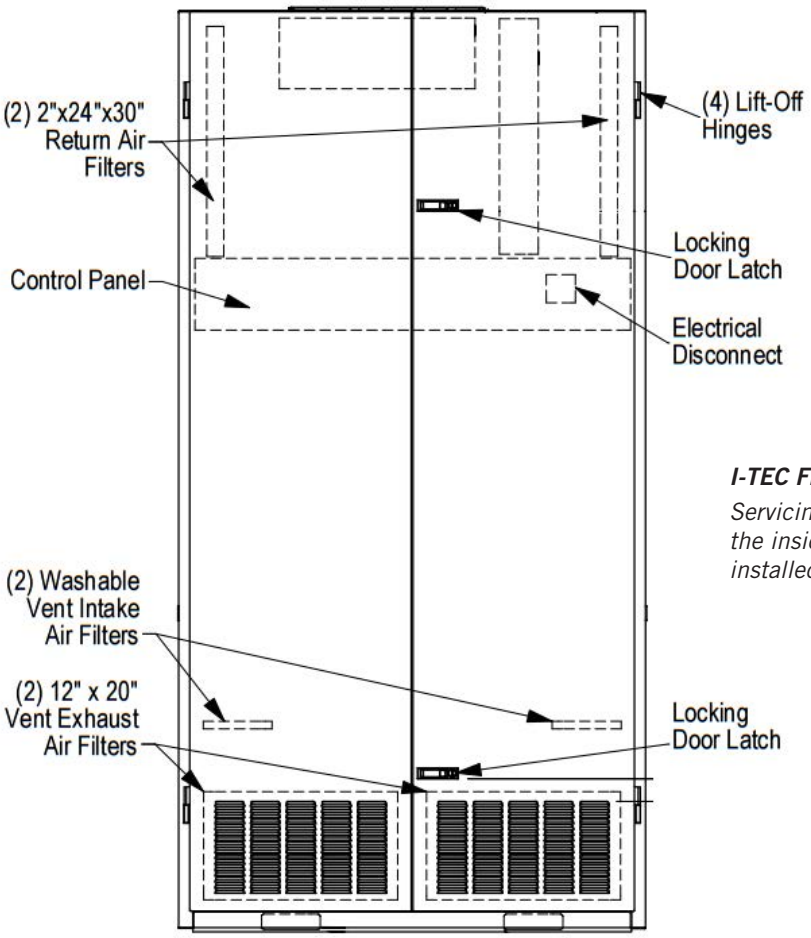
I-TEC Indoor Products – Filters and Filter Servicing

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

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

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

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



I-TEC Filter Locations:

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

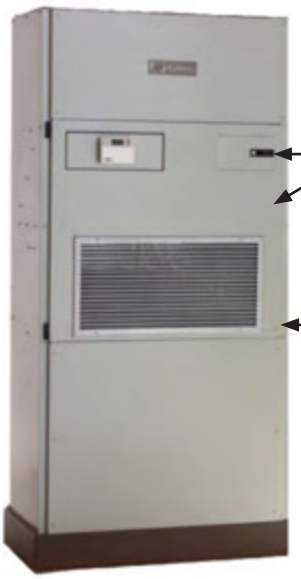
The I-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

Q-TEC Indoor Products – Filters and Filter Servicing

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

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

QWS Unit



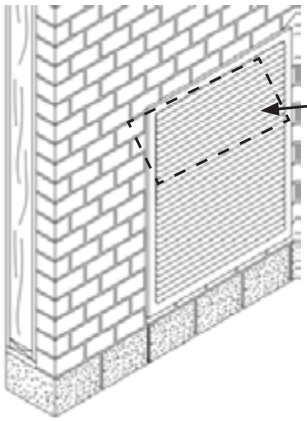
Q-TEC Filter Location:

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

Screw location

QH/QA Unit

Filter locations



Pre-filter location

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

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

All Products – Coil Cleaning

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

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

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

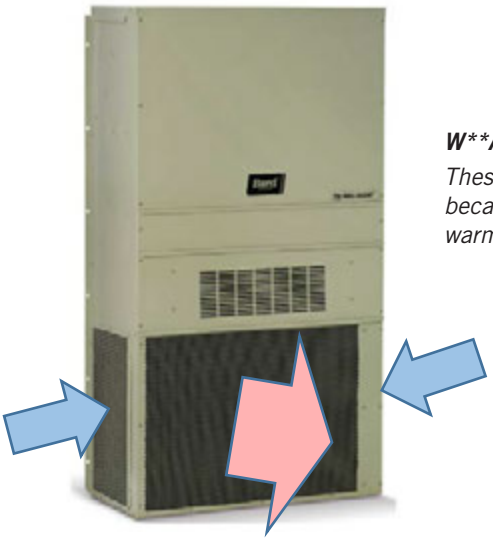
Other conditions that can cause reduction of airflow across the outdoor coil are flowers, shrubbery or other growth too near the outdoor coil air inlet and outlet openings. These living things, especially as they mature and grow, will be just as effective in blocking the airflow and create the same problems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

Equipment Corrosion Protection

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

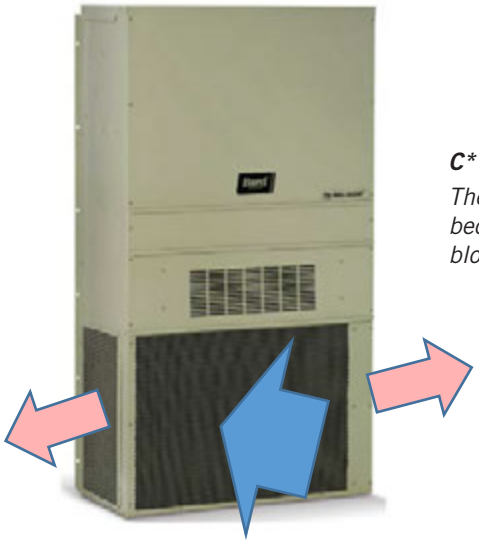
The product installation instructions contain additional information regarding unit coil cleaning. This information may be accessed at www.bardhvac.com.

All Products – Condenser Airflow



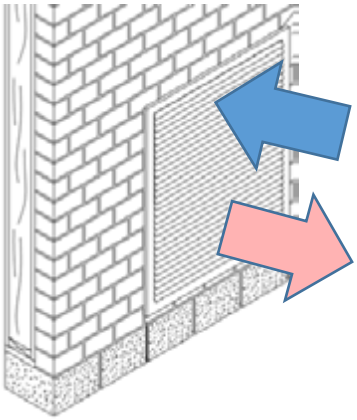
W**A, W**H, T**H, T**S, W*RV Wall Mount Units:

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



C**H Wall Mount Units:

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



I-TEC and Q-TEC Units:

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

Air-to-Air Cooling Products (Air Conditioners)

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

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

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

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

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

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

Cooling Mode

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

Heating Mode

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

Defrost Cycle

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

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

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

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

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

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

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

Cooling Mode

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

Heat Mode

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

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

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

Water Supply Systems

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

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

Dehumidification and Ventilation Operation

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

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

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

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

Ventilation has multiple purposes:

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

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

All Units – Troubleshooting

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

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

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

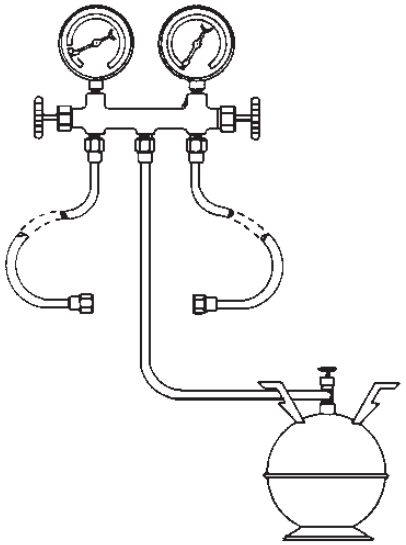
Helpful Hints and Good Operating Practices

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

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

SERVICING PROCEDURE

R-410A
LEAK TEST EVACUATION
CHARGING



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

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

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

CONTENTS

General

⚠ WARNING

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

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

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

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

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

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

GAUGE MANIFOLD

⚠ WARNING

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

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

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

ATTACHING GAUGE MANIFOLD

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

ATTACHING MANIFOLD HOSE TO SCHRADER VALVE

WARNING

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

A. Put high pressure hose “B” on first. (Unit should not be running.)

B. Put low pressure hose “A” on second. (Unit should be running.)

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

Leak Test

1. Remove gauge port cap from suction and liquid service valve ports and attach manifold gauge hoses. Connect an upright R-410A drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system to a positive pressure with refrigerant vapor. Pressurize the complete system with dry nitrogen, or CO2 until the pressure reaches 200 psig. **Do not** exceed 250 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector suitable for use with HFC refrigerants or R-410A. If a leak is found which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from system.
3. Close drum valve and disconnect from center port. Release nitrogen or CO2 into the atmosphere through suction line of gauge manifold.
4. Correct any leaks and recheck. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.
5. Change the filter dryer. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

Evacuation

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

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

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

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

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

WARNING

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

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

R-410A System Charging

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

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

CHARGING

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

PRELIMINARY CHARGING STEPS

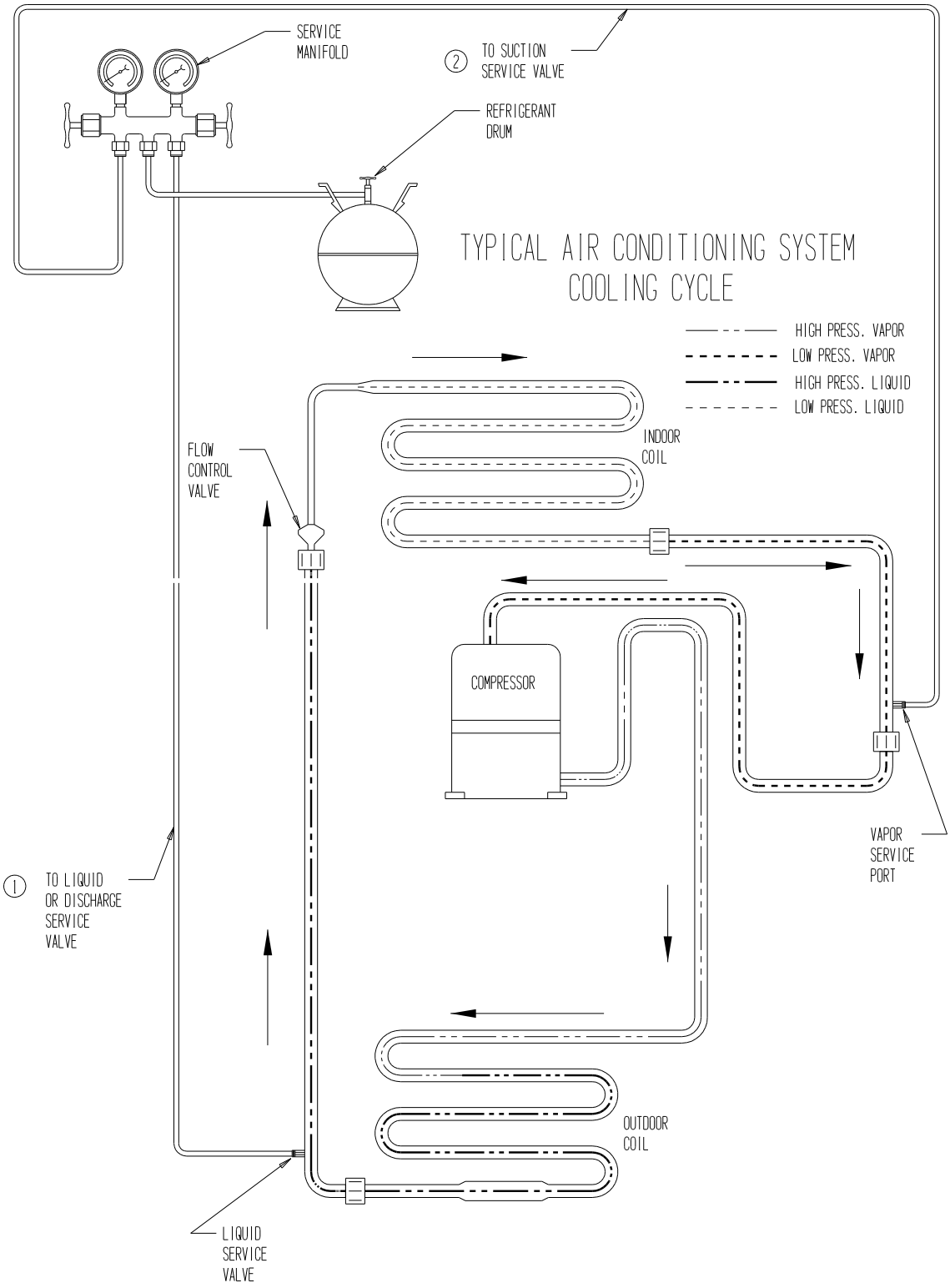
If the system has been open to the atmosphere, the filter dryer should be replaced and then evacuated. Then proceed as follows:

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

CHARGING THE SYSTEM BY WEIGHT

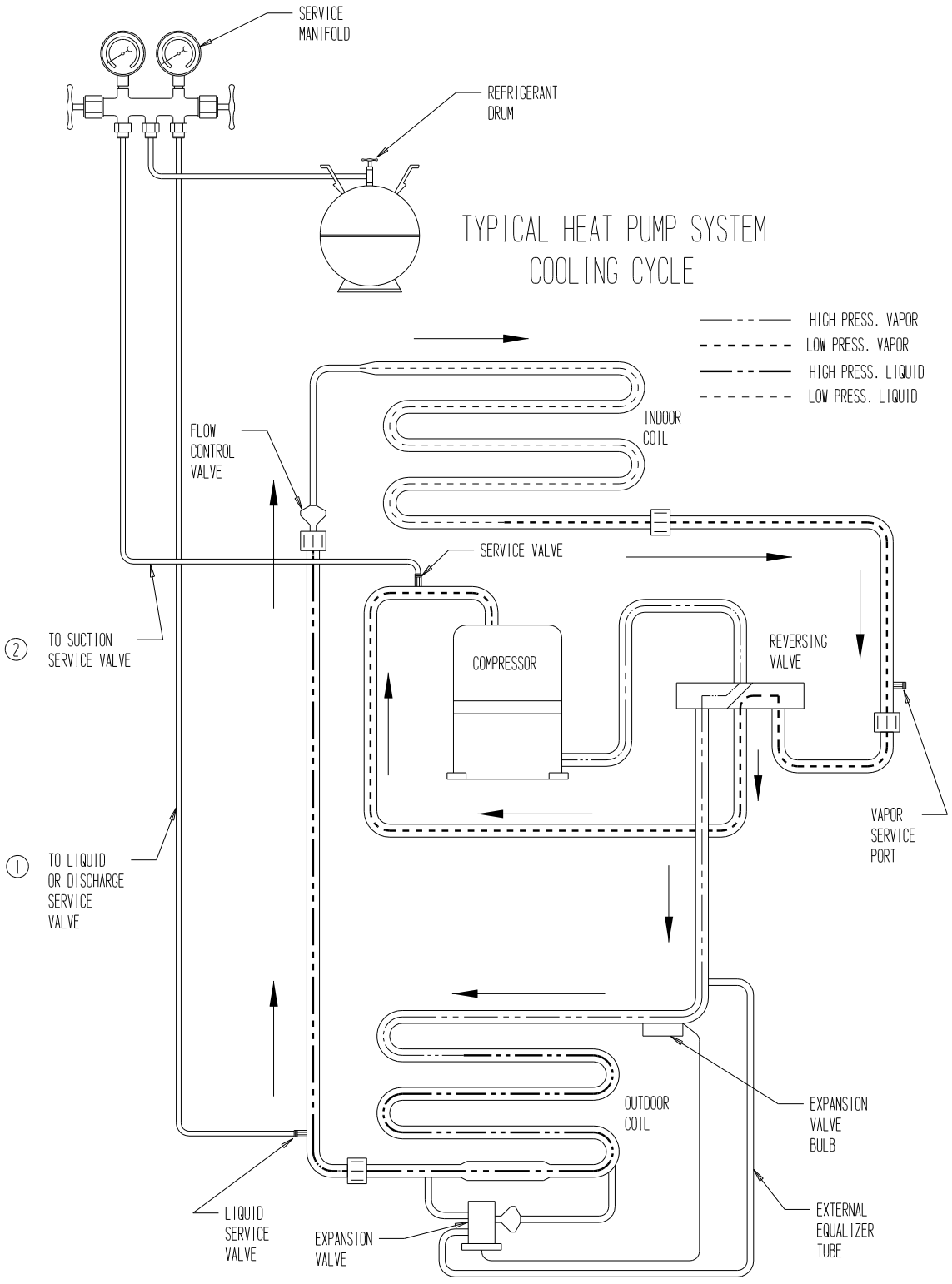
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder liquid valve and allow pressure in system to balance with pressure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

FIGURE 1
TYPICAL AIR CONDITIONING SYSTEM COOLING CYCLE



MIS-369

FIGURE 2
TYPICAL HEAT PUMP SYSTEM COOLING CYCLE

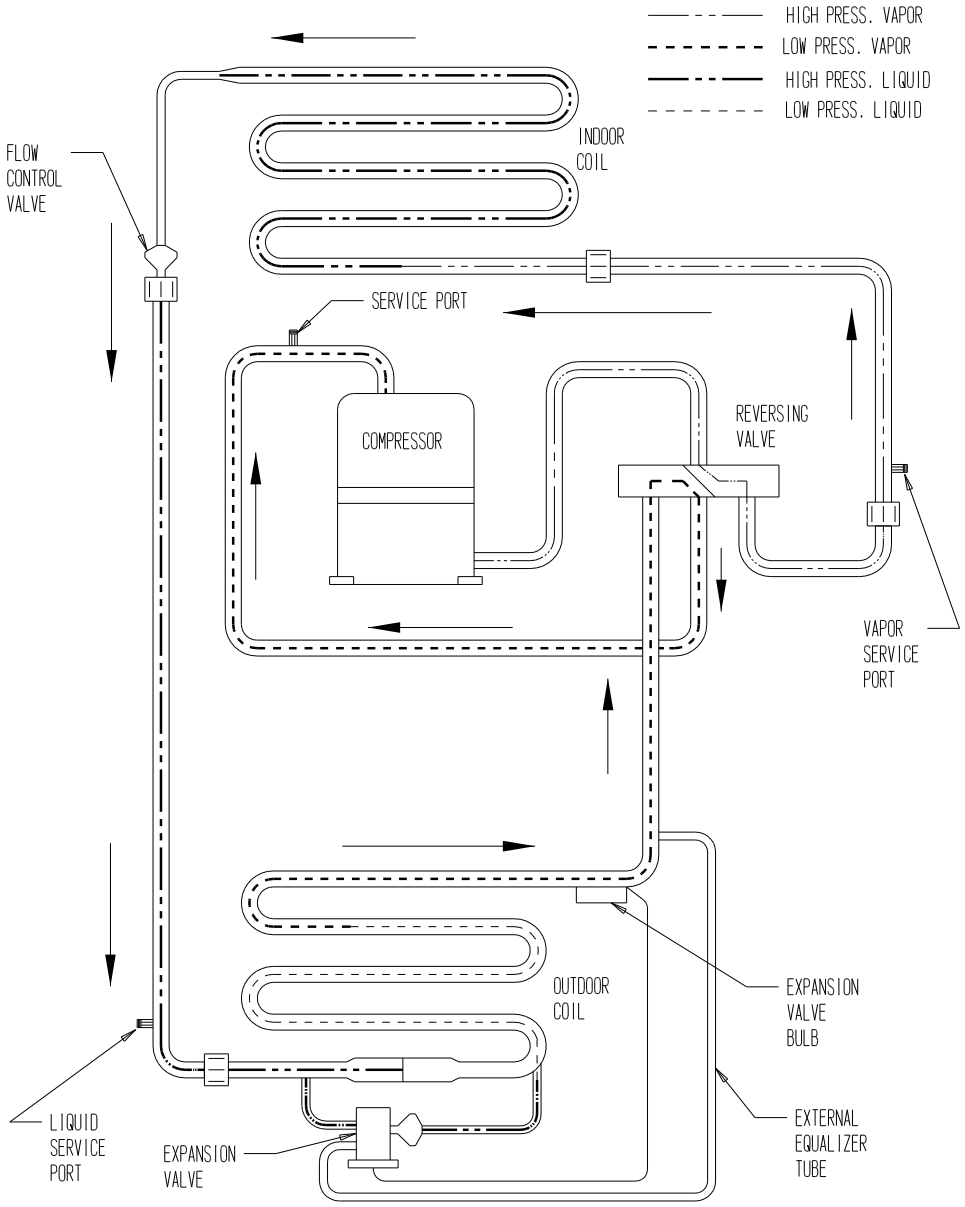


MIS-368

⚠ WARNING

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

FIGURE 3
HEATING CYCLE



MIS-289

TROUBLESHOOTING THE MECHANICAL SYSTEM

AIR CONDITIONING AND HEAT PUMP — COOLING

LOW SUCTION—LOW HEAD PRESSURE

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

HIGH SUCTION—LOW HEAD PRESSURE

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

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

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

① Water source heat pump.

HEAT PUMP — HEATING

LOW SUCTION—LOW HEAD PRESSURE

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

HIGH SUCTION—LOW HEAD PRESSURE

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

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

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

① Water source heat pump.

TROUBLESHOOTING CHART FOR AIR CONDITIONERS

- ● Generally the cause. Always make these checks first.
- ◆ Occasionally the cause. Make these checks only if first checks fail to locate trouble.
- ■ Rarely the cause. Make this check only if previous checks fail to locate trouble.

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

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

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

TROUBLESHOOTING CHART FOR AIR TO AIR HEAT PUMPS

● Denotes common cause.

◆ Denotes occasional cause.

Power Supply

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

Outdoor Section — Compressor and Refrigerant System

Cycle	Symptom	Compressor: Discharge Line Hitting Inside of Shell	Bearings Defective	Seized	Valve Defective	Motor Windings Defective	Refrigerant System: Refrigerant Charge Low	Refrigerant Overcharge	High Head Pressure	Low Head Pressure	High Suction Pressure	Low Suction Pressure	Non-Condensables	Unequalized Pressures
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate													
	Compressor will not run O.D. fan motor runs		◆	●		●								●
	Compressor "hums" but will not start		●	●		●								●
	Compressor cycles on overload		◆		◆	◆	●	●	◆		◆		●	
	Compressor off on high pressure control							●					●	
	Compressor noisy	◆	◆		●									
	Head pressure too high							●					●	
	Head pressure too low				●		●					●		
	Suction pressure too high				●			●	●					
	Suction pressure too low						●			◆				
	I.D. blower will not start													
	I.D. coil frosting or icing-						●					●		
	High compressor amps		●	●				●	●		●		●	
Cooling Cycle	Compressor runs continuously—no cooling				●		●							
	Liquid refrigerant flooding back to compressor							●	●					
Heating Cycle	Compressor runs continuously—no heating				●		●							
	Defrost cycle initiates no ice on coil						◆							
	Reversing valve does not shift						◆			◆				
	Ice build up on lower part of O.D. coil						●					◆		
	Liquid refrigerant flooding back to compressor							●	●					
	Auxiliary heat on I.D. blower off													
	Excessive operating costs						●	●						
	Excessive ice on O.D. coil						●							

Outdoor Section — Defrost Control, Rev. Valve, Check Valve, Outdoor Fan Motor and Coil

Cycle	Symptom	Defrost Control: Sensing Bulb Loose-Poorly Located	Cycle Too Long (Clock timer)	Defective Control, Timer or Relay	Rev. Valve: Leaking	Defective Valve or Coil	Check Valve: Sticking Closed	Leaking or Defective	Outdoor Fan Motor and Coil: 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)
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate													
	Compressor will not run O.D. fan motor runs													
	Compressor "hums" but will not start													
	Compressor cycles on overload				◆					◆	◆	◆	◆	
	Compressor off on high pressure control	◆	●	●			●		◆	●	●	●	●	
	Compressor noisy													
	Head pressure too high	◆	◆			◆	◆		◆	●	●	◆	●	
	Head pressure too low				●			◆						●
	Suction pressure too high				●			◆						
	Suction pressure too low						◆		◆	●	●	◆		◆
	I.D. blower will not start													
	I.D. coil frosting or icing-						◆							
	High compressor amps						◆							
Cooling Cycle	Compressor runs continuously—no cooling									◆	◆	◆	◆	◆
	Liquid refrigerant flooding back to compressor													
Heating Cycle	Compressor runs continuously—no heating		◆	◆	●									
	Defrost cycle initiates no ice on coil			●										
	Reversing valve does not shift					●								
	Ice build up on lower part of O.D. coil	●	●	●										
	Liquid refrigerant flooding back to compressor													
	Auxiliary heat on I.D. blower off													
	Excessive operating costs			●	●	●				◆	◆	◆		
	Excessive ice on O.D. coil	●	●	●		●								

Indoor Section and Aux. Heat

Cycle	Symptom	Indoor Blower Motor and Coil: Plugged or Restricted Metering Device (Clg)	Fins Dirty or Plugged	Motor Winding Defective	Air Volume Low	Air Filters Dirty	Undersized or Restricted Ductwork	Check: Sticking Closed	Leaking or Defective	Aux. Heat: Auxiliary Heat Upstream of Coil
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate									
	Compressor will not run O.D. fan motor runs									
	Compressor "hums" but will not start									
	Compressor cycles on overload		◆	◆	◆	●	◆			
	Compressor off on high pressure control	◆	●	●	●	●	●	●		●
	Compressor noisy									
	Head pressure too high	◆	◆	◆	●	●	◆	◆		●
	Head pressure too low								◆	
	Suction pressure too high								◆	
	Suction pressure too low	◆	●	◆	●	●	◆	◆		
	I.D. blower will not start									
	I.D. coil frosting or icing-	◆	●	●	●	●	◆			
	High compressor amps		●	●	●	●	◆	◆		
Cooling Cycle	Compressor runs continuously—no cooling		●	●	●	●	◆			
	Liquid refrigerant flooding back to compressor		●	●	●	●	◆	◆		
Heating Cycle	Compressor runs continuously—no heating									
	Defrost cycle initiates no ice on coil									
	Reversing valve does not shift									
	Ice build up on lower part of O.D. coil									
	Liquid refrigerant flooding back to compressor									
	Auxiliary heat on I.D. blower off			●						
	Excessive operating costs		◆	◆	◆					
	Excessive ice on O.D. coil									

REPLACEMENT PARTS MANUAL

MULTI-TEC® Wall Mount Air Conditioner

Models:

W42ACEA	W42ACPB	W48ACMA	W48ACPF	W60ACMC	W72ACEA	W72ACPB
W42ACEB	W42ACPC	W48ACMB	W48ACPQ	W60ACPA	W72ACEB	W72ACPC
W42ACEC	W42ACPE	W48ACMC	W60ACEA	W60ACPB	W72ACEC	W72ACPF
W42ACMA	W42ACPF	W48ACPA	W60ACEB	W60ACPC	W72ACMA	W72ACPQ
W42ACMB	W48ACEA	W48ACPB	W60ACEC	W60ACPE	W72ACMB	
W42ACMC	W48ACEB	W48ACPC	W60ACMA	W60ACPF	W72ACMC	
W42ACPA	W48ACEC	W48ACPE	W60ACMB	W60ACPQ	W72ACPA	

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 following 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.

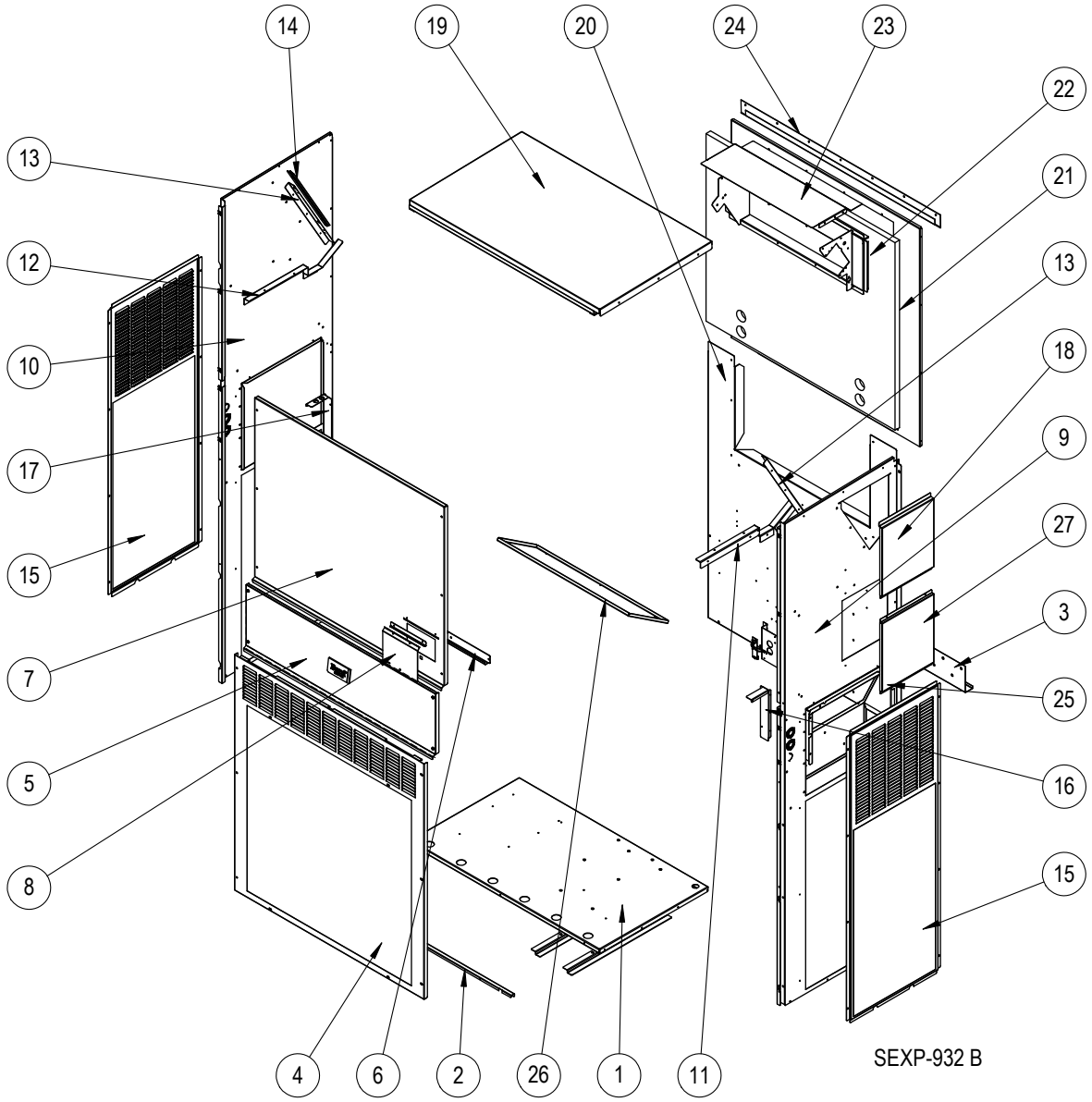
Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual: 2110-1464N
Supersedes: 2110-1464M
Date: 8-29-24

EXTERNAL PARTS



This drawing to be used for reference for pages 3 and 4

Dwg No.	Part Number	Description	W42ACPA, B, C, E, F	W42ACMA, B, C	W42ACEA, B, C	W48ACPA, B, C, E, F, Q	W48ACMA, B, C	W48ACEA, B, C
1	S127-574	Unit Base	X	X	X	X	X	X
1	S127-584 ③	Unit Base	O	O	O	O	O	O
2	113-762	Front Base Bracket	X	X	X	X	X	X
2	113-797 ③	Front Base Bracket	O	O	O	O	O	O
3	113-140	Bottom Mounting Bracket	X	X	X	X	X	X
4	119-125-* ①	Front Grille	X	X	X	X	X	X
4	119-131 ②	Front Grille	O	O	O	O	O	O
4	119-135 ③	Front Grille	O	O	O	O	O	O
5	S533-301-* ①	Control Panel Cover (Outer)	X	X	X	X	X	X
5	S533-309 ②	Control Panel Cover (Outer)	O	O	O	O	O	O
5	S533-310 ③	Control Panel Cover (Outer)	O	O	O	O	O	O
6	S165-608-* ①	Rain Channel	X	X	X	X	X	X
6	S165-609 ②	Rain Channel	O	O	O	O	O	O
6	S165-610 ③	Rain Channel	O	O	O	O	O	O
7	S515-323-* ①	Upper Front	X	X	X	X	X	X
7	S515-328 ②	Upper Front	O	O	O	O	O	O
7	S515-330 ③	Upper Front	O	O	O	O	O	O
8	153-717-* ①	Disconnect Access Door	X	X	X	X	X	X
8	153-723 ②	Disconnect Access Door	O	O	O	O	O	O
8	153-724 ③	Disconnect Access Door	O	O	O	O	O	O
9	S501-1133-* ①	Right Side	X	X	X	X	X	X
9	S501-1134 ②	Right Side	O	O	O	O	O	O
9	S501-1129 ③	Right Side	O	O	O	O	O	O
10	501-1083-* ①	Left Side	X	X	X	X	X	X
10	501-1085 ②	Left Side	O	O	O	O	O	O
10	501-1077 ③	Left Side	O	O	O	O	O	O
11	105X1454	Right Support Angle	X	X	X	X	X	X
12	105Y1454	Left Support Angle	X	X	X	X	X	X
13	105-1457	Coil Support	2	2	2	2	2	2
14	147-055	Coil Support Offset	X	X	X	X	X	X
15	119-126-* ①	Side Grille	2	2	2	2	2	2
15	119-132 ②	Side Grille	2	2	2	2	2	2
15	119-136 ③	Side Grille	2	2	2	2	2	2
16	105-1450	Right Control Panel Angle	X	X	X	X	X	X
17	105-1451	Left Control Panel Angle	X	X	X	X	X	X
18	S543-221-* ①	Heater Access Cover	X	X	X	X	X	X
18	S543-228 ②	Heater Access Cover	O	O	O	O	O	O
18	S543-229 ③	Heater Access Cover	O	O	O	O	O	O
19	507-382-* ①	Top	X	X	X	X	X	X
19	507-391 ②	Top	O	O	O	O	O	O
19	507-392 ③	Top	O	O	O	O	O	O
20	109-412	Lower Back	X	X	X	X	X	X
20	109-418 ②	Lower Back	O	O	O	O	O	O
20	109-422 ③	Lower Back	O	O	O	O	O	O
21	S509-411	Upper Back	X	X	X	X	X	X
21	S509-417 ②	Upper Back	O	O	O	O	O	O
21	S509-421 ③	Upper Back	O	O	O	O	O	O
22	S111-299	Outlet Air Frame Assembly	X	X	X	X	X	X
23	535-129	Heat Shield	X	X	X	X	X	X
24	113-150-* ①	Top Rain Flashing	X	X	X	X	X	X
24	113-150-4 ②	Top Rain Flashing	O	O	O	O	O	O
24	113-359 ③	Top Rain Flashing	O	O	O	O	O	O
25	539-406	Fresh Air Damper Assembly	X	X	X	X	X	X
25	543-222	Intake Blank Off Plate	O	O	O	O	O	O
26	543-220	Exhaust Blank Off Plate	X	X	X	X	X	X
27	S543-248-* ①	Access Cover	X	X	X	X	X	X
27	S543-250 ②	Access Cover	O	O	O	O	O	O
27	S543-251 ③	Access Cover	O	O	O	O	O	O
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.

X – Standard Component
O – Optional Component

② Exterior cabinet parts are manufactured from aluminum Code "A" (#24 - Top rain flashing not available in aluminum; order 113-150-4 (Buckeye Gray).

③ Exterior cabinet parts are manufactured from stainless steel Code "S"

EXTERNAL PARTS – STANDARD & DEHUMIDIFICATION

Dwg No.	Part Number	Description	W60ACPA, B, C, E, F, Q	W60ACMA, B, C	W60ACEA, B, C	W72ACPA, B, C, F, Q	W72ACMA, B, C	W72ACEA, B, C
1	S127-574	Unit Base	X	X	X	X	X	X
1	S127-584 ③	Unit Base	O	O	O	O	O	O
2	113-762	Front Base Bracket	X	X	X	X	X	X
2	113-797 ③	Front Base Bracket	O	O	O	O	O	O
3	113-140	Bottom Mounting Bracket	X	X	X	X	X	X
4	119-127-* ①	Front Grille	X	X	X	X	X	X
4	119-133 ②	Front Grille	O	O	O	O	O	O
4	119-137 ③	Front Grille	O	O	O	O	O	O
5	S533-301-* ①	Control Panel Cover (Outer)	X	X	X	X	X	X
5	S533-309 ②	Control Panel Cover (Outer)	O	O	O	O	O	O
5	S533-310 ③	Control Panel Cover (Outer)	O	O	O	O	O	O
6	S165-608-* ①	Rain Channel	X	X	X	X	X	X
6	S165-609 ②	Rain Channel	O	O	O	O	O	O
6	S165-610 ③	Rain Channel	O	O	O	O	O	O
7	S515-324-* ①	Upper Front	X	X	X	X	X	X
7	S515-329 ②	Upper Front	O	O	O	O	O	O
7	S515-331 ③	Upper Front	O	O	O	O	O	O
8	153-717-* ①	Disconnect Access Door	X	X	X	X	X	X
8	153-723 ②	Disconnect Access Door	O	O	O	O	O	O
8	153-724 ③	Disconnect Access Door	O	O	O	O	O	O
9	S501-1135-* ①	Right Side	X	X	X	X	X	X
9	S501-1136 ②	Right Side	O	O	O	O	O	O
9	S501-1132 ③	Right Side	O	O	O	O	O	O
10	501-1081-* ①	Left Side	X	X	X	X	X	X
10	501-1087 ②	Left Side	O	O	O	O	O	O
10	501-1079 ③	Left Side	O	O	O	O	O	O
11	105X1454	Right Support Angle	X	X	X	X	X	X
12	105Y1454	Left Support Angle	X	X	X	X	X	X
13	105-1455	Coil Support	2	2	2	2	2	2
14	147-054	Coil Support Offset	X	X	X	X	X	X
15	119-128-* ①	Side Grille	2	2	2	2	2	2
15	119-134 ②	Side Grille	2	2	2	2	2	2
15	119-138 ③	Side Grille	2	2	2	2	2	2
16	105-1450	Right Control Panel Angle	X	X	X	X	X	X
17	105-1451	Left Control Panel Angle	X	X	X	X	X	X
18	S543-221-* ①	Heater Access Cover	X	X	X	X	X	X
18	S543-228 ②	Heater Access Cover	O	O	O	O	O	O
18	S543-229 ③	Heater Access Cover	O	O	O	O	O	O
19	507-382-* ①	Top	X	X	X	X	X	X
19	507-391 ②	Top	O	O	O	O	O	O
19	507-392 ③	Top	O	O	O	O	O	O
20	109-414	Lower Back	X	X	X	X	X	X
20	109-420 ②	Lower Back	O	O	O	O	O	O
20	109-424 ③	Lower Back	O	O	O	O	O	O
21	S509-413	Upper Back	X	X	X	X	X	X
21	S509-419 ②	Upper Back	O	O	O	O	O	O
21	S509-423 ③	Upper Back	O	O	O	O	O	O
22	S111-299	Outlet Air Frame Assembly	X	X	X	X	X	X
23	535-129	Heat Shield	X	X	X	X	X	X
24	113-150-* ①	Top Rain Flashing	X	X	X	X	X	X
24	113-150-4 ②	Top Rain Flashing	O	O	O	O	O	O
24	113-359 ③	Top Rain Flashing	O	O	O	O	O	O
25	539-406	Fresh Air Damper Assembly	X	X	X	X	X	X
25	543-222	Intake Blank Off Plate	O	O	O	O	O	O
26	543-220	Exhaust Blank Off Plate	X	X	X	X	X	X
27	S543-248-* ①	Access Cover	X	X	X	X	X	X
27	S543-250 ②	Access Cover	O	O	O	O	O	O
27	S543-251 ③	Access Cover	O	O	O	O	O	O
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.

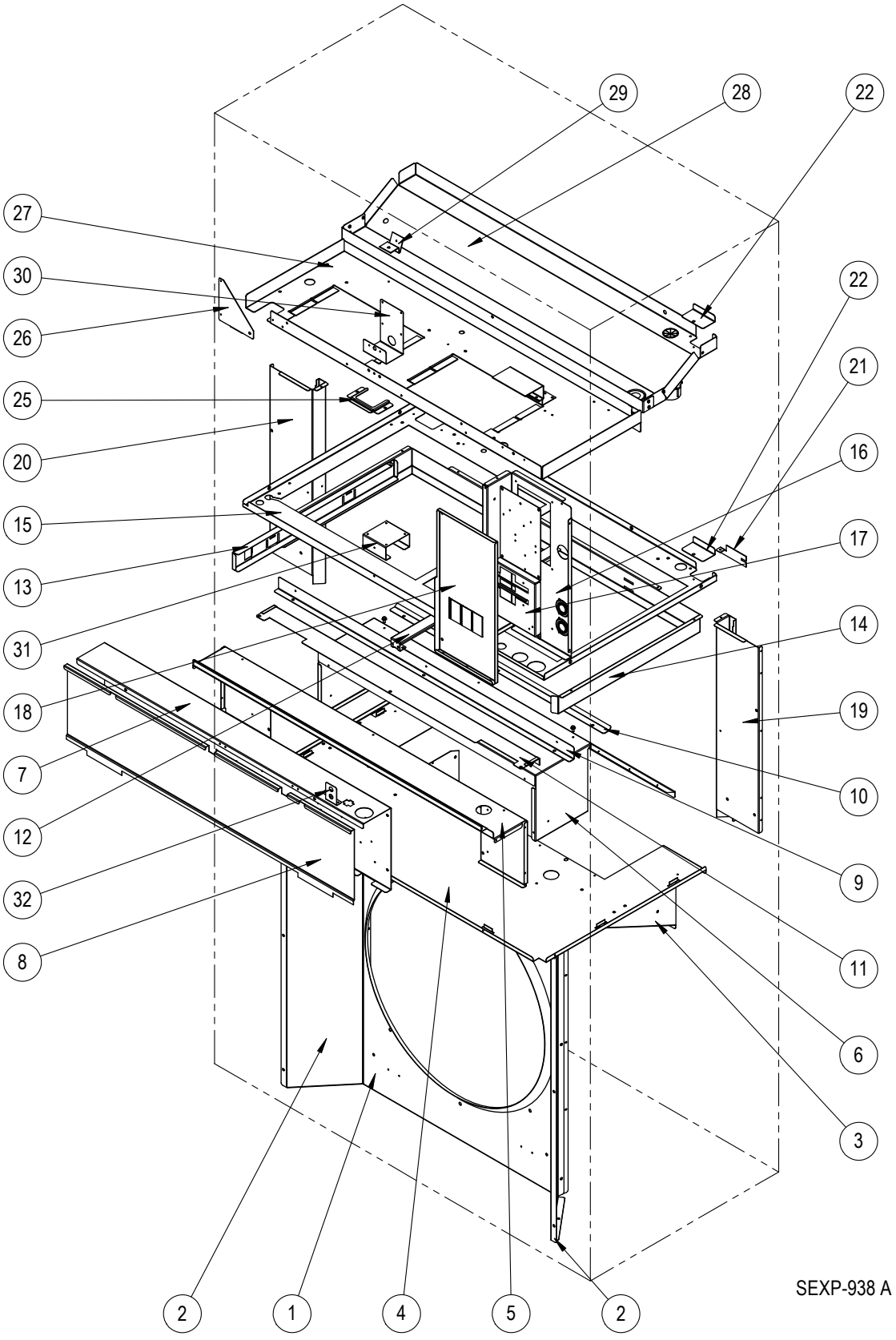
X – Standard Component
O – Optional Component

② Exterior cabinet parts are manufactured from aluminum Code "A" (#24 - Top rain flashing not available in aluminum; order 113-150-4 (Buckeye Gray).

③ Exterior cabinet parts are manufactured from stainless steel Code "S"

Refer to drawing on page 2

This page intentionally left blank



This drawing to be used for reference for pages 7 and 8

Dwg No.	Part Number	Description	W42ACPA, B, E	W42ACPC, F	W42ACMA, B	W42ACMC	W42ACEA, B	W42ACEC	W48ACPA, B, E	W48ACPC, F, Q	W48ACMA, B	W48ACMC	W48ACEA, B	W48ACEC
1	125-089	Fan Shroud	X	X	X	X	X	X	X	X	X	X	X	X
1	125-093 ①	Fan Shroud	O	O	O	O	O	O	O	O	O	O	O	O
2	S125-090	Fan Shroud Side Access Cover	2	2	2	2	2	2	2	2	2	2	2	2
2	S125-094 ①	Fan Shroud Side Access Cover	2	2	2	2	2	2	2	2	2	2	2	2
3	121-586	Condenser Partition Insert	X	X	X	X	X	X	X	X	X	X	X	X
3	121-600 ①	Condenser Partition Insert	O	O	O	O	O	O	O	O	O	O	O	O
4	121-585	Condenser Partition	X	X	X	X	X	X	X	X	X	X	X	X
4	121-599 ①	Condenser Partition	O	O	O	O	O	O	O	O	O	O	O	O
5	521-630	Front Exhaust Partition	X	X	X	X	X	X	X	X	X	X	X	X
6	521-587	Exhaust Partition	X	X	X	X	X	X	X	X	X	X	X	X
7	Control Panel Assy.	See Control Panel Assy. Drawing & Parts List	X	X	X	X	X	X	X	X	X	X	X	X
8	S133-330	Control Panel Cover (Inner)	X	X	X	X	X	X	X	X	X	X	X	X
9	105-1453	Front Vent Guide Rail	X	X	X	X	X	X	X	X	X	X	X	X
10	105-1452	Vent Guide Rail	X	X	X	X	X	X	X	X	X	X	X	X
11	S135-409	Field Wire Shield	X	X	X	X	X	X	X	X	X	X	X	X
12	131-168	Filter Support Bracket	2	2	2	2	2	2	2	2	2	2	2	2
13	131-170	Filter Slide	X	X	X	X	X	X	X	X	X	X	X	X
14	131-169	Filter Rack Frame	X	X	X	X	X	X	X	X	X	X	X	X
15	121-663	Filter Partition	X	X	X	X	X	X	X	X	X	X	X	X
16	117-412	Upper Control Panel	X	X	X	X	X	X	X	X	X	X	X	X
17	127-575	Circuit Breaker Base	X		X		X		X		X		X	
17	127-585	Circuit Breaker Base - 460V		X		X		X		X		X		X
18	S133-303	Upper Control Panel Cover	X		X		X		X		X		X	
18	S133-304	Upper Control Panel Cover - 460V		X		X		X		X		X		X
19	135X393	Right Copper Chase	X	X	X	X	X	X	X	X	X	X	X	X
19	135X397 ①	Right Copper Chase	O	O	O	O	O	O	O	O	O	O	O	O
20	135Y393	Left Copper Chase	X	X	X	X	X	X	X	X	X	X	X	X
20	135Y397 ①	Left Copper Chase	O	O	O	O	O	O	O	O	O	O	O	O
21	113-796	Copper Retainer	2	2	2	2	2	2	2	2	2	2	2	2
22	137-920	Copper Fill Plate	2	2	2	2	2	2	2	2	2	2	2	2
25	113-765	Grommet Retainer	X	X	X	X	X	X	X	X	X	X	X	X
26	141-492	Blower Partition Support	X	X	X	X	X	X	X	X	X	X	X	X
27	121-582	Blower Partition	X	X	X	X	X	X	X	X	X	X	X	X
28	523-161	Drain Pan	X	X	X	X	X	X	X	X	X	X	X	X
28	523-162 ①②	Drain Pan	O	O	O	O	O	O	O	O	O	O	O	O
29	113-768	EEV mounting Bracket			X	X	X	X			X	X	X	X
30	113-787	Airflow Switch Bracket	O	O	O	O	O	O	O	O	O	O	O	O
31	113-788	Filter Switch Bracket	O	O	O	O	O	O	O	O	O	O	O	O
32	113-789	Filter Switch Light Bracket	O	O	O	O	O	O	O	O	O	O	O	O

① Exterior cabinet parts are manufactured from stainless steel Code "S"
② For aluminum units, order 523-162 stainless steel drain pan.

X – Standard Component
O – Optional Component

INTERNAL PARTS – STANDARD & DEHUMIDIFICATION

Dwg No.	Part Number	Description	W60ACPA, B, E	W60ACPC, F, Q	W60ACMA, B	W60ACMC	W60ACEA, B	W60ACEC	W72ACPA, B	W72ACPC, F, Q	W72ACMA, B	W72ACMC	W72ACEA, B	W72ACEC
1	125-091	Fan Shroud	X	X	X	X	X	X	X	X	X	X	X	X
1	125-095 ①	Fan Shroud	O	O	O	O	O	O	O	O	O	O	O	O
2	S125-092	Fan Shroud Side Access Cover	2	2	2	2	2	2	2	2	2	2	2	2
2	S125-096 ①	Fan Shroud Side Access Cover	2	2	2	2	2	2	2	2	2	2	2	2
3	121-586	Condenser Partition Insert	X	X	X	X	X	X	X	X	X	X	X	X
3	121-600 ①	Condenser Partition Insert	O	O	O	O	O	O	O	O	O	O	O	O
4	121-585	Condenser Partition	X	X	X	X	X	X	X	X	X	X	X	X
4	121-599 ①	Condenser Partition	O	O	O	O	O	O	O	O	O	O	O	O
5	521-630	Front Exhaust Partition	X	X	X	X	X	X	X	X	X	X	X	X
6	521-587	Exhaust Partition	X	X	X	X	X	X	X	X	X	X	X	X
7	Control Panel Assy.	See Control Panel Assy. Drawing & Parts List	X	X	X	X	X	X	X	X	X	X	X	X
8	S133-330	Control Panel Cover (Inner)	X	X	X	X	X	X	X	X	X	X	X	X
9	105-1453	Front Vent Guide Rail	X	X	X	X	X	X	X	X	X	X	X	X
10	105-1452	Vent Guide Rail	X	X	X	X	X	X	X	X	X	X	X	X
11	S135-409	Field Wire Shield	X	X	X	X	X	X	X	X	X	X	X	X
12	131-168	Filter Support Bracket	2	2	2	2	2	2	2	2	2	2	2	2
13	131-170	Filter Slide	X	X	X	X	X	X	X	X	X	X	X	X
14	131-169	Filter Rack Frame	X	X	X	X	X	X	X	X	X	X	X	X
15	121-663	Filter Partition	X	X	X	X	X	X	X	X	X	X	X	X
16	117-412	Upper Control Panel	X	X	X	X	X	X	X	X	X	X	X	X
17	127-575	Circuit Breaker Base	X		X		X		X		X		X	
17	127-585	Circuit Breaker Base - 460V		X		X		X		X		X		X
18	S133-303	Upper Control Panel Cover	X		X		X		X		X		X	
18	S133-304	Upper Control Panel Cover - 460V		X		X		X		X		X		X
19	135X393	Right Copper Chase	X	X	X	X	X	X	X	X	X	X	X	X
19	135X397 ①	Right Copper Chase	O	O	O	O	O	O	O	O	O	O	O	O
20	135Y393	Left Copper Chase	X	X	X	X	X	X	X	X	X	X	X	X
20	135Y397 ①	Left Copper Chase	O	O	O	O	O	O	O	O	O	O	O	O
21	113-796	Copper Retainer	2	2	2	2	2	2	2	2	2	2	2	2
22	137-920	Copper Fill Plate	2	2	2	2	2	2	2	2	2	2	2	2
25	113-765	Grommet Retainer	X	X	X	X	X	X	X	X	X	X	X	X
26	141-492	Blower Partition Support	X	X	X	X	X	X	X	X	X	X	X	X
27	121-582	Blower Partition	X	X	X	X	X	X	X	X	X	X	X	X
28	523-161	Drain Pan	X	X	X	X	X	X	X	X	X	X	X	X
28	523-162 ①②	Drain Pan	O	O	O	O	O	O	O	O	O	O	O	O
29	113-768	EEV mounting Bracket			X	X	X	X			X	X	X	X
30	113-787	Airflow Switch Bracket	O	O	O	O	O	O	O	O	O	O	O	O
31	113-788	Filter Switch Bracket	O	O	O	O	O	O	O	O	O	O	O	O
32	113-789	Filter Switch Light Bracket	O	O	O	O	O	O	O	O	O	O	O	O

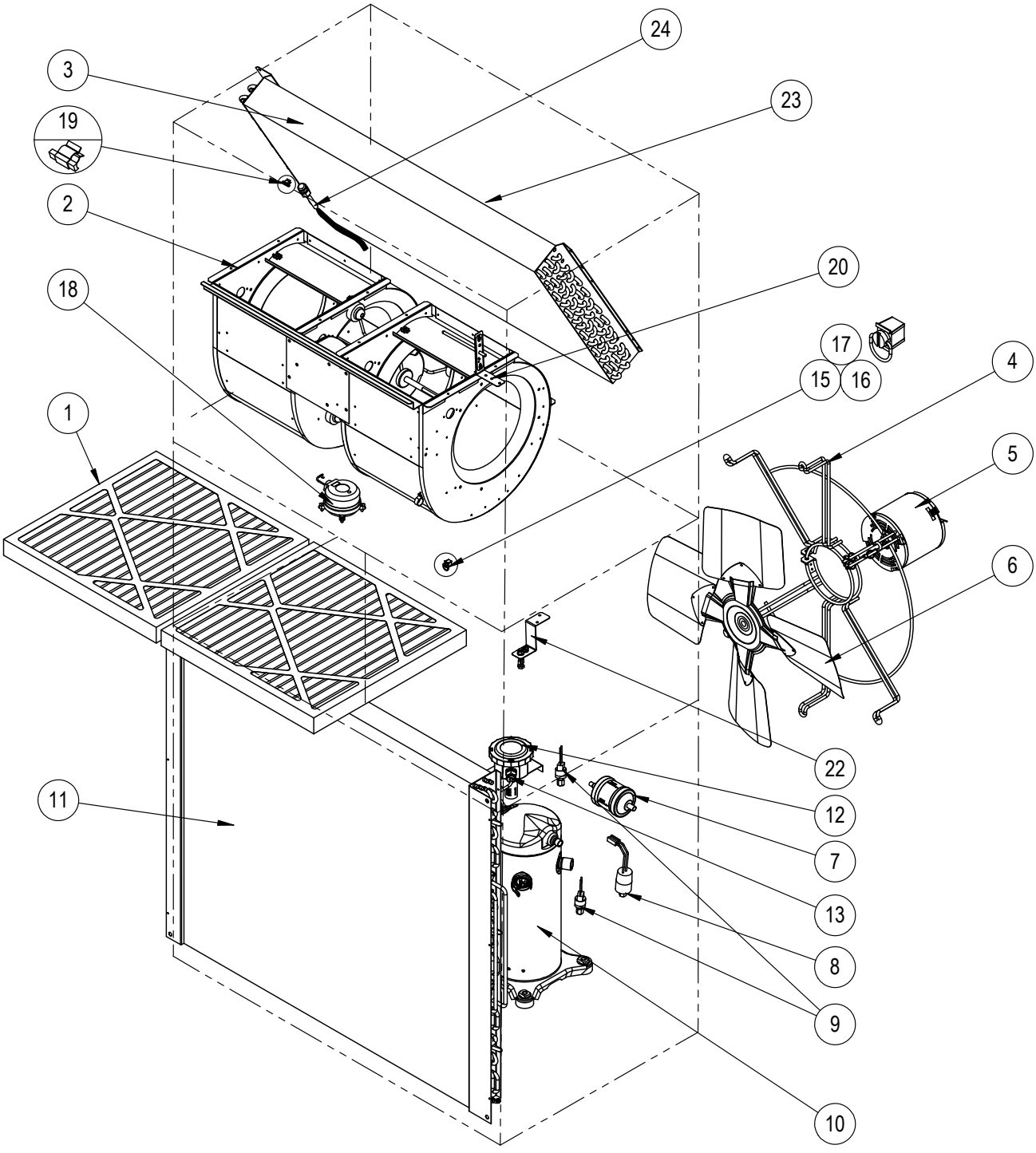
① Exterior cabinet parts are manufactured from stainless steel Code "S"
② For aluminum units, order 523-162 stainless steel drain pan.

X – Standard Component
O – Optional Component

Refer to drawing on page 6

This page intentionally left blank

FUNCTIONAL COMPONENTS



SEXP-1012 C

This drawing to be used for reference for pages 11, 12, 13 and 14

Dwg No.	Part Number	Description	W42ACPA	W42ACPB	W42ACPC	W42ACPE	W42ACPF	W42ACMA	W42ACMB	W42ACMC	W42ACEA	W42ACEB	W42ACEC
1	7004-012	Air Filter 1" Throw-Away (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2
1	7003-085 ①	Air Filter 1" Washable (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2
1	7004-052 ①	Air Filter 2" Merv 8 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
1	7004-060 ①	Air Filter 2" Merv 11 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
1	7004-063 ①	Air Filter 2" Merv 13 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
2	900-366-0155BX	Blower Assembly	X	X		X	X	X	X		X	X	
2	900-367-0156BX	Blower Assembly - 460V			X					X			X
3	917-0366BX	Evaporator Coil w/Distributor Assy.	X	X	X	X	X	X	X	X	X	X	X
3	917-0367BX	Evaporator Coil - Coated w/Distributor Assy.	O	O	O	O	O	O	O	O	O	O	O
4	8200-004	Fan Motor Mount	X	X	X	X	X	X	X	X	X	X	X
4	8200-051 ②	Fan Motor Mount	O	O	O	O	O	O	O	O	O	O	O
5	8105-039	Condenser Motor 1/3HP 230/208 CW PSC 825RPM				X	X						
5	8105-068	Condenser Motor 1/3HP 230/208 CW PSC 825RPM	X	X				X	X		X	X	
5	8105-071	Condenser Motor 1/3HP 460V CW PSC			X					X			X
6	5151-060	Fan Blade	X	X	X	X	X	X	X	X	X	X	X
6	5151C060 ②	Fan Blade - Coated	O	O	O	O	O	O	O	O	O	O	O
7	5201-022	Filter Drier	X	X	X	X	X	X	X	X	X	X	X
8	8406-112	Low Ambient Control 350#/225#	X	X	X	X	X	X	X	X	X	X	X
9	8406-142	High Pressure Switch	X	X	X	X	X	X	X	X	X	X	X
9	910-2135	Low Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X
10	8000-349	Compressor	X					X			X		
10	8000-350	Compressor		X		X			X			X	
10	8000-351	Compressor			X		X			X			X
11	5051-222BX	Condenser Coil	X	X	X	X	X	X	X	X	X	X	X
11	5054-222BX	Condenser Coil - Coated	O	O	O	O	O	O	O	O	O	O	O
12	910-2109	Outdoor Temperature and Humidity Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X
13	8406-158	Low Pressure Transducer						X	X	X			
15	1171-023	1/4 Turn Receptacle	X	X	X	X	X	X	X	X	X	X	X
16	1171-022	1/4 Turn Fastener	X	X	X	X	X	X	X	X	X	X	X
17	1171-024	1/4 Turn Retainer	X	X	X	X	X	X	X	X	X	X	X
18	910-2101	Filter Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X
19	910-2113	Freeze Protection Thermostat Assy.	X	X	X	X	X	X	X	X	X	X	X
20	910-2106	Mixed Air Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X
22	910-2291	Return Air Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X
23	5051-221BX	Reheat Coil						X	X	X			
23	5054-221BX	Reheat Coil - Coated						O	O	O			
24	800-0482	Distributor Assembly	X	X	X	X	X				X	X	X
24	800-0424	Distributor Assembly						X	X	X			
24	5651S245	Electronic Expansion Valve						X	X	X			
24	905-0737	Electronic Expansion Valve (EEV) Assy.						X	X	X			
NS	5451-024	Tubing Isolation Grommet	2	2	2	2	2	2	2	2	2	2	2
NS	6031-009	Coremax Valve Core	2	2	2	2	2	2	2	2	2	2	2
NS	1171-070	Control Panel Door Clip	4	4	4	4	4	4	4	4	4	4	4
NS	1171-068	Control Panel Door Screw	4	4	4	4	4	4	4	4	4	4	4
NS	1171-069	Control Panel Door Screw Retainer	4	4	4	4	4	4	4	4	4	4	4
NS	3000-1698	Transducer Wire Assy.						X	X	X			
NS	5651-246	EEV Stator Cable						X	X	X			
NS	910-2134	Suction Temp Sensor Assy.						X	X	X			

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

X – Standard Component
O – Optional Component

FUNCTIONAL COMPONENTS

Dwg No.	Part Number	Description	W48ACPA	W48ACPB	W48ACPC	W48ACPE	W48ACPF	W48ACPQ	W48ACMA	W48ACMB	W48ACMC	W48ACEA	W48ACEB	W48ACEC
1	7004-012	Air Filter 1" Throw-Away (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2	2
1	7003-085 ①	Air Filter 1" Washable (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-052 ①	Air Filter 2" Merv 8 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-060 ①	Air Filter 2" Merv 11 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-063 ①	Air Filter 2" Merv 13 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
2	900-368-0157BX	Blower Assembly	X	X		X	X	X	X	X		X	X	
2	900-369-0158BX	Blower Assembly - 460V			X						X			X
3	917-0370BX	Evaporator Coil w/Distributor Assy.	X	X	X	X	X	X	X	X	X	X	X	X
3	917-0371BX	Evaporator Coil - Coated w/Distributor Assy.	O	O	O	O	O	O	O	O	O	O	O	O
4	8200-004	Fan Motor Mount	X	X	X	X	X	X	X	X	X	X	X	X
4	8200-051 ②	Fan Motor Mount	O	O	O	O	O	O	O	O	O	O	O	O
5	8105-039	Condenser Motor 1/3HP 230/208 CW PSC 825RPM				X	X							
5	8105-068	Condenser Motor 1/3HP 230/208 CW PSC 825RPM	X	X				X	X	X		X	X	
5	8105-071	Condenser Motor 1/3HP 460V CW PSC			X						X			X
6	5151-060	Fan Blade	X	X	X	X	X	X	X	X	X	X	X	X
6	5151C060 ②	Fan Blade - Coated	O	O	O	O	O	O	O	O	O	O	O	O
7	5201-022	Filter Drier	X	X	X	X	X	X	X	X	X	X	X	X
8	8406-112	Low Ambient Control 350#/225#	X	X	X	X	X	X	X	X	X	X	X	X
9	8406-142	High Pressure Switch	X	X	X	X	X	X	X	X	X	X	X	X
9	910-2135	Low Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X	X
10	8000-332	Compressor	X						X			X		
10	8000-333	Compressor		X		X				X			X	
10	8000-334	Compressor			X		X				X			X
10	8000-466	Compressor						X						
11	5051-222BX	Condenser Coil	X	X	X	X	X	X	X	X	X	X	X	X
11	5054-222BX	Condenser Coil - Coated	O	O	O	O	O	O	O	O	O	O	O	O
12	910-2109	Outdoor Temperature and Humidity Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X	X
13	8406-158	Low Pressure Transducer							X	X	X			
15	1171-023	1/4 Turn Receptacle	X	X	X	X	X	X	X	X	X	X	X	X
16	1171-022	1/4 Turn Fastener	X	X	X	X	X	X	X	X	X	X	X	X
17	1171-024	1/4 Turn Retainer	X	X	X	X	X	X	X	X	X	X	X	X
18	910-2101	Filter Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X	X
19	910-2113	Freeze Protection Thermostat Assy.	X	X	X	X	X	X	X	X	X	X	X	X
20	910-2106	Mixed Air Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X	X
22	910-2291	Return Air Sensor Assy.	X	X	X	X	X	X	X	X	X	X	X	X
23	5051-221BX	Reheat Coil							X	X	X			
23	5054-221BX	Reheat Coil - Coated							O	O	O			
24	800-0483	Distributor Assembly	X	X	X	X	X	X				X	X	X
24	800-0455	Distributor Assembly							X	X	X			
24	5651S245	Electronic Expansion Valve							X	X	X			
24	905-0737	Electronic Expansion Valve (EEV) Assy.							X	X	X			
NS	5451-024	Tubing Isolation Grommet	2	2	2	2	2	2	2	2	2	2	2	2
NS	6031-009	Coremax Valve Core	2	2	2	2	2	2	2	2	2	2	2	2
NS	1171-070	Control Panel Door Clip	4	4	4	4	4	4	4	4	4	4	4	4
NS	1171-068	Control Panel Door Screw	4	4	4	4	4	4	4	4	4	4	4	4
NS	1171-069	Control Panel Door Screw Retainer	4	4	4	4	4	4	4	4	4	4	4	4
NS	910-1963	575/230V Transformer Assy.						X						
NS	3000-1698	Transducer Wire Assy.							X	X	X			
NS	5651-246	EEV Stator Cable							X	X	X			
NS	910-2134	Suction Temp Sensor Assy.							X	X	X			

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

X – Standard Component
O – Optional Component

Refer to drawing on page 10

Dwg No.	Part Number	Description	W60ACPA	W60ACPB	W60ACPC	W60ACPE	W60ACPF	W60ACPQ	W60ACMA	W60ACMB	W60ACMC	W60ACEA	W60ACEB	W60ACEC
1	7004-012	Air Filter 1" Throw-Away (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2	2
1	7003-085 ①	Air Filter 1" Washable (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-052 ①	Air Filter 2" Merv 8 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-060 ①	Air Filter 2" Merv 11 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
1	7004-063 ①	Air Filter 2" Merv 13 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2	2
2	900-368-0159BX	Blower Assembly	X	X		X	X	X	X	X		X	X	
2	900-369-0160BX	Blower Assembly - 460V			X						X			X
3	917-0374BX	Evaporator Coil w/Distributor Assy.	X	X	X	X	X	X	X	X	X	X	X	X
3	917-0375BX	Evaporator Coil - Coated w/Distributor Assy.	O	O	O	O	O	O	O	O	O	O	O	O
4	8200-004	Fan Motor Mount	X	X	X	X	X	X	X	X	X	X	X	X
4	8200-051 ②	Fan Motor Mount	O	O	O	O	O	O	O	O	O	O	O	O
5	8105-039	Condenser Motor 1/3HP 230/208 CW PSC 825RPM				X	X							
5	8106-053	Condenser Motor 1/3HP 460V CW PSC 1075RPM						X						
5	8105-068	Condenser Motor 1/3HP 230/208 CW PSC 825RPM	X	X					X	X		X	X	
5	8105-071	Condenser Motor 1/3HP 460V CW PSC			X						X			X
6	5151-060	Fan Blade	X	X	X	X	X	X	X	X	X	X	X	X
6	5151C060 ②	Fan Blade - Coated	O	O	O	O	O	O	O	O	O	O	O	O
7	5201-022	Filter Drier	X	X	X	X	X	X	X	X	X	X	X	X
8	8406-112	Low Ambient Control 350#/225#	X	X	X	X	X	X	X	X	X	X	X	X
9	8406-142	High Pressure Switch	X	X	X	X	X	X	X	X	X	X	X	X
9	910-2135	Low Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X	X
10	8000-289	Compressor	X						X			X		
10	8000-292	Compressor		X		X				X			X	
10	8000-308	Compressor			X		X				X			X
10	8000-467	Compressor						X						
11	5051-223BX	Condenser Coil	X	X	X	X	X	X	X	X	X	X	X	X
11	5054-223BX	Condenser Coil - Coated	O	O	O	O	O	O	O	O	O	O	O	O
12	8301-067	Outdoor Temperature and Humidity Sensor	X	X	X	X	X	X	X	X	X	X	X	X
13	8406-158	Low Pressure Transducer							X	X	X			
15	1171-023	1/4 Turn Receptacle	X	X	X	X	X	X	X	X	X	X	X	X
16	1171-022	1/4 Turn Fastener	X	X	X	X	X	X	X	X	X	X	X	X
17	1171-024	1/4 Turn Retainer	X	X	X	X	X	X	X	X	X	X	X	X
18	8301-057	Filter Pressure Switch	X	X	X	X	X	X	X	X	X	X	X	X
19	910-2113	Freeze Protection Thermostat Assy.	X	X	X	X	X	X	X	X	X	X	X	X
20	910-2106	Mixed Air Sensor	X	X	X	X	X	X	X	X	X	X	X	X
22	910-2291	Return Air Sensor Assembly	X	X	X	X	X	X	X	X	X	X	X	X
23	5051-221BX	Reheat Coil							X	X	X			
23	5054-221BX	Reheat Coil - Coated							O	O	O			
24	800-0484	Distributor Assembly	X	X	X	X	X	X				X	X	X
24	800-0455	Distributor Assembly							X	X	X			
24	5651S248	Electronic Expansion Valve							X	X	X			
24	905-0745	Electronic Expansion Valve (EEV) Assy.							X	X	X			
NS	5451-024	Tubing Isolation Grommet	2	2	2	2	2	2	2	2	2	2	2	2
NS	6031-009	Coremax Valve Core	2	2	2	2	2	2	2	2	2	2	2	2
NS	1171-070	Control Panel Door Clip	4	4	4	4	4	4	4	4	4	4	4	4
NS	1171-058	Control Panel Door Screw	4	4	4	4	4	4	4	4	4	4	4	4
NS	1171-069	Control Panel Door Screw Retainer	4	4	4	4	4	4	4	4	4	4	4	4
NS	910-1963	575/230V Transformer Assy.						X						
NS	8605-017	Crankcase Heater - 230V	X	X		X	X		X	X		X	X	
NS	8605-018	Crankcase Heater - 460V			X						X			X
NS	8605-021	Crankcase Heater - 575V						X						
NS	3000-1698	Transducer Wire Assy.							X	X	X			
NS	5651-246	EEV Stator Cable							X	X	X			
NS	910-2134	Suction Temp Sensor Assy.							X	X	X			

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

X – Standard Component
O – Optional Component

Refer to drawing on page 10

FUNCTIONAL COMPONENTS

Dwg No.	Part Number	Description	W72ACPA	W72ACPB	W72ACPC	W72ACPF	W72ACPQ	W72ACMA	W72ACMB	W72ACMC	W72ACEA	W72ACEB	W72ACEC
1	7004-012	Air Filter 1" Throw-Away (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2
1	7003-085 ①	Air Filter 1" Washable (20 x 20 x 1)	2	2	2	2	2	2	2	2	2	2	2
1	7004-052 ①	Air Filter 2" Merv 8 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
1	7004-060 ①	Air Filter 2" Merv 11 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
1	7004-063 ①	Air Filter 2" Merv 13 (20 x 20 x 2)	2	2	2	2	2	2	2	2	2	2	2
2	900-368-0161BX	Blower Assembly	X	X		X	X	X	X		X	X	
2	900-369-0162BX	Blower Assembly - 460V			X					X			X
3	917-0378BX	Evaporator Coil w/Distributor Assy.	X	X	X	X	X	X	X	X	X	X	X
3	917-0379BX	Evaporator Coil - Coated w/Distributor Assy.	O	O	O	O	O	O	O	O	O	O	O
4	8200-049	Fan Motor Mount	X	X	X	X	X	X	X	X	X	X	X
4	8200-052 ②	Fan Motor Mount	O	O	O	O	O	O	O	O	O	O	O
5	8106-070	Condenser Motor	X	X		X		X	X		X	X	
5	8106-071	Condenser Motor - 460V			X					X			X
5	8106-053	Condenser Motor					X						
6	5151-063	Fan Blade	X	X	X	X	X	X	X	X	X	X	X
6	5151C063 ②	Fan Blade - Coated	O	O	O	O	O	O	O	O	O	O	O
7	5201-022	Filter Drier	X	X	X	X	X	X	X	X	X	X	X
8	8406-112	Low Ambient Control 350#/225#	X	X	X	X	X	X	X	X	X	X	X
9	8406-142	High Pressure Switch	X	X	X	X	X	X	X	X	X	X	X
9	910-2135	Low Pressure Switch Assy.	X	X	X	X	X	X	X	X	X	X	X
10	8000-403	Compressor	X					X			X		
10	8000-404	Compressor		X					X			X	
10	8000-405	Compressor			X	X				X			X
10	8000-418	Compressor					X						
11	5051-223BX	Condenser Coil	X	X	X	X	X	X	X	X	X	X	X
11	5054-223BX	Condenser Coil - Coated	O	O	O	O	O	O	O	O	O	O	O
12	8301-067	Outdoor Temperature and Humidity Sensor	X	X	X	X	X	X	X	X	X	X	X
13	8406-158	Low Pressure Transducer						X	X	X			
15	1171-023	1/4 Turn Receptacle	X	X	X	X	X	X	X	X	X	X	X
16	1171-022	1/4 Turn Fastener	X	X	X	X	X	X	X	X	X	X	X
17	1171-024	1/4 Turn Retainer	X	X	X	X	X	X	X	X	X	X	X
18	8301-057	Filter Pressure Switch	X	X	X	X	X	X	X	X	X	X	X
19	910-2113	Freeze Protection Thermostat Assy.	X	X	X	X	X	X	X	X	X	X	X
20	910-2106	Mixed Air Sensor	X	X	X	X	X	X	X	X	X	X	X
22	910-2291	Return Air Sensor Assembly	X	X	X	X	X	X	X	X	X	X	X
23	5051-221BX	Reheat Coil						X	X	X			
23	5054-221BX	Reheat Coil - Coated						O	O	O			
24	800-0454	Distributor Assembly	X	X	X	X	X				X	X	X
24	800-0455	Distributor Assembly						X	X	X			
24	5651S248	Electronic Expansion Valve						X	X	X			
24	905-0745	Electronic Expansion Valve (EEV) Assy.						X	X	X			
NS	5451-024	Tubing Isolation Grommet	2	2	2	2	2	2	2	2	2	2	2
NS	6031-009	Coremax Valve Core	2	2	2	2	2	2	2	2	2	2	2
NS	1171-070	Control Panel Door Clip	4	4	4	4	4	4	4	4	4	4	4
NS	1171-058	Control Panel Door Screw	4	4	4	4	4	4	4	4	4	4	4
NS	1171-069	Control Panel Door Screw Retainer	4	4	4	4	4	4	4	4	4	4	4
NS	910-1963	575/230V Transformer Assy.					X						
NS	8605-017	Crankcase Heater - 230V	X	X		X		X	X		X	X	
NS	8605-018	Crankcase Heater - 460V			X					X			X
NS	8605-021	Crankcase Heater - 575V					X						
NS	3000-1698	Transducer Wire Assy.						X	X	X			
NS	5651-246	EEV Stator Cable						X	X	X			
NS	910-2134	Suction Temp Sensor Assy.						X	X	X			

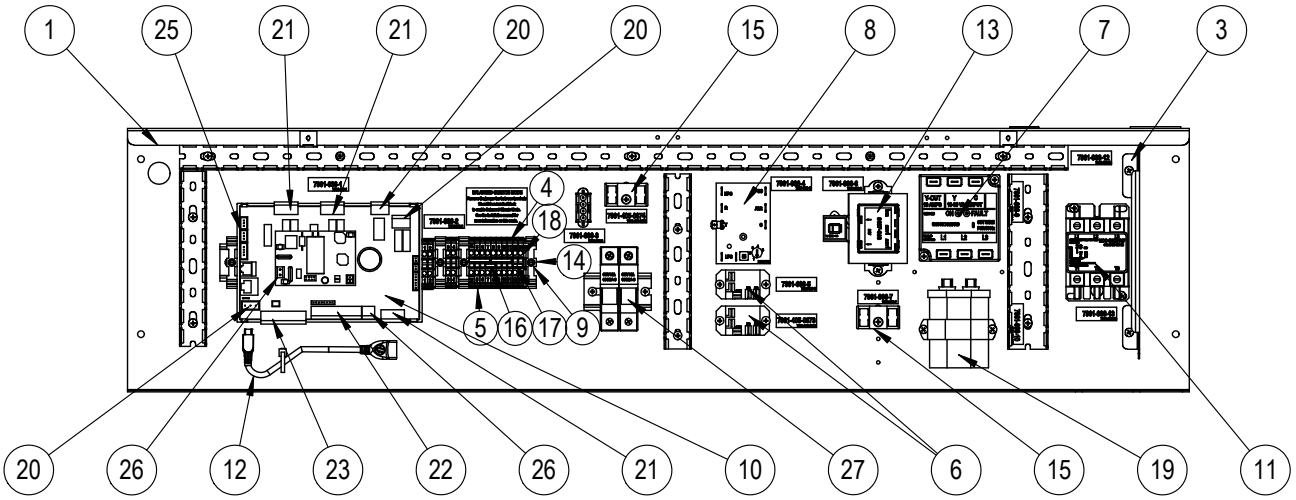
NS – Not Shown
① – Optional on these models
② – Used with stainless steel cabinet option

X – Standard Component
O – Optional Component

Refer to drawing on page 10

This page intentionally left blank

CONTROL PANEL



SEXP-1007 C

This drawing to be used for reference for pages 17, 18, 19 and 20

Dwg No.	Part Number	Description	W42ACPA	W42ACPB	W42ACPC	W42ACPE	W42ACPF	W42ACMA	W42ACMB	W42ACMC	W42ACEA	W42ACEB	W42ACEC
1	117-417	Control Panel Assembly	X	X	X	X	X	X	X	X	X	X	X
3	135-394	Wire Shield	X	X	X	X	X	X	X	X	X	X	X
4	8607-055	Terminal Designation (11-20)	X	X	X	X	X	X	X	X	X	X	X
5	8607-056	Terminal Designation (1-10)	X	X	X	X	X	X	X	X	X	X	X
6	8201-174BX	3 Phase Line Monitor 50/60 HZ		X	X	X	X		X	X		X	X
7	8201-130	Relay, SPDT, Pilot Duty	X	X	X	X	X	X	X	X	X	X	X
8	8201-176BX	Compressor Control Module	X	X	X	X	X	X	X	X	X	X	X
9	8611-150	Terminal Block DIN Rail	X	X	X	X	X	X	X	X	X	X	X
10	8301-098-004*	UPC3-C2 MULTI-TEC	X	X	X	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		X	X
11	8401-038	Contactor 2 Pole 40 Amp w/Aux. Contact	X					X			X		
12	8301-075	USB Micro Cable Female to Male	X	X	X	X	X	X	X	X	X	X	X
13	8407-065	Transformer 208/240-24 75VA	X	X		X	X	X	X		X	X	
13	8407-072	Transformer 460/24VAC 75VA			X					X			X
14	8611-144	End Clamp for DIN Rail	4	4	4	4	4	4	4	4	4	4	4
15	8607-017	Terminal Block 240V 2 Terminal	X	X	X	X	X	X	X	X	X	X	X
16	8611-194	Jumper 2 Position	X	X	X	X	X	X	X	X	X	X	X
17	8611-195	Jumper 4 Position	X	X	X	X	X	X	X	X	X	X	X
18	8611-151	Terminal Block End Cap for DIN Rail	X	X	X	X	X	X	X	X	X	X	X
19	8552-004	Capacitor 7-1/2MFD 370V 1-1/4" O			X		X			X			X
19	8552-005	Capacitor 10MFD 370V1-1/4" O		X		X			X			X	
19	8552-079	Capacitor 45/10 MFD 370V	X					X			X		
20	8611-147	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
21	8611-148	4-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
22	8611-149	9-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
23	8611-185	8-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
25	8611-192	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
26	8611-183	2-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
NS	4207-109	Wiring Diagram	X								X		
NS	4207-110	Wiring Diagram						X					
NS	4207-209	Wiring Diagram		X		X						X	
NS	4207-210	Wiring Diagram							X				
NS	4207-309	Wiring Diagram			X								X
NS	4207-310	Wiring Diagram								X			
NS	4207-610	Wiring Diagram					X						

* Replacement part will have a letter attached to the end of the part number to designate software version (Example: 8301-098-004**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/

NS = Not Shown

CONTROL PANEL

Dwg No.	Part Number	Description	W48ACPA	W48ACPB	W48ACPC	W48ACPE	W48ACPF	W48ACPQ	W48ACMA	W48ACMB	W48ACMC	W48ACEA	W48ACEB	W48ACEC
1	117-417	Control Panel Assembly	X	X	X	X	X	X	X	X	X	X	X	X
3	135-394	Wire Shield	X	X	X	X	X	X	X	X	X	X	X	X
4	8607-055	Terminal Designation (11-20)	X	X	X	X	X	X	X	X	X	X	X	X
5	8607-056	Terminal Designation (1-10)	X	X	X	X	X	X	X	X	X	X	X	X
6	8201-174BX	3 Phase Line Monitor 50/60 HZ		X	X	X	X	X		X	X		X	X
7	8201-130	Relay, SPDT, Pilot Duty	X	X	X	X	X	2	X	X	X	X	X	X
8	8201-176BX	Compressor Control Module	X	X	X	X	X	X	X	X	X	X	X	X
9	8611-150	Terminal Block DIN Rail	X	X	X	X	X	X	X	X	X	X	X	X
10	8301-098-004*	UPC3-C2 MULTI-TEC	X	X	X	X	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	X		X	X
11	8401-038	Contactor 2 Pole 40 Amp w/Aux. Contact	X						X			X		
12	8301-075	USB Micro Cable Female to Male	X	X	X	X	X	X	X	X	X	X	X	X
13	8407-065	Transformer 208/240-24 75VA	X	X		X	X	X	X	X		X	X	
13	8407-072	Transformer 460/24VAC 75VA			X						X			X
14	8611-144	End Clamp for DIN Rail	4	4	4	4	4	4	4	4	4	4	4	4
15	8607-017	Terminal Block 240V 2 Terminal	X	X	X	X	X	2	X	X	X	X	X	X
16	8611-194	Jumper 2 Position	X	X	X	X	X	X	X	X	X	X	X	X
17	8611-195	Jumper 4 Position	X	X	X	X	X	X	X	X	X	X	X	X
18	8611-151	Terminal Block End Cap for DIN Rail	X	X	X	X	X	X	X	X	X	X	X	X
19	8552-004	Capacitor 7-1/2MFD 370V 1-1/4" O			X		X				X			X
19	8552-005	Capacitor 10MFD 370V1-1/4" O		X		X		X		X			X	
19	8552-089	Capacitor 70/10 MFD 370V	X						X			X		
20	8611-147	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
21	8611-148	4-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
22	8611-149	9-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
23	8611-185	8-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
25	8611-192	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
26	8611-183	2-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
27	8614-058	2-Pole Fuse Holder						X						
27	8614-042	7 Amp Class CC Fuse						2						
NS	8611-210	2-1/2" DIN Rail						X						
NS	4207-109	Wiring Diagram	X									X		
NS	4207-110	Wiring Diagram							X					
NS	4207-209	Wiring Diagram		X		X							X	
NS	4207-210	Wiring Diagram								X				
NS	4207-309	Wiring Diagram			X									X
NS	4207-310	Wiring Diagram									X			
NS	4207-610	Wiring Diagram					X							
NS	4207-705	Wiring Diagram						X						

* Replacement part will have a letter attached to the end of the part number to designate software version (Example: 8301-098-004**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/

NS = Not Shown

Refer to drawing on page 16

Dwg No.	Part Number	Description	W60ACPA	W60ACPB	W60ACPC	W60ACPE	W60ACPF	W60ACPQ	W60ACMA	W60ACMB	W60ACMC	W60ACEA	W60ACEB	W60ACEC
1	117-417	Control Panel Assembly	X	X	X	X	X	X	X	X	X	X	X	X
3	135-394	Wire Shield	X	X	X	X	X	X	X	X	X	X	X	X
4	8607-055	Terminal Designation (11-20)	X	X	X	X	X	X	X	X	X	X	X	X
5	8607-056	Terminal Designation (1-10)	X	X	X	X	X	X	X	X	X	X	X	X
6	8201-174BX	3 Phase Line Monitor 50/60 HZ		X	X	X	X	X		X	X		X	X
7	8201-130	Relay, SPDT, Pilot Duty	X	X	X	X	X	X	X	X	X	X	X	X
8	8201-176BX	Compressor Control Module	X	X	X	X	X	X	X	X	X	X	X	X
9	8611-150	Terminal Block DIN Rail	X	X	X	X	X	X	X	X	X	X	X	X
10	8301-098-004*	UPC3-C2 MULTI-TEC	X	X	X	X	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	X		X	X
11	8401-038	Contactor 2 Pole 40 Amp w/Aux. Contact	X						X			X		
12	8301-075	USB Micro Cable Female to Male	X	X	X	X	X	X	X	X	X	X	X	X
13	8407-065	Transformer 208/240-24 75VA	X	X		X	X	X	X	X		X	X	
13	8407-072	Transformer 460/24VAC 75VA			X						X			X
14	8611-144	End Clamp for DIN Rail	4	4	4	4	4	4	4	4	4	4	4	4
15	8607-017	Terminal Block 240V 2 Terminal	X	X	X	X	X	2	X	X	X	X	X	X
16	8611-194	Jumper 2 Position	X	X	X	X	X	X	X	X	X	X	X	X
17	8611-195	Jumper 4 Position	X	X	X	X	X	X	X	X	X	X	X	X
18	8611-151	Terminal Block End Cap for DIN Rail	X	X	X	X	X	X	X	X	X	X	X	X
19	8552-004	Capacitor 7-1/2MFD 370V 1-1/4" O			X		X				X			X
19	8552-005	Capacitor 10MFD 370V1-1/4" O		X		X				X			X	
19	8552-089	Capacitor 70/10 MFD 370V	X						X			X		
20	8611-147	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
21	8611-148	4-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
22	8611-149	9-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
23	8611-185	8-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
25	8611-192	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
26	8611-183	2-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X	X
27	8614-058	2-Pole Fuse Holder						X						
27	8614-042	7 Amp Class CC Fuse						2						
NS	8611-210	2-1/2" DIN Rail						X						
NS	4207-109	Wiring Diagram	X									X		
NS	4207-110	Wiring Diagram							X					
NS	4207-209	Wiring Diagram		X		X							X	
NS	4207-210	Wiring Diagram								X				
NS	4207-309	Wiring Diagram			X									X
NS	4207-310	Wiring Diagram									X			
NS	4207-610	Wiring Diagram					X							
NS	4207-706	Wiring Diagram						X						

* Replacement part will have a letter attached to the end of the part number to designate software version (Example: 8301-098-004**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/

NS = Not Shown

Refer to drawing on page 16

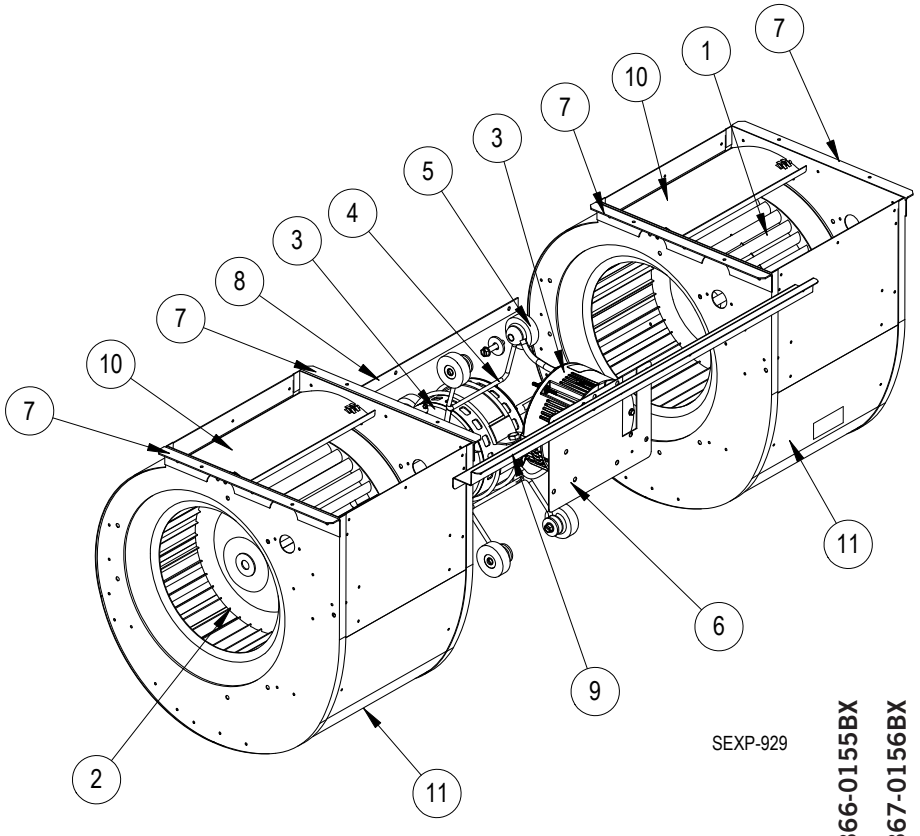
CONTROL PANEL

Dwg No.	Part Number	Description	W72ACPA	W72ACPB	W72ACPC	W72ACPF	W72ACPQ	W72ACMA	W72ACMB	W72ACMC	W72ACEA	W72ACEB	W72ACEC
1	117-417	Control Panel Assembly	X	X	X	X	X	X	X	X	X	X	X
3	135-394	Wire Shield	X	X	X	X	X	X	X	X	X	X	X
4	8607-055	Terminal Designation (11-20)	X	X	X	X	X	X	X	X	X	X	X
5	8607-056	Terminal Designation (1-10)	X	X	X	X	X	X	X	X	X	X	X
6	8201-174BX	3 Phase Line Monitor 50/60 HZ		X	X	X	X		X	X		X	X
7	8201-130	Relay, SPDT, Pilot Duty	X	X	X	X	X	X	X	X	X	X	X
8	8201-176BX	Compressor Control Module	X	X	X	X	X	X	X	X	X	X	X
9	8611-150	Terminal Block DIN Rail	X	X	X	X	X	X	X	X	X	X	X
10	8301-098-004*	UPC3-C2 MULTI-TEC	X	X	X	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		X	X
11	8401-038	Contactor 2 Pole 40 Amp w/Aux. Contact	X					X			X		
12	8301-075	USB Micro Cable Female to Male	X	X	X	X	X	X	X	X	X	X	X
13	8407-065	Transformer 208/240-24 75VA	X	X		X	X	X	X		X	X	
13	8407-072	Transformer 460/24VAC 75VA			X					X			X
14	8611-144	End Clamp for DIN Rail	4	4	4	4	4	4	4	4	4	4	4
15	8607-017	Terminal Block 240V 2 Terminal	X	X	X	X	2	X	X	X	X	X	X
16	8611-194	Jumper 2 Position	X	X	X	X	X	X	X	X	X	X	X
17	8611-195	Jumper 4 Position	X	X	X	X	X	X	X	X	X	X	X
18	8611-151	Terminal Block End Cap for DIN Rail	X	X	X	X	X	X	X	X	X	X	X
19	8552-004	Capacitor 7-1/2MFD 370V 1-1/4" O		X					X			X	
19	8552-005	Capacitor 10MFD 370V1-1/4" O			X	X				X			X
19	8552-097	Capacitor 80/7.5 440V 2-1/2" R	X					X			X		
20	8611-147	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
21	8611-148	4-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
22	8611-149	9-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
23	8611-185	8-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
25	8611-192	3-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
26	8611-183	2-Pin Circuit Board Connector	X	X	X	X	X	X	X	X	X	X	X
27	8614-058	2-Pole Fuse Holder					X						
27	8614-042	7 Amp Class CC Fuse					2						
NS	8611-210	2-1/2" DIN Rail					X						
NS	4207-109	Wiring Diagram	X								X		
NS	4207-110	Wiring Diagram						X					
NS	4207-209	Wiring Diagram		X								X	
NS	4207-210	Wiring Diagram							X				
NS	4207-309	Wiring Diagram			X								X
NS	4207-310	Wiring Diagram								X			
NS	4207-610	Wiring Diagram				X							
NS	4207-706	Wiring Diagram					X						

* Replacement part will have a letter attached to the end of the part number to designate software version (Example: 8301-098-004**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/

NS = Not Shown

Refer to drawing on page 16

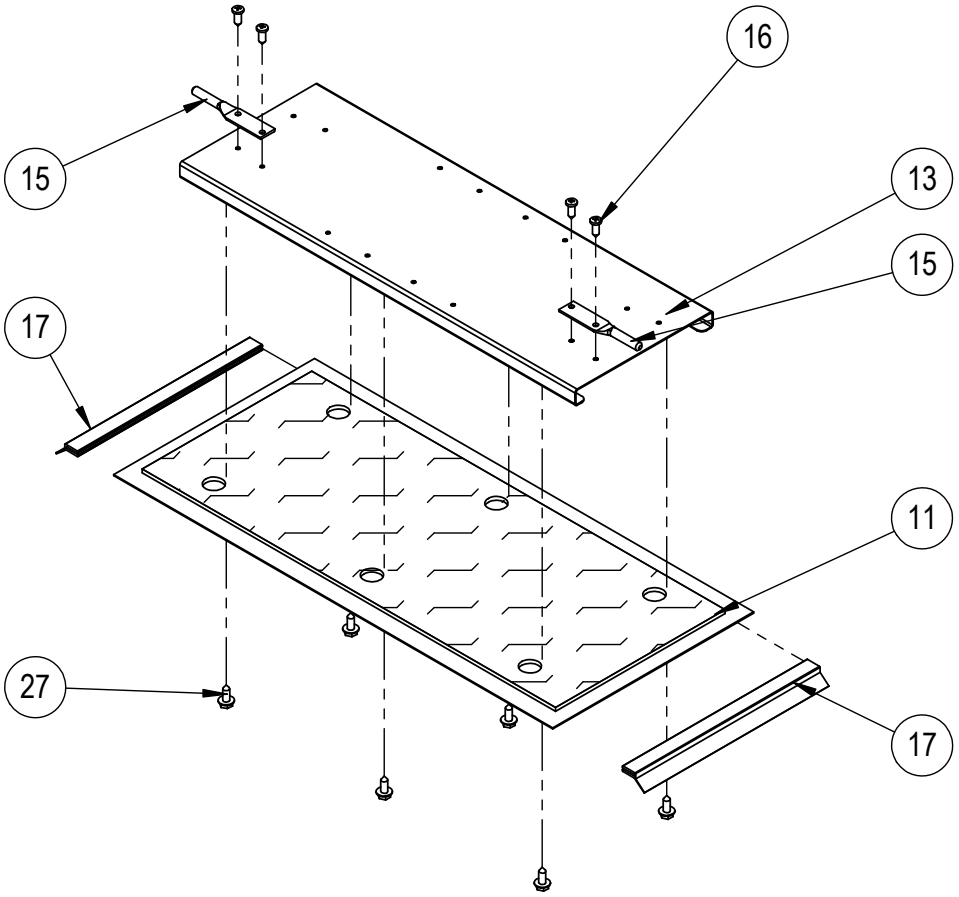


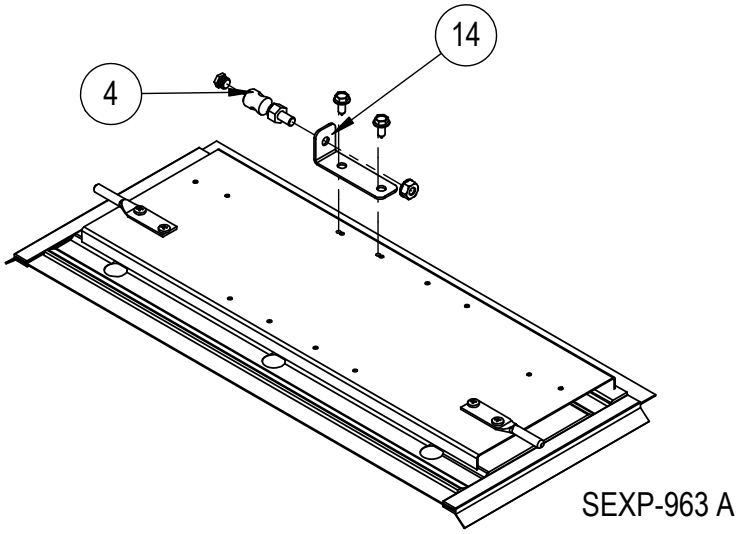
SEXP-929

Dwg No.	Part Number	Description	900-366-0155BX	900-367-0156BX	900-368-0157BX	900-368-0159BX	900-368-0161BX	900-369-0158BX	900-369-0160BX	900-369-0162BX
1	5152-011	10 Inch Wheel (CW)	X	X	X	X	X	X	X	X
2	5152-012	10 Inch Wheel (CW)	X	X	X	X	X	X	X	X
3	S8106-068-0155	Programmed Blower Motor & Control (230/208V)	X							
3	S8106-069-0156	Programmed Blower Motor & Control (460V)		X						
3	S8107-028-0157	Programmed Blower Motor & Control (230/208V)			X					
3	S8107-028-0159	Programmed Blower Motor & Control (230/208V)				X				
3	S8107-028-0161	Programmed Blower Motor & Control (230/208V)					X			
3	S8107-029-0158	Programmed Blower Motor & Control (460V)						X		
3	S8107-029-0160	Programmed Blower Motor & Control (460V)							X	
3	S8107-029-0162	Programmed Blower Motor & Control (460V)								X
3	C8106-074-0155	Programmed Control Only (230/208V)	O							
3	C8106-075-0156	Programmed Control Only (460V)		O						
3	C8107-030-0157	Programmed Control Only (230/208V)			O					
3	C8107-030-0159	Programmed Control Only (230/208V)				O				
3	C8107-030-0161	Programmed Control Only (230/208V)					O			
3	C8107-031-0158	Programmed Control Only (460V)						O		
3	C8107-031-0160	Programmed Control Only (460V)							O	
3	C8107-031-0162	Programmed Control Only (460V)								O
4	8200-040	Motor Mount	X	X	X	X	X	X	X	X
5	5451-011	Grommets	6	6	6	6	6	6	6	6
6	112-775	Motor Control Bracket	X	X	X	X	X	X	X	X
7	105-880	Side Angle	4	4	4	4	4	4	4	4
8	105-881	Back Brace	X	X	X	X	X	X	X	X
9	103-541	Front Mounting Offset	X	X	X	X	X	X	X	X
10	144-166	Diffuser	2	2	2	2	2	2	2	2
11	151-101	Blower Housing	2	2	2	2	2	2	2	2

X – Standard Component
O – Optional Component

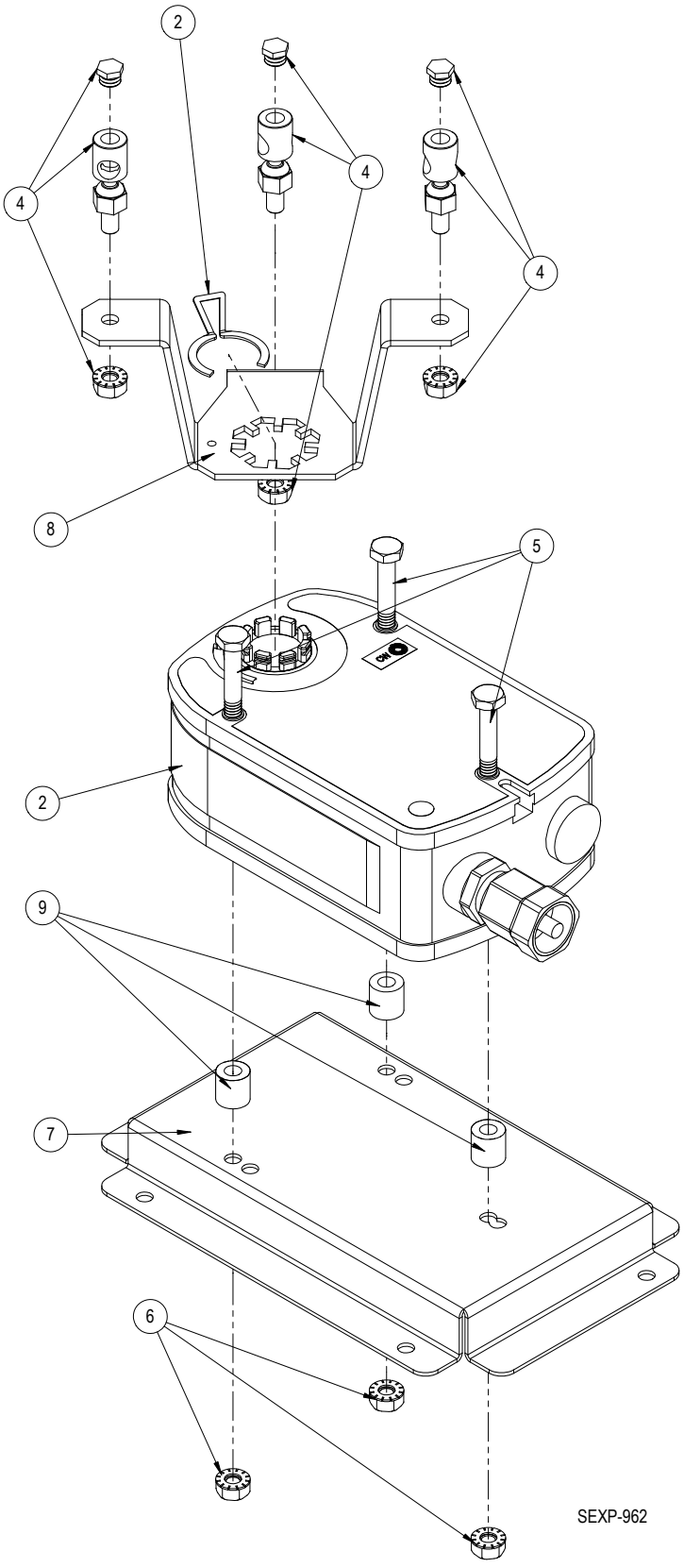
INTAKE BLADE ASSEMBLY





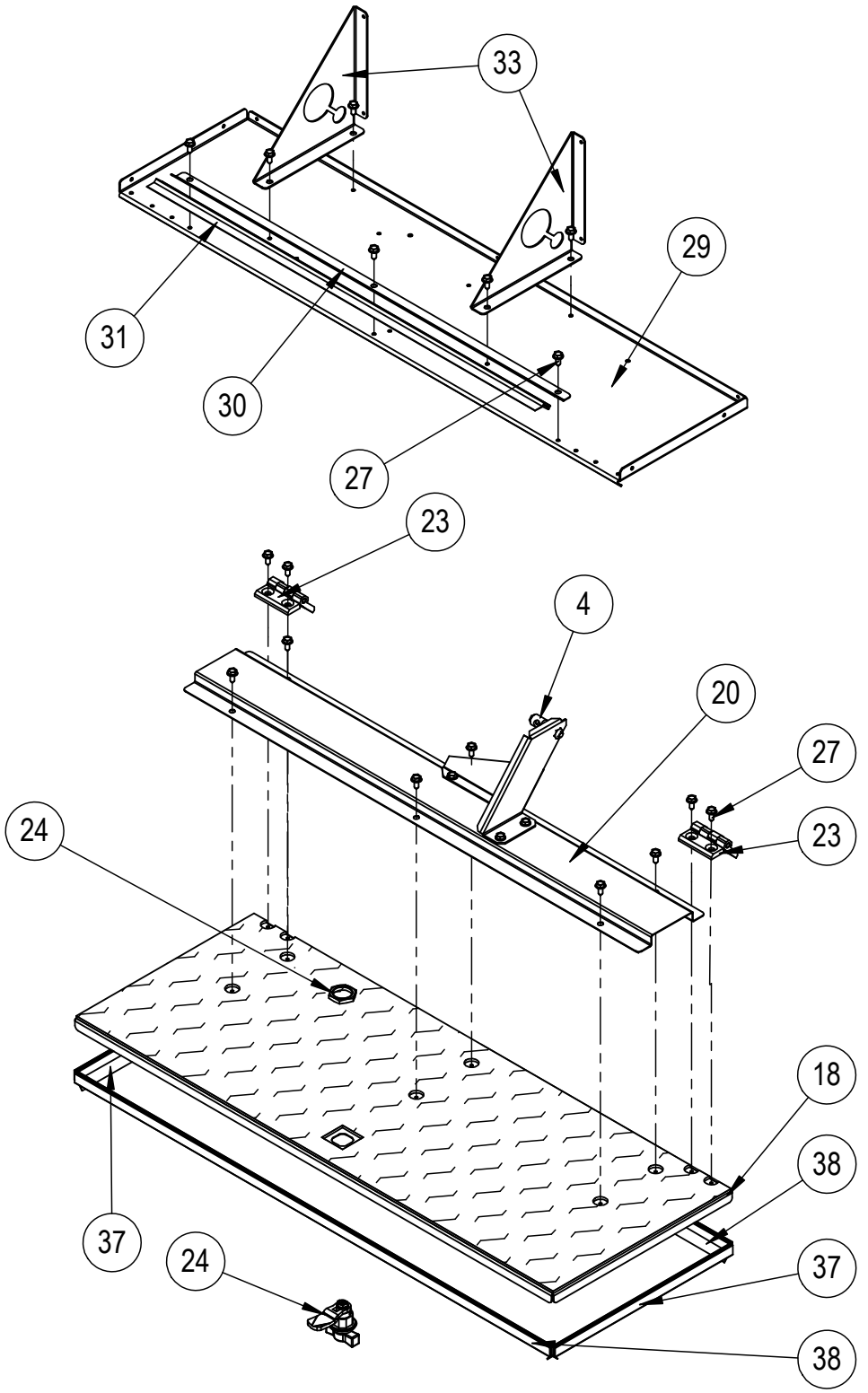
Drawing No.	Part No.	Description	
4	8602-008	BALL JOINT	X
11	138-419	INTAKE BLADE	X
12	1913-125	INSULATION	X
13	141-496	INTAKE BLADE SUPPORT	X
14	113-772	BALL JOINT MOUNTING BRACKET	X
15	8602-106	1/4" ROUND END BEARING	2
17	1921-067-0700	7" DAMPER BLADE SEAL	2

ACTUATOR ASSEMBLY



Drawing No.	Part No.	Description	
2	8602-075	DIRECT COUPLED ACTUATOR	X
4	8602-008	BALL JOINTS	3
5	1012-174	1/4"-20X3-1/4 HEX - CAP SCREW	3
6	1012-201	1/4-20 STEEL KEPS HEX NUT ZINC	3
7	141-495	ACTUATOR SUPPORT PLATE	X
8	139-432	ACTUATOR TRI-ARM	X
9	5451-029	NYLON SLEEVE .257"I.D.X.5"LONG	3

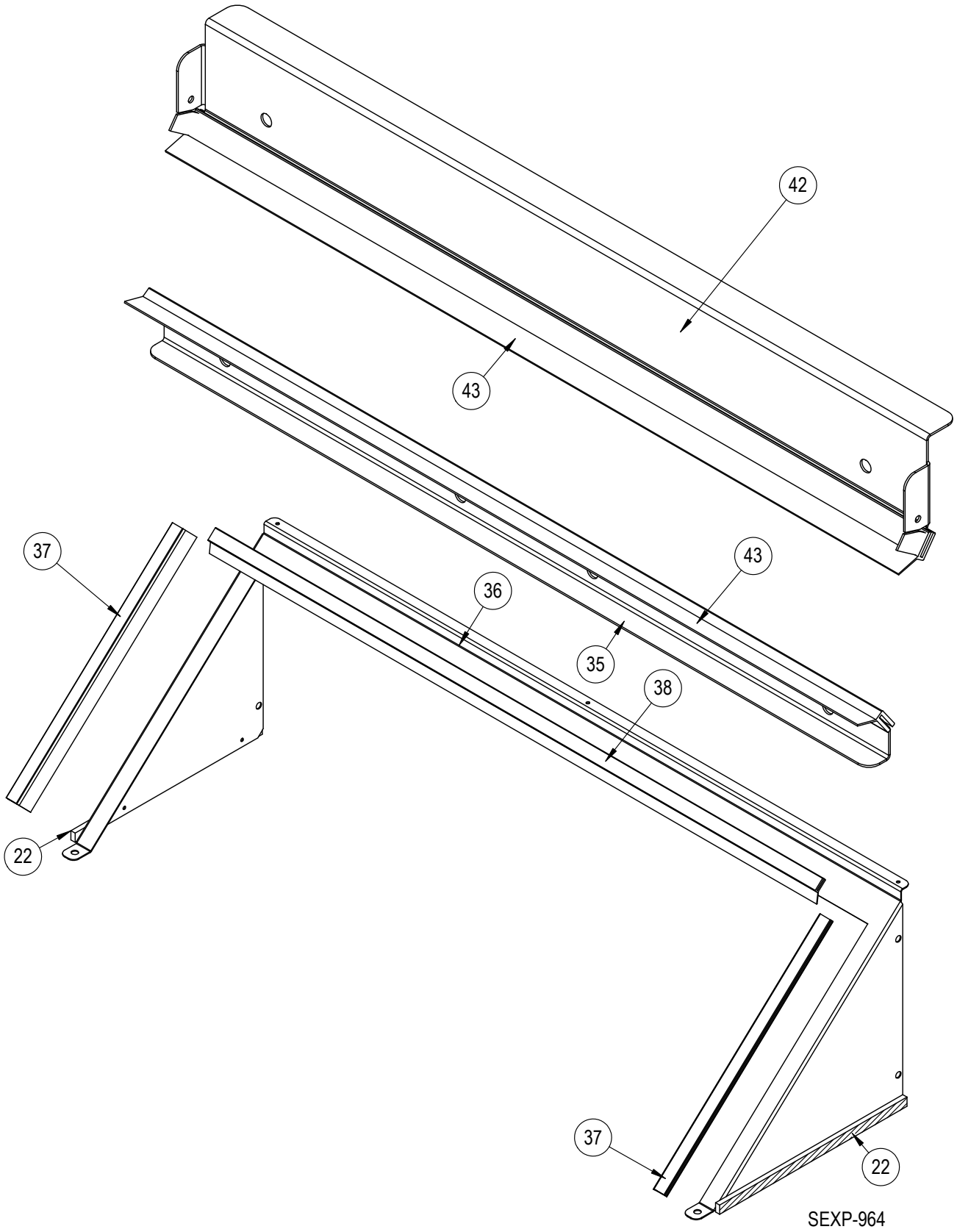
BASE ASSEMBLY AND EXHAUST BLADE ASSEMBLY



SEXP-961

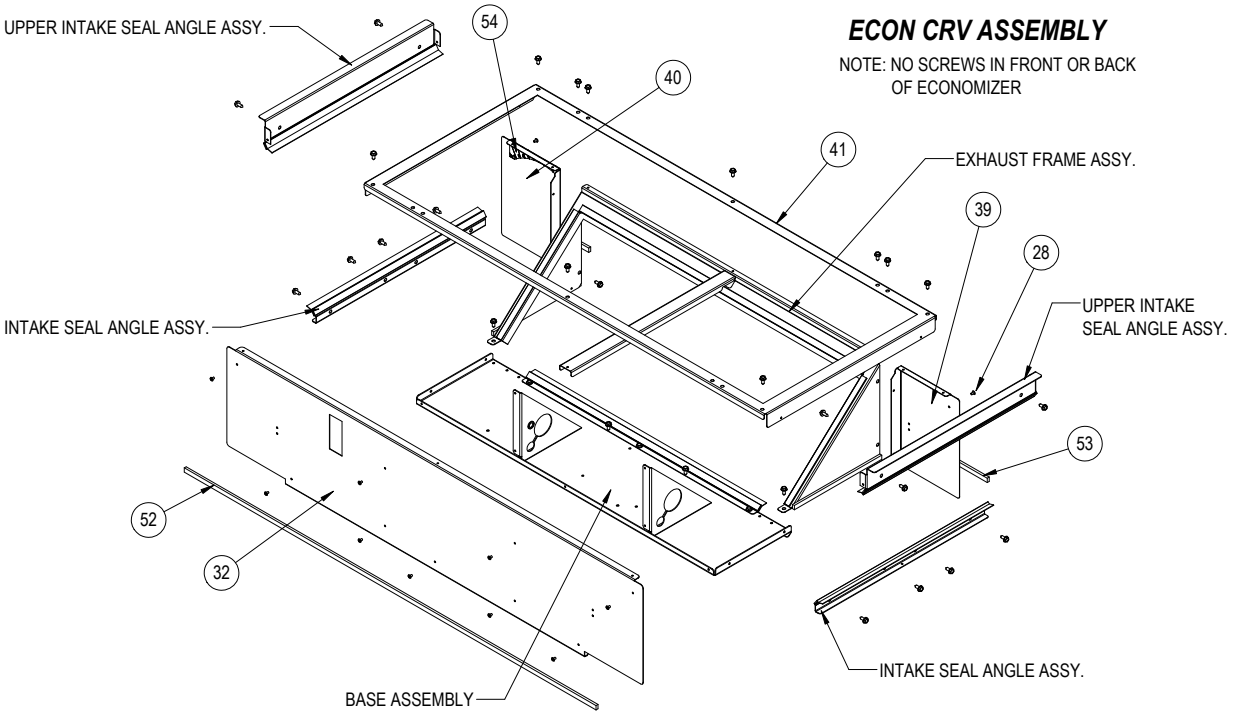
Drawing No.	Part No.	Description	
4	8602-008	BALL JOINT	X
18	139-420	EXHAUST BLADE	X
19	1913-126	INSULATION	X
20	141-497	EXHAUST BLADE SUPPORT	X
21	139-421	EXHAUST BLADE ARM	X
23	5400-010	METAL DBL LEAF HINGE 50 X 50MM	2
24	1171-072	1/4 TURN - WING KNOB LATCH	X
29	127-578	BASE	X
30	105-1461	EXHAUST SEAL ANGLE	X
31	1921-067-2303	23-3/16" DAMPER BLADE SEAL	X
33	141-499	BASE SUPPORT GUSSET	2
37	1921-067-1010	10-5/8" DAMPER BLADE SEAL	2
38	1921-067-2806	28-3/8" DAMPER BLADE SEAL	2

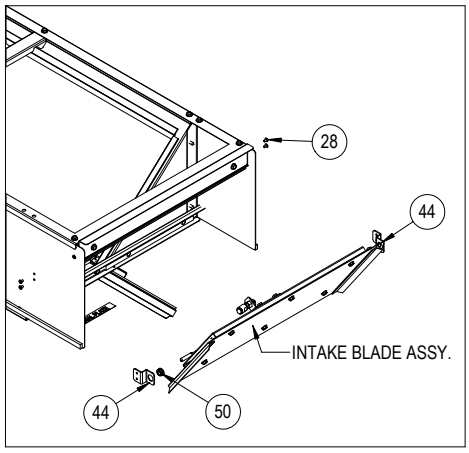
EXHAUST PARTITION ASSEMBLY/INTAKE SEAL ANGLE ASSEMBLY

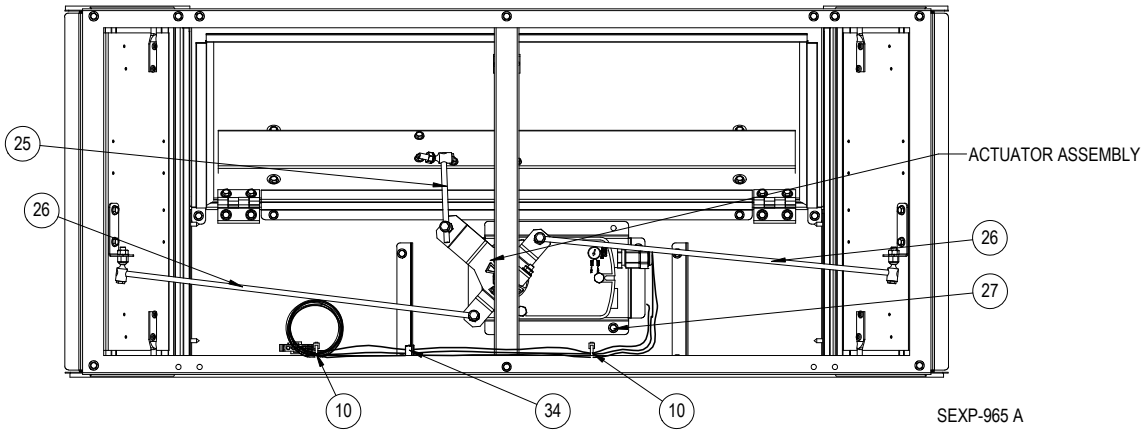


Drawing No.	Part No.	Description	
22	1913-079-0812	8-3/4" SFO W/PSA .197 X .375	2
35	105-1460	LOWER INTAKE SEAL ANGLE	X
36	139-422	EXHAUST FRAME	X
37	1921-067-1010	10-5/8" DAMPER BLADE SEAL	2
38	1921-067-2806	28-3/8" DAMPER BLADE SEAL	X
42	105-1459	UPPER INTAKE SEAL ANGLE	X
43	1921-067-1614	16-7/8" DAMPER BLADE SEAL	X

VENT ASSEMBLY







Drawing No.	Part No.	Description	
10	7950-012	PUSH MOUNT CABLE TIE 6-1/8"	2
25	8602-104	1/4 X 4-1/4" ROD	X
26	8602-105	1/4 X 17-1/4" ROD	2
32	115-332	FRONT	X
34	8611-047	OPEN/CLOSE SNAP BUSHING 3/4"	X
39	139X424	REAR INTAKE PARTITION - RH	X
40	139Y424	REAR INTAKE PARTITION - LH	X
41	107-385	TOP	X
44	113-773	DAMPER PIVOT BRACKET	4
50	8611-239	1/2" SNAP-IN SMOOTH BORE BSHNG	4
52	1913-079-4104	41-1/4" SFO W/PSA .197 X .375	X
53	1913-079-0514	5-7/8" SFO W/PSA .197 X .375	2
54	7961-904	CRVV-5 Position Label	X
NS	7003-084	MIST FILTER	2
NS	7003-083	EXHAUST BUG SCREEN	X
NS	543-223	SIDE VENT BLOCK OFF PLATE ASSEMBLY	2
NS	539-405	INTAKE SEALING FRAME	2
NS	8406-150	MAGNETIC REED SWITCH	X
NS	4056-246	WIRING DIAGRAM	X

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.

Supplemental Instructions

Models:

W42ACM W48ACM W60ACM W72ACM

This model provides a unique dehumidification circuit for periods of low outdoor ambient temperature and high indoor humidity conditions.

Refer to Specification Sheet S3596 for the standard features of the base units and this manual for electrical data.

Mechanical dehumidification is only available as a factory-installed option that must be ordered with the unit. It cannot be installed in the field on an existing unit.

Dehumidification Sequence of Operation

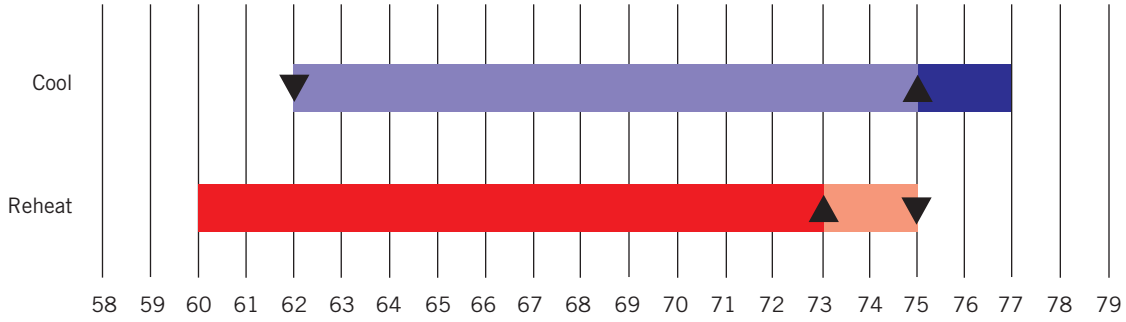
Dehumidification will only become active if the unit is connected to the LC6000 and the appropriate conditions are present.

When the wall-mount unit receives a dehumidification call from the LC6000, the wall-mount unit will disable the economizer to force the system to use air conditioning and prevent any additional humidity from being introduced from outdoor air. The wall-mount unit will then turn on the air conditioning system which will remove moisture and cool the space. At the same time, the 3-way dehumidification valve will be opened to extend the run time of the cooling cycle and prevent cool air from being introduced to the space. The dehumidification sequence will run until the space temperature reaches the heating setpoint or cooling setpoint or the humidity setpoint is reached.

When the dehumidification command is first received both cooling and reheat will be activated.

The cooling will shut off when the return air temperature is 62°F to prevent the unit from causing the system to go into heating mode (see Figure 1).

FIGURE 1
Dehumidification Control



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

Manual: 7960-864C
Supersedes: 7960-864B
Date: 2-3-21

The compressor will turn on again once the return temperature rises to 75°F.

The electric heat will operate to maximize cooling times which will in turn remove moisture from the space. The electric reheat will turn on when the temperature falls to 73°F and will turn back off at 75°F.

The system will continue to operate this way until the LC removes the call for active dehumidification.

The reheat coil is dependent on space load to warm the temperature back up once the compressor is disabled.

A heating or cooling call will disable the dehumidification call. Dehumidification can only take place when system is not actively heating or cooling.

For a more detailed operation description, see the latest version of LC6000 service instructions 2100-669.

Balanced Climate™ Mode

It is recommended that Balanced Climate mode be enabled to enhance dehumidification performance and comfort. Balanced Climate is deactivated by default. To activate Balanced Climate, see the latest version of MULTI-TEC service instructions 2100-725. The LC6000 will then operate the unit at the lower airflow (Balanced Climate mode) whenever the humidity is above the passive dehumidification setpoint. When the indoor humidity drops below the dehumidification off setpoint, the unit will return to nominal blower speeds.

See latest version of MULTI-TEC service instructions 2100-725 for further information regarding Balanced Climate operation. See latest version of LC6000 service instructions 2100-669 for further information regarding dehumidification configuration for the LC6000.

Electronic Expansion Valve (EEV)

Operation

This model employs an electronic expansion valve which meters the refrigerant to the evaporator. The EEV is made of a stepper motor that is controlled with a step output from the controller. The valve is capable of 480 steps which drives a needle valve that in turn regulates the flow of refrigerant. The EEV allows for tighter control and better capacity management in varying operating conditions than a standard TXV. The EEV system consists of the electronic valve, stator, suction temperature sensor and suction pressure transducer. The pressure transducer and temperature sensor monitor the suction line to provide real time data to the PLC so that a real time superheat can be calculated. This then determines the EEV position. The controller is set to maintain around 13° superheat.

WARNING/AVERTISSEMENT

- Exposure to high pressure refrigerant hazard.
- This unit is equipped with an electronic expansion valve. In order to fully recover refrigerant or evacuate the system during repairs, be sure to use service tool 2151-021 to manually open the electronic expansion valve or be sure to recover and evacuate from all service ports; suction, liquid, and discharge.
- Failure to do so could result in eye injuries and/or refrigerant burns.

- Exposition à un risque de réfrigérant à haute pression.
- Cet appareil est équipé d'un détendeur électronique. Afini de récupérer complètement le réfrigérant ou d'évacuer le système pendant les réparations, assurez-vous d'utiliser l'outil de service 2151-021 pour ouvrir manuellement le détendeur électronique ou assurrez-vous de récupérer et d'évacuer de tous les ports de service: aspiration, liquide et refoulement.
- Ne pas le faire pourrait entraîner des blessures auz yeux et / ou des brûlures de réfrigérant.

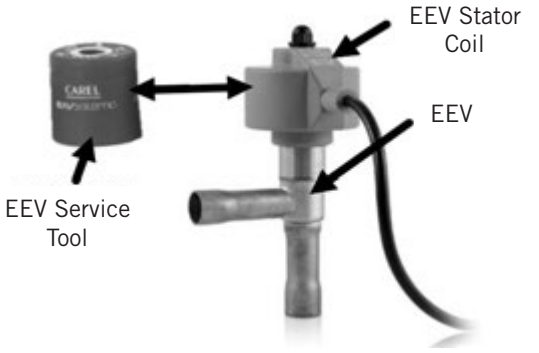
7961-953

EEV Instructions for Vacuuming, Reclaiming and Charging Unit

The electronic expansion valve moves to a closed position when there is no call to control. In order to pull a complete vacuum, fully reclaim the system or charge the unit, connections to both the suction and discharge service ports need to be utilized or the valve needs to be manually opened first. The valve can be opened manually using the magnetic EEV service tool (Bard Part # 2151-021) shown in Figure 2. To do this, remove the EEV stator coil (red color with retaining nut on top), slide the magnetic tool over the shaft where the stator was removed and turn in a clockwise direction to open the valve to the full open position (directional arrows are provided on the tool).

Reapply the EEV stator coil and retaining nut once complete. Upon powering the unit back up, the PLC will automatically drive the EEV back to the fully shut position. Once the compressor starts, the PLC will again modulate the EEV position to control the system superheat.

FIGURE 2
Electronic Expansion Valve (EEV) and Service Tool



Troubleshooting the Electronic Expansion Valve

Electronic Expansion Valve

Check to see if valve can be moved by manually moving the stepper motor using the EEV service tool shown in Figure 1 (Bard Part # 2151-021). If valve still does not control, check the transducer and thermistor sensors as described on page 4. If sensors are good, replace the valve.

Stator Coil

Disconnect the stator from the valve and the control and measure the resistance of the windings using an electrical tester. The resistance of both windings should be around 40 ohms +/– 10%. The four wire sets that will have resistance between them are: White and red, green and red, yellow and purple, blue and purple. If the resistance falls outside these values, replace the stator.

Transducer Sensor

1. Check continuity of all three wires from transducer plug to the PLC. Replace wires if poor connection in any wire.
2. Check to ensure wires are correctly connected as follows:

   Blue wire = B9 on PLC to pin C on transducer plug

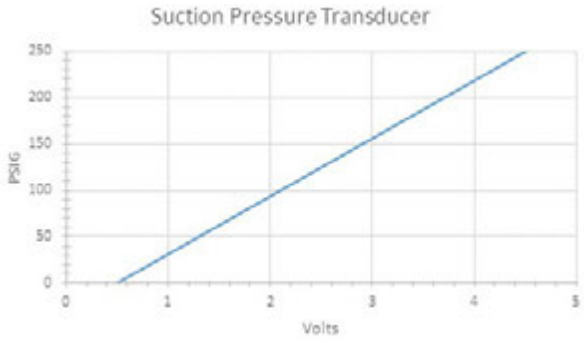
   Red wire = +5V on PLC to pin B on transducer plug

   Black wire = terminal block 7 to pin A on transducer plug
3. Check that there is 5VDC Nominal between the red and black wires going to the transducer.
4. Check the signal voltage between the blue and black wires (0.5-4.5VDC Actual). The following formula and Figure 3 can be used to determine if the transducer's voltage to pressure ratio is within range. Replace transducer if out of range.

Formula for Tech:

(Measured Pressure x .016) + .5 =
Expected Transducer Signal Voltage (see Figure 3).

FIGURE 3
Voltage to Pressure: Suction Pressure Transducer



Thermistor Sensor

1. Make a visual check for broken wire insulation, broken wires or cracked epoxy material.
2. Disconnect 10k ohm NTC thermistor from terminal B8 on the PLC and terminal block 6.
3. Use an ohmmeter to measure the resistance between the two connectors. Also use ohmmeter to check for short or open.
4. Compare the resistance reading to Table 1 on page 4. Use sensor ambient temperature. (Tolerance of part is ±10 %.)
5. If sensor is out of tolerance, shorted, open or reads very low ohms, it should be replaced.

TABLE 1
10K Ohm NTC Sensor: Temperature/Resistance

Temperature		Resistance
F	C	Ω
-40	-40	188,500
-38.2	-39	178,500
-36.4	-38	169,000
-34.6	-37	160,200
-32.8	-36	151,900
-31	-35	144,100
-29.2	-34	136,700
-27.4	-33	129,800
-25.6	-32	123,300
-23.8	-31	117,100
-22	-30	111,300
-20.2	-29	105,700
-18.4	-28	100,500
-16.6	-27	95,520
-14.8	-26	90,840
-13	-25	86,430
-11.2	-24	82,260
-9.4	-23	78,330
-7.6	-22	74,610
-5.8	-21	71,100
-4	-20	67,770
-2.2	-19	64,570
-0.4	-18	61,540
1.4	-17	58,680
3.2	-16	55,970
5	-15	53,410
6.8	-14	50,980
8.6	-13	48,680
10.4	-12	46,500
12.2	-11	44,430
14	-10	42,470
15.8	-9	40,570
17.6	-8	38,770
19.4	-7	37,060
21.2	-6	35,440
23	-5	33,900
24.8	-4	32,440
26.6	-3	31,050

Temperature		Resistance
F	C	Ω
28.4	-2	29,730
30.2	-1	28,480
32	0	27,280
33.8	1	26,130
35.6	2	25,030
37.4	3	23,990
39.2	4	23,000
41	5	22,050
42.8	6	21,150
44.6	7	20,300
46.4	8	19,480
48.2	9	18,700
50	10	17,960
51.8	11	17,240
53.6	12	16,560
55.4	13	15,900
57.2	14	15,280
59	15	14,690
60.8	16	14,120
62.6	17	13,580
64.4	18	13,060
66.2	19	12,560
68	20	12,090
69.8	21	11,630
71.6	22	11,200
73.4	23	10,780
75.2	24	10,380
77	25	10,000
78.8	26	9,630
80.6	27	9,280
82.4	28	8,940
84.2	29	8,620
86	30	8,310
87.8	31	8,010
89.6	32	7,730
91.4	33	7,450
93.2	34	7,190
95	35	6,940

Temperature		Resistance
F	C	Ω
96.8	36	6,700
98.6	37	6,470
100.4	38	6,250
102.2	39	6,030
104	40	5,830
105.8	41	5,630
107.6	42	5,440
109.4	43	5,260
111.2	44	5,080
113	45	4,910
114.8	46	4,750
116.6	47	4,590
118.4	48	4,440
120.2	49	4,300
122	50	4,160
123.8	51	4,030
125.6	52	3,900
127.4	53	3,770
129.2	54	3,650
131	55	3,540
132.8	56	3,430
134.6	57	3,320
136.4	58	3,220
138.2	59	3,120
140	60	3,020
141.8	61	2,930
143.6	62	2,840
145.4	63	2,750
147.2	64	2,670
149	65	2,590
150.8	66	2,510
152.6	67	2,440
154.4	68	2,360
156.2	69	2,300
158	70	2,230
159.8	71	2,160
161.6	72	2,100
163.4	73	2,040

Temperature		Resistance
F	C	Ω
165.2	74	1,980
167	75	1,920
168.8	76	1,870
170.6	77	1,820
172.4	78	1,770
174.2	79	1,920
176	80	1,670
177.8	81	1,620
179.6	82	1,580
181.4	83	1,530
183.2	84	1,490
185	85	1,450
186.8	86	1,441
188.6	87	1,370
190.4	88	1,340
192.2	89	1,300
194	90	1,270
195.8	91	1,230
197.6	92	1,200
199.4	93	1,170
201.2	94	1,140
203	95	1,110
204.8	96	1,080
206.6	97	1,050
208.4	98	1,020
210.2	99	1,000
212	100	970

W42ACM Cooling and Dehumidification Application Data[1]

DB/WB[2]	OD Temp.	65°F[3]		70°F		75°F		80°F		85°F		90°F		95°F		100°F		105°F	
	Mode	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum
75/62.5 (50% RH)	Total Cooling Btuh	45,900	22,500	44,500	19,700	43,200	16,800	41,800	14,000	40,600	11,000	39,300	8,000	38,100	4,900	36,900	1,700	35,700	
	Sensible Btuh	33,300	9,200	32,600	7,000	32,100	4,900	31,500	2,500	30,900	300	30,300	(2,000)	29,800	(4,300)	29,300	(6,600)	28,800	(9,000)
	S/T	0.725	0.409	0.733	0.355	0.743	0.292	0.754	0.179	0.761	0.027	0.771	0	0.782	0	0.794	0	0.807	0
	Latent Btuh	12,600	13,300	11,900	12,700	11,100	11,900	10,300	11,500	9,700	10,700	9,000	10,000	8,300	9,200	7,600	8,300	6,900	7,500
	Lbs. H20/hr.	11.9	12.5	11.2	12.0	10.5	11.2	9.7	10.8	9.2	10.1	8.5	9.4	7.8	8.7	7.2	7.8	6.5	7.1
	Supply Air DB	52.6	66.1	53.0	68.3	53.3	70.4	53.8	72.6	54.2	74.8	54.5	76.9	54.9	79.1	55.3	81.4	55.6	83.6
	Supply Air WB	50.8	54.9	51.2	55.9	51.6	56.8	51.9	58.0	52.3	59.0	52.6	60.1	52.9	61.1	53.3	62.1	53.6	63.2
	Suction PSIG[4]	119	108	120	109	121	110	122	112	123	114	125	116	126	118	127	121	129	124
	Discharge PSIG[4]	274	243	295	260	315	273	339	292	362	307	384	322	407	335	431	348	455	360
75/64.1 (55% RH)	Total Cooling Btuh	47,200	24,000	45,800	21,200	44,500	18,300	43,200	15,400	41,900	12,400	40,600	9,400	39,400	6,300	38,200	3,200	37,000	
	Sensible Btuh	31,500	8,200	30,900	6,000	30,300	3,800	29,700	1,500	29,100	(700)	28,600	(3,000)	28,000	(5,300)	27,500	(7,600)	27,000	(10,000)
	S/T	0.667	0.34	0.675	0.28	0.681	0.21	0.688	0.10	0.695	0	0.704	0	0.711	0	0.720	0	0.730	0
	Latent Btuh	15,700	15,800	14,900	15,200	14,200	14,500	13,500	13,900	12,800	13,100	12,000	12,400	11,400	11,600	10,700	10,800	10,000	10,000
	Lbs. H20/hr.	14.8	14.9	14.1	14.3	13.4	13.7	12.7	13.1	12.1	12.4	11.3	11.7	10.8	10.9	10.1	10.2	9.4	9.4
	Supply Air DB	53.8	67.1	54.2	69.2	54.6	71.4	54.9	73.5	55.3	75.7	55.7	77.9	56.1	80.1	56.4	82.3	56.8	84.5
	Supply Air WB	52.2	56.0	52.6	57.0	53.0	58.0	53.3	59.0	53.7	60.1	54.0	61.1	54.3	62.2	54.6	63.2	54.9	64.3
	Suction PSIG[4]	122	111	123	112	124	113	125	115	126	117	128	119	129	122	130	124	132	128
	Discharge PSIG[4]	275	246	297	263	319	280	341	295	363	310	386	325	409	338	433	351	456	363
75/65.5 (60% RH)	Total Cooling Btuh	48,500	25,400	47,100	22,600	45,800	19,700	44,500	16,900	43,200	13,900	41,900	10,900	40,700	7,800	39,500	4,600	38,400	1,400
	Sensible Btuh	29,700	7,200	29,100	5,000	28,500	2,900	27,900	500	27,400	(1,700)	26,800	(4,000)	26,300	(6,300)	25,700	(8,600)	25,200	(11,000)
	S/T	0.612	0.283	0.618	0.221	0.622	0.147	0.627	0.030	0.634	0	0.640	0	0.646	0	0.651	0	0.656	0
	Latent Btuh	18,800	18,200	18,000	17,600	17,300	16,800	16,600	16,400	15,800	15,600	15,100	14,900	14,400	14,100	13,800	13,200	13,200	12,400
	Lbs. H20/hr.	17.7	17.2	17.0	16.6	16.3	15.8	15.7	15.5	14.9	14.7	14.2	14.1	13.6	13.3	13.0	12.5	12.5	11.7
	Supply Air DB	54.9	68.0	55.3	70.2	55.6	72.3	56.1	74.5	56.5	76.7	56.9	78.8	57.2	81.0	57.6	83.3	58.0	85.5
	Supply Air WB	53.6	57.0	54.0	58.1	54.3	59.0	54.7	60.1	55.0	61.1	55.4	62.2	55.7	63.2	56.0	64.3	56.3	65.3
	Suction PSIG[4]	125	114	126	115	127	117	128	118	129	120	131	122	132	125	134	128	135	131
	Discharge PSIG[4]	277	249	298	266	318	279	342	298	365	313	387	328	411	341	434	354	458	366
75/66.7 (65% RH)	Total Cooling Btuh	49,800	26,800	48,400	24,000	47,100	21,100	45,800	18,300	44,500	15,300	43,300	12,300	42,000	9,200	40,800	6,100	39,700	2,800
	Sensible Btuh	28,000	6,200	27,300	4,000	26,800	1,900	26,200	(500)	25,600	(2,700)	25,000	(5,000)	24,500	(7,300)	24,000	(9,600)	23,500	(12,000)
	S/T	0.562	0.23	0.564	0.17	0.569	0.09	0.572	0	0.575	0	0.577	0	0.583	0	0.588	0	0.592	0
	Latent Btuh	21,800	20,600	21,100	20,000	20,300	19,200	19,600	18,800	18,900	18,000	18,300	17,300	17,500	16,500	16,800	15,700	16,200	14,800
	Lbs. H20/hr.	20.6	19.4	19.9	18.9	19.2	18.1	18.5	17.7	17.8	17.0	17.3	16.3	16.5	15.6	15.8	14.8	15.3	14.0
	Supply Air DB	56.1	69.0	56.5	71.1	56.8	73.3	57.3	75.4	57.7	77.6	58.0	79.8	58.4	82.0	58.8	84.2	59.1	86.4
	Supply Air WB	55.0	58.1	55.3	59.1	55.7	60.0	56.1	61.2	56.4	62.2	56.8	63.2	57.1	64.3	57.4	65.3	57.7	66.4
	Suction PSIG[4]	128	118	129	119	130	120	131	121	133	123	134	126	135	128	137	131	138	134
	Discharge PSIG[4]	279	252	300	269	320	282	344	301	366	316	389	331	412	344	436	357	459	369
75/68 (70% RH)	Total Cooling Btuh	51,100	28,300	49,800	25,500	48,500	22,500	47,100	19,700	45,800	16,800	44,600	13,700	43,400	10,600	42,200	7,500	41,000	4,300
	Sensible Btuh	26,200	5,200	25,600	3,000	25,000	900	24,400	(1,500)	23,800	(3,700)	23,300	(6,000)	22,700	(8,300)	22,200	(10,600)	21,700	(13,000)
	S/T	0.513	0.184	0.514	0.118	0.515	0.040	0.518	0	0.520	0	0.522	0	0.523	0	0.526	0	0.529	0
	Latent Btuh	24,900	23,100	24,200	22,500	23,500	21,600	22,700	21,200	22,000	20,500	21,300	19,700	20,700	18,900	20,000	18,100	19,300	17,300
	Lbs. H20/hr.	23.5	21.8	22.8	21.2	22.2	20.4	21.4	20.0	20.8	19.3	20.1	18.6	19.5	17.8	18.9	17.1	18.2	16.3
	Supply Air DB	57.3	69.9	57.7	72.1	58.0	74.2	58.5	76.4	58.8	78.6	59.2	80.8	59.6	83.0	59.9	85.2	60.3	87.4
	Supply Air WB	56.4	59.2	56.7	60.2	57.1	61.1	57.5	62.2	57.8	63.3	58.1	64.3	58.5	65.4	58.8	66.4	59.1	67.5
	Suction PSIG[4]	131	121	132	122	133	123	134	125	136	127	137	129	138	131	140	134	141	137
	Discharge PSIG[4]	280	255	302	272	322	285	345	304	368	319	391	334	414	347	437	360	461	372
80/68.3 (55% RH)	Total Cooling Btuh	51,700	29,200	50,300	26,400	49,000	23,400	47,600	20,600	46,400	17,700	45,100	14,600	43,900	11,500	42,700	8,400	41,500	5,200
	Sensible Btuh	32,900	9,900	32,200	7,700	31,700	5,600	31,100	3,200	30,500	1,000	29,900	(1,300)	29,400	(3,600)	28,900	(5,900)	28,400	(8,300)
	S/T	0.636	0.34	0.640	0.29	0.647	0.24	0.653	0.16	0.657	0.06	0.663	0	0.670	0	0.677	0	0.684	0
	Latent Btuh	18,800	19,300	18,100	18,700	17,300	17,800	16,500	17,400	15,900	16,700	15,200	15,900	14,500	15,100	13,800	14,300	13,100	13,500
	Lbs. H20/hr.	17.7	18.2	17.1	17.6	16.3	16.8	15.6	16.4	15.0	15.8	14.3	15.0	13.7	14.2	13.0	13.5	12.4	12.7
	Supply Air DB	58.0	70.4	58.4	72.5	58.7	74.6	59.2	76.8	59.6	79.0	60.0	81.2	60.4	83.4	60.7	85.6	61.1	87.8
	Supply Air WB	56.3	59.2	56.7	60.2	57.0	61.2	57.4	62.3	57.7	63.3	58.1	64.4	58.4	65.4	58.7	66.4	59.0	67.5
	Suction PSIG[4]	131	121	132	122	133	123	135	125	136	127	137	129	139	132	140	135	141	138
	Discharge PSIG[4]	280	255	302	273	322	285	346	305	368	320	391	334	414	348	437	360	461	373

[1] Values listed are with ventilation package disabled

[2] Return air temperature °F @ Default airflow (1350 CFM) for AC tests and Balanced Climate airflow (950 CFM) for dehumidification tests

[3] Below 50°F, unit requires a factory or field installed low ambient control.

[4] Suction pressure +/- 4 psi, Discharge pressure +/- 10 psi

W48ACM Cooling and Dehumidification Application Data[1]

DB/WB[2]	OD Temp.	65°F[3]		70°F		75°F		80°F		85°F		90°F		95°F		100°F		105°F	
	Mode	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum
75/62.5 (50% RH)	Total Cooling Btuh	53,100	26,400	52,100	23,400	50,800	20,000	49,600	17,000	48,000	13,600	46,200	10,100	44,200	6,500	42,100	2,800	39,700	
	Sensible Btuh	39,800	11,100	39,300	8,700	39,200	6,300	38,200	3,900	37,500	1,400	36,700	(1,100)	35,900	(3,600)	35,000	(6,100)	34,000	(8,700)
	S/T	0.750	0.420	0.754	0.372	0.772	0.315	0.770	0.229	0.781	0.103	0.794	0	0.812	0	0.831	0	0.856	0
	Latent Btuh	13,300	15,300	12,800	14,700	11,600	13,700	11,400	13,100	10,500	12,200	9,500	11,200	8,300	10,100	7,100	8,900	5,700	7,700
	Lbs. H20/hr.	12.5	14.4	12.1	13.9	10.9	12.9	10.8	12.4	9.9	11.5	9.0	10.6	7.8	9.5	6.7	8.4	5.4	7.3
	Supply Air DB	51.5	65.9	51.7	67.9	52.0	69.8	52.3	71.9	52.7	73.9	53.2	76.0	53.8	78.0	54.4	80.1	55.1	82.2
	Supply Air WB	50.4	54.8	50.7	55.7	50.9	56.7	51.3	57.7	51.7	58.7	52.2	59.8	52.6	60.8	53.1	61.9	53.7	63.0
	Suction PSIG[4]	127	117	129	118	130	119	132	121	134	123	135	125	136	127	136	130	137	133
	Discharge PSIG[4]	287	237	307	254	328	269	349	288	373	304	397	320	424	336	451	351	480	366
75/64.1 (55% RH)	Total Cooling Btuh	54,400	28,000	53,400	25,000	52,200	21,800	50,800	18,600	49,300	15,200	47,500	11,700	45,500	8,100	43,300	4,400	41,000	600
	Sensible Btuh	37,500	9,700	37,000	7,400	36,500	5,000	35,900	2,600	35,200	100	34,400	(2,400)	33,600	(4,900)	32,600	(7,400)	31,600	(10,000)
	S/T	0.689	0.35	0.693	0.30	0.699	0.23	0.707	0.14	0.714	0.01	0.724	0	0.738	0	0.753	0	0.771	0
	Latent Btuh	16,900	18,300	16,400	17,600	15,700	16,800	14,900	16,000	14,100	15,100	13,100	14,100	11,900	13,000	10,700	11,800	9,400	10,600
	Lbs. H20/hr.	15.9	17.3	15.5	16.6	14.8	15.8	14.1	15.1	13.3	14.2	12.4	13.3	11.2	12.3	10.1	11.1	8.9	10.0
	Supply Air DB	52.9	67.0	53.1	68.9	53.4	70.9	53.7	73.0	54.2	75.0	54.6	77.0	55.2	79.1	55.8	81.2	56.5	83.3
	Supply Air WB	51.9	55.9	52.2	56.8	52.5	57.8	52.9	58.8	53.2	59.8	53.7	60.9	54.1	61.9	54.7	63.0	55.2	64.1
	Suction PSIG[4]	130	120	132	121	134	122	135	124	137	126	138	128	139	130	139	133	140	136
	Discharge PSIG[4]	289	239	308	257	329	274	351	291	374	307	399	323	425	338	452	354	481	368
75/65.5 (60% RH)	Total Cooling Btuh	55,600	29,600	54,700	26,500	53,300	23,200	52,100	20,100	50,500	16,800	48,800	13,300	46,800	9,700	44,600	6,000	42,300	2,200
	Sensible Btuh	35,200	8,400	34,700	6,100	34,500	3,700	33,600	1,300	32,900	(1,200)	32,100	(3,700)	31,200	(6,200)	30,300	(8,700)	29,300	(11,300)
	S/T	0.633	0.284	0.634	0.230	0.647	0.159	0.645	0.065	0.651	0	0.658	0	0.667	0	0.679	0	0.693	0
	Latent Btuh	20,400	21,200	20,000	20,400	18,800	19,500	18,500	18,800	17,600	18,000	16,700	17,000	15,600	15,900	14,300	14,700	13,000	13,500
	Lbs. H20/hr.	19.2	20.0	18.9	19.2	17.7	18.4	17.5	17.7	16.6	17.0	15.8	16.0	14.7	15.0	13.5	13.9	12.3	12.7
	Supply Air DB	54.3	68.0	54.5	70.0	54.8	72.0	55.2	74.0	55.6	76.1	56.1	78.1	56.6	80.2	57.2	82.2	57.9	84.3
	Supply Air WB	53.4	57.0	53.7	57.9	53.9	58.9	54.4	59.9	54.8	60.9	55.2	62.0	55.7	63.0	56.2	64.1	56.7	65.2
	Suction PSIG[4]	133	123	135	124	137	125	138	127	140	129	141	131	142	134	142	136	143	139
	Discharge PSIG[4]	290	242	309	259	331	274	352	293	375	309	400	325	426	341	454	356	483	371
75/66.7 (65% RH)	Total Cooling Btuh	56,900	31,200	56,000	28,100	54,600	24,800	53,400	21,700	51,800	18,400	50,100	14,900	48,100	11,300	45,900	7,600	43,500	3,800
	Sensible Btuh	32,800	7,100	32,400	4,800	32,200	2,400	31,200	(100)	30,500	(2,500)	29,800	(5,000)	28,900	(7,500)	28,000	(10,000)	27,000	(12,600)
	S/T	0.576	0.23	0.579	0.17	0.590	0.10	0.584	0	0.589	0	0.595	0	0.601	0	0.610	0	0.621	0
	Latent Btuh	24,100	24,100	23,600	23,300	22,400	22,400	22,200	21,800	21,300	20,900	20,300	19,900	19,200	18,800	17,900	17,600	16,500	16,400
	Lbs. H20/hr.	22.7	22.7	22.3	22.0	21.1	21.1	20.9	20.6	20.1	19.7	19.2	18.8	18.1	17.7	16.9	16.6	15.6	15.5
	Supply Air DB	55.8	69.1	56.0	71.1	56.2	73.0	56.6	75.1	57.0	77.1	57.5	79.2	58.0	81.2	58.6	83.3	59.3	85.4
	Supply Air WB	54.9	58.0	55.2	59.0	55.4	60.0	55.9	61.0	56.3	62.0	56.7	63.0	57.2	64.1	57.7	65.2	58.2	66.3
	Suction PSIG[4]	136	126	138	127	140	129	141	130	143	132	144	134	145	137	145	139	146	142
	Discharge PSIG[4]	291	244	311	262	332	276	353	296	377	312	402	328	428	343	455	359	484	373
75/68 (70% RH)	Total Cooling Btuh	58,200	32,800	57,200	29,700	55,900	26,400	54,700	23,300	53,100	20,000	51,300	16,500	49,400	12,900	47,200	9,200	44,800	5,300
	Sensible Btuh	30,500	5,800	30,100	3,400	29,900	1,100	28,900	(1,400)	28,200	(3,800)	27,400	(6,300)	26,600	(8,800)	25,700	(11,300)	24,700	(13,900)
	S/T	0.524	0.177	0.526	0.114	0.535	0.042	0.528	0	0.531	0	0.534	0	0.538	0	0.544	0	0.551	0
	Latent Btuh	27,700	27,000	27,100	26,300	26,000	25,300	25,800	24,700	24,900	23,800	23,900	22,800	22,800	21,700	21,500	20,500	20,100	19,200
	Lbs. H20/hr.	26.1	25.5	25.6	24.8	24.5	23.9	24.3	23.3	23.5	22.5	22.5	21.5	21.5	20.5	20.3	19.3	19.0	18.1
	Supply Air DB	57.2	70.2	57.4	72.1	57.6	74.1	58.0	76.2	58.4	78.2	58.9	80.2	59.4	82.3	60.1	84.4	60.7	86.5
	Supply Air WB	56.5	59.1	56.7	60.1	57.0	61.1	57.4	62.1	57.8	63.1	58.2	64.1	58.7	65.2	59.2	66.3	59.7	67.4
	Suction PSIG[4]	139	130	141	131	143	132	144	134	146	136	147	138	148	140	148	143	149	146
	Discharge PSIG[4]	293	247	312	264	333	279	355	298	378	314	403	330	429	346	457	361	485	376
80/68.3 (55% RH)	Total Cooling Btuh	58,200	33,300	57,300	30,200	55,900	26,900	54,700	23,800	53,100	20,500	51,400	17,000	49,400	13,400	47,200	9,700	44,800	5,800
	Sensible Btuh	37,900	11,200	37,500	8,800	37,300	6,500	36,300	4,000	35,600	1,600	34,900	(900)	34,000	(3,400)	33,100	(5,900)	32,100	(8,500)
	S/T	0.651	0.34	0.654	0.29	0.667	0.24	0.664	0.17	0.670	0.08	0.679	0	0.688	0	0.701	0	0.717	0
	Latent Btuh	20,300	22,100	19,800	21,400	18,600	20,400	18,400	19,800	17,500	18,900	16,500	17,900	15,400	16,800	14,100	15,600	12,700	14,300
	Lbs. H20/hr.	19.2	20.8	18.7	20.2	17.5	19.2	17.4	18.7	16.5	17.8	15.6	16.9	14.5	15.8	13.3	14.7	12.0	13.5
	Supply Air DB	57.5	70.5	57.7	72.5	58.0	74.4	58.3	76.5	58.8	78.5	59.2	80.6	59.8	82.7	60.4	84.7	61.1	86.8
	Supply Air WB	56.5	59.1	56.8	60.1	57.0	61.1	57.4	62.1	57.8	63.1	58.3	64.1	58.7	65.2	59.2	66.3	59.8	67.4
	Suction PSIG[4]	139	130	142	131	143	133	145	134	146	136	147	138	148	141	149	143	149	146
	Discharge PSIG[4]	288	241	307	258	329	272	350	292	373	308	398	324	424	340	452	355	481	370

[1] Values listed are with ventilation package disabled

[2] Return air temperature °F @ Default airflow (1550 CFM) for AC tests and Balanced Climate airflow (1090 CFM) for dehumidification tests

[3] Below 50°F, unit requires a factory or field installed low ambient control.

[4] Suction pressure +/- 4 psi, Discharge pressure +/- 10 psi

W60ACM Cooling and Dehumidification Application Data[1]

DB/WB[2]	OD Temp.	65°F[3]		70°F		75°F		80°F		85°F		90°F		95°F		100°F		105°F	
	Mode	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum
75/62.5 (50% RH)	Total Cooling Btuh	65,400	31,900	63,800	28,500	62,100	24,700	60,500	21,600	58,800	18,000	57,000	14,300	55,200	10,500	53,300	6,600	51,400	2,600
	Sensible Btuh	47,600	13,600	46,900	11,200	46,200	8,700	45,400	6,400	44,700	3,800	43,900	1,300	43,100	(1,300)	42,300	(4,000)	41,500	(6,700)
	S/T	0.728	0.426	0.735	0.393	0.744	0.352	0.750	0.296	0.760	0.211	0.770	0.091	0.781	0	0.794	0	0.807	0
	Latent Btuh	17,800	18,300	16,900	17,300	15,900	16,000	15,100	15,200	14,100	14,200	13,100	13,000	12,100	11,800	11,000	10,600	9,900	9,300
	Lbs. H20/hr.	16.8	17.3	15.9	16.3	15.0	15.1	14.2	14.3	13.3	13.4	12.4	12.3	11.4	11.1	10.4	10.0	9.3	8.8
	Supply Air DB	50.3	65.2	50.7	66.9	51.0	68.7	51.4	70.4	51.8	72.3	52.2	74.1	52.6	76.1	53.0	78.0	53.4	80.0
	Supply Air WB	49.4	54.2	49.7	55.1	50.0	56.0	50.4	57.0	50.8	58.0	51.2	58.9	51.5	59.9	51.9	60.9	52.3	61.9
	Suction PSIG[4]	126	118	127	119	127	120	128	122	130	123	131	124	132	125	133	127	135	128
	Discharge PSIG[4]	296	278	316	291	339	305	359	318	382	333	405	348	430	364	455	381	481	398
75/64.1 (55% RH)	Total Cooling Btuh	66,800	33,600	65,200	30,300	63,600	26,800	61,900	23,300	60,200	19,700	58,400	16,000	56,600	12,200	54,700	8,300	52,800	4,400
	Sensible Btuh	45,000	12,000	44,300	9,600	43,500	7,200	42,800	4,700	42,000	2,200	41,200	(300)	40,400	(3,000)	39,600	(5,600)	38,800	(8,400)
	S/T	0.674	0.36	0.679	0.32	0.684	0.27	0.691	0.20	0.698	0.11	0.705	0	0.714	0	0.724	0	0.735	0
	Latent Btuh	21,800	21,600	20,900	20,700	20,100	19,600	19,100	18,600	18,200	17,500	17,200	16,300	16,200	15,200	15,100	13,900	14,000	12,800
	Lbs. H20/hr.	20.6	20.4	19.7	19.5	19.0	18.5	18.0	17.5	17.2	16.5	16.2	15.4	15.3	14.3	14.2	13.1	13.2	12.1
	Supply Air DB	51.7	66.3	52.0	68.1	52.4	69.8	52.8	71.6	53.1	73.4	53.5	75.3	53.9	77.2	54.3	79.2	54.7	81.2
	Supply Air WB	50.9	55.3	51.2	56.3	51.5	57.2	51.9	58.1	52.3	59.1	52.6	60.1	53.0	61.0	53.4	62.0	53.8	63.1
	Suction PSIG[4]	129	121	130	122	131	124	132	125	133	126	134	127	135	129	137	130	138	132
	Discharge PSIG[4]	298	282	318	295	340	308	362	322	384	337	408	352	432	368	458	385	484	402
75/65.5 (60% RH)	Total Cooling Btuh	68,200	35,300	66,600	32,000	65,000	28,100	63,300	25,000	61,600	21,400	59,800	17,700	58,000	13,900	56,100	10,100	54,200	6,100
	Sensible Btuh	42,300	10,300	41,600	8,000	40,900	5,400	40,100	3,100	39,400	600	38,600	(2,000)	37,800	(4,600)	37,000	(7,300)	36,100	(10,000)
	S/T	0.620	0.292	0.625	0.250	0.629	0.192	0.633	0.124	0.640	0.028	0.645	0	0.652	0	0.660	0	0.666	0
	Latent Btuh	25,900	25,000	25,000	24,000	24,100	22,700	23,200	21,900	22,200	20,800	21,200	19,700	20,200	18,500	19,100	17,400	18,100	16,100
	Lbs. H20/hr.	24.4	23.6	23.6	22.6	22.7	21.4	21.9	20.7	20.9	19.6	20.0	18.6	19.1	17.5	18.0	16.4	17.1	15.2
	Supply Air DB	53.0	67.5	53.4	69.2	53.7	71.0	54.1	72.8	54.5	74.6	54.9	76.5	55.3	78.4	55.7	80.3	56.1	82.3
	Supply Air WB	52.3	56.5	52.7	57.4	52.9	58.3	53.4	59.3	53.7	60.2	54.1	61.2	54.5	62.2	54.9	63.2	55.3	64.2
	Suction PSIG[4]	132	125	133	126	134	127	135	128	136	129	137	131	139	132	140	133	141	135
	Discharge PSIG[4]	301	286	321	299	344	313	364	326	387	341	410	356	435	372	460	389	486	406
75/66.7 (65% RH)	Total Cooling Btuh	69,600	37,100	68,000	33,700	66,400	29,900	64,700	26,800	63,000	23,100	61,200	19,400	59,400	15,700	57,600	11,800	55,600	7,800
	Sensible Btuh	39,700	8,700	38,900	6,400	38,200	3,800	37,500	1,500	36,700	(1,000)	35,900	(3,600)	35,100	(6,200)	34,300	(8,900)	33,500	(11,600)
	S/T	0.570	0.23	0.572	0.19	0.575	0.13	0.580	0.06	0.583	0	0.587	0	0.591	0	0.595	0	0.603	0
	Latent Btuh	29,900	28,400	29,100	27,300	28,200	26,100	27,200	25,300	26,300	24,100	25,300	23,000	24,300	21,900	23,300	20,700	22,100	19,400
	Lbs. H20/hr.	28.2	26.8	27.5	25.8	26.6	24.6	25.7	23.9	24.8	22.7	23.9	21.7	22.9	20.7	22.0	19.5	20.8	18.3
	Supply Air DB	54.4	68.7	54.7	70.4	55.1	72.2	55.5	73.9	55.9	75.7	56.2	77.6	56.6	79.5	57.1	81.5	57.5	83.5
	Supply Air WB	53.8	57.6	54.1	58.5	54.4	59.4	54.8	60.4	55.2	61.4	55.5	62.3	55.9	63.3	56.3	64.3	56.7	65.3
	Suction PSIG[4]	136	128	137	129	138	130	139	131	140	133	141	134	142	135	143	137	145	138
	Discharge PSIG[4]	303	290	324	303	347	317	367	330	389	345	413	360	437	376	463	393	489	410
75/68 (70% RH)	Total Cooling Btuh	71,000	38,800	69,400	35,500	67,800	31,600	66,100	28,500	64,400	24,900	62,700	21,200	60,800	17,400	59,000	13,500	57,100	9,600
	Sensible Btuh	37,000	7,100	36,300	4,700	35,600	2,200	34,800	(100)	34,000	(2,600)	33,300	(5,200)	32,500	(7,800)	31,600	(10,500)	30,800	(13,200)
	S/T	0.521	0.183	0.523	0.132	0.525	0.070	0.526	0	0.528	0	0.531	0	0.535	0	0.536	0	0.539	0
	Latent Btuh	34,000	31,700	33,100	30,800	32,200	29,400	31,300	28,600	30,400	27,500	29,400	26,400	28,300	25,200	27,400	24,000	26,300	22,800
	Lbs. H20/hr.	32.1	29.9	31.2	29.1	30.4	27.7	29.5	27.0	28.7	25.9	27.7	24.9	26.7	23.8	25.8	22.6	24.8	21.5
	Supply Air DB	55.8	69.8	56.1	71.5	56.5	73.3	56.8	75.1	57.2	76.9	57.6	78.8	58.0	80.7	58.4	82.7	58.8	84.6
	Supply Air WB	55.2	58.7	55.6	59.6	55.8	60.6	56.3	61.5	56.6	62.5	57.0	63.5	57.4	64.4	57.8	65.4	58.2	66.5
	Suction PSIG[4]	139	131	140	132	141	134	142	135	143	136	144	137	146	139	147	140	148	142
	Discharge PSIG[4]	306	294	326	307	349	321	369	334	392	349	416	364	440	380	465	397	491	414
80/68.3 (55% RH)	Total Cooling Btuh	71,400	39,200	69,900	35,900	68,200	32,000	66,600	28,900	64,800	25,300	63,100	21,600	61,300	17,800	59,400	14,000	57,500	10,000
	Sensible Btuh	45,800	13,600	45,100	11,200	44,400	8,700	43,600	6,400	42,800	3,800	42,000	1,300	41,200	(1,300)	40,400	(4,000)	39,600	(6,700)
	S/T	0.641	0.35	0.645	0.31	0.651	0.27	0.655	0.22	0.660	0.15	0.666	0.06	0.672	0	0.680	0	0.689	0
	Latent Btuh	25,600	25,600	24,800	24,700	23,800	23,300	23,000	22,500	22,000	21,500	21,100	20,300	20,100	19,100	19,000	18,000	17,900	16,700
	Lbs. H20/hr.	24.2	24.2	24.2	23.3	22.5	22.0	21.7	21.2	20.8	20.3	19.9	19.2	19.0	18.0	17.9	17.0	16.9	15.8
	Supply Air DB	56.1	70.2	56.5	71.9	56.8	73.7	57.2	75.5	57.6	77.3	58.0	79.2	58.4	81.1	58.8	83.1	59.2	85.1
	Supply Air WB	55.4	58.9	55.7	59.9	56.0	60.8	56.4	61.7	56.8	62.7	57.2	63.7	57.5	64.7	57.9	65.7	58.3	66.7
	Suction PSIG[4]	140	132	141	133	142	134	143	135	144	137	145	138	146	139	148	141	149	142
	Discharge PSIG[4]	305	295	325	308	348	322	368	336	391	350	415	366	439	381	464	398	490	415

[1] Values listed are with ventilation package disabled

[2] Return air temperature °F @ Default airflow (1750 CFM) for AC tests and Balanced Climate airflow (1180 CFM) for dehumidification tests

[3] Below 50°F, unit requires a factory or field installed low ambient control.

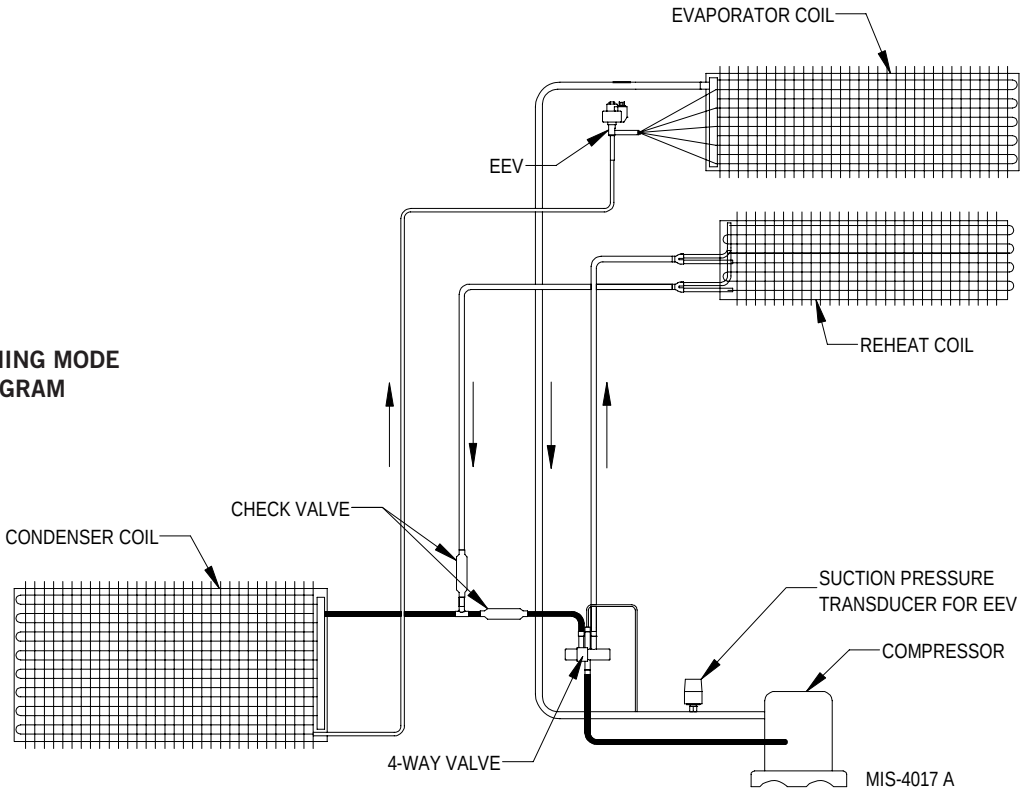
[4] Suction pressure +/- 4 psi, Discharge pressure +/- 10 psi

W72ACM Cooling and Dehumidification Application Data[1]

DB/WB[2]	OD Temp.	65°F[3]		70°F		75°F		80°F		85°F		90°F		95°F		100°F		105°F	
	Mode	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum	A/C	Dehum
75/62.5 (50% RH)	Total Cooling Btuh	79,000	38,500	77,000	35,000	75,200	31,700	73,100	27,700	71,000	23,800	69,000	19,800	67,000	15,700	64,900	11,400	62,800	6,900
	Sensible Btuh	55,100	15,100	54,100	12,400	53,200	9,800	52,200	6,900	51,200	4,100	50,300	1,200	49,400	(1,700)	48,500	(4,700)	47,700	(7,700)
	S/T	0.697	0.392	0.703	0.354	0.707	0.309	0.714	0.249	0.721	0.172	0.729	0.061	0.737	0	0.747	0	0.760	0
	Latent Btuh	23,900	23,400	22,900	22,600	22,000	21,900	20,900	20,800	19,800	19,700	18,700	18,600	17,600	17,400	16,400	16,100	15,100	14,600
	Lbs. H20/hr.	22.5	22.1	21.6	21.3	20.8	20.7	19.7	19.6	18.7	18.6	17.6	17.5	16.6	16.4	15.5	15.2	14.2	13.8
	Supply Air DB	48.5	64.9	48.9	66.7	49.4	68.3	49.8	70.3	50.3	72.2	50.7	74.2	51.1	76.1	51.6	78.1	52.0	80.2
	Supply Air WB	47.6	53.1	48.1	54.0	48.5	54.9	48.9	56.0	49.4	57.0	49.8	58.0	50.2	59.0	50.6	60.0	50.9	61.1
	Suction PSIG[4]	117	109	119	111	120	112	121	113	122	115	124	116	125	117	126	119	127	120
	Discharge PSIG[4]	301	300	321	313	342	326	365	341	389	356	413	372	439	389	466	406	494	425
75/64.1 (55% RH)	Total Cooling Btuh	80,800	40,600	78,900	37,200	76,900	33,600	74,900	29,800	72,900	26,000	70,900	21,900	68,800	17,800	66,700	13,500	64,600	9,000
	Sensible Btuh	52,200	13,200	51,200	10,600	50,200	7,800	49,200	5,100	48,300	2,300	47,400	(600)	46,500	(3,500)	45,600	(6,500)	44,700	(9,500)
	S/T	0.646	0.33	0.649	0.28	0.653	0.23	0.657	0.17	0.663	0.09	0.669	0	0.676	0	0.684	0	0.692	0
	Latent Btuh	28,600	27,400	27,700	26,600	26,700	25,800	25,700	24,700	24,600	23,700	23,500	22,500	22,300	21,300	21,100	20,000	19,900	18,500
	Lbs. H20/hr.	27.0	25.8	26.1	25.1	25.2	24.3	24.2	23.3	23.2	22.4	22.2	21.2	21.0	20.1	19.9	18.9	18.8	17.5
	Supply Air DB	49.9	66.2	50.4	67.9	50.8	69.7	51.3	71.6	51.7	73.5	52.1	75.4	52.6	77.3	53.0	79.4	53.4	81.4
	Supply Air WB	49.1	54.2	49.6	55.1	50.0	56.1	50.4	57.0	50.9	58.0	51.3	59.0	51.7	60.1	52.1	61.1	52.4	62.2
	Suction PSIG[4]	120	112	122	114	123	115	124	116	125	118	127	119	128	120	129	122	130	123
	Discharge PSIG[4]	304	305	324	317	346	331	368	345	392	361	416	377	442	394	469	411	497	430
75/65.5 (60% RH)	Total Cooling Btuh	82,700	42,700	80,700	39,300	78,900	36,000	76,700	32,000	74,700	28,100	72,700	24,100	70,600	19,900	68,600	15,600	66,500	11,200
	Sensible Btuh	49,300	11,400	48,200	8,700	47,300	6,200	46,300	3,300	45,400	400	44,400	(2,400)	43,500	(5,400)	42,700	(8,300)	41,800	(11,300)
	S/T	0.596	0.267	0.597	0.221	0.599	0.172	0.604	0.103	0.608	0.014	0.611	0	0.616	0	0.622	0	0.629	0
	Latent Btuh	33,400	31,300	32,500	30,600	31,600	29,800	30,400	28,700	29,300	27,700	28,300	26,500	27,100	25,300	25,900	23,900	24,700	22,500
	Lbs. H20/hr.	31.5	29.5	30.7	28.9	29.8	28.1	28.7	27.1	27.6	26.1	26.7	25.0	25.6	23.9	24.4	22.5	23.3	21.2
	Supply Air DB	51.3	67.4	51.8	69.2	52.2	70.8	52.7	72.8	53.1	74.7	53.6	76.6	54.0	78.6	54.4	80.6	54.8	82.6
	Supply Air WB	50.6	55.2	51.1	56.2	51.5	57.1	51.9	58.1	52.3	59.1	52.8	60.1	53.2	61.2	53.5	62.2	53.9	63.3
	Suction PSIG[4]	124	115	125	117	126	118	127	119	129	121	130	122	131	123	132	125	133	126
	Discharge PSIG[4]	307	309	327	322	349	335	371	350	395	365	420	381	445	398	472	416	500	434
75/66.7 (65% RH)	Total Cooling Btuh	84,500	44,800	82,600	41,400	80,700	38,100	78,600	34,100	76,600	30,200	74,500	26,200	72,500	22,000	70,400	17,700	68,300	13,300
	Sensible Btuh	46,300	9,600	45,300	6,900	44,400	4,400	43,400	1,400	42,400	(1,400)	41,500	(4,300)	40,600	(7,200)	39,700	(10,100)	38,900	(13,200)
	S/T	0.548	0.21	0.548	0.17	0.550	0.12	0.552	0.04	0.554	0	0.557	0	0.560	0	0.564	0	0.570	0
	Latent Btuh	38,200	35,200	37,300	34,500	36,300	33,700	35,200	32,700	34,200	31,600	33,000	30,500	31,900	29,200	30,700	27,800	29,400	26,500
	Lbs. H20/hr.	36.0	33.2	35.2	32.5	34.2	31.8	33.2	30.8	32.3	29.8	31.1	28.8	30.1	27.5	29.0	26.2	27.7	25.0
	Supply Air DB	52.7	68.6	53.2	70.4	53.6	72.0	54.1	74.0	54.5	75.9	55.0	77.8	55.4	79.8	55.8	81.8	56.2	83.9
	Supply Air WB	52.1	56.3	52.5	57.3	53.0	58.2	53.4	59.2	53.8	60.2	54.2	61.2	54.6	62.2	55.0	63.3	55.4	64.3
	Suction PSIG[4]	127	118	128	120	129	121	131	122	132	123	133	125	134	126	135	128	136	129
	Discharge PSIG[4]	310	314	331	327	352	340	375	355	398	370	423	386	448	403	475	421	503	439
75/68 (70% RH)	Total Cooling Btuh	86,400	47,000	84,400	43,500	82,600	40,200	80,400	36,200	78,400	32,300	76,400	28,300	74,300	24,200	72,200	19,900	70,100	15,400
	Sensible Btuh	43,400	7,800	42,400	5,100	41,500	2,500	40,400	(400)	39,500	(3,200)	38,600	(6,100)	37,700	(9,000)	36,800	(12,000)	36,000	(15,000)
	S/T	0.502	0.166	0.502	0.117	0.502	0.062	0.502	0	0.504	0	0.505	0	0.507	0	0.510	0	0.514	0
	Latent Btuh	43,000	39,200	42,000	38,400	41,100	37,700	40,000	36,600	38,900	35,500	37,800	34,400	36,600	33,200	35,400	31,900	34,100	30,400
	Lbs. H20/hr.	40.6	37.0	39.6	36.2	38.8	35.6	37.7	34.5	36.7	33.5	35.7	32.5	34.5	31.3	33.4	30.1	32.2	28.7
	Supply Air DB	54.2	69.8	54.6	71.6	55.1	73.3	55.5	75.3	56.0	77.2	56.4	79.1	56.8	81.0	57.2	83.0	57.6	85.1
	Supply Air WB	53.6	57.4	54.0	58.4	54.5	59.2	54.9	60.3	55.3	61.3	55.7	62.3	56.1	63.3	56.5	64.4	56.9	65.4
	Suction PSIG[4]	130	121	131	123	132	124	134	125	135	126	136	128	137	129	138	131	140	132
	Discharge PSIG[4]	313	319	334	332	355	344	378	360	401	375	426	391	452	408	478	425	506	444
80/68.3 (55% RH)	Total Cooling Btuh	86,500	46,800	84,600	43,300	82,700	40,000	80,600	36,000	78,600	32,100	76,500	28,100	74,500	23,900	72,400	19,600	70,300	15,200
	Sensible Btuh	53,200	14,300	52,200	11,700	51,300	9,100	50,300	6,200	49,300	3,300	48,400	500	47,500	(2,400)	46,700	(5,400)	45,800	(8,400)
	S/T	0.615	0.31	0.617	0.27	0.620	0.23	0.624	0.17	0.627	0.10	0.633	0.02	0.638	0	0.645	0	0.651	0
	Latent Btuh	33,300	32,500	32,400	31,600	31,400	30,900	30,300	29,800	29,300	28,800	28,100	27,600	27,000	26,300	25,700	25,000	24,500	23,600
	Lbs. H20/hr.	31.4	30.7	30.6	29.8	29.6	29.2	28.6	28.1	27.6	27.2	26.5	26.0	25.5	24.8	24.2	23.6	23.1	22.3
	Supply Air DB	54.3	70.4	54.8	72.2	55.3	73.8	55.7	75.8	56.2	77.7	56.6	79.6	57.0	81.6	57.4	83.6	57.8	85.6
	Supply Air WB	53.5	57.6	54.0	58.6	54.4	59.5	54.8	60.5	55.3	61.5	55.7	62.5	56.1	63.6	56.5	64.6	56.8	65.6
	Suction PSIG[4]	131	122	132	123	133	124	135	126	136	127	137	128	138	130	139	131	140	133
	Discharge PSIG[4]	314	321	334	334	356	346	378	362	402	377	426	393	452	410	479	427	507	446

[1] Values listed are with ventilation package disabled
[2] Return air temperature °F @ Default airflow (1900 CFM) for AC tests and Balanced Climate airflow (1330 CFM) for dehumidification tests
[3] Below 50°F, unit requires a factory or field installed low ambient control.
[4] Suction pressure +/- 4 psi, Discharge pressure +/- 10 psi

AIR CONDITIONING MODE
CIRCUIT DIAGRAM



DEHUMIDIFICATION MODE
CIRCUIT DIAGRAM

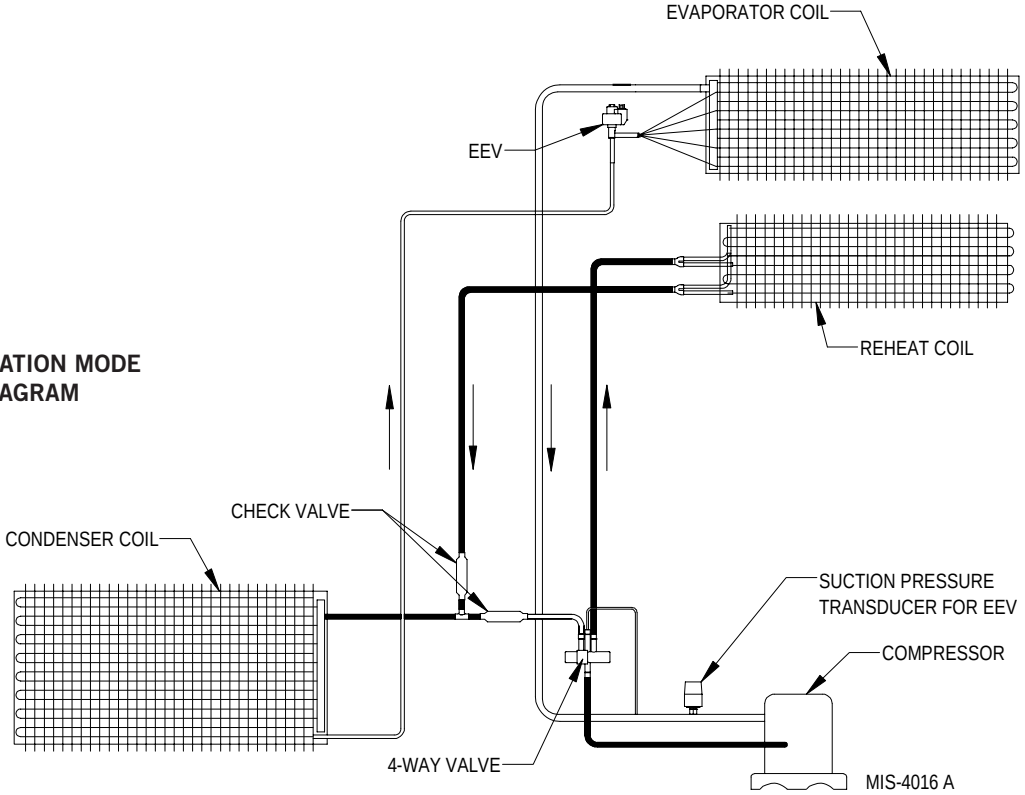


TABLE 2
Electrical Specifications

Model	Rated Volts & Phase	No. Field Power Circuits	Single Circuit				Dual 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
W42ACMA00,A0Z	230/208-1	1	31	40	8	10								
A05		1	31	40	8	10								
A10		1	57	60	6	10								
W42ACMB00,B0Z	230/208-3	1	23	35	8	10								
B09		1	33	35	8	10								
B18		1	60	60	6	10								
W42ACMC00,C0Z	460-3	1	13	15	14	14								
C09		1	18	20	12	12								
W48ACMA00,A0Z	230/208-1	1	34	50	8	10								
A05		1	34	50	8	10								
A10		1	59	60	6	10								
W48ACMB00,B0Z	230/208-3	1	25	40	8	10								
B09		1	34	40	8	10								
B18		1	60	60	6	10								
W48ACMC00,C0Z	460-3	1	12	15	14	14								
C09		1	17	20	10	10								
W60ACMA00,A0Z	230/208-1	1	41	50	8	10								
A05		1	41	50	8	10								
A10		1	59	60	6	10								
W60ACMB00,B0Z	230/208-3	1	28	40	8	10								
B09		1	35	40	8	10								
B15		1	53	60	6	10								
W60ACMC00,C0Z	460-3	1	15	20	12	12								
C09		1	18	20	12	12								
W72ACMA00,A0Z	230/208-1	1	56	60	6	10								
A05		1	56	60	6	10								
A10		1	60	70	6	10								
A15		1 or 2	86	90	3	8	59	26	60	30	6	10	10	10
W72ACMB00,B0Z	230/208-3	1	38	50	8	10								
B06		1	38	50	8	10								
B09		1	38	50	8	10								
B15		1	54	60	6	10								
W72ACMC00,C0Z	460-3	1	19	25	10	10								
C09		1	19	25	10	10								
C15		1	27	30	10	10								

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing. ***CAUTION:*** *When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.*

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

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

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

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

Bard®
SINCE 1914
Climate Control Solutions

Limited Warranty

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

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

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

What This Warranty Does Not Cover: (Also see Duration of Warranty on reverse side.)
This warranty does not cover defects or damage caused by:

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

Your Responsibilities:
You are responsible for

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

What Bard Will Do About A Defect:
Bard will either repair or replace the defective part only. Replacement parts may be reconditioned parts. The warranty for the repaired or replaced part will last only for the remainder of the warranty period for the original part.

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

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

What You Must Do

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

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

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

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

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

Model Number Series:	— Number of Years from Installation Date ① —			
	Compressor ④	Sealed System Components ②④⑤	All Other Functional Parts ③	Heat Exchangers
AIR CONDITIONERS W12A, W18A, W24A, W30A, W36A, W42A, W48A, W60A, W72A, W090A, W120A, W150, W180A, W18L, W24L, W30L, W36L, W3SA, W4SA, W5SA, Q36A, Q42A, Q48A, I30A, I36A, I42A, I48A, I60A	5	5	5	N/A
AIR SOURCE HEAT PUMPS W18H, W24H, W30H, W36H, W42H, W48H, W60H, C24H, C30H, C36H, C42H, C48H, C60H, T24H, T30H, T36H, T42H, T48H, T60H, T24S, T30S, T36S, T42S, T48S, T60S, Q24H, Q30H, Q36H, Q43H, Q48H, I30H, I36H, I42H, I48H, I60H, I36Z, I48Z, I60Z	5	5	5	N/A
ENVIRONMENTAL CONTROL UNITS W6RV, W6LV	5	5	1	N/A
AGRICULTURAL UNITS A36C and all HVAC equipment used in this application.	5	5	1	N/A
EQUIPMENT SHELTER UNITS MULTI-TEC, MEGA-TEC, FUSION-TEC, and all HVAC equipment used in this application.	5	5	1	N/A
GEOTHERMAL/WATER SOURCE HEAT PUMPS QW2S, QW3S, QW4S, QW5S, QC50 (No Compressor)	5	5	5	N/A
GAS/ELECTRIC WALL-MOUNT W24G, W30G, W36G, W42G, W48G, W60G, WG3S, WG4S, WG5S	5	5	5	10
ACCESSORIES Factory/Field Installed Bard Ventilation and Heater Packages, Bard branded Thermostats/ Temperature Controllers, UV-C LED Light Kits, LC6000, LV1000, MC4002, DC3003, TEC40, BG1000, PGD, PGDX, MC5300, MC5600, Humidistats, C02 Controllers, add-on controller/thermostat cards and all other field-installed accessories not listed separately	N/A N/A N/A N/A	N/A N/A N/A N/A	5 5 1 1	N/A N/A N/A N/A

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

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

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

④ All OTR (over the road) applications that are moved from one location to another:
Factory Warranty applies up to the point of initial start-up and test at all OEM manufacturing locations or subsequent outfitting facility. Once it goes into OTR service, the warranty expires immediately for compressor and sealed system components. This OTR exemption does not apply to relocatable classrooms, construction, or office trailers.

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

Internet Resources

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

Literature Assembly
911-0813-2
BOOK 2 OF 2

Contains the following:

2100-725(G)	Wall-Mount PKG A/C Manual
2100-726(F)	Multi-Tec A/C Install Instruct
2100-727	Multi-Tec Quick Start Guide

SERVICE INSTRUCTIONS

MULTI-TEC®
Wall-Mount Air Conditioner

Models:

W42ACE*	W60ACE*
W42ACM*	W60ACM*
W42ACP*	W60ACP*
W48ACE*	W72ACE*
W48ACM*	W72ACM*
W48ACP*	W72ACP*

NOTE: LC6000 controller is required for operation when multiple MULTI-TEC wall-mount air conditioners are used.

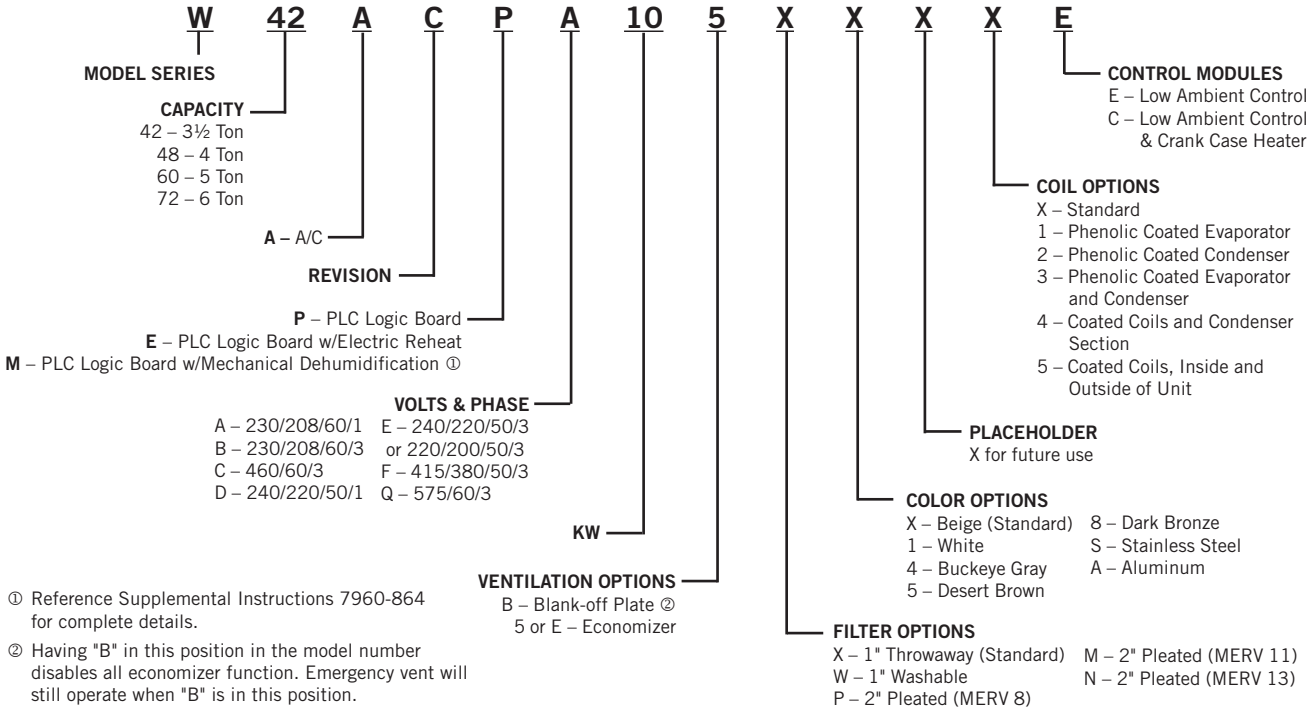
Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2100-725G
Supersedes: 2100-725F
Date: 10-3-23

CONTENTS

Figures and Tables

FIGURE 1
MULTI-TEC W42-72AC Wall-Mount Unit Model Nomenclature



① Reference Supplemental Instructions 7960-864 for complete details.

② Having "B" in this position in the model number disables all economizer function. Emergency vent will still operate when "B" is in this position.

GENERAL INFORMATION

Air Conditioning System

The 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 Bard 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. If more than one wall-mount unit is installed, the LC6000 controller must be matched with the air conditioning units. The wall mounts 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.*

Wall-Mount Air Conditioner Units

The MULTI-TEC units are designed to supply full 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. In the event that free Cooling operation cannot satisfy the load requirements, mechanical cooling will be utilized to assist in cooling the shelter.

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

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 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.

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

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

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

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.

⚠ WARNING

Fire hazard.

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

FIGURE 2
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 Hand-Held Service Tool

The TEC-EYE service tool is used to communicate with the MULTI-TEC unit logic board. By connecting directly to the logic board inside the unit control panel, it is possible to perform diagnostics on the unit, adjust certain settings and verify unit and economizer operation through a self test procedure. **The TEC-EYE service tool is required for unit setup and operation.** The TEC-EYE is supplied with the LC6000 controller but can also be ordered separately (Bard P/N 8301-059).

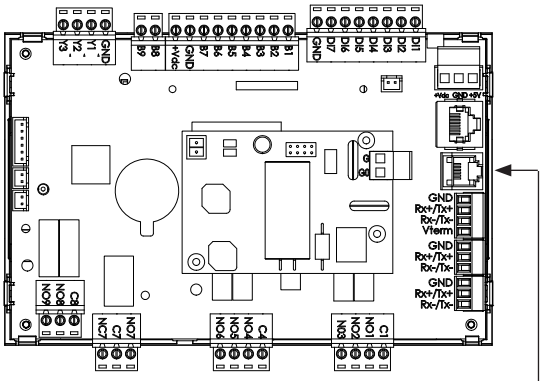
The menu driven interface provides users the ability to scroll through two menu levels: Quick Menu and Main Menu. The menus permit the user to easily view, control and configure the unit.

The controller is completely programmed at the factory; the default setpoints and their ranges are easily viewed and adjusted from the TEC-EYE display. The program and operating parameters are permanently stored on FLASH-MEMORY in case of power failure.

The TEC-EYE connects to the wall-mount unit control board via an RJ11 modular connector as shown in Figure 3.

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 3
TEC-EYE Connection to Unit Control



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

TABLE 1
LC6000/TEC-EYE Passwords (Defaults)

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

TEC-EYE Screen Structure and Password Level

Quick Menu
- Setpoints (Stand Alone Temperature Control)
- Information
- Alarm Log

Main Menu
- **A** System Config: A1-A11 User (2000)
- **B** Adv Sys Config: B1-B5 Technician (1313)
- **C** I-O Config: C1-C9 Technician (1313)
- **D** On/Off: User (2000)
- **E** Alarm Logs: User (2000)
- **F** Settings
  - Date/Time: Technician (1313)
  - Language: User (2000)
  - Initialization
    - Clear Logs: User (2000)
    - System Default: Engineer (9254)
    - Alarm Export: User (2000)
    - 7 Day I/O Log: User (2000)
- **G** Logout

In addition to the menu structure above, there are also Status and Alarm screens.

TEC-EYE Acronyms

MAT – Mixed air temperature
RAT – Return air temperature
OAT – Outdoor air temperature
OAH – Outdoor air humidity
Blower – Indoor Blower Status
Damper – Free cooling damper position status
C1 – Compressor activate status
H1 – Heater Stage 1 status
H2 – Heater Stage 2 status
ODP – Calculated outdoor dew point
FC – Free cooling status
RN – Component run time in minutes in last hour
ST – Number of start requests in last hour

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 button repeatedly.

The wall-mount unit address is displayed in the upper right corner on the Status screen (see Figure 2). The Status screen also shows the current date, time, return air temperature, mixed air temperature, outdoor air temperature, outdoor humidity and outdoor dewpoint conditions. Blower, damper and unit status are also displayed. See Table 2 for MULTI-TEC wall-mount unit status messages.

TABLE 2
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** on page 14.
Self Test	Self 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.

The Quick Menu is displayed in the bottom right corner of the status screen (see Figure 2 on page 6). Alarm Log, Unit Information and Setpoints are available through the Quick Menu. Pressing the UP or DOWN keys while on the Status screen will change the Quick Menu icon displayed (see Figure 4). Press the ENTER key when the desired icon is displayed.

FIGURE 4
Quick Menu Icons

Quick Menu

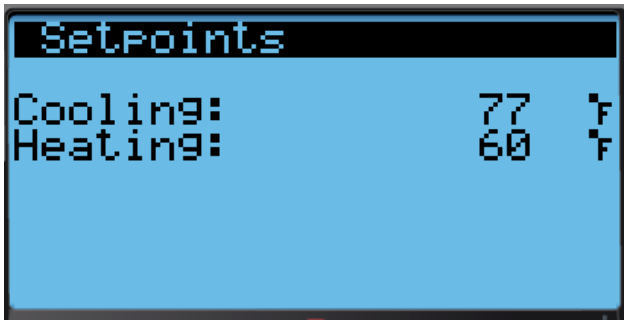
Setpoints

If at any time the unit(s) loses communication with the LC6000 controller, the unit(s) will go to orphan mode. The setpoints are synced with the LC6000 when communication is established. The unit will save and control to these values until communication is re-established.

To change the cooling and heating setpoints:

1. From the Status screen, press UP or DOWN key until Quick Menu displays Setpoints icon. Press ENTER key.
2. Press ENTER key to scroll to the selected choice (see Figure 5).
3. Press UP or DOWN key on desired value until value displays correctly.
4. Press ENTER key to submit value and move to next parameter.
5. Press ESCAPE key until Main Menu screen is displayed.

FIGURE 5
Cooling and Heating Setpoints



Information

These screens show unit run hours, averages and software version information (see Figures 6, 7 and 8).

FIGURE 6
Last 24 Hour Tracking

FIGURE 7
Last 24 Hour Tracking

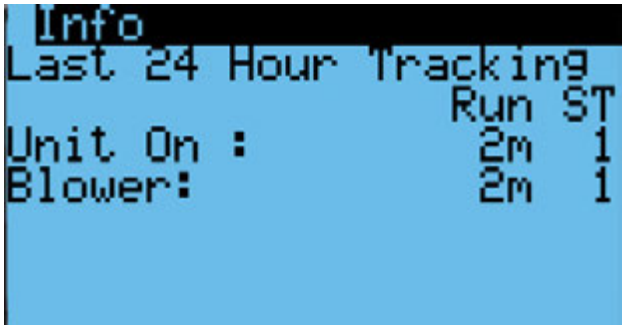
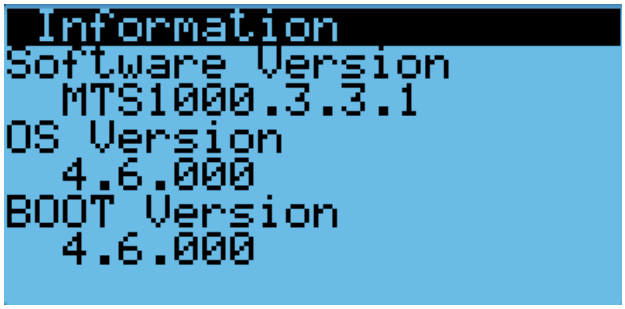


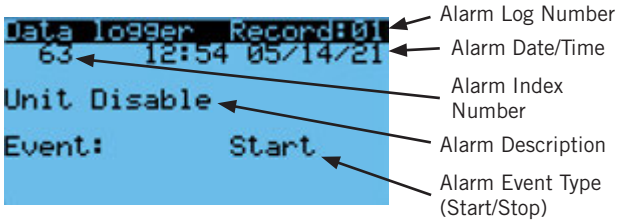
FIGURE 8
Software Version Information



Alarm Log

The alarm log screens show a log of each alarm (see Figure 9. There will be a log for when alarm occurred and if the alarm auto clears, it will show when the alarm cleared. See page 11 for instructions on clearing the alarm logs.

FIGURE 9
Alarm Log Screen Breakdown



Addressing Wall-Mount Units

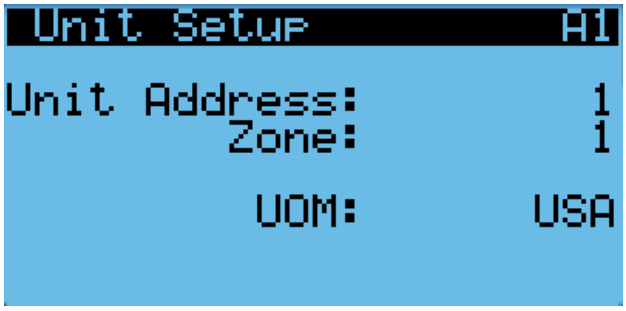
Each unit must have a unique address for the system to operate correctly with the LC controller (*Ex: 1, 2, 3, ...14 depending on the number of units*). The wall-mount unit address is displayed in the upper right corner on the Status screen on the TEC-EYE display (see Figure 2 on page 6).

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 10).
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 10
Unit Configuration



Setting Unit Zone

To assign zones:

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 10).
5. Press UP or DOWN keys to change value to desired zone.

Additional Features

Software Versioning Guide

MTS1000.X.Y.Z

Software Name: The name of the software is the base part number used to identify which product the software is used in.

TABLE 3
Software Versioning Guide

Product	Software Name
MULTI-TEC	MTS1000
FUSION-TEC (WR)	WTS1000
MEGA-TEC	MGS1000
LC6000	LCS6000

X The letter X represents a major change to the software effecting product compatibility or function of the equipment.

Y The letter Y represents a minor change to the software that either adds, removes, or alters a feature of the equipment without effecting compatibility with other products.

Z The letter Z represents a change to the software that fixes existing features or user interface.

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/

Model/Serial Number Retain

Model numbers and serial numbers will be retained through most software updates. It still remains good practice to verify the software version, model numbers and serial numbers of any wall-mount unit after a software update, as some functionality of the MULTI-TEC wall-mount unit require a specific model number.

Model Number Verification

The MULTI-TEC software will check the entered model number against available unit sizes/configurations. If there is an issue with model configuration, the unit will display Invalid Model # as the Unit Status and an alarm will turn off the unit to prevent damage to the unit.

Time/Date/Timezone Sync

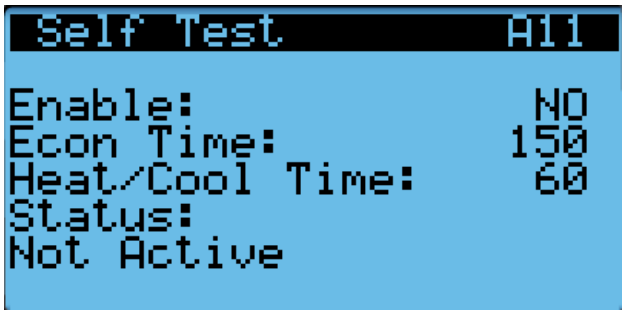
On MULTI-TEC wall-mount unit models with a software version number MTS1000.2.0.0 and higher, when the wall-mount unit is connected and correctly addressed to a LC6000 supervisory controller, local time, date, and timezone information will be synced from the LC6000. This feature allows for faster set-up and correct correlation between alarm logs.

Executing a Self Test

Execute a self test on each unit to verify the equipment is functioning correctly.

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 **Self Test (A11)** screen.
5. Press ENTER key to scroll to **Self Test Enable** parameter (see Figure 11).
6. Press UP or DOWN key to change value to ON. The self test will begin.

FIGURE 11
Executing Self 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 self 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. Self Test Stop

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

Changing Free Cooling Type

The comparative enthalpy free cooling setting can be changed to dry bulb free cooling using the TEC-EYE hand-held diagnostic tool.

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 screen with **Free Cooling Config** heading.
5. Press ENTER key to scroll to parameter type.
6. Press UP or DOWN keys to change to desired value.
7. Press ENTER key to save.
8. Press ESCAPE key until Main Menu screen is displayed.

Entering Model/Serial Number

To enter or change the model or serial number manually:

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 **Adv Sys Config**; press ENTER key.
4. Press UP or DOWN keys followed by ENTER key for each character in the serial number (see Figure 12). Once the serial number has been fully entered, the cursor will automatically cycle on to **Model Number**. Repeat the same process to enter the model number.

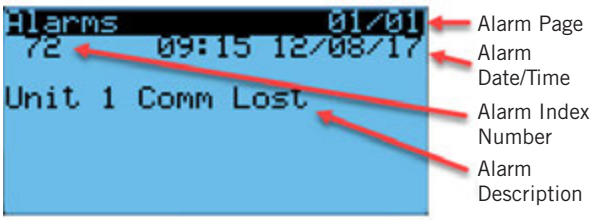
FIGURE 12
Entering Model/Serial Number

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

Acknowledging/Clearing Alarms

Alarm conditions activate a red LED indicator that backlights the ALARM function key. As an option, an alarm condition may also be enunciated by an audible alarm signal. An alarm is acknowledged by pressing the ALARM key. This calls up alarm display screen(s) that provide a text message detailing the alarm condition(s)—as shown in Figure 13.

FIGURE 13
Alarm Screen Breakdown



The MULTI-TEC wall-mount unit alarm index can be found on page 36.

Clearing Alarms

After an alarm condition has been corrected, the alarm can be cleared/reset.

To clear alarms, press the ALARM key and the UP or DOWN keys to scroll to the alarm reset screen (see Figure 14). Hold down the ALARM key for 3 seconds until the screen flashes. After the screen flashes, if all alarms are able to be cleared, the screen should read NO ALARMS. If there are still active alarms, the screen will show the first indexed alarm.

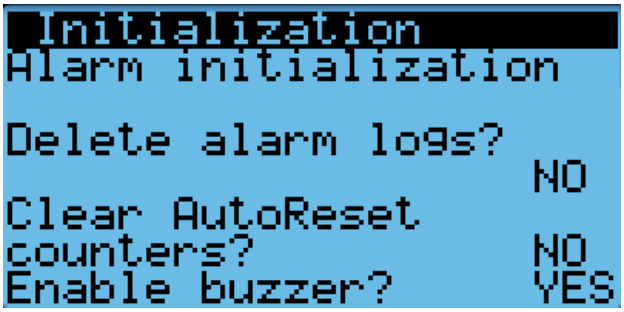
FIGURE 14
Clearing Alarms

Clearing Alarm Logs

To clear the alarm logs:

1. Press MENU key to go to the Main Menu screen.
2. Press 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**; press ENTER key.
6. Press ENTER key to scroll to **Delete alarm logs?** (see Figure 15).
7. Press UP or DOWN key to change from **NO** to **YES**.
8. Press ENTER key to clear all alarm logs.

FIGURE 15
Clearing Alarm Logs



Alarm Adjustment

Mixed Air Alarm

The mixed air alarm is used to indicate proper operation of the economizer. An alarm will be generated when the mixed air temperature is above or below two independent setpoints.

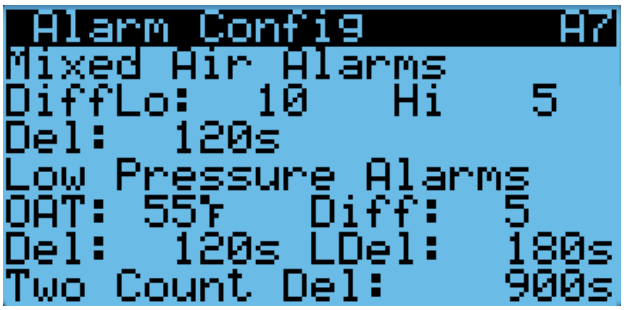
This alarm can be adjusted by changing the alarm setpoints and/or delay. The differential low references the economizer control setpoint. For example, if the economizer setpoint is 55°F (as shown in Figure 24 on page 17) and the differential is set to 10, the lower limit for the mixed air alarm would be 45°F. The high differential references the outdoor air temperature setpoint that enables the economizer. For example, if the outdoor air temperature setpoint for economizer enable is set to 65°F and the high alarm is set to 5, the alarm would actuate at 70°F. The alarm also has a delay to help reduce nuisance alarms. With the delay set to 120 seconds, either the high mixed air or low

mixed air alarm will need to be active for 120 seconds before an alarm will be generated.

To adjust these values:

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 **Alarm Config (A7)**; press ENTER key.
5. Press ENTER key to scroll to desired value **Diff Lo**, **Diff Hi** or **Del** (see Figure 16).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

FIGURE 16
Adjusting Mixed Air Alarm Values



Refrigerant Low Pressure

When the low pressure switch indicates a low pressure condition and there is an active call for cooling, the controller will generate an alarm (after a delay). The delay used by the low pressure alarm is determined by the outdoor air temperature (OAT on display). If the outdoor air temperature is below 55°F, the delay is 180 seconds (LDel on display). If the outdoor temperature is above 55°F, the delay is 120 seconds (Del on display). The unit will also have an address-based delay that will affect start up time; the default is 5 seconds multiplied by unit address. (The unit address-based delay is only when the unit is in orphan mode operation.) Additionally, if the outdoor temperature sensor is not used, the delay is set to 180 seconds. The controller will try to run the refrigeration system two times before the alarm will lock the compressor out.

If 15 minutes (Two Count Del value on display) passes before the second attempt, the number of tries will be reset.

To adjust these values:

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 **Alarm Config (A7)**; press ENTER key.
5. Press ENTER key to scroll to desired value **OAT**, **Diff**, **Del**, **LDel** or **Two Count Del** (see Figure 16).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

Refrigerant High Pressure

When the wall-mount unit receives a signal from the compressor control module (CCM) indicating a high pressure event, the wall-mount unit will generate an alarm. Upon receiving the alarm, the wall-mount unit will remove the “Y” call from the CCM, resetting the status of the CCM. The alarm will stay present on the wall-mount unit until manually cleared. This operation has no configurable parameters.

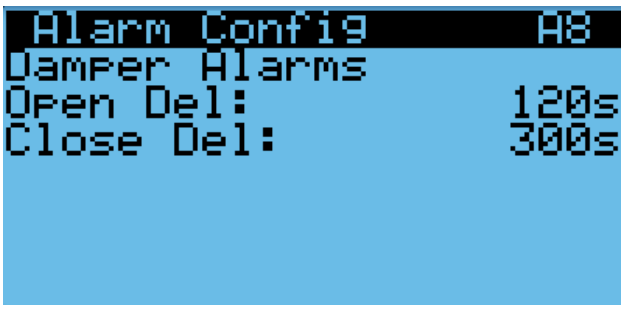
Economizer Damper

When the controller commands the economizer damper actuator to a position other than 0% and the damper switch indicates the damper is not open, after a delay of 120 seconds (Open Del on display) the controller will generate a damper failed to open alarm. When the controller commands the economizer damper actuator to the 0% position and the damper switch indicates the damper is not closed, after a delay of 300 seconds (Close Del on display) the controller will generate a damper failed to close alarm.

To adjust these values:

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 **Alarm Config (A8)**; press ENTER key.
5. Press ENTER key to scroll to desired value **Open Del** or **Close Del** (see Figure 17).

FIGURE 17
Adjusting Damper Alarm Values



6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

Freezestat

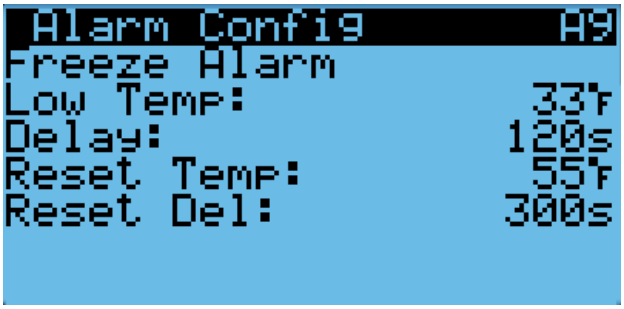
When the coil temperature is below 33°F, the unit will generate a Freeze alarm on the TEC-EYE and a Freeze Temp alarm on the LC6000. This will operate the blower and turn off the compressor.

The alarm will be automatically reset when the coil temperature rises above 55°F or after a 5-minute delay while the temperature is above 33°F.

To adjust freezestat values:

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 **Alarm Config (A9)**; press ENTER key.
5. Press ENTER key to scroll to desired value **Low Temp**, **Delay**, **Reset Temp** or **Reset Del** (see Figure 18).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

FIGURE 18
Adjusting Freeze Alarm Values



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

On/Off Control

The wall-mount unit can be turned on and off with the TEC-EYE. When the unit is set to ON, the system will heat and cool the space either in orphan mode or when connected to the LC. When the unit is set to OFF, the unit will not heat or cool the space.

To turn the unit on or off:

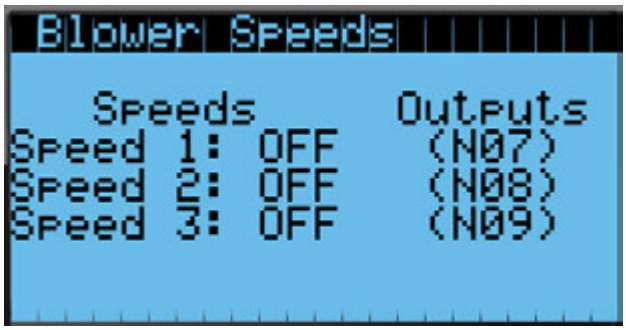
1. Press MENU key to go to the Main Menu screen.
2. Press UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **ON/OFF**; press ENTER key.
4. Press UP or DOWN key to change the system from OFF to ON or from ON to OFF.
5. Press ESCAPE key until Main Menu screen is displayed.

Blower Control

The blower will be in continuous operation in orphan mode. To operate the blower continuously while communicating with the LC6000 or PGD stand-alone display, refer to the latest version of the 2100-669 LC6000 Service Instructions manual or 2100-678 th-Tune manual.

The 11EER MULTI-TEC wall-mount unit is equipped with an ECM 5-speed blower. Three different speeds are used: Low for Balanced Climate, nominal for normal blower operation and high for high sensible (see Figure 19).

FIGURE 19
Blower Speeds



Blower Speed 1: Balanced Climate (NO7)

This blower speed is available when the unit is in passive dehumidification and there is a cooling or heating call.

Blower Speed 2: Nominal (N08)

This blower speed is available when the unit is in cooling, heating, orphan mode, freeze condition, free cool or continuous blower.

Blower Speed 3: High Sensible (N09)

This blower speed is available when the unit is in high sensible mode, which is selectable from the LC6000 controller, and cooling mode is active.

The Balanced Climate (blower speed 1) and high sensible (blower speed 3) are only available when connected to the LC6000 controller.

IMPORTANT: *If the unit model number does not have the letter C as the fifth character (Ex. W36ACP...), the blower will not run in orphan mode.*

Balanced Climate Mode

MULTI-TEC Series wall-mount units offer an enhanced latent capacity that can be controlled by an LC6000 controller. When passive dehumidification (Balanced Climate mode) is active on the LC6000 controller, the unit will increase the amount of moisture removed during compressor operation. When high sensible mode is enabled on the LC6000 controller, this mode increases the sensible cooling capacity to increase the amount of heat removed from the structure during compressor operation.

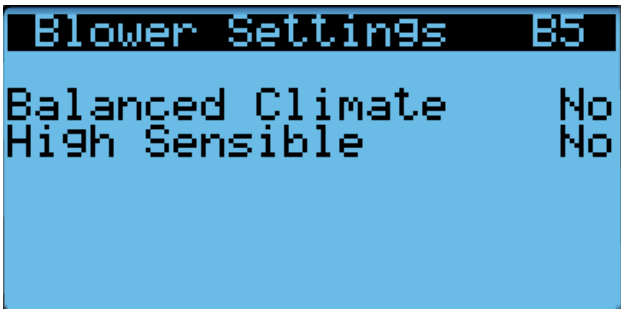
Balanced Climate Enable/Disable

When the MULTI-TEC is connected to an LC6000 controller, Balanced Climate mode can be enabled or disabled. Balanced Climate mode is disabled by default.

To enable or disable Balanced Climate mode:

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 **Adv Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Blower Settings (B5)**
5. Press UP or DOWN keys to scroll to **Balanced Climate** (see Figure 20).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

FIGURE 20
Balanced Climate Enable/Disable



Temperature Control

When the unit is connected to the LC controller, it will receive all of its heating, cooling and ventilation commands from the controller.

When the unit is in orphan mode, it will heat, cool and ventilate based on the return air temperature measurement. The return air temperature will be compared to the cooling setpoint. Based on differentials above and below the setpoint, the available cooling and heating stages will be utilized.

Cooling Sequence – Economizer Available
(see Figure 21)

If the return air temperature is higher than 79°F (Setpoint + Stage 1 Diff On) and outdoor conditions are acceptable for economizing, the unit will enable the economizer. If the return air temperature is higher than 80°F (Setpoint + Stage 2 Diff On), the unit will enable mechanical cooling stage 1. If the control value is higher than 81°F (Setpoint + Stage 3 Diff On), the unit will enable mechanical cooling stage 2.

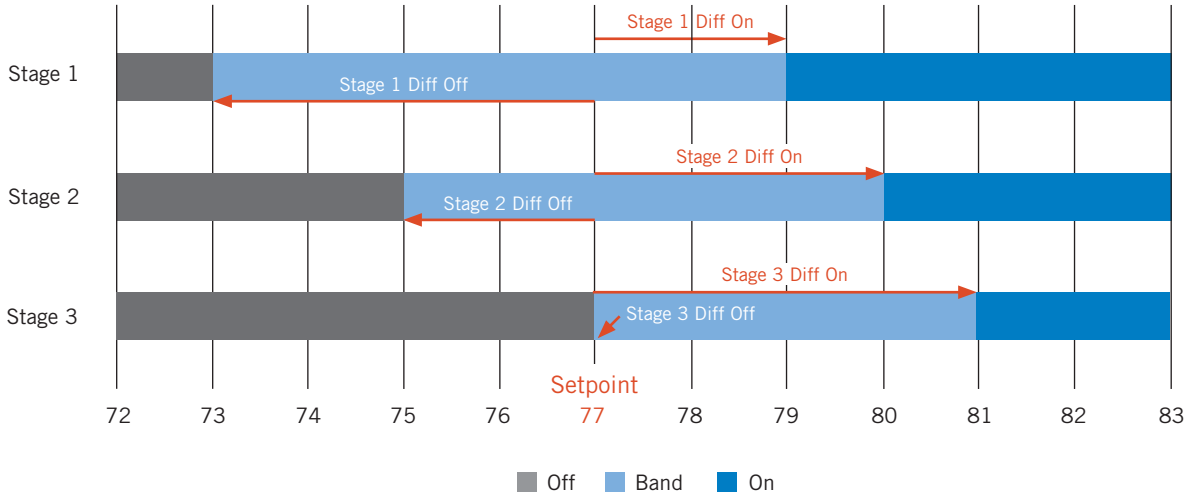
Cooling Sequence – Economizer Not Available
(see Figure 21)

If the return air temperature is higher than 79°F (Setpoint + Stage 1 Diff On), the unit will enable stage 1 mechanical cooling. If the return air temperature is higher than 80°F (Setpoint + Stage 2 Diff On), the unit will enable stage 2 mechanical cooling.

To adjust these parameters:

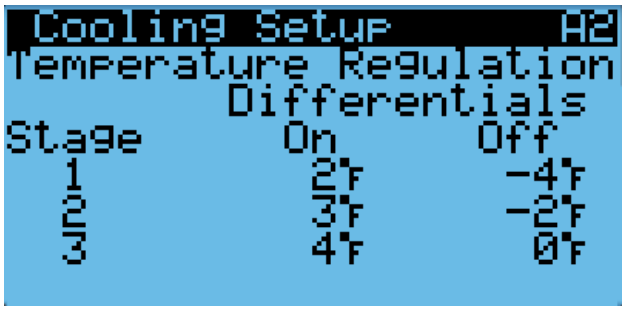
1. Press MENU key to go to the Main Menu screen.
2. Press UP or DOWN keys and ENTER key to enter USER password 2000.
3. Press UP or DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP or DOWN keys to scroll to **Cooling Setup (A2)**; press ENTER key.
5. Press ENTER key to scroll to **Stage 1 Diff On**, **Stage 1 Diff Off**, **Stage 2 Diff On**, **Stage 2 Diff Off**, **Stage 3 Diff On** or **Stage 3 Diff Off** (see Figure 22 on page 16).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

FIGURE 21
MULTI-TEC Wall-Mount Unit Cooling Staging



NOTE: *Stages available are based on unit configuration. Example: If the unit has a single stage compressor with a blank-off plate (no economizer), there will be only one stage available for cooling. If there is a two stage compressor with an economizer, it will operate all three stages when free cooling is available, or two stages when free cooling is not available.*

FIGURE 22
Adjusting Cooling Differential Values



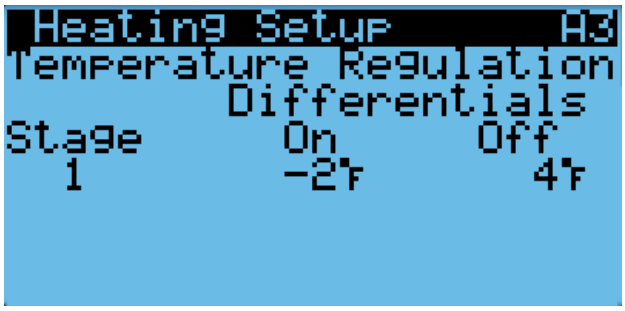
Heating Sequence *(see Figure 24)*

If the return air temperature is below 58°F (Setpoint + Stage 1 Diff On), the unit will enable electric heat stage 1. If the return air temperature is below 57°F (Setpoint + Stage 2 Diff On), the unit will enable electric heat stage 2. If the control value is below 56°F (Setpoint + Stage 3 Diff On), the unit will enable electric heat stage 3.

To adjust these parameters:

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 **Heating Setup (A3)**; press ENTER key.
5. Press ENTER key to scroll to **Stage 1 Diff On**, **Stage 1 Diff Off**, **Stage 2 Diff On**, **Stage 2 Diff Off**, **Stage 3 Diff On** or **Stage 3 Diff Off** (see Figure 23).
6. Press UP or DOWN keys to adjust value.
7. Press ENTER key to save.

FIGURE 23
Adjusting Heating Differential Values



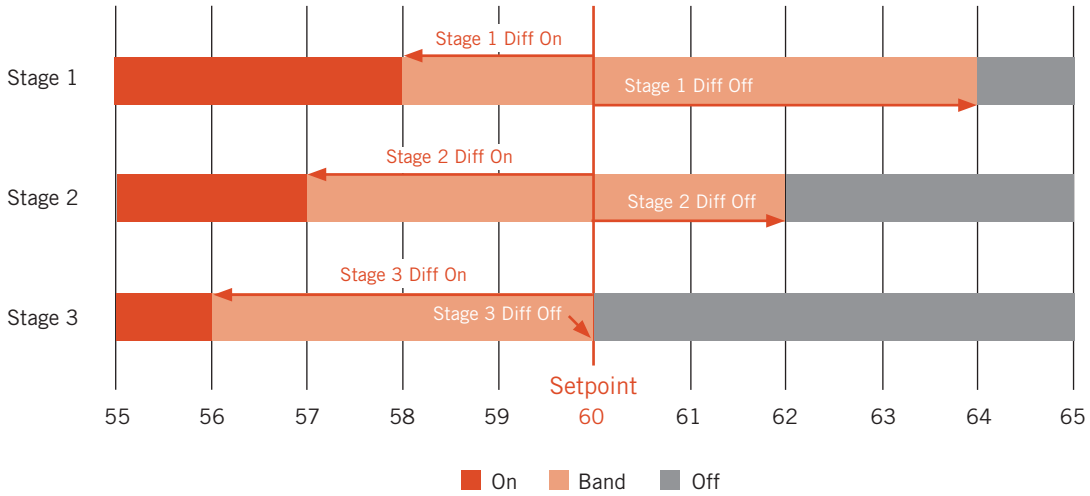
Free Cooling

If the unit is equipped with an economizer, and conditions are acceptable for economizer operation, the MULTI-TEC wall-mount unit will utilize free cooling operation before the use of any cooling operation requiring compressor operation to reduce the energy required to cool the indoor space.

Economizer Disable

There are two methods to disable the economizer if the use of free cooling is restricted. The first method is to select None as the economizer type within the **Sys Config** menu. The second method requires changing the model number within the **Adv Sys Config** menu to reflect a model installed with a blank-off plate (see model nomenclature in Figure 1 on page 3). Changing the wall-mount unit model number to reflect a unit with a blank-off plate will not allow for an economizer type

FIGURE 24
MULTI-TEC Wall-Mount Unit Heating Staging



NOTE: *Stages available are based on unit configuration. Example: If only a single stage of heat is present, only a single stage of heat will be considered for heating operation.*

to be selected therefore defaulting to a disabled state, along with all sensors/alarms associated with it.

Economizer Enable

The economizer will be enabled for cooling operation if the model number reflects a wall-mount unit with an economizer installed, an economizer type other than None and the conditions for the economizer type are met. The following list explains the economizer types and the parameters required for operation. See also Figures 25 and 26.

FIGURE 25
Economizer A4 Screen

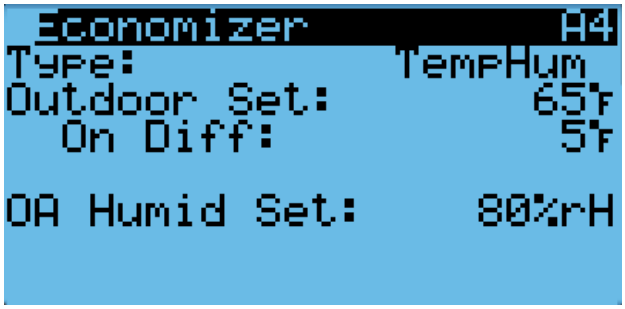
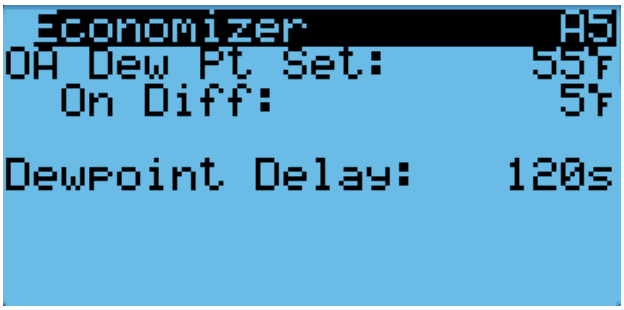


FIGURE 26
Economizer A5 Screen



None

Economizer will not be enabled for free cooling operation.

Drybulb Only

1. Outdoor air temperature is below the Outdoor Set outdoor temperature setpoint listed within the **Sys Config** menu. (Outdoor Set temperature setpoint is 70°F by default.)
2. LC6000 is not currently in any dehumidification mode.
3. LC6000 is not currently in any emergency mode.

Temperature and Humidity (Default)

1. Outdoor air temperature is below the Outdoor Set outdoor temperature setpoint listed within the **Sys Config** menu. (Outdoor Set temperature setpoint is 70°F by default.)
2. Outdoor relative humidity is below the OA Humid Set outdoor humidity setpoint listed within the **Sys. Config** menu. (OA Humid Set humidity setpoint is 80% RH by default.)
3. LC6000 is not currently in any dehumidification mode.
4. LC6000 is not currently in any emergency mode.

Enthalpy

1. Outdoor air temperature is below the Outdoor Set, outdoor temperature setpoint, listed within the **Sys Config** menu. (Outdoor Set temperature setpoint is 70°F by default.)
2. Outdoor relative humidity is below the OA Humid Set outdoor humidity setpoint listed within the **Sys. Config** menu. (OA Humid Set humidity setpoint is 80% RH by default.)
3. The outdoor air dewpoint is below the OA Dew Pt Set outdoor dewpoint setpoint, listed within the **Sys Config** menu. (OA Dew Pt Set dewpoint setpoint is 55°F by default.).
4. LC6000 is not currently in any dehumidification mode.
5. LC6000 is not currently in any emergency mode.

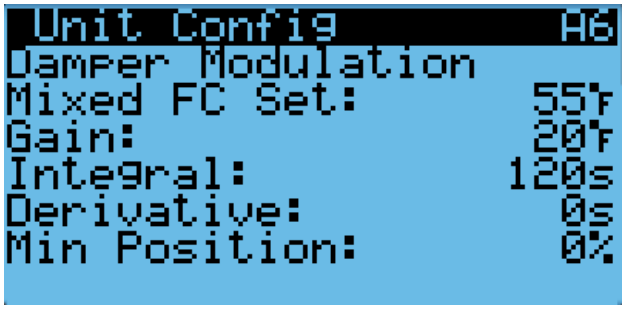
Economizer Modulation

The economizer damper output will modulate between 0% and 100% to maintain a 55°F mixed air temperature when the outdoor air conditions are acceptable.

To adjust damper modulation values:

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 **Unit Config (A6)**; press ENTER key.
5. Press ENTER key to scroll to **Mixed FC Set**, **Gain**, **Integral**, **Derivative** or **Min Position** (see Figure 27).

FIGURE 27
Adjusting Damper Modulation Values



6. Press UP or DOWN keys to adjust parameter value.
7. Press ENTER key to save.

Economizer Note

The economizer and mechanical cooling can operate simultaneously because the economizer uses the mixed air temperature sensor.

Emergency Cooling

When return air temperature rises above 95°F, the unit will enter emergency cooling mode and an alarm will be displayed (unit can also be commanded by LC6000 to enter emergency cooling mode). In emergency cooling mode, if the unit is equipped with an economizer (and the model does not indicate a blank off plate), the economizer operation will ignore current setpoints. If the return air temperature is above the outdoor air temperature, the economizer will open and the unit will enter optimized cooling. If at any point the return air temperature falls below the outdoor air temperature or the mixed air temperature falls below 65°F, the economizer will close. This is done in an effort to cool the space as quickly and efficiently as possible. This feature will be disabled by a model number indicating a blank off plate (model # position 10 set to 'B') which disables all economizer function.

Unit Disable

The wall-mount unit can be disabled by opening a dry set of contacts connected to Input DI1 on the PLC board. This feature can be used in addition to the emergency off feature provided by the LC6000 to ensure that the unit does not operate even when in orphan mode. This feature is disabled by default and must be enabled before the input will affect unit operation. When the input detects open contacts, all unit operation will stop and the dampers will close. This is an automatic reset feature that will resume operation as soon as the unit detects the contacts are closed again.

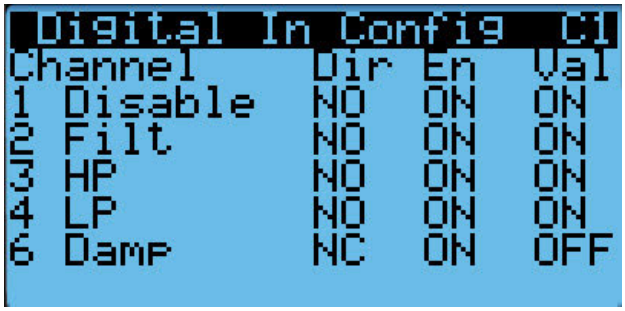
For applications that require the dampers to close rapidly, an additional relay should be installed that either breaks the 24VAC power supply to each actuator or breaks the low voltage power supply to all units. In normal operation, the dampers can take up to 2 minutes to close from fully open. When the 24VAC power is removed from the actuator, the dampers will close in under 30 seconds using the spring return on the actuator.

NOTE: *Alarm logging and trend logging will not be available if power is removed from the controller and unit offline alarms will be recorded on the LC6000.*

To make adjustments to the unit disable option:

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 **Digital In Config C1**; press ENTER key.
5. Press ENTER key to scroll to the variable in the table that intersects **Disable** and **Dir** (see Figure 28).
6. Press UP or DOWN keys to change the direction value from **NO** to **NC** or **NC** to **NO**.
7. Press ENTER key to scroll to the variable in the table that intersects **Disable** and **En**.
8. Press UP or DOWN keys to change the enable value from **On** to **Off** or **Off** to **On**; press ENTER key.
9. Press ESCAPE key several times to return to the main menu.

FIGURE 28
Making Adjustments to Unit Disable



Compressor

Enable

The compressor will be enabled when stage 1 is enabled and outdoor air conditions are not acceptable for economizing. If the outdoor conditions are acceptable, the compressor will run when stage 2 is enabled.

Delays and Run Time

The compressor will have a minimum run time of 180 seconds and a minimum off time of 120 seconds. If the compressor is two stage, the second stage will have a minimum delay of 120 seconds. The 2nd stage will also have a minimum on time of 120 seconds. When communicating with the LC, the delay between compressors in units installed on the same shelter will be managed by the settings configured in the LC.

Dehumidification

Dehumidification Modes

Dehumidification Off

When the humidity level inside a zone falls to the Dehumidification Off setpoint, the system will stop attempting to dehumidify the space. The default setpoint value for this mode is 60% RH.

Passive Dehumidification

When the humidity level rises to the Passive Dehumidification setpoint, the controller will activate staged dehumidification at the available wall units. As the humidity level rises to the passive dehumidification setpoint, the free cooling function (economizer) is disabled. When there is a call for cooling, the compressor will energize and the blower speed will be reduced to the unit dehumidification mode or Balanced Climate speed whichever is applicable to the unit. All units allowed to run within the zone will be given the dehumidification command and will operate as such on a call for cooling. The default setpoint value for passive dehumidification is 70% RH.

Active Dehumidification

When the humidity level rises to the Active Dehumidification setpoint, the supervisory controller will active staged dehumidification at the available wall units. The supervisory controller will then calculate the dehumidification demand based on how far above the setpoint and how long the RH level has been above the setpoint. The controller will then utilize all of the units with active dehumidification capabilities to reduce the indoor humidity level. The units will be staged on based on the existing cooling rotation for the units in the zone up to the maximum number of units allowed to run. When in demand minimum compressor run time is applicable, examples of demand are as follows:

With two units with dehumidification capabilities, Unit 1 in rotation will come on at 50% demand and Unit 2 in rotation will come on at 100% demand. They will rotate off in a reverse; Unit 2 will be off at 50% demand and Unit 1 will be off at the dehumidification off setpoint.

With three units with dehumidification capabilities, Unit 1 in rotation will come on at 33% demand, Unit 2 in rotation will come on at 67% demand and Unit 3 in rotation will come on at 100% demand. They will rotate off in reverse; Unit 3 will be off at 67% demand, Unit 2 will be off at 33% demand and Unit 1 will be off at dehumidification off setpoint.

An active dehumidification sequence will run until the space temperature falls to the heating setpoint or increases to the cooling setpoint, or the dehumidification off setpoint is reached. Refer to the specific unit manual for active dehumidification sequence and space temperature control.

The passive dehumidification setpoint must be lower than the active dehumidification setpoint to ensure the economizer is disabled during active dehumidification.

Availability for active dehumidification will be determined by model number. Units with electric reheat, mechanical dehumidification or cycling reheat will be considered. The active dehumidification default setpoint is 80% RH.

Electric Reheat Dehumidification

Electric reheat dehumidification is only available as a factory-installed option that must be ordered with the unit. It cannot be installed in the field on an existing unit.

Dehumidification will only become active if the unit is connected to the LC6000 and the appropriate conditions are present.

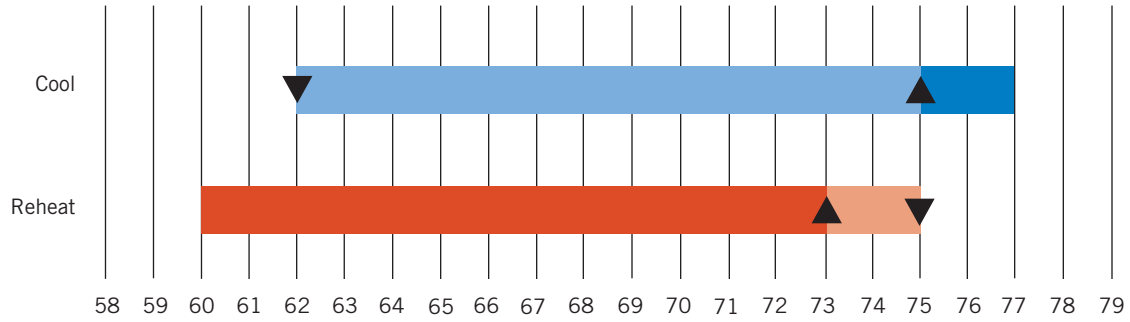
Electric Reheat Dehumidification Operation

When the wall-mount unit receives a dehumidification call from the LC6000, the wall-mount unit will disable the economizer to force the system to use air conditioning and prevent any additional humidity from being introduced from outdoor air. The wall-mount unit will then turn on the air conditioning system which will remove moisture and cool the space. At the same time, the electric reheat coil will be energized to extend the run time of the cooling cycle and prevent cool air from being introduced to the space.

On a call for electric reheat dehumidification, the unit return air sensor will control the compressor and heating element operation based on the supervisory control setpoints. If the space temperature, based on the sensor attached to the supervisory control, reaches the cooling or heating setpoint, the dehumidification call is overridden until the cooling or heating call is satisfied. If communication is lost with the supervisory controller during a dehumidification call, the electric reheat function at the unit is lost and the unit will operate in orphan mode.

During a call for electric reheat, the wall unit will energize the compressor and the electric reheat coil will be energized to extend the run time of the cooling cycle, mitigating the cooling done by the compressor. If/when the temperature falls to 2° above heating setpoint, the compressor will be disabled until the temperature is increased 2° below the cooling setpoint and then the compressor will be re-energized (see Figure 29 on page 20). If/when the temperature reaches 4° below the cooling setpoint, the electric heating elements will be energized. The electric heating elements will be disabled 2° below the cooling setpoint. The system will continue the dehumidification process until either the heating or cooling setpoint are reached again or the requirement for dehumidification is no longer present.

FIGURE 29
Dehumidification Control (°F)



A call for electric dehumidification is ignored if there is a call for emergency vent, emergency cool or emergency off.

For a more detailed operation description, see the 2100-669 LC6000 Service Instructions manual.

Mechanical Dehumidification

Mechanical dehumidification is only available as a factory-installed option that must be ordered with the unit. It cannot be installed in the field on an existing unit.

Dehumidification will only become active if the unit is connected to the LC6000 and the appropriate conditions are present.

Mechanical Dehumidification Operation

When the wall-mount unit receives a dehumidification call from the LC6000, the wall-mount unit will disable the economizer to force the system to use air conditioning and prevent any additional humidity from being introduced from outdoor air. The wall-mount unit will then turn on the air conditioning system which will remove moisture and cool the space. At the same time, the 3-way dehumidification valve will be opened to extend the run time of the cooling cycle and prevent cool air from being introduced to the space. The dehumidification sequence will run until the space temperature reaches the heating setpoint or cooling setpoint or the humidity setpoint is reached.

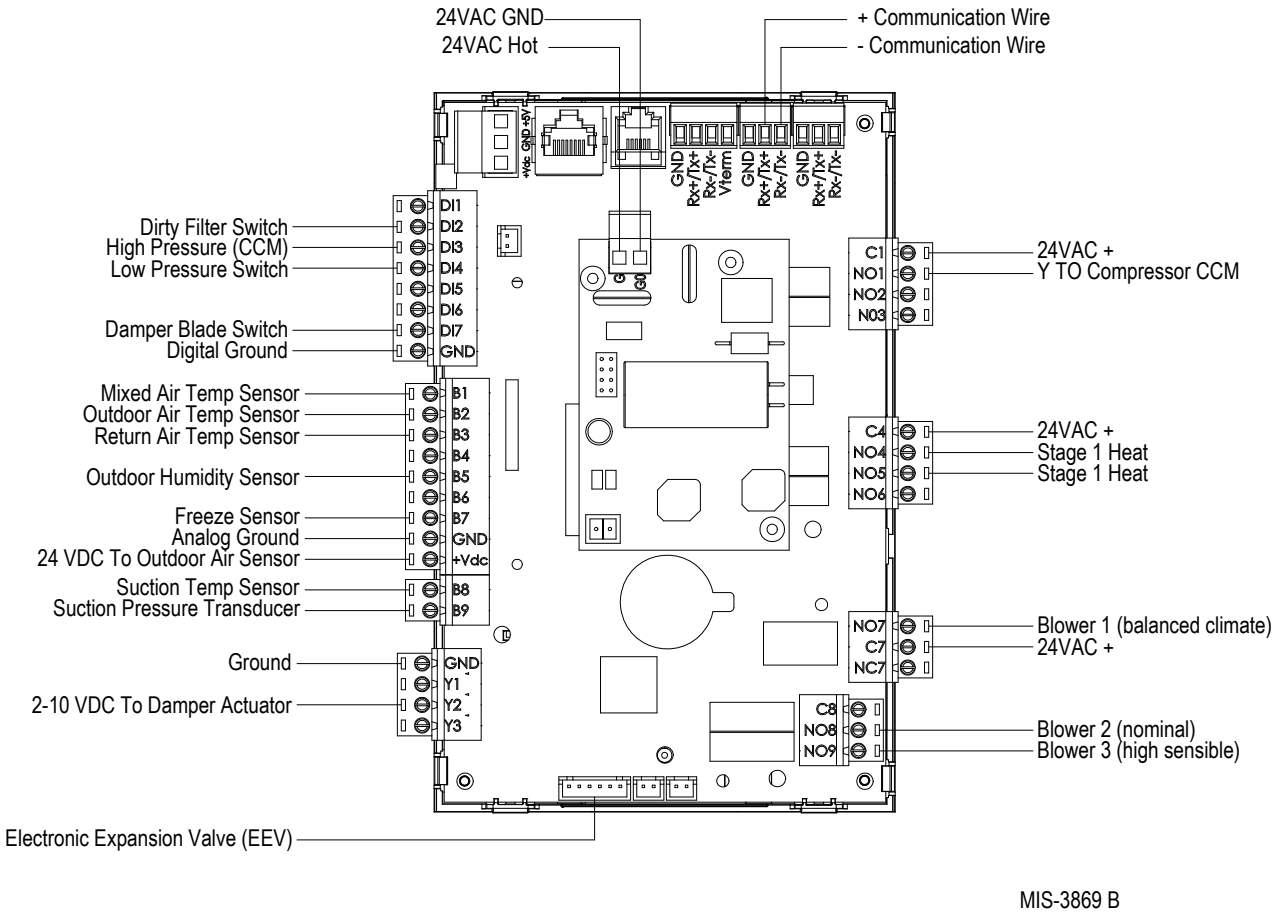
On a call for mechanical dehumidification, the unit return air sensor will control the compressor and dehumidification valve operation based on the supervisory control setpoints. If the space temperature, based on the sensor attached to the supervisory control, reaches the cooling or heating setpoint, the dehumidification call is overridden until the cooling or heating call is satisfied. Free cooling (economizer) is disabled during mechanical dehumidification. If communication is lost with the supervisory controller during a dehumidification call, the dehumidification function at the unit is lost and the unit will operate in orphan mode.

During a call for mechanical dehumidification, the wall unit will energize the compressor. The dehumidification valve will be energized, circuiting the hot gas to the reheat coil, mitigating the cooling and extending the run time. If/when the temperature rises to 2° below the cooling setpoint, the dehumidification valve will be de-energized. If/when the temperature falls to 2° above heating setpoint, the compressor will be disabled until the temperature is increased 2° below the cooling setpoint and then the compressor will be re-energized (see Figure 29). If/when the temperature reaches 4° below the cooling setpoint, the dehumidification valve will be energized until the space reaches 2° above the heating setpoint. At this point, the system will continue the dehumidification process until the cooling or heating setpoint is reached or the requirement for dehumidification is satisfied.

A call for mechanical dehumidification is ignored if there is a call for emergency vent, emergency cool or emergency off.

For a more detailed operation description, see the 2100-669 LC6000 Service Instructions manual.

FIGURE 30
Wall-Mount Unit Control Board



See Table 4 on page 22 for information on control board terminal functions.

TABLE 4
MULTI-TEC Wall-Mount Unit Control Board Terminals

Terminal	Function	Type	Form
Rx+/Tx+		Communication	
Rx-/Tx-		Communication	
DI1	Unit Disable	Digital	N/C
DI2	Dirty Filter Switch	Digital	N/C
DI3	High Pressure (CCM)	Digital	N/C
DI4	Low Pressure Switch	Digital	N/C
DI5	Not Used		
DI6	Damper Blade Switch	Digital	N/C
DI7	Not Used		
GND	Digital Ground		
B1	Mixed Air Temperature Sensor	Analog Input	10K Ohm Curve J
B2	Outdoor Air Temperature Sensor	Analog Input	10K Ohm Type
B3	Return Air Temperature Sensor	Analog Input	10K Ohm Curve J
B4	Not Used		
B5	Outdoor Humidity Sensor	Analog Input	
B6	Not Used		
B7	Freeze Temperature Sensor	Analog Input	10K Ohm Curve J
GND	Analog Ground		
+VDC	24VDC to Outdoor Air Sensor		
B8	Suction Temperature Sensor	Analog Input	10K Ohm Curve J
B9	Suction Pressure Sensor	Analog Input	
Y1	Not Used		
Y2	2-10VDC to Damper Actuator		
Y3	Not Used		
GND	Ground		
C1	24VAC+	Power	
NO1	Cool 1 Out	Relay Output	
NO2	Not Used		
NO3	Reheat Valve		
C4	24VAC+	Power	
NO4	Stage 1 Heating	Relay Output	
NO5	Stage 2 Heating	Relay Output	
NO6	Not Used		
NO7	Blower 1	Relay Output	
C7	24VAC+		
NC7	Not Used		
C8	Not Used		
NO8	Blower 2	Relay Output	
NO9	Blower 3	Relay Output	
GO	24VAC Ground		
G	24VAC Hot		

NOTICE

These units require R-410A refrigerant and polyol ester oil.

General

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

Topping Off System Charge

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

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

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

Safety Practices

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

Important Installer Note

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

R410-A 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 5 on page 24 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.

TABLE 5
MULTI-TEC Cooling Pressures

Air Temperature Entering Outdoor Coil °F

Model	Return Air Temp (DB/WB)	Pressure	75	80	85	90	95	100	105	110	115	120	125
W42AC	75/62	Low Side	123	125	128	130	132	135	137	138	140	142	144
		High Side	323	346	371	395	421	447	474	501	528	558	587
	80/67	Low Side	132	134	137	139	141	144	146	148	150	152	154
		High Side	331	355	380	405	432	458	486	514	542	572	602
	85/72	Low Side	137	139	142	144	146	149	151	153	155	157	159
		High Side	343	367	393	419	447	474	503	532	561	592	623
W48AC	75/62	Low Side	120	122	125	127	130	132	134	136	137	139	141
		High Side	330	353	377	402	428	454	482	510	540	570	601
	80/67	Low Side	128	131	134	136	139	141	143	145	147	149	151
		High Side	338	362	387	412	439	466	494	523	554	585	616
	85/72	Low Side	132	136	139	141	144	146	148	150	152	154	156
		High Side	350	375	401	426	454	482	511	541	573	605	638
W60C	75/62	Low Side	127	129	131	134	136	137	140	142	145	148	151
		High Side	344	362	380	401	421	444	467	492	518	545	573
	80/67	Low Side	136	138	140	143	145	147	150	152	155	158	161
		High Side	353	371	390	411	432	455	479	505	531	559	588
	85/72	Low Side	141	143	145	148	150	152	155	157	160	164	167
		High Side	365	384	404	425	447	471	496	523	550	579	609
W72C	75/62	Low Side	117	119	121	122	124	126	128	130	132	134	136
		High Side	332	353	376	402	427	454	483	512	542	574	607
	80/67	Low Side	125	127	129	131	133	135	137	139	141	143	145
		High Side	340	362	386	412	438	466	495	525	556	589	623
	85/72	Low Side	129	131	134	136	138	140	142	144	146	148	150
		High Side	352	375	400	426	453	482	512	543	575	610	645

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

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

NOTE: *Pressure table based on high speed condenser fan operation. If condensing pressures appear elevated check condenser fan wiring. See* **Condenser Fan Operation** *on page 25.*

⚠ WARNING

Electrical shock hazard.

Disconnect VAC power supply before servicing.

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

High Pressure Switch

All W**ACP* wall-mount air conditioner series models are supplied with a high pressure switch. The high pressure switch opens at 650 psi.

Three Phase Scroll Compressor Start Up Information

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

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

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

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

All three phase compressors are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction.

The direction of rotation of the compressor may be changed by reversing any two line connections to the unit.

Phase Monitor

Used only on 3-phase equipment, the phase monitor is a compressor protection device that will prohibit operation of the compressor if the device senses a possible reverse-rotation situation due to incorrect phasing. On a call for compressor (and only compressor), the device will check incoming phase, check for severe voltage imbalance and check for proper frequency. Under nominal conditions, a green LED light will show on the face of the monitor. If there is improper phasing, voltage imbalance or frequency deviation, the device will show a red LED light and prohibit compressor operation.

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.***

Condenser Fan Operation

NOTE: *On models equipped with a low ambient control (LAC), the condenser fan motor will have a delayed start until system refrigerant operating pressure builds up. After starting, the fan motor may or may not cycle depending upon ambient conditions. This is normal operation.*

The condenser fan motor on 230/208 volt, one and three phase, 60 HZ units is a two-speed motor that comes factory wired on high speed for peak performance. If ambient conditions permit, it can be reconnected to low speed (red wire) for lower sound level. See unit wiring diagram. (*This applies to W42, W48, W60 and W72 models only.*)

Low Ambient Control

Modulating head-pressure control that allows full speed at pressures above 315 psi. Below 315 psi, the control will slow fan speed—following internal head pressures—until a minimum RPM is reached (approx 300 RPM). Below this point, the control will shut the fan completely off until internal pressures rise. The control is preset from the factory, but should adjustment become necessary, there is an adjustment screw located on the bottom of the control behind a weatherproof cap. One full turn clockwise equals approximately +48 psi.

Compressor Control Module

The compressor control module (CCM) is standard on all models covered by this manual.

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 (see Figure 31). Once a compressor call is lost, the time period must expire before a new call will be initiated.

10% of this time is also considered on the delay-on-make timer (see **Delay-on-Make Timer**).

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, 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

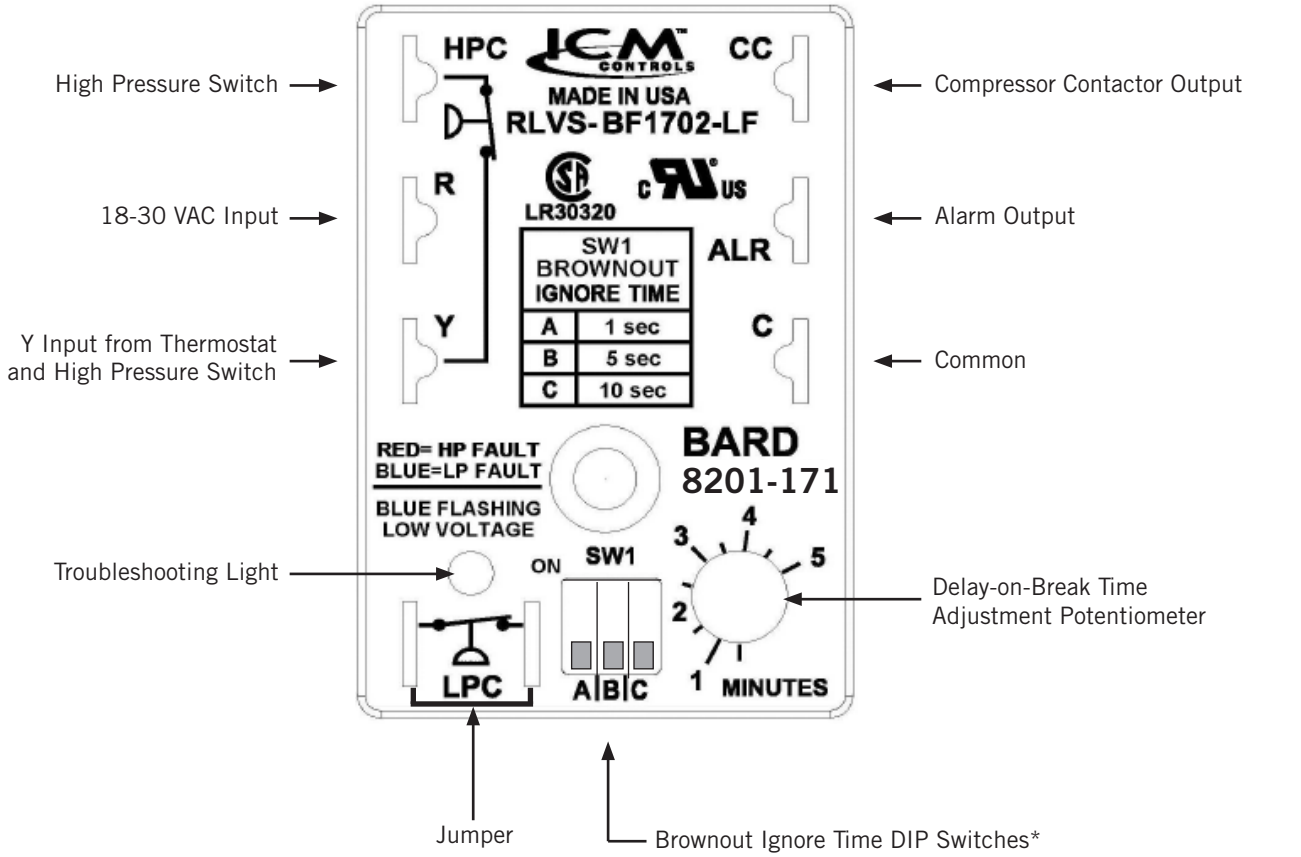
By rapidly rotating the potentiometer (POT) clockwise (see Figure 31), all timing functions will be removed for testing.

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

FIGURE 31
8201-171 Compressor Control Module



* Turn on only one switch for that specific ignore time setting. 10 seconds is the maximum brownout ignore time. If all switches are "off", the control is in "do not ignore".

shipped in "0" do not ignore position, with all the DIP switches off (see Figure 31).

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 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 millisecond long power glitch can be enough that the compressor will start to run backwards.

Pressure Service Ports

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. A pressure table covering all models can be found on page 24. It is imperative to match the correct pressure table to the unit by model number.

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

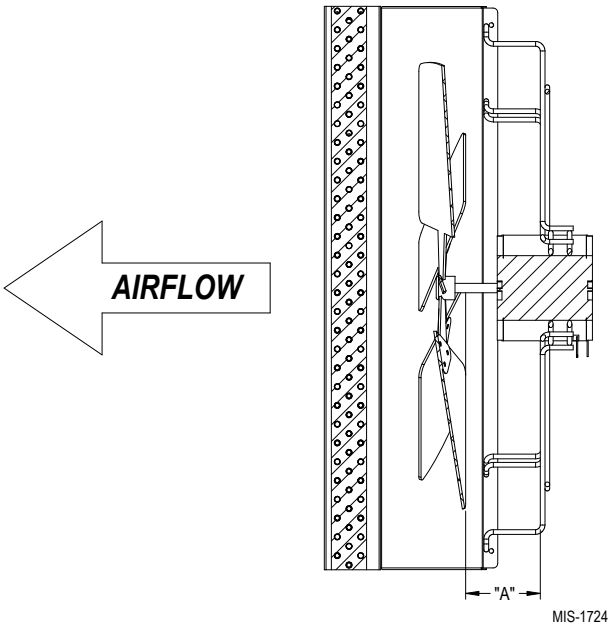
WARNING! Do NOT use a Schrader valve core removal tool with these valves. Use of such a tool could result in eye injuries or refrigerant burns!

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.

Outdoor Fan Motor

Due to design considerations of the condenser section of the wall-mount unit, placement/clearance of the motor/fan blade is critical to heat dispersal. Should a change of motor or fan blade be necessary, please view Figure 32 for proper clearance adjustment.

FIGURE 32
Fan Blade Setting



Model	Dimension A
W42AC W48AC W60AC W72AC	1.75"

TABLE 6
MULTI-TEC W42-72AC* Optional Accessories

		W42AC*A	W42AC*B	W42AC*C	W48AC*A	W48AC*B	W48AC*C	W60AC*A	W60AC*B	W60AC*C	W72AC*A	W72AC*B	W72AC*C
Heater Kits	EHW4TA-A05	X			X								
	EHWA05-A10B	X			X			X					
	EHWA05-A15B	X			X			X					
	EHWA05-A20B	X			X			X					
	EHW4TA-B06		X			X			X				
	EHWA05-B09B		X			X							
	EHW6TA-B06											X	
	EHWA05-B15B		X			X			X			X	
	EHW5TA-B18								X				
	EHW4TA-B18		X			X							
	EHW4TA-C09			X			X			X			X
	EHW4TA-C15			X			X			X			X
	EHW5TA-A05							X			X		
	EHW60A-B09B								X				
	EHW70A-B09B											X	
	EHW6TA-B18											X	
	EHW72A-A10B										X		
	EHW72A-A15B										X		
	EHW72A-A20B										X		
Circuit Breaker (WMCB) and Toggle Disconnect (WMPD)	WMCB-05B		X			X							
	WMCB-06B								X				
	WMCB-08A	X			X								
	WMCB-09A							X			X		
	WMPD-01C			X			X			X			X
	WMCB-08B											X	

Standard Maintenance Procedures

⚠ WARNING

Electrical shock hazard.

Disconnect all power supplies before servicing.

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

⚠ CAUTION

Cut hazard.

Wear gloves to avoid contact with sharp edges.

Failure to do so could result in personal injury.

1. Disable system from LC6000 controller (see latest version of 2100-669 LC6000 Service Instructions manual).
2. Turn off AC breakers at wall-mount units.
3. Check inlet sides of condenser and evaporator coils for obstructions/debris—clean if necessary using a quality manufactured coil cleaning product specific for the evaporator or condenser coil.
   - Condenser coil: Remove the fan shroud/ motor/motor bracket as an assembly from the condenser section. This will give clear access to the inlet side of the coil for cleaning. Follow the coil cleaner manufacturer's directions for necessary safety gear and precautions, as well as for application and use. More than one application may be necessary. Rinse thoroughly.
   - Evaporator coil: Remove the evaporator section panel and apply specific evaporator cleaner directly to the inlet side of coil, being very careful not to overspray into insulation or surrounding panels and wiring. Residual cleaner and dissolved debris should drip into the drain pan and leave the unit through the condensate hose. More than one application may be necessary. Rinse thoroughly.
4. Manually spin fan and blower motors to ensure they turn freely. All motors are permanently lubricated, so no oil is necessary.
5. Inspect free cooling damper actuator and linkage.
6. Install new air filter; check for additional filter grilles internal to the structure.
7. Inspect the control panel of the system.
   - Look for insect or rodent activity and remove any nesting materials.
   - Manually push contactor closed, observe for movement—contactor points should have minimal discoloration, no spalling or other signs of arcing. Replace if doubtful.
   - Check field and factory wiring for tightness and look for signs of overheating (discoloration of terminals or wire insulation).
8. Ensure that supply and return registers are not obstructed, and more importantly, are not recycling the air to one another. Adjust supply louvers if necessary to direct discharge air away from any direct route to the return grille.
9. Re-assemble wall-mount unit, turn breakers back on.
10. Enable system to LC6000 controller (see latest version of 2100-669 LC6000 Service Instructions manual).
11. Repeat steps for additional wall-mount units.

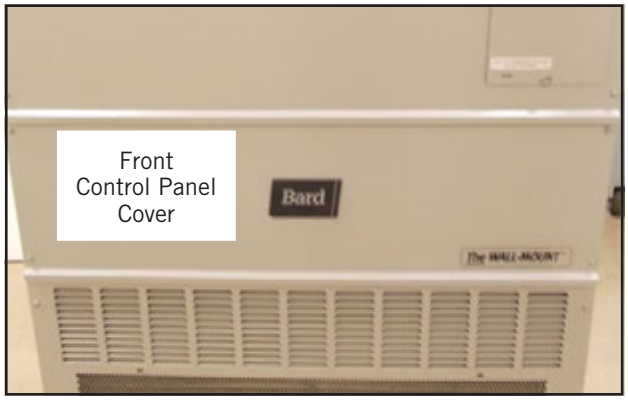
Removal of Fan Shroud

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Remove nine screws holding fan shroud to condenser and bottom.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade and shroud assembly out the left side of the unit.
6. Service motor/fan as needed. Any service work requiring removal or adjustment in the fan and/or motor will require that the dimensions be checked and blade adjusted in or out on the motor shaft accordingly (see page 27 for proper clearance adjustment).
7. Reverse steps to re-install.

Filters

The filters can be serviced from the outside by removing the front control panel cover (see Figure 33). Two (2) 20" x 20" x 1" throwaway filters come standard with each unit. Additional 1" and 2" filter options are available as optional accessories.

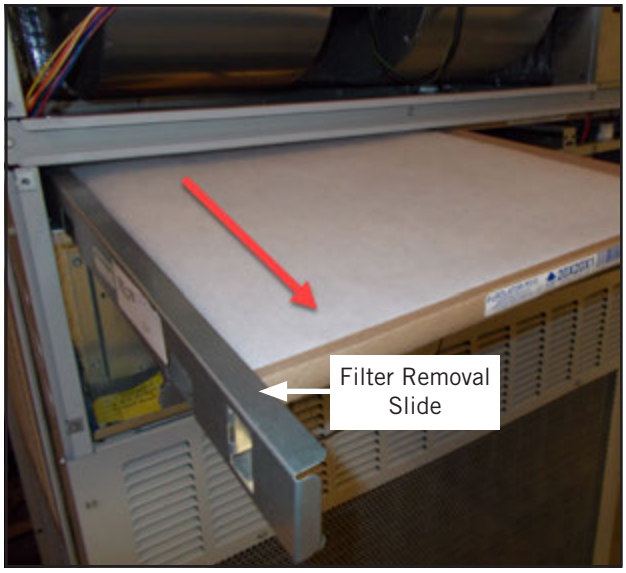
FIGURE 33
Front Control Panel Cover



Filter Removal/Installation

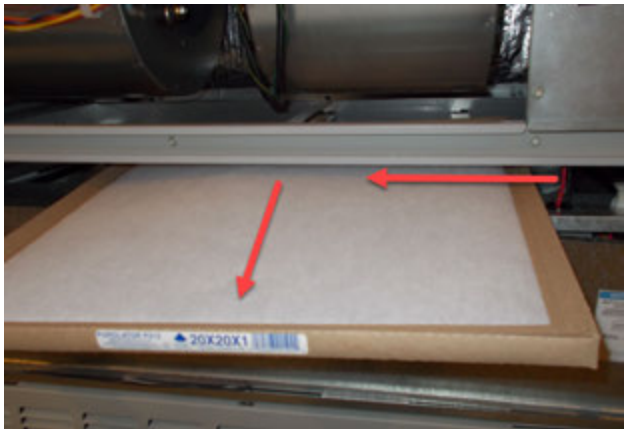
1. Remove left filter first by pulling on filter removal slide (see Figure 34).

FIGURE 34
Removing Left Filter



2. Slide second filter to the left around the wires and pull the filter out (see Figure 35).

FIGURE 35
Removing Second Filter



3. Reverse the order for new filter installation.

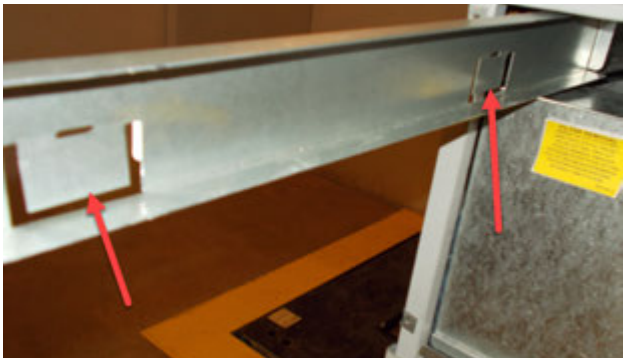
NOTE: *When installing new filters, make sure that airflow arrows on filters point up.*

Switching Filter Sizes

1. To switch from 1" to 2" filters, start by removing the filter slide and bend the tabs down out of the way (see Figures 36 and 37).

FIGURE 36
Filter Tabs in Up Position

FIGURE 37
Bend Filter Tabs Down

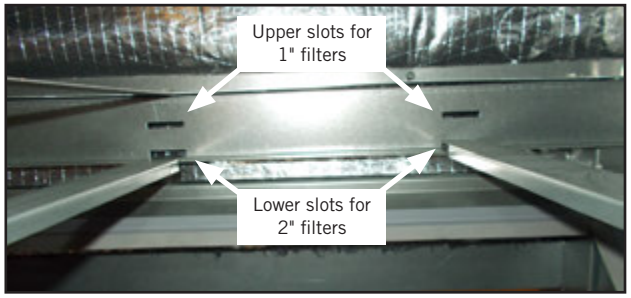


2. Locate the filter support brackets and remove the four (4) screws holding them to the top of the control panel (see Figure 38).

FIGURE 38
Remove Four Screws

3. Pull the brackets out towards the front of the unit. The back of the bracket will slip out of the upper slots at the back of the filter tray.
4. Re-install the filter support brackets into the lower slots at the back of the filter tray (see Figure 39).

FIGURE 39
Re-Install Filter Support Brackets into Lower Slots



5. Re-install the four (4) screws into the upper screw holes on the filter support brackets. Then bend the tab up out of the way (see Figure 40).

FIGURE 40
Re-Install Screws and Bend Tabs Up

6. Install the right 2" filter first followed by the left filter (see Figures 41 and 42).

NOTE: *When installing new filters, make sure that airflow arrows on filters point up.*

7. Reverse the steps above to switch from 2" to 1" filters.

FIGURE 41
Install Right 2" Filter

FIGURE 42
Install Left 2" Filter

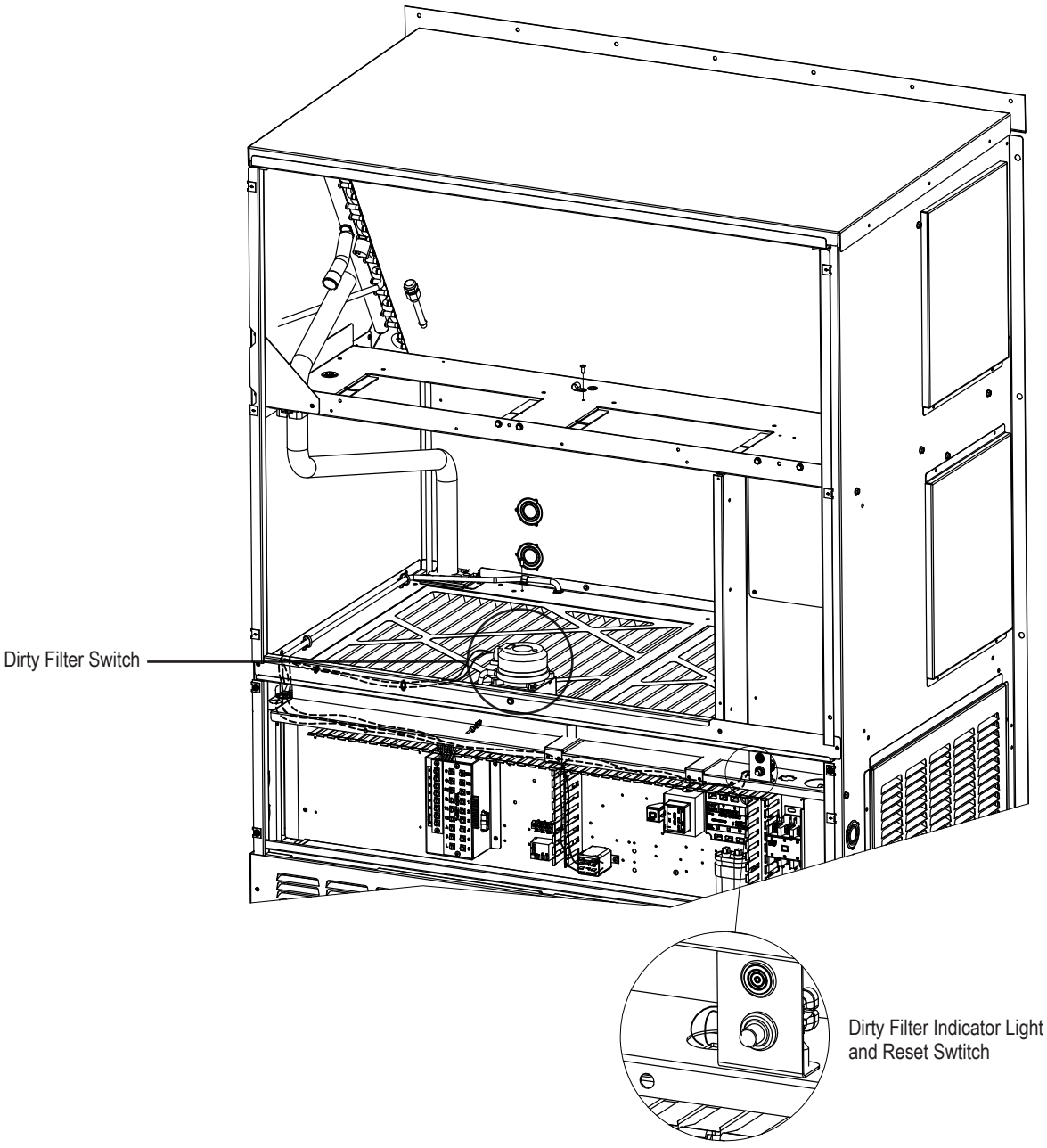
Dirty Filter Switch

1. Disconnect all power to the unit. Remove control panel outer cover and upper front panel.
2. The dirty filter switch is located on top of the filter partition between the blower wheels (see Figure 43). The dirty filter indicator light and reset switch is located on the right side of the filter access opening above the control panel. Remove the cover on the dirty filter switch and ensure the knob is set at 0.4" W.C. (see Figure 44). This is only a recommended starting point prior to making switch adjustments. Switch setting is highly dependent on filter type used, blower speed, unit ducting and other unit installation characteristics. See **Dirty Filter Switch Adjustment** for instructions on how to make proper switch adjustments.
3. Re-install upper front panel.

Dirty Filter Switch Adjustment

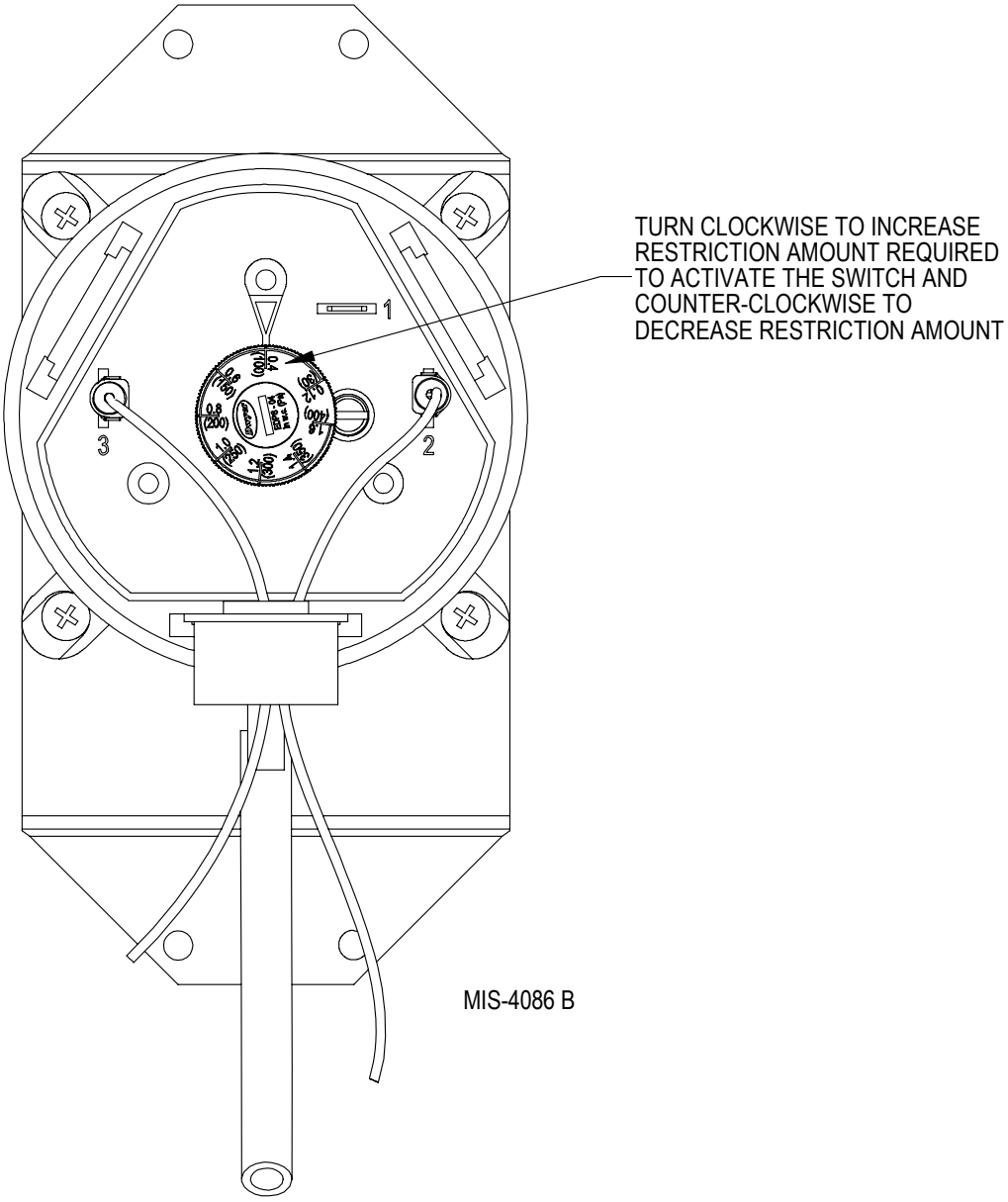
1. Apply power to the unit.
2. Turn the unit indoor blower on (energize R-G on low voltage terminal board).

FIGURE 43
Dirty Filter Switch and Dirty Filter Indicator Light/Reset Switch



3. With air filters installed and switch initially set at 0.4" W.C. (see Step 2 under **Dirty Filter Switch**), begin restricting the air filter of the unit using a piece of cardboard under the filters until the switch trips and the light comes on. If the filter is restricted by 75% (or desired restriction amount), skip to Step 6.
4. If switch setting adjustment is required, disconnect power to the unit. Remove the upper front panel and the cover on the airflow switch so that adjustment can be made. If the switch tripped before 75% restriction was reached, turn the knob slightly clockwise. If the switch tripped after 75%, turn the knob counter-clockwise (see Figure 44).
5. Replace the upper front panel and repeat Steps 1-3. Continue to make adjustments described in Step 4 until the desired restriction is obtained.
6. Remove the restriction and reset the filter switch. Replace the switch cover once adjustment is complete.
7. Install the outer control panel cover. This completes the adjustment.

FIGURE 44
Adjusting Dirty Filter Switch



Troubleshooting Nidec SelecTech Series ECM Motors

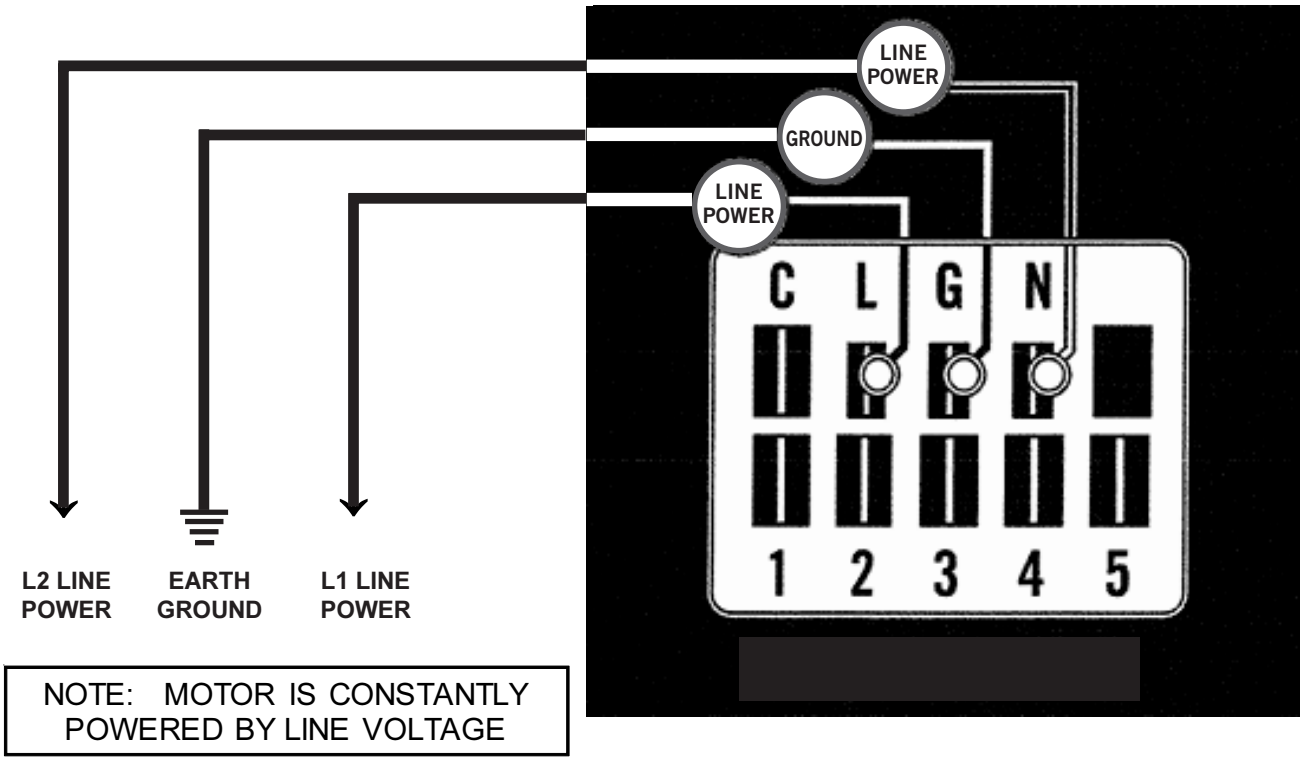
If the Motor Is Running

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. Ensure 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 and N/L2 connections at the motor (see Figure 45). 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 or minus 10% of the nominal line power VAC is acceptable.

FIGURE 45
Motor Connections



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

Model SelecTech Communication Diagnostics

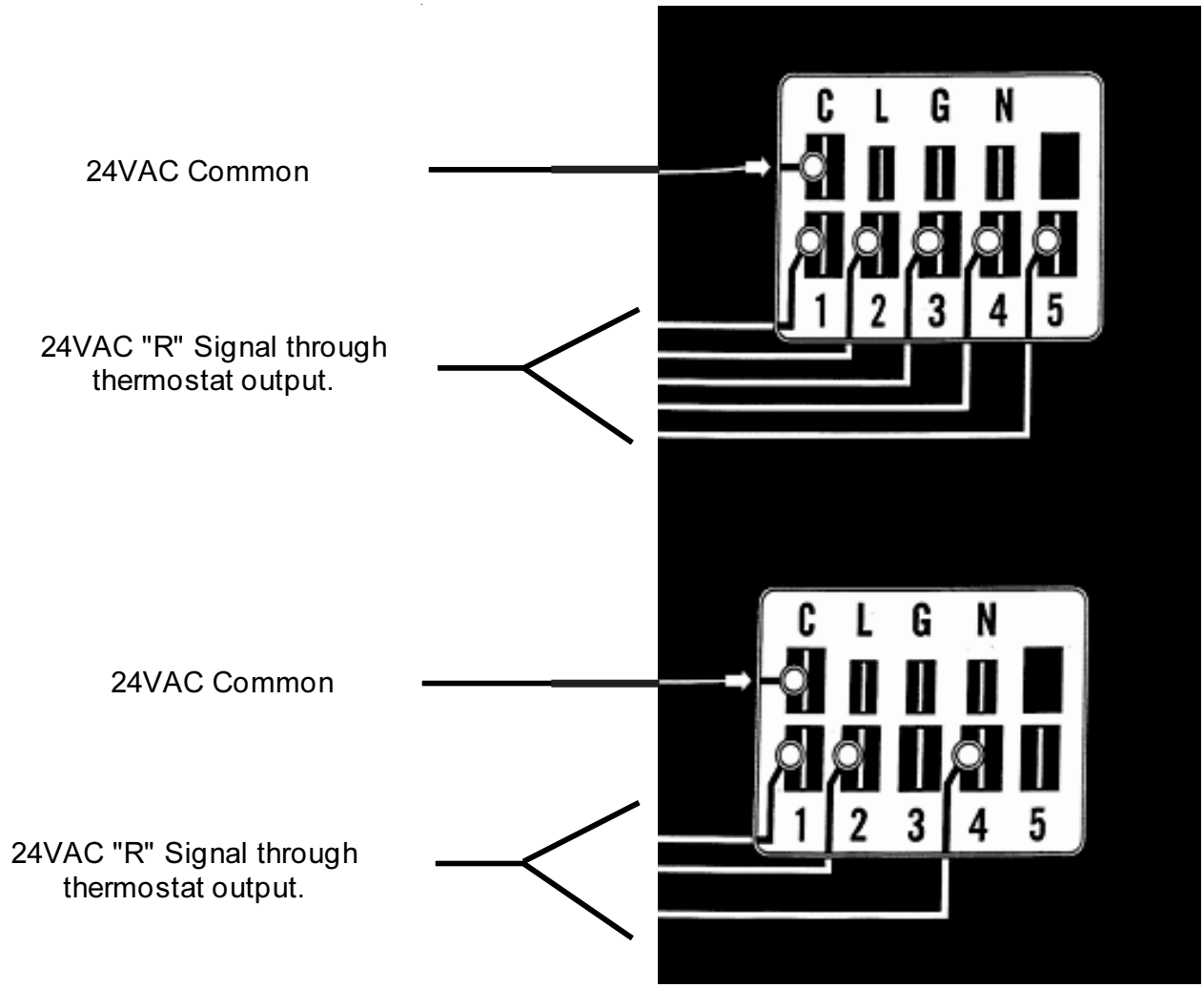
The SelecTech motor is communicated through 24 VAC low voltage (thermostat control circuit wiring).

1. Start with unit wiring diagram to confirm proper connections and voltage (see Figure 46).
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.

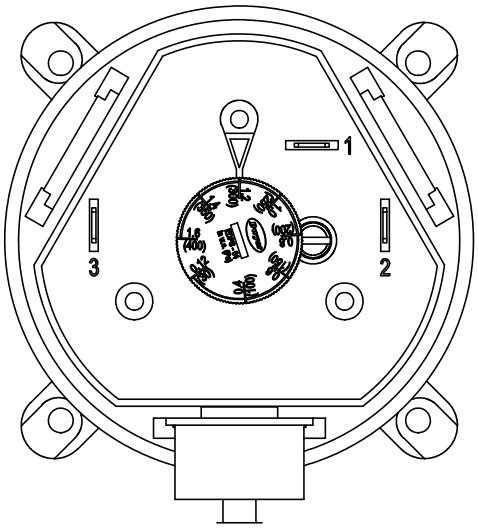
B. If the motor has proper high voltage as identified on page 34 (Step 1 in **If the Motor Is Not Running**), proper low voltage to a programmed terminal and is not operating, the motor is failed and will require replacement.

FIGURE 46
Motor Connections



8301-057 Airflow Differential/Dirty Filter Switch

FIGURE 47
8301-057 Air Differential Switch Terminals



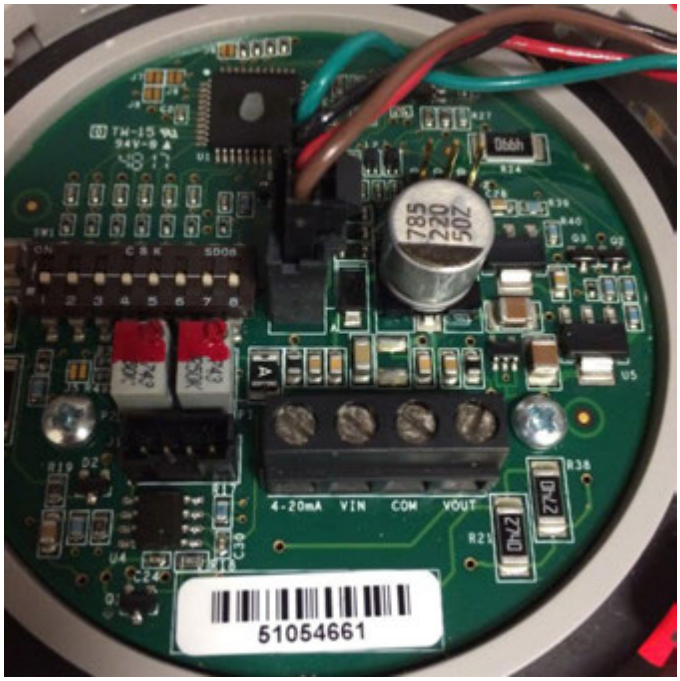
Terminals

1 – Normally Closed
2 – Normally Open
3 – Common

NOTE: *Contact position is in resting state.*

8301-067 Outdoor Temperature/Humidity Sensor

FIGURE 48
8301-067 Sensor Dip Switches



8301-067 sensor Temperature/Resistance and Humidity/Voltage tables on pages 37 and 38.

TABLE 7
8301-067 Sensor: Temperature/Resistance

Temperature		Resistance
F	C	Ω
-25	-31.7	148,452.94
-24	-31.1	143,910.37
-23	-30.6	139,521.46
-22	-30.0	135,280.55
-21	-29.4	131,182.22
-20	-28.9	127,221.25
-19	-28.3	123,392.63
-18	-27.8	119,691.54
-17	-27.2	116,113.37
-16	-26.7	112,653.66
-15	-26.1	109,308.15
-14	-25.6	106,072.72
-13	-25.0	102,943.44
-12	-24.4	99,916.50
-11	-23.9	96,988.26
-10	-23.3	94,155.21
-9	-22.8	91,413.97
-8	-22.2	88,761.30
-7	-21.7	86,194.07
-6	-21.1	83,709.29
-5	-20.6	81,304.06
-4	-20.0	78,975.60
-3	-19.4	76,721.24
-2	-18.9	74,538.41
-1	-18.3	72,424.61
0	-17.8	70,377.48
1	-17.2	68,394.70
2	-16.7	66,474.07
3	-16.1	64,613.46
4	-15.6	62,810.82
5	-15.0	61,064.17
6	-14.4	59,371.62
7	-13.9	57,731.32
8	-13.3	56,141.52
9	-12.8	54,600.50
10	-12.2	53,106.64
11	-11.7	51,658.35
12	-11.1	50,254.11
13	-10.6	48,892.46
14	-10.0	47,571.97
15	-9.4	46,291.29
16	-8.9	45,049.09
17	-8.3	43,844.12
18	-7.8	42,675.14
19	-7.2	41,540.99
20	-6.7	40,440.51
21	-6.1	39,372.62
22	-5.6	38,336.26
23	-5.0	37,330.40
24	-4.4	36,354.06
25	-3.9	35,406.29
26	-3.3	34,486.17
27	-2.8	33,592.81
28	-2.2	32,725.36
29	-1.7	31,883.00
30	-1.1	31,064.92
31	-0.6	30,270.36
32	0.0	29,498.58
33	0.6	28,748.85
34	1.1	28,020.48
35	1.7	27,312.81
36	2.2	26,625.18
37	2.8	25,956.98
38	3.3	25,307.60
39	3.9	24,676.45
40	4.4	24,062.97
41	5.0	23,466.62
42	5.6	22,886.87
43	6.1	22,323.22
44	6.7	21,775.16
45	7.2	21,242.23
46	7.8	20,723.96
47	8.3	20,219.91
48	8.9	19,729.65
49	9.4	19,252.76
50	10.0	18,788.84
51	10.6	18,337.51
52	11.1	17,898.38
53	11.7	17,471.09
54	12.2	17,055.30
55	12.8	16,650.65
56	13.3	16,256.82
57	13.9	15,873.48
58	14.4	15,500.34
59	15.0	15,137.09
60	15.6	14,783.44
61	16.1	14,439.11
62	16.7	14,103.83
63	17.2	13,777.34
64	17.8	13,459.38
65	18.3	13,149.70
66	18.9	12,848.07
67	19.4	12,554.26
68	20.0	12,268.04
69	20.6	11,989.19
70	21.1	11,717.51
71	21.7	11,452.79
72	22.2	11,194.83
73	22.8	10,943.45
74	23.3	10698.45
75	23.9	10,459.65
76	24.4	10,226.90
77	25.0	10,000.00
78	25.6	9778.81
79	26.1	9563.15
80	26.7	9352.89
81	27.2	9147.86
82	27.8	8947.93
83	28.3	8752.95
84	28.9	8562.79
85	29.4	8377.31
86	30.0	8196.39
87	30.6	8019.91
88	31.1	7847.74
89	31.7	7679.76
90	32.2	7515.86
91	32.8	7355.94
92	33.3	7199.88
93	33.9	7047.59
94	34.4	6898.95
95	35.0	6753.88
96	35.6	6612.28
97	36.1	6474.05
98	36.7	6339.11
99	37.2	6207.37
100	37.8	6078.74
101	38.3	5953.15
102	38.9	5830.51
103	39.4	5710.75
104	40.0	5593.78
105	40.6	5479.55
106	41.1	5367.98
107	41.7	5258.99
108	42.2	5152.53
109	42.8	5048.52
110	43.3	4946.91
111	43.9	4847.63
112	44.4	4750.62
113	45.0	4655.83
114	45.6	4563.20
115	46.1	4472.67
116	46.7	4384.19
117	47.2	4297.71
118	47.8	4213.18
119	48.3	4130.55
120	48.9	4049.77
121	49.4	3970.79
122	50.0	3893.58
123	50.6	3818.08
124	51.1	3744.26
125	51.7	3672.07

TABLE 8
8301-067 Sensor: Humidity/Voltage

RH%	mA Output
0	4.000 mA
1	4.160 mA
2	4.320 mA
3	4.480 mA
4	4.640 mA
5	4.800 mA
6	4.960 mA
7	5.120 mA
8	5.280 mA
9	5.440 mA
10	5.600 mA
11	5.760 mA
12	5.920 mA
13	6.080 mA
14	6.240 mA
15	6.400 mA
16	6.560 mA
17	6.720 mA
18	6.880 mA
19	7.040 mA
20	7.200 mA
21	7.360 mA
22	7.520 mA
23	7.680 mA
24	7.840 mA
25	8.000 mA
26	8.160 mA
27	8.320 mA
28	8.480 mA
29	8.640 mA
30	8.800 mA
31	8.960 mA
32	9.120 mA
33	9.280 mA

RH%	mA Output
34	9.440 mA
35	9.600 mA
36	9.760 mA
37	9.920 mA
38	10.080 mA
39	10.240 mA
40	10.400 mA
41	10.560 mA
42	10.720 mA
43	10.880 mA
44	11.040 mA
45	11.200 mA
46	11.360 mA
47	11.520 mA
48	11.680 mA
49	11.840 mA
50	12.000 mA
51	12.160 mA
52	12.320 mA
53	12.480 mA
54	12.640 mA
55	12.800 mA
56	12.960 mA
57	13.120 mA
58	13.280 mA
59	13.440 mA
60	13.600 mA
61	13.760 mA
62	13.920 mA
63	14.080 mA
64	14.240 mA
65	14.400 mA
66	14.560 mA
67	14.720 mA

RH%	mA Output
68	14.880 mA
69	15.040 mA
70	15.200 mA
71	15.360 mA
72	15.520 mA
73	15.680 mA
74	15.840 mA
75	16.000 mA
76	16.160 mA
77	16.320 mA
78	16.480 mA
79	16.640 mA
80	16.800 mA
81	16.960 mA
82	17.120 mA
83	17.280 mA
84	17.440 mA
85	17.600 mA
86	17.760 mA
87	17.920 mA
88	18.080 mA
89	18.240 mA
90	18.400 mA
91	18.560 mA
92	18.720 mA
93	18.880 mA
94	19.040 mA
95	19.200 mA
96	19.360 mA
97	19.520 mA
98	19.680 mA
99	19.840 mA
100	20.000 mA

8408-044 Return Air Sensor/Suction Sensor

TABLE 9
8408-044 Sensor: Temperature/Resistance Curve J

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

ALARM INDEX

TABLE 10
Wall-Mount Unit Alarm Index

Index	Alarm Log Export Variable	PGD Displayed Alarm Description
0	AI_retain	Error in the number of retain memory writings
1	AI_Err_retain_write	Error in retain memory writings
2	AI_ReturnAir1In	Circuit 1 Return Air Temperature Sensor Alarm
3	AI_ReturnAir1High	Circuit 1 High Return Air Temperature Alarm
6	AI_MixedAir1In	Circuit 1 Mixed Air Temperature Sensor Alarm
7	AI_MixedAir1High	Circuit 1 Mixed Air High Temperature
8	AI_MixedAir1Low	Circuit 1 Mixed Air Low Temperature
18	AI_OutdoorAirIn	Outdoor Air Temperature Sensor Alarm
19	AI_OutdoorHumIn	Outdoor Air Humidity Sensor Alarm
32	AI_SuctionTemp1In	Circuit 1 Suction Temperature Sensor Alarm
34	AI_SuctionPress1In	Circuit 1 Suction Pressure Sensor Alarm
36	AI_LowPress1	Circuit 1 Low Pressure Alarm
38	AI_HighPress1	Circuit 1 High Pressure Alarm
40	AI_Damper1FailedtoOpen	Circuit 1 Damper Failed to Open
41	AI_Damper1FailedtoClose	Circuit 1 Damper Failed to Close
48	AI_Freeze1In	Circuit 1 Freeze Temperature Sensor Alarm
50	AI_Freeze1	Circuit 1 Freeze Condition
54	AI_Filter1	Dirty Filter 1 Alarm
60	AI_EmergencyVent	Emergency Ventalation Mode Active
61	AI_EmergencyCool	Emergency Cooling Mode Active
62	AI_HeatRunaway	Extreme High Return Temp Alarm (Heat Cutout)
63	AI_UnitDisable	Unit Disable Alarm
66	AI_LowSH_1	Circuit 1 Low SuperHeat
67	AI_LOP_1	Circuit 1 Low Evaporation Pressure
68	AI_MOP_1	Circuit 1 High Evaportation Pressure
69	AI_HiTempCond_1	Circuit 1 High Condenser Temperature
70	AI_LowSuct_1	Circuit 1 Low Suction pressure
71	AI_EEV_1	Circuit 1 EEV motor error
72	AI_SelfTuning_1	Circuit 1 SelfTuning error
73	AI_EmergClos_1	Circuit 1 Emergency close
74	AI_TempDelta_1	Circuit 1 High Delta Temperature
75	AI_P_Delta_1	Circuit 1 High Delta Pressure
76	AI_RangeError_1	Circuit 1 Range Error
77	AI_ServicePosit_perc_1	Circuit 1 Service Position Percent
78	AI_ValveID_1	Circuit 1 Valve ID
92	AI_Offline_THTN_1	Th-Tune Device Offline
93	AI_TempPrb_THTN_1	Th-Tune Temperature Probe Alarm
94	AI_HumPrb_THTN_1	Th-Tune Humidity Probe Alarm
95	AI_ClkBrd_THTN_1	Th-Tune Clock Board Alarm

INSTALLATION INSTRUCTIONS

Bard Air Conditioning System

MULTI-TEC®
W42-72AC
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: 2100-726F
Supersedes: 2100-726E
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 Bard 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 page 4 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.

⚠ 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.

⚠ 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.

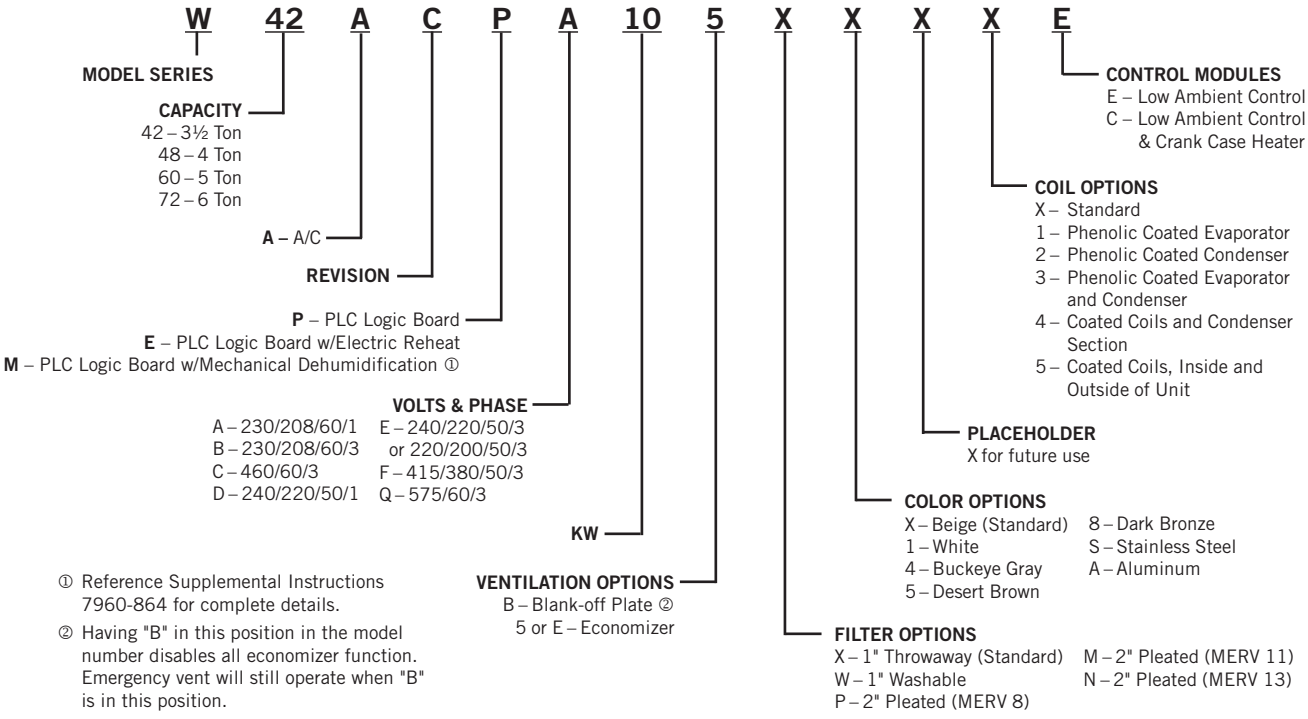
LIST OF NECESSARY MATERIALS/TOOLS

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 15 and 16)
  - High-voltage wire of various gauges (see tables on pages 15 and 16)
  - 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 W42-72AC Wall-Mount Unit Model Nomenclature



① Reference Supplemental Instructions 7960-864 for complete details.

② Having "B" in this position in the model number disables all economizer function. Emergency vent will still operate when "B" is in this position.

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

On side-by-side installations, maintain a minimum of 20" clearance on both sides to allow access to heat strips and to provide 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.

TABLE 1
Clearance Required for Service Access and Adequate Condenser Airflow

Model	Left Side	Right Side	Discharge – Front
W42AC* W48AC* W60AC* W72AC*	20"	20"	10'

Clearance to Combustibles

All model series require a 1/4" clearance to combustible material for the first 3' of duct attached to the outlet air frame. However, it is generally recommended that a 1" clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figure 3 on page 10 for details on opening sizes.

⚠ 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.

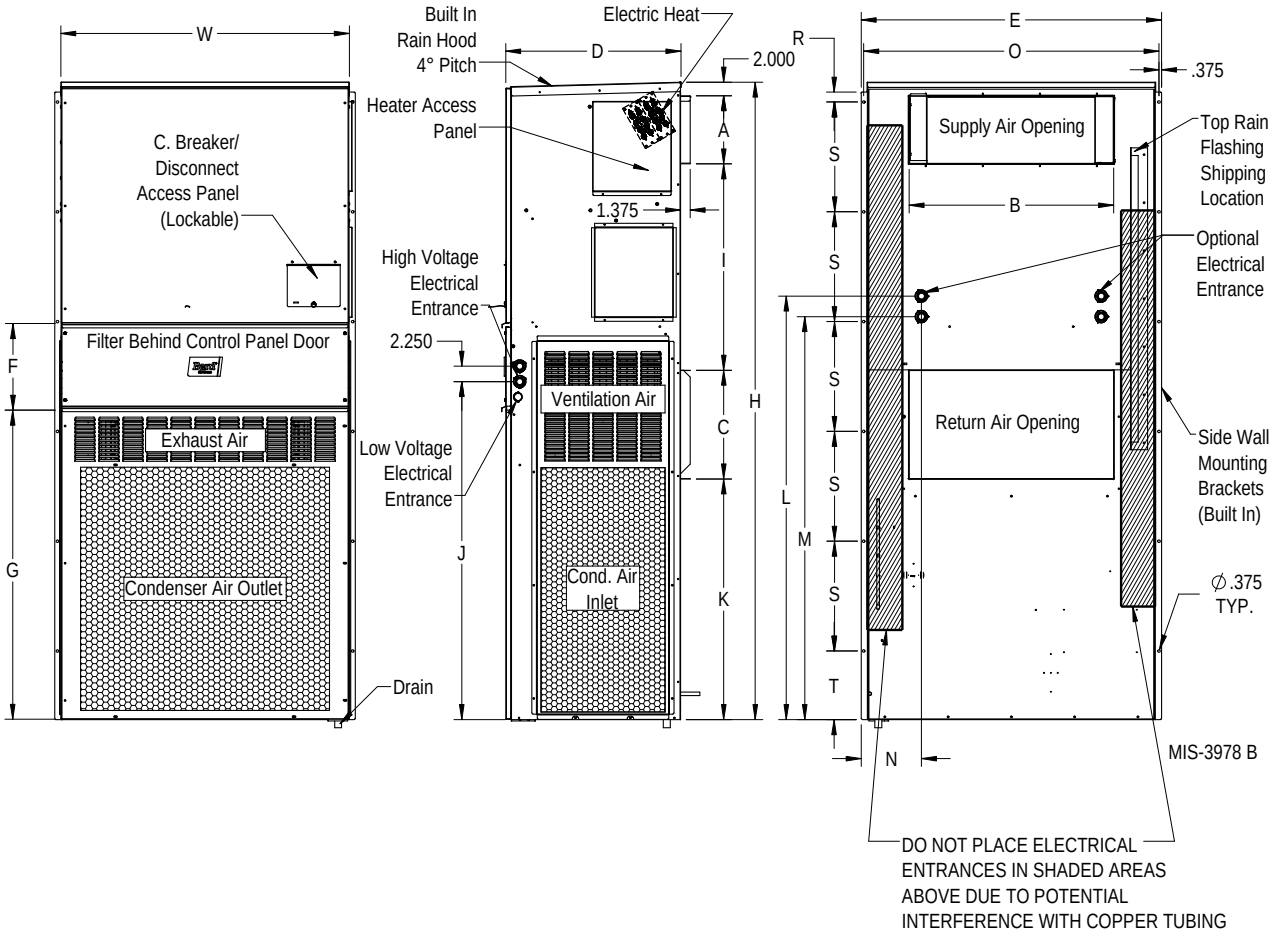
TABLE 2
Minimum Clearances Required to Combustible Materials

Model	Supply Air Duct (1st 3')	Cabinet
W42AC* W48AC* W60AC* W72AC*	1/4"	0"

FIGURE 2
Unit Dimensions

Model	Width (W)	Depth (D)	Height (H)	Supply		Return															
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	R	S	T	
W42AC* **W48AC***	42.00	25.52	84.75	9.88	29.88	15.88	29.88	43.88	12.63	39.06	30.06	53.75	26.94	55.59	52.59	8.82	43.00	1.44	16.00	1.88	
W60AC* **W72AC***	42.00	25.52	92.88	9.88	29.88	15.88	29.88	43.88	12.63	45.00	30.06	59.75	35.06	61.72	58.72	8.82	43.00	1.44	16.00	10.00	

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



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).*

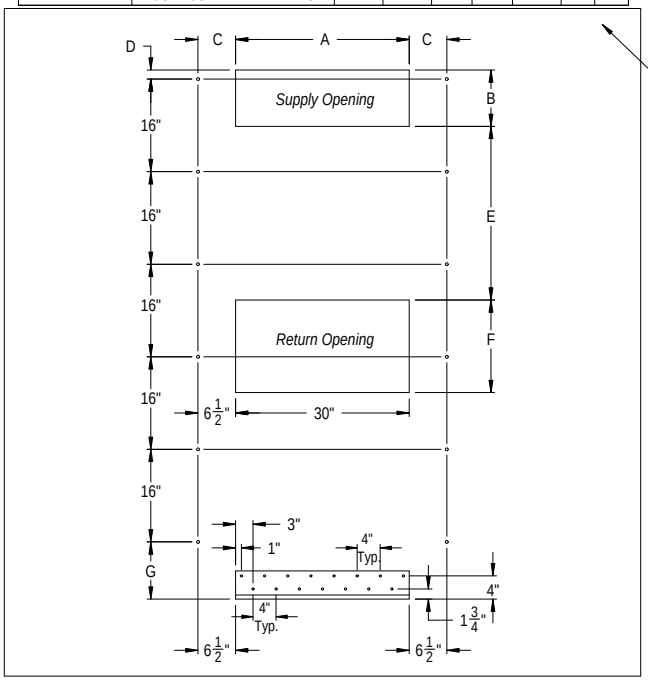
Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3 on page 10. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration. All walls must be thoroughly inspected to 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.

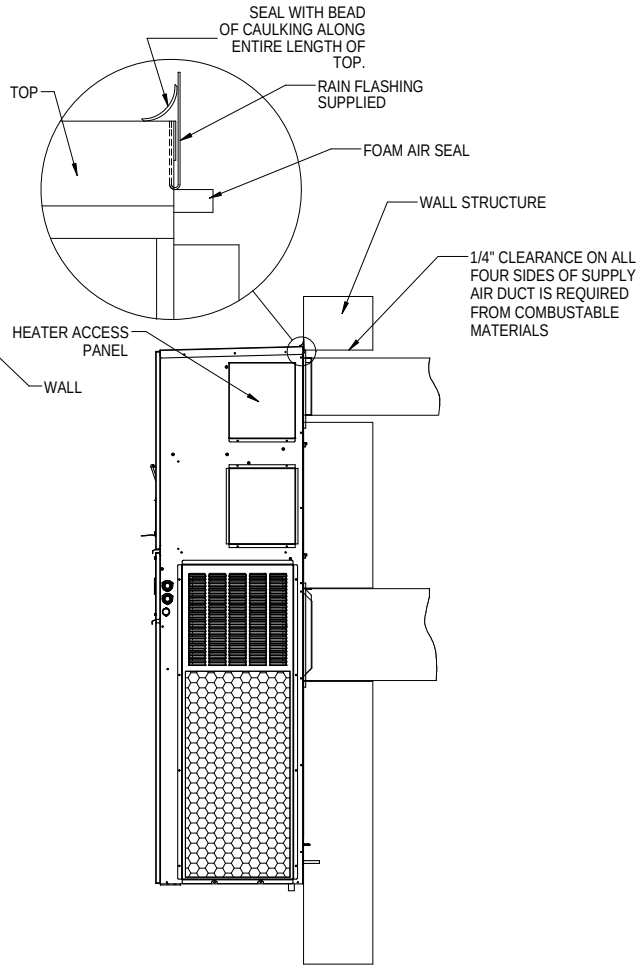
1. These units are secured by full-length mounting flanges built into the cabinet on each side which secure the unit to the outside wall surface. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The unit itself is suitable for 0" 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 Figure 3 for details on opening sizes.
3. Locate and mark lag bolt locations and location for optional bottom mounting bracket, if desired (see Figure 3).
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 Figure 3).
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
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.

FIGURE 3
Mounting Instructions

UNITS	REQUIRED DIMESIONS	A	B	C	D	E	F	G
W42AC-W48AC UNITS	REQUIRED DIMESIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	30 1/2	10 1/2	6 1/4	1 1/4	29 3/4	16	1 7/8
	REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	32	12	5 1/2	2	29	16	1 7/8
W60AC-W72AC UNITS	REQUIRED DIMESIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	30 1/2	10 1/2	6 1/4	1 1/4	29 3/4	16	9 7/8
	REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	32	12	5 1/2	2	29	16	9 7/8



Wall Opening and Hole Location View



Right Side View

MIS-3980 C

FIGURE 4
Electric Heat Clearance

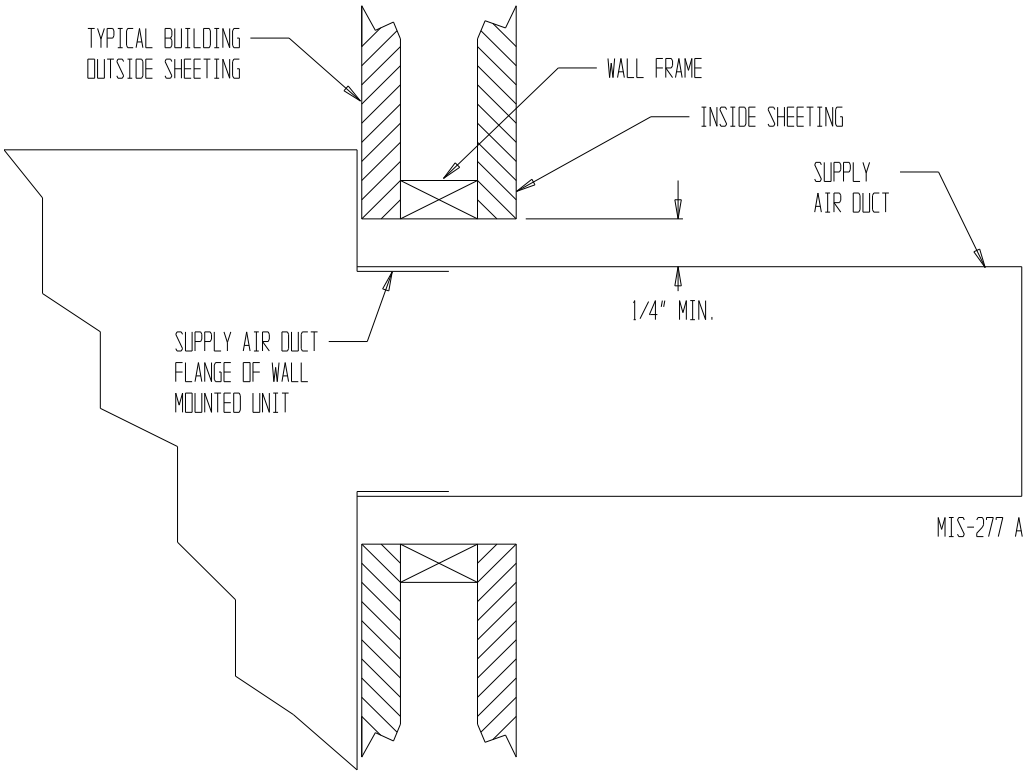
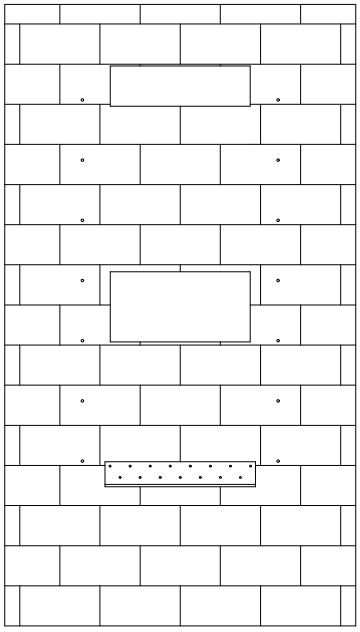
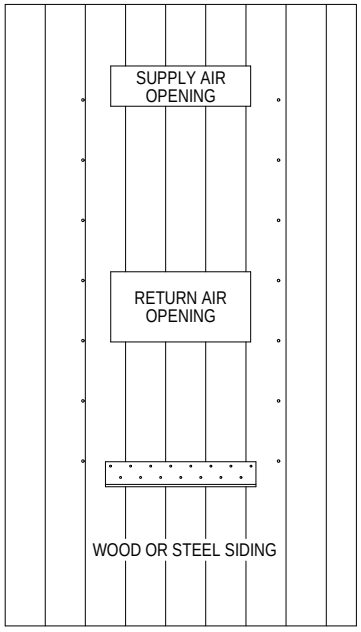


FIGURE 5
Wall Mounting Instructions

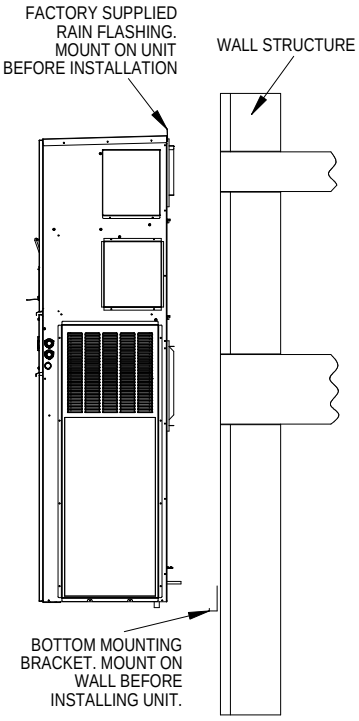
See Figure 3 Mounting Instructions



CONCRETE BLOCK WALL INSTALLATION



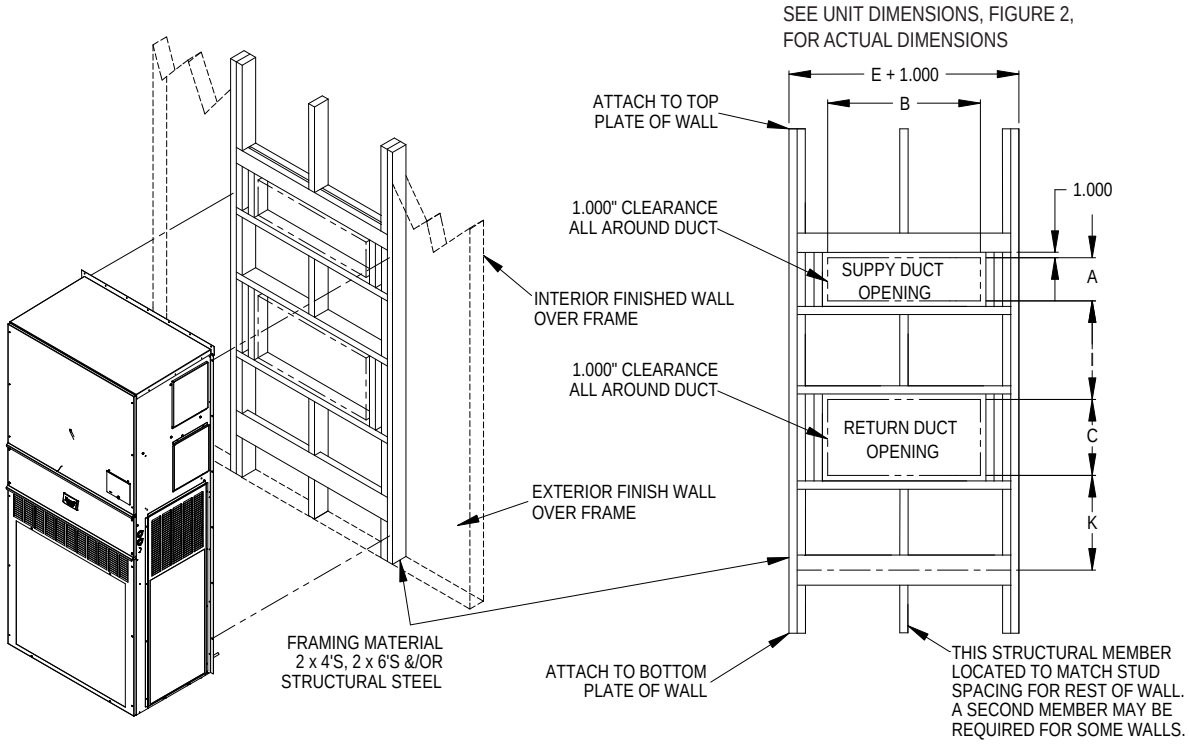
WOOD FRAME WALL INSTALLATION



SIDE VIEW

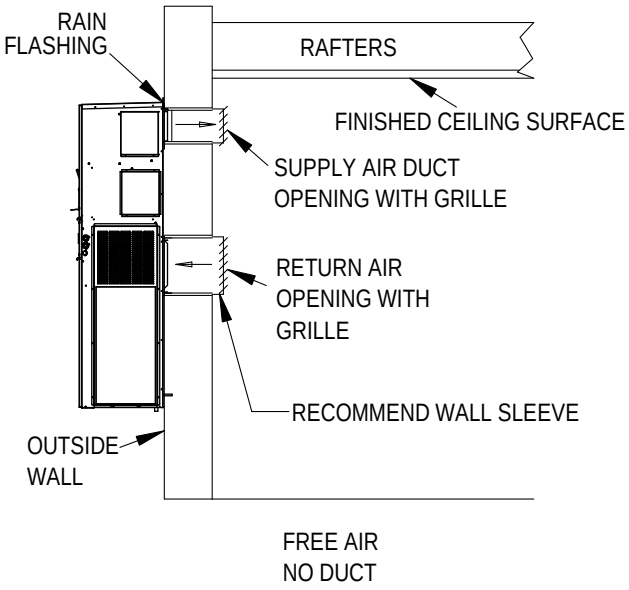
MIS-3981 B

FIGURE 6
Wall Mounting Instructions

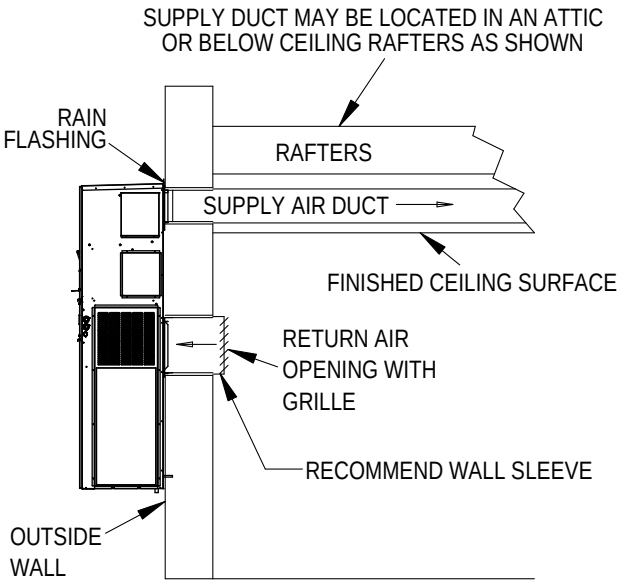


MIS-3982 B

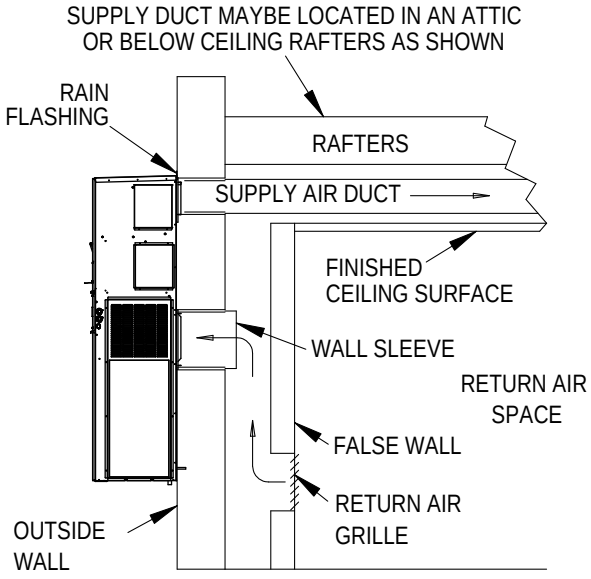
FIGURE 7
Common Wall Mounting Installations



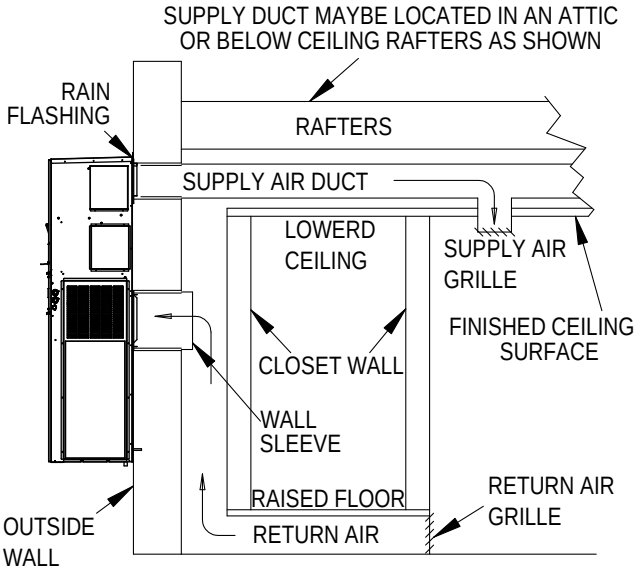
FREE AIR
NO DUCT



DUCTED SUPPLY
RETURN AT UNIT



FALSE WALL INSTALLATION



CLOSET INSTALLATION

MIS-4043 B

WALL-MOUNT UNIT WIRING

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 3, 4 or 5 (pages 15 and 16) 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 3, 4 and 5 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 8 (and also on the wall-mount units).

See Figure 9 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 8
Circuit Routing Label

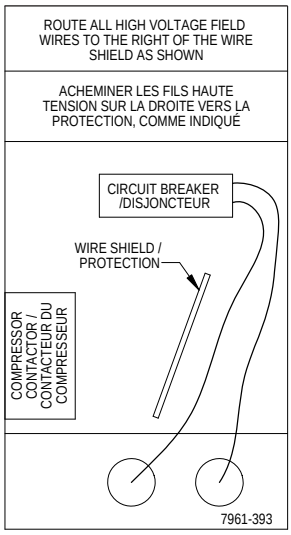
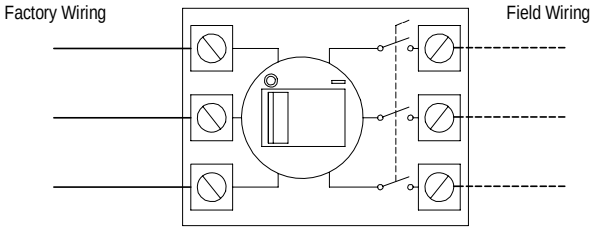


FIGURE 9
VAC Supply Wiring Landing Points



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 3
Electrical Specifications – W**ACP 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
W42ACPA00, A0Z		1	31	50	8	10								
A05		1	31	50	8	10								
A10	230/208-1	1	57	60	6	10								
A15		1 or 2	83	90	4	8	57	26	60	30	6	10	10	10
A20		1 or 2	109	125	2	6	57	52	60	60	6	6	10	10
W42ACPB00, B0Z		1	23	35	8	10								
B06		1	23	35	8	10								
B09	230/208-3	1	32	35	8	10								
B15		1	51	60	6	10								
B18		1	60	60	6	10								
W42ACPC00, C0Z		1	12	15	14	14								
C09	460-3	1	17	20	12	12								
C15		1	26	30	10	10								
W48ACPA00, A0Z		1	35	50	8	10								
A05		1	35	50	8	10								
A10	230/208-1	1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	111	125	2	6	59	52	60	60	6	6	10	10
W48ACPB00, B0Z		1	26	35	8	10								
B06		1	26	35	8	10								
B09	230/208-3	1	33	35	8	10								
B15		1	51	60	6	10								
B18		1	60	60	6	10								
W48ACPC00, C0Z		1	12	15	14	14								
C09	460-3	1	17	20	12	12								
C15		1	26	30	10	10								
W48ACPQ00, Q0Z	575-3	1	8	15	14	14								
Q15		1	20	25	10	10								
W60ACPA00, A0Z		1	38	60	8	10								
A05		1	38	60	8	10								
A10	230/208-1	1	59	60	6	10								
A15		1 or 2	85	90	3	8	59	26	60	30	6	10	10	10
A20		1 or 2	111	125	2	6	59	52	60	60	6	6	10	10
W60ACPB00, B0Z		1	28	40	8	10								
B06		1	28	40	8	10								
B09	230/208-3	1	34	40	8	10								
B15		1	52	60	6	10								
B18		2	N/A	N/A	N/A	N/A	34	28	40	30	8	10	10	10
W60ACPC00, C0Z		1	14	20	12	12								
C09	460-3	1	18	20	12	12								
C15		1	26	30	10	10								
W60ACPQ00, Q0Z	575-3	1	10	15	14	14								
Q15		1	20	25	10	10								
W72ACPA00, A0Z		1	56	60	6	10								
A05		1	56	60	6	10								
A10	230/208-1	1 or 2	60	70	6	8	56	26	60	30	6	10	10	10
A15		1 or 2	86	90	3	8	56	52	60	60	6	6	10	10
A20		1 or 2	112	125	2	6	56	52	60	60	6	6	10	10
W72ACPB00, B0Z		1	38	50	8	10								
B06		1	38	50	8	10								
B09	230/208-3	1	38	50	8	10								
B15		1	54	60	6	10								
B18		2	N/A	N/A	N/A	N/A	38	28	40	30			10	10
W72ACPC00, C0Z		1	18	25	10	10								
C09	460-3	1	18	25	10	10								
C15		1	27	30	10	10								
W72ACPQ00, Q0Z	575-3	1	13	20	12	12								
Q15		1	21	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.

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.*

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.*

TABLE 4
Electrical Specifications – W**ACP Series – 50Hz Units

Model	Rated Volts & Phase	No. Field Power Circuits	Minimum Circuit Ampacity ①	Maximum External Fuse or Ckt. Brkr. ②
W42ACPE00, E0Z	220/200-3	1	21	30
E09		1	31	30
E15		1	48	50
W42ACPF00, F0Z	415/380-3 ③	1	12	15
F07		1	16	20
F12		1	29	30
W48ACPE00, E0Z	220/200-3	1	23	35
E09		1	31	35
E15		1	50	50
W48ACPF00, F0Z	415/380-3 ③	1	12	15
F07		1	17	20
F12		1	31	35
W60ACPE00, E0Z	220/200-3	1	25	35
E09		1	32	35
E15		1	50	50
W60ACPF00, F0Z	415/380-3 ③	1	15	15
F07		1	18	20
F12		1	31	35
W72ACPF00, F0Z	415/380-3 ③	1	21	25
F07		1	21	25
F12		1	32	35

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.*

TABLE 5
Electrical Specifications – W**ACE 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. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C
W42ACE A15	230/208-1	1 or 2	107	110	2	6	55	52		60	60		6	6		10	10	
B15	230/208-1	2	66	70	4	8	39	28		40	30		8	10		10	10	
C15	460-3	1	34	35	8	10												
W48ACE A15	230/208-1	1 or 2	11	125	2	6	58	53		60	60		6			10	10	
B15	230/208-1	2	68	70	4	8	46	22		50	30		8	6		10	10	
C15	460-3	1	33	35	8	10								10				
W60ACE A15	230/208-1	1 or 2	114	125	2	6	58	56		60	60		6	6		10	10	
B15	230/208-1	2	71	80	4	8	46	22		50	30		8	10		10	10	
C15	460-3	1	35	40	8	10												
W72ACE A15	230/208-1	1 or 3	132	150	1/0	6	54	52	26	60	60	30	6	6	10	10	10	10
B15	230/208-1	2	81	90	4	8	55	26		60	30		6	10		10	10	
C15	460-3	1	40	45	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.

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

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

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 current carrying conductors are in a raceway.*

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 th-Tune 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.

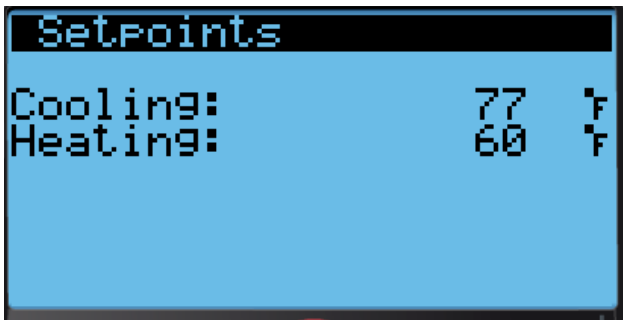
To turn the unit on or off with TEC-EYE:

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 10).
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 10
Cooling and Heating Setpoints

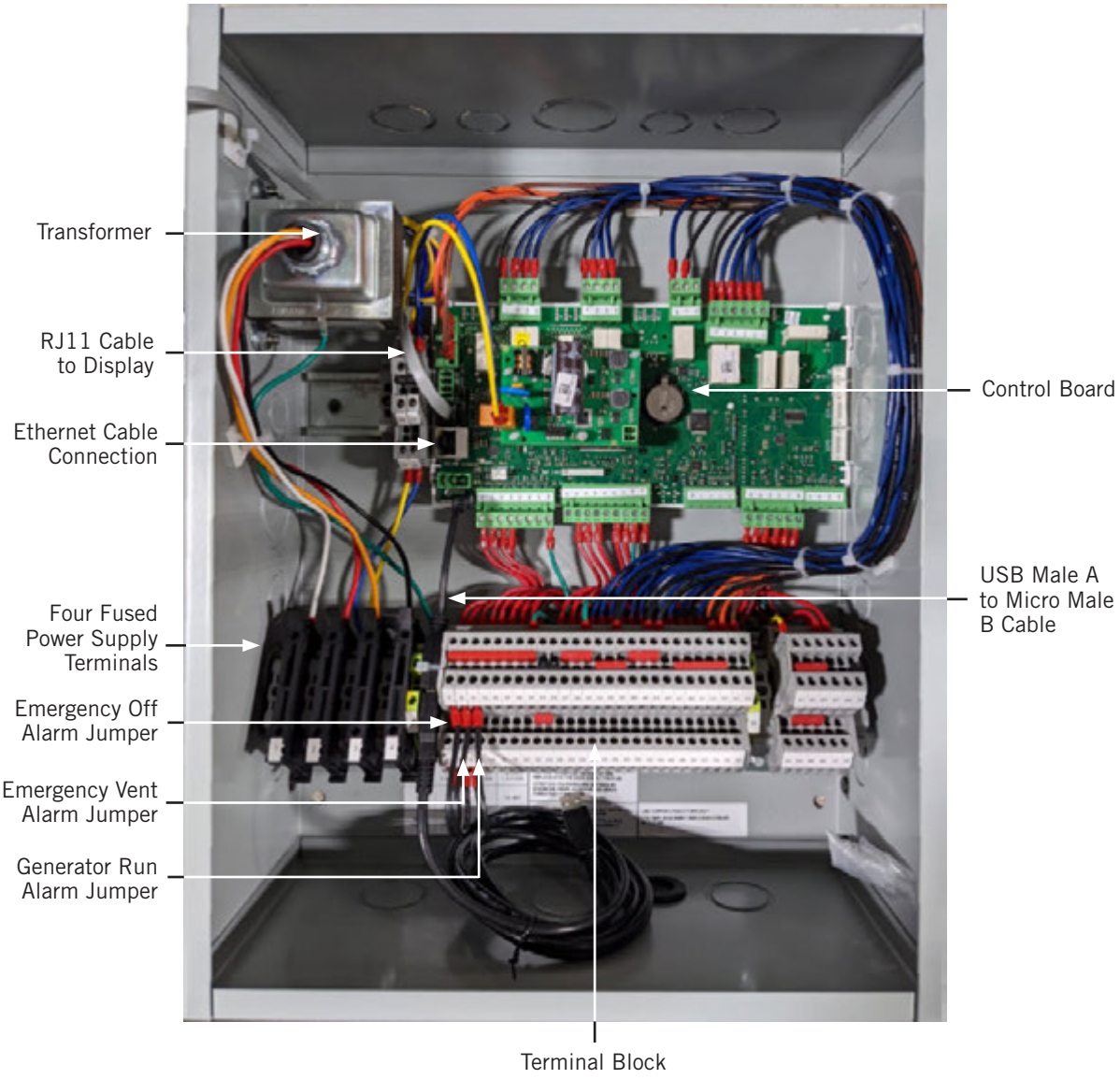


During installation, the ability to run in orphan mode allows deactivation of one of the existing, older wall-mount units, while keeping the shelter cool with the other unit still operating. Once the first of the Bard MULTI-TEC wall-mount units is installed, orphan mode can be enabled early in the installation—keeping 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 11
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.

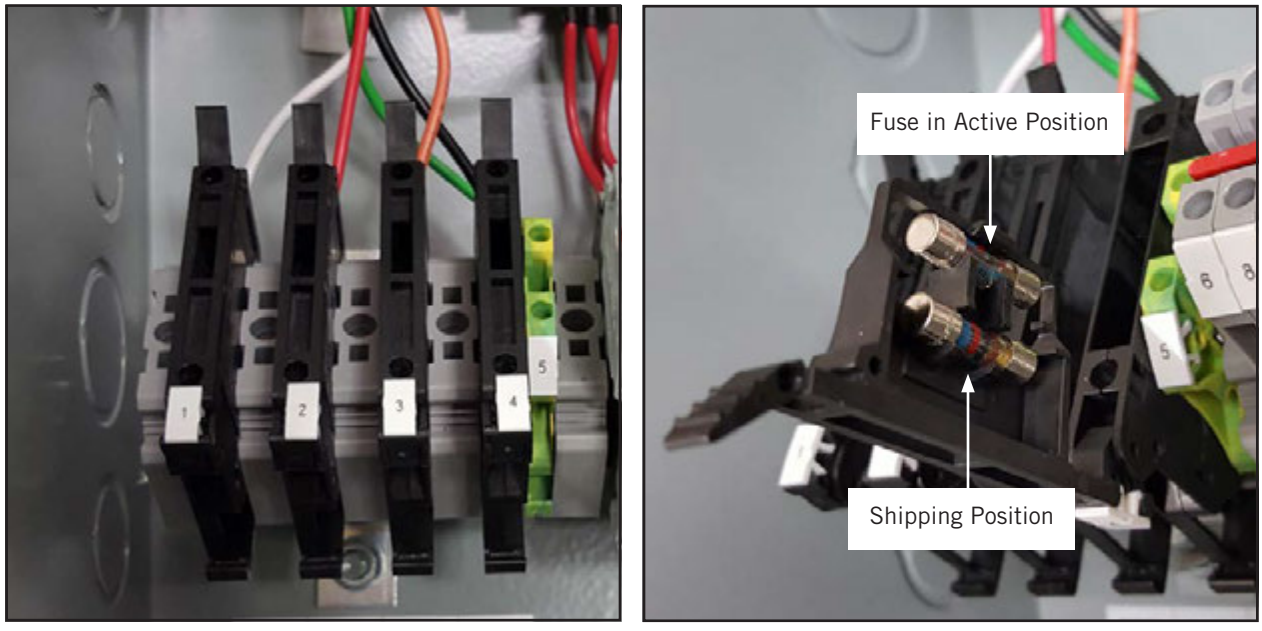
Mounting the LC6000 Controller

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 knock outs 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 12.

FIGURE 12
LC6000 Fused Power Supply Terminal



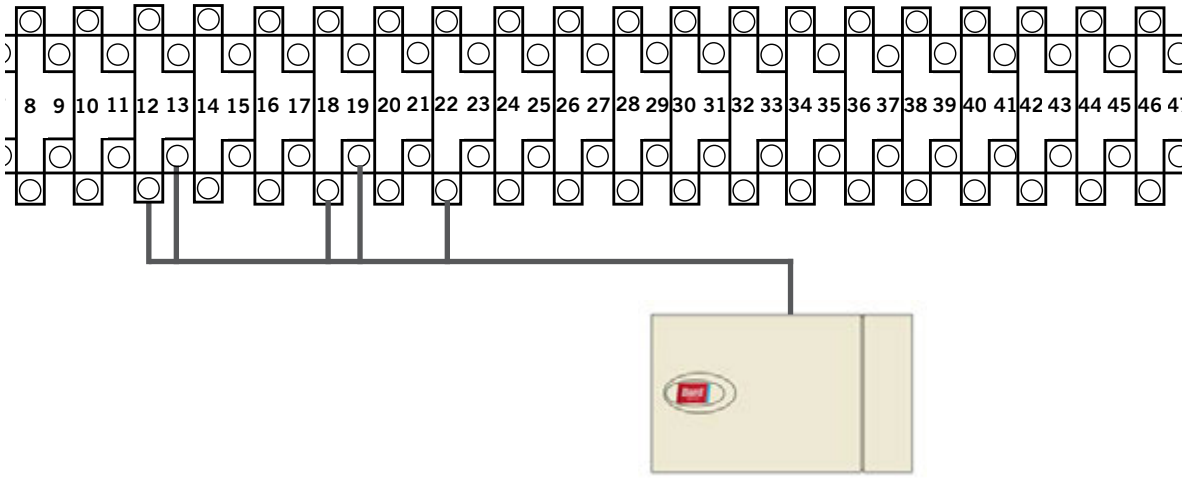
Installing Remote Indoor Temperature/Humidity Sensor(s)

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 13
Remote Indoor Temperature/Humidity Sensor Installation

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

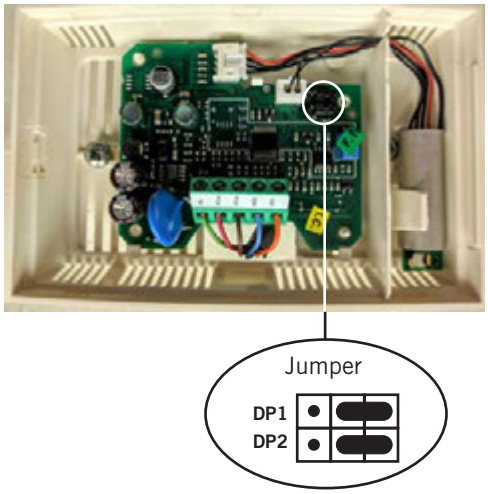
TB#	Wire Mark	Sensor	Description
18	B6	NTC OUT	Indoor Remote Sensor (Zone 1)
19	GND	NTC OUT	Ground
12	B2	OUT H	Remote Indoor Humidity Sensor: 0-1 VDC (Zone 1)
13	GND	M (GO)	Ground
22	+VDC	+ (G)	Power for B2

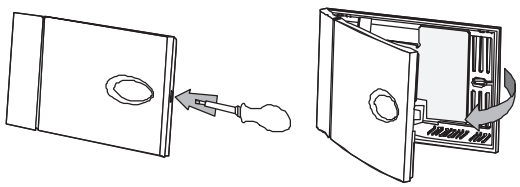


2. Connect the other end of the shielded cable to the sensor terminals. Be sure wires are connected to proper terminals as shown in table above.

   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 42 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 20. 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 35).

FIGURE 14
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 13*

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 13*

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.

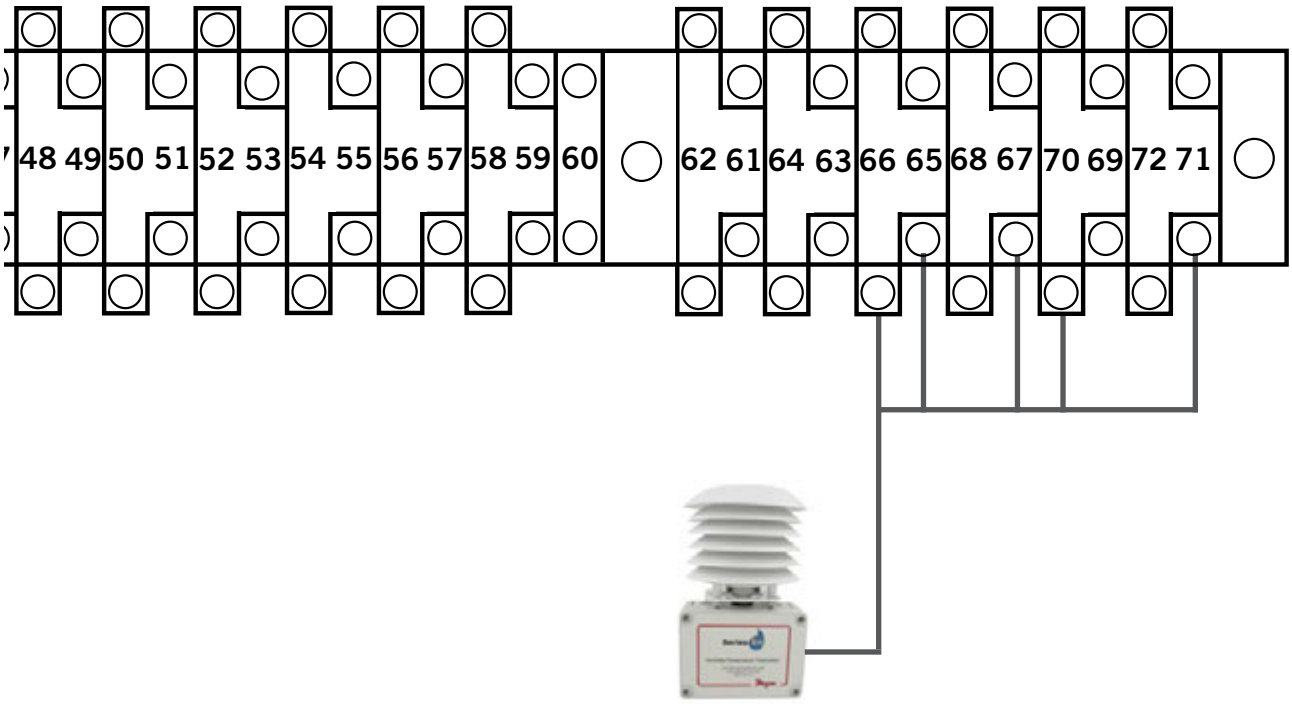
Installing Optional Outdoor Temperature/Humidity Sensor

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 15
Remote Outside 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

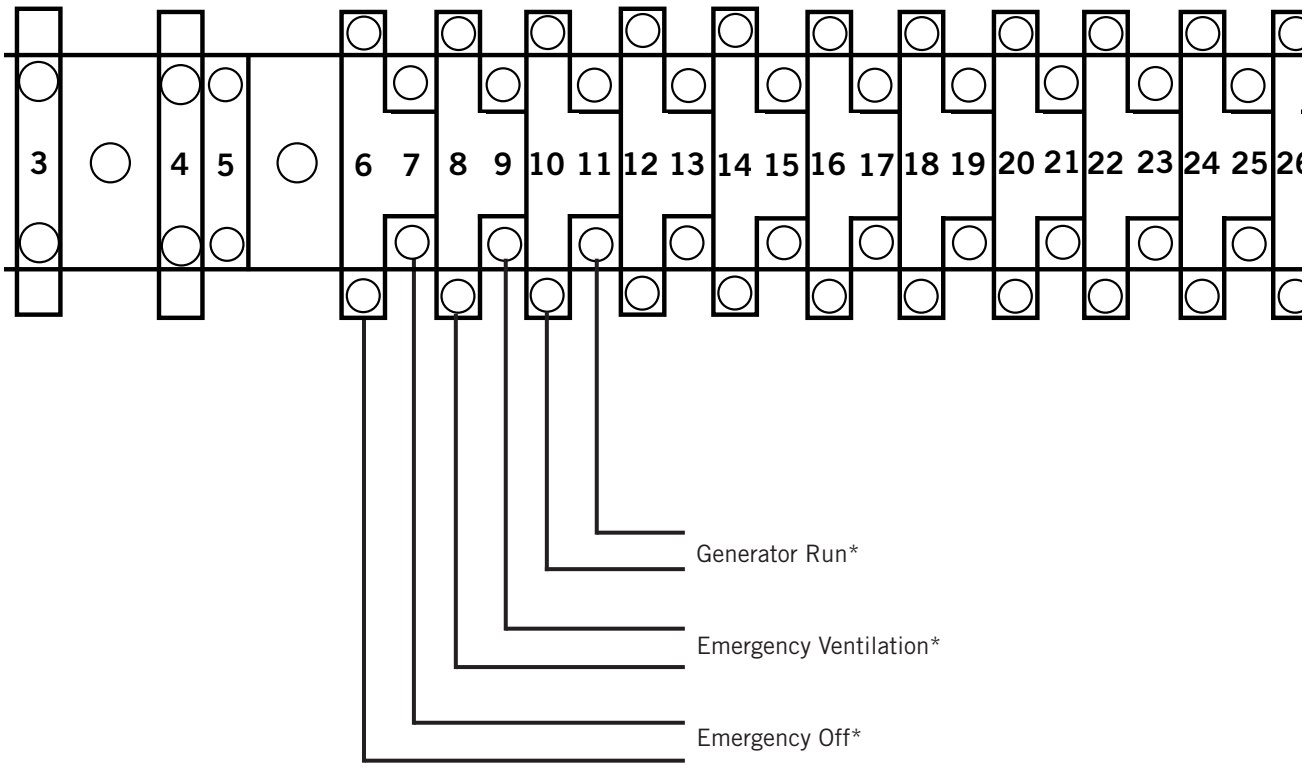


2. Connect the other end of the shielded cable to the sensor terminals. Be sure wires are connected to proper terminals as shown in table above.

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 16
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

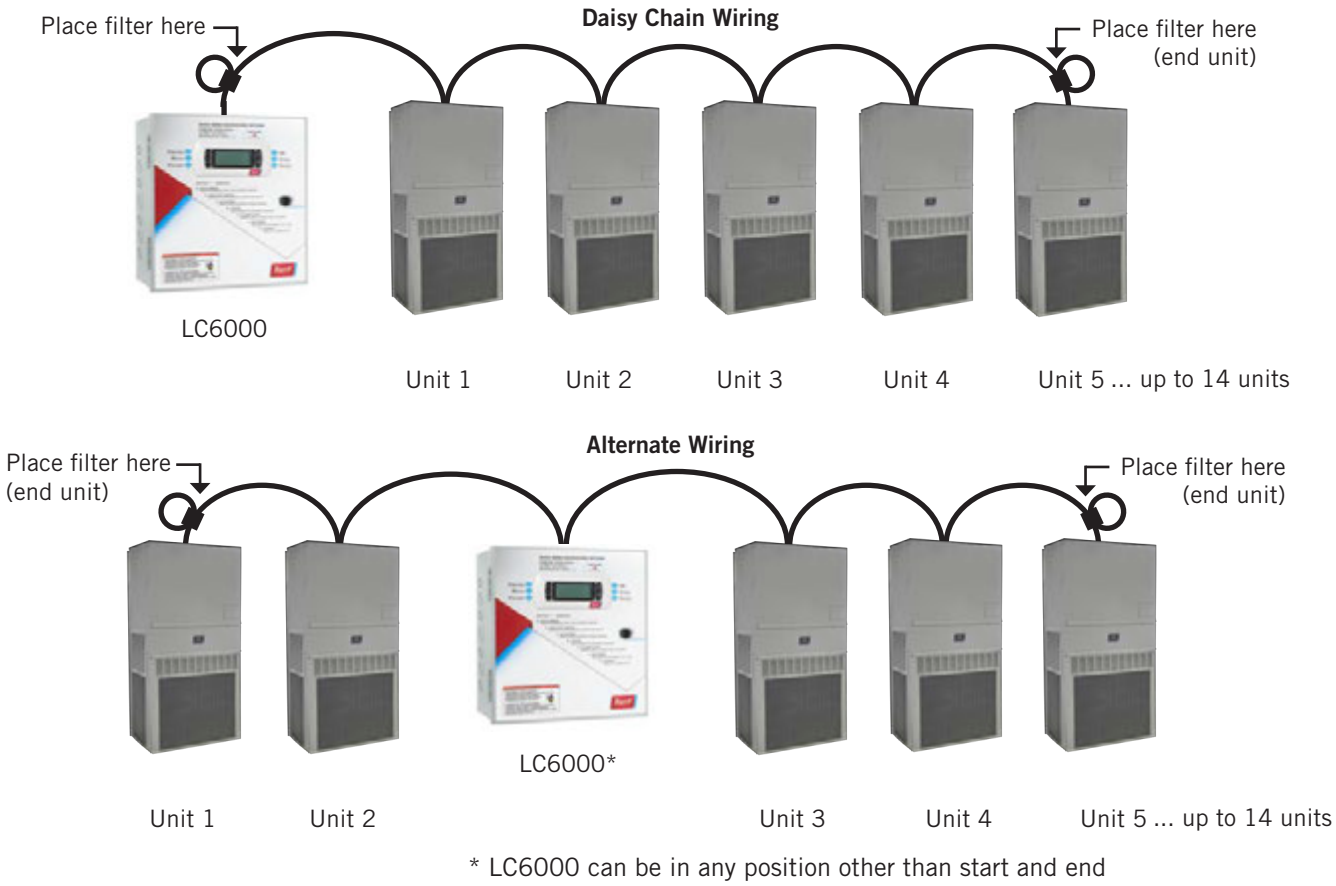
Connect the communication wiring from the wall-mount units to the controller in the manner shown in Figures 17, 18 or 19. **The daisy chain does not need to follow the addressing order.** The communication wire should be 2-wire, 18 gauge shielded cable with drain. Any color can be used. Be sure to match "+" and "-" symbols on controller terminal blocks to prewired unit control terminal block (see Figures 21 and 22 on pages 27 and 28). Attach communication wire filters as shown in Figures 17, 18 or 19. **Do not run communication wiring in same conduit as supply wiring. Route communication wiring and power supply wiring in their own separate conduits.**

FIGURE 17
Communication Wiring (Daisy Chain Method)

In addition to the "daisy chain" method of connecting the communication wiring shown in Figure 17, the wall-mount units can also be connected in the manner shown in Figure 18. If connecting wall-units this way, be sure to place the communication wire filters in the positions shown in Figure 18. See Figure 19 for more information on the correct placement of the communication wire filters depending on the wiring method used.

FIGURE 18
Communication Wiring (Alternate Method)

FIGURE 19
Placement of Communication Wire Filters (Daisy Chain and Alternate Methods)



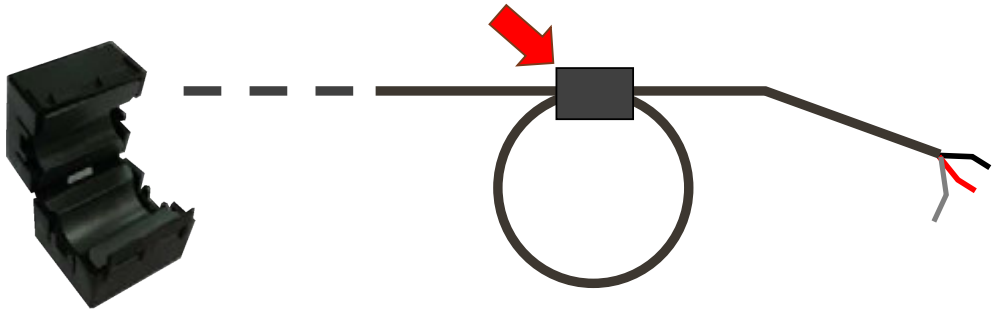
* LC6000 can be in any position other than start and end

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 17. If using the alternate method (as shown in Figure 18), 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 19.

FIGURE 20
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.

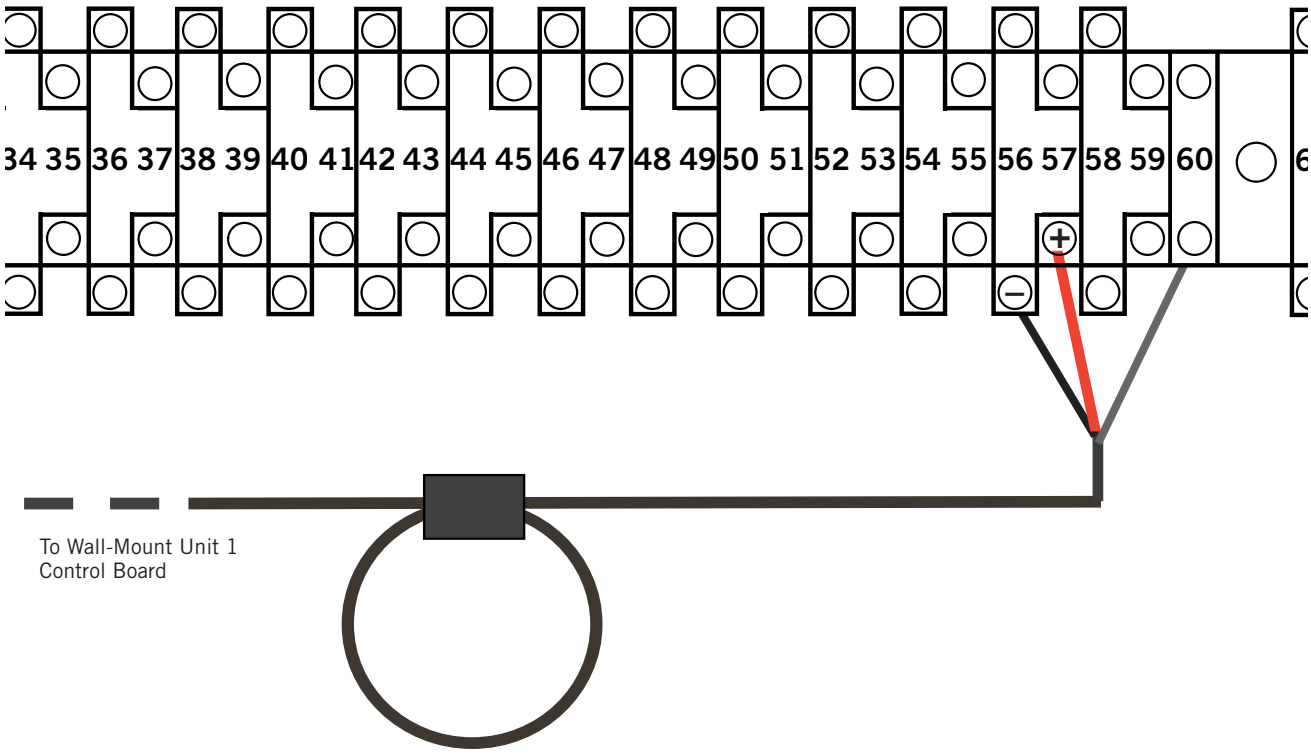
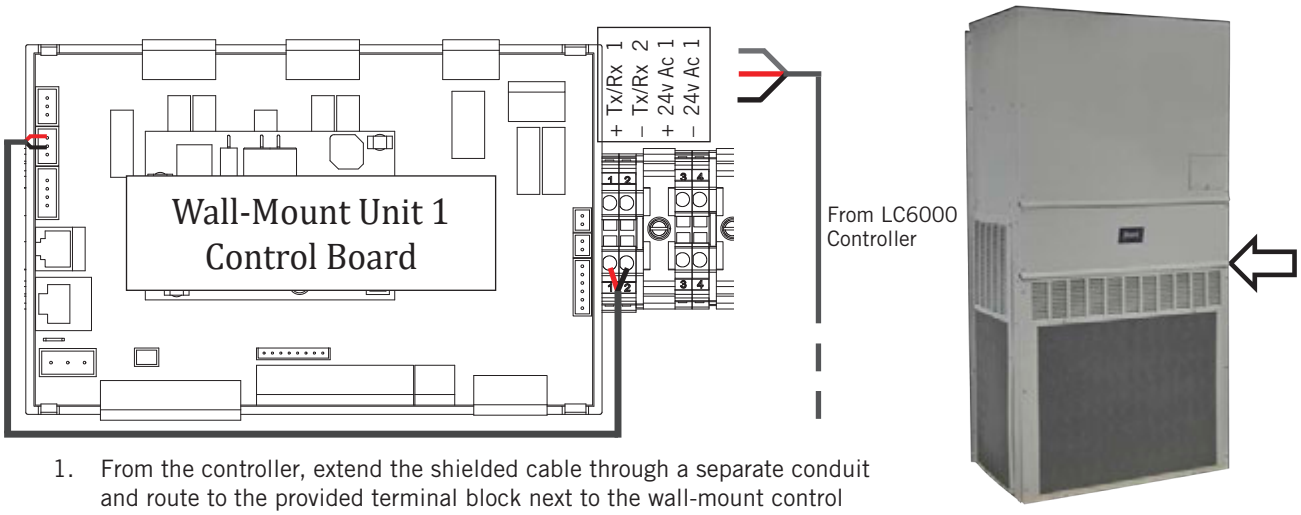
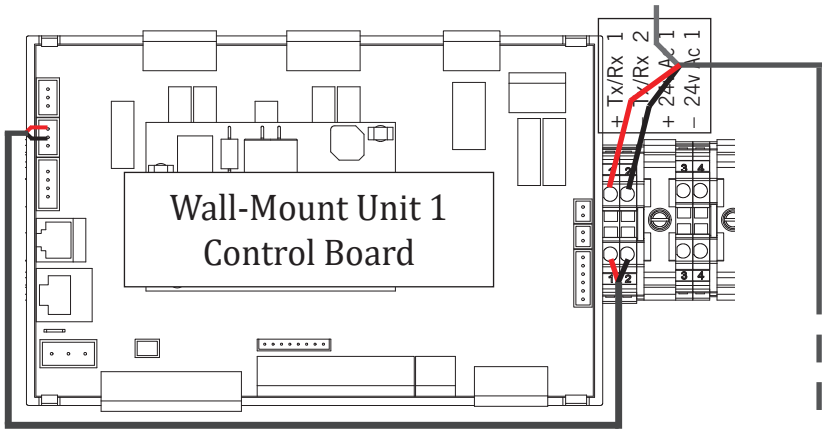


FIGURE 21
Communication Wiring: Termination at the First Wall-Mount Unit

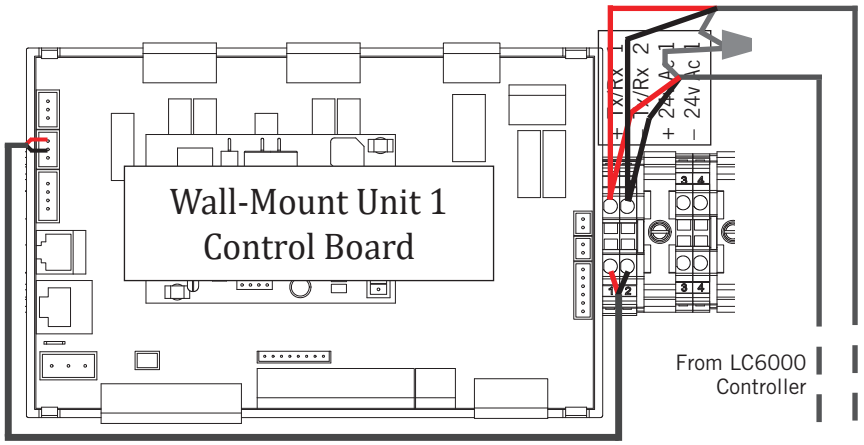


1. From the controller, extend the shielded cable through a separate conduit and route to the provided terminal block next to the wall-mount control board.

   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.

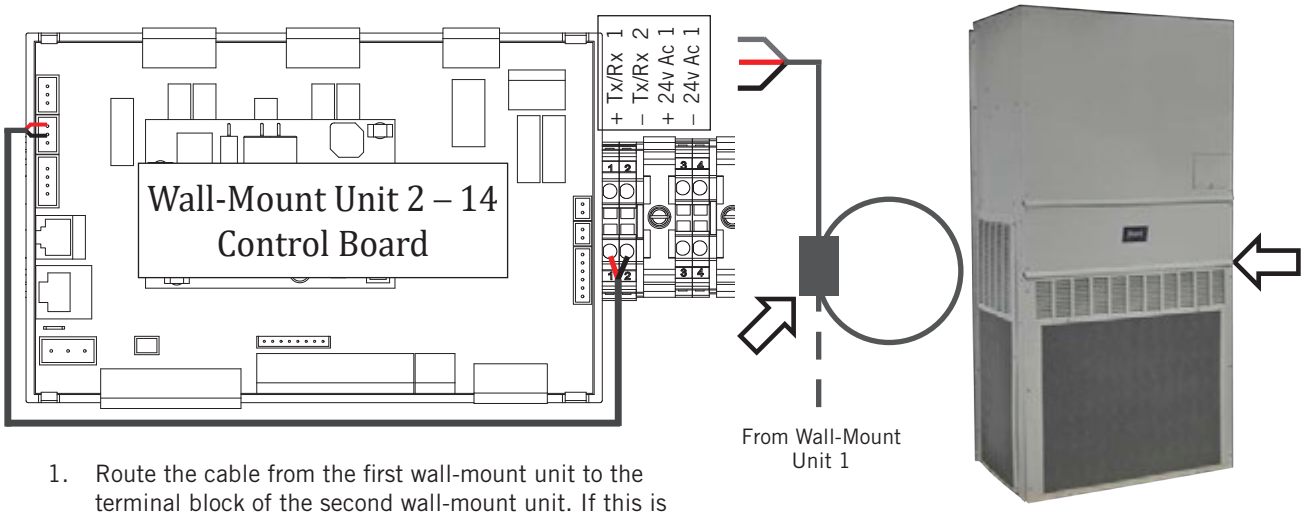


2. Connect the wires matching the terminal designations (+/-) of the controller terminals. Leave the drain wire loose.

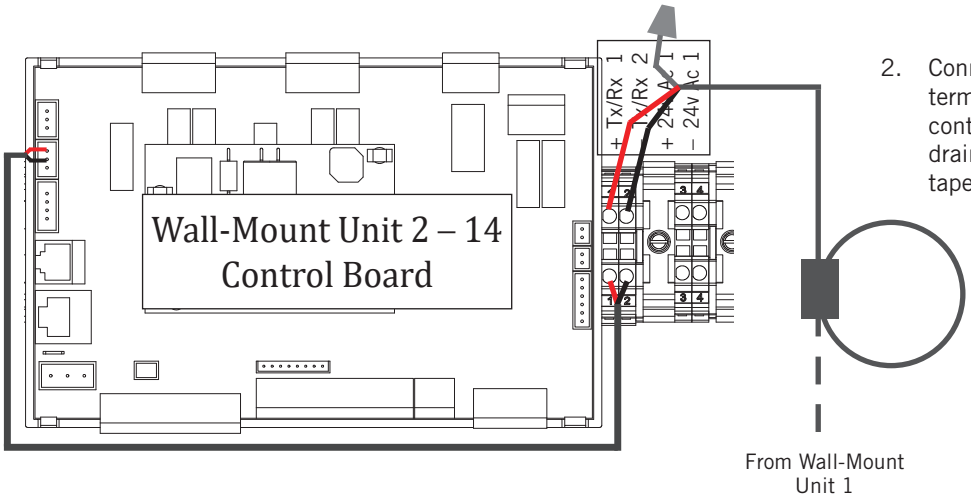


3. Connect another cable in a similar fashion (“daisy chain”) to route in conduit to the second wall-mount unit. Connect both drain wires with wire nut. Maximum two wires per terminal.

FIGURE 22
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 23). 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 24. **Failing to ground the controller box properly could result in damage to the equipment.**

FIGURE 23
LC6000 Controller Circuit Install

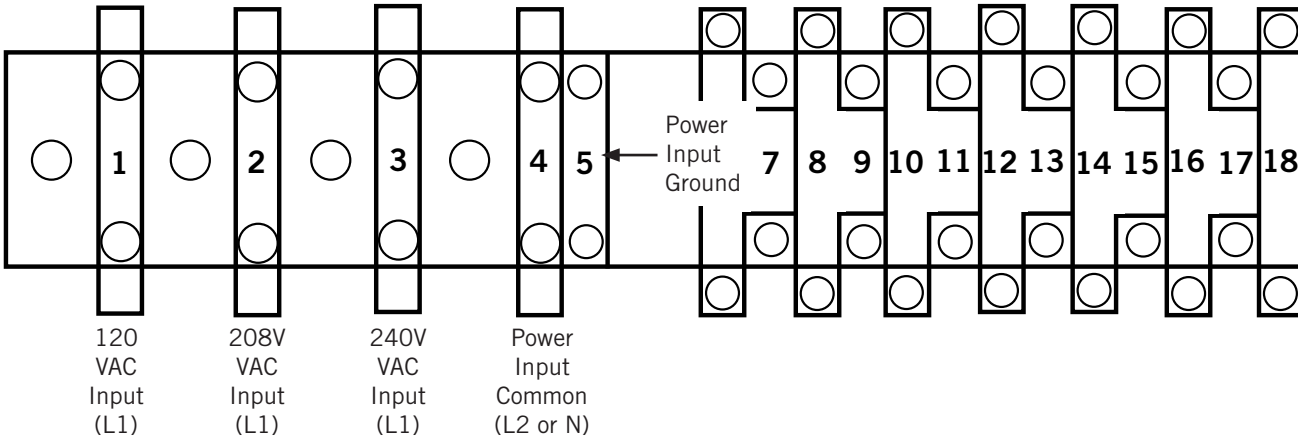
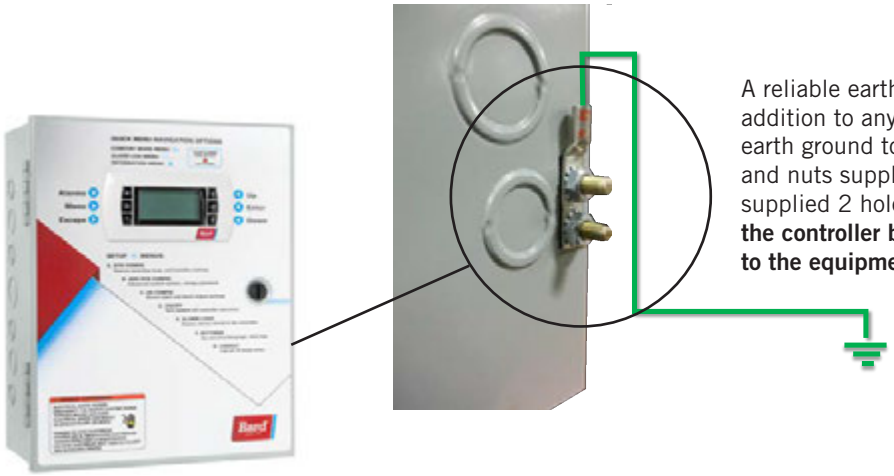


FIGURE 24
Controller Grounding Posts



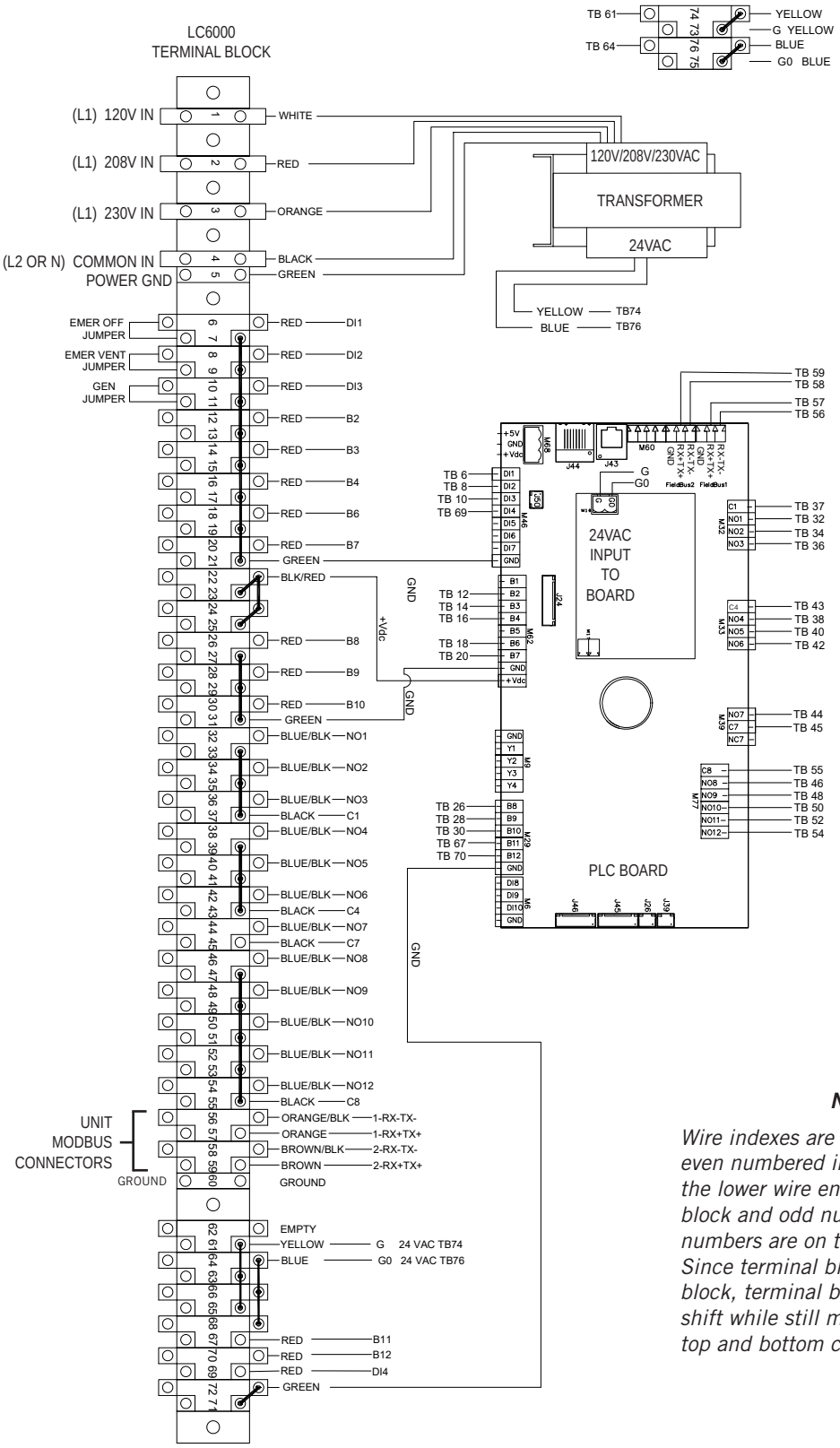
A reliable earth ground must be connected in addition to any grounding from conduit. Attach earth ground to side of controller box using bolts and nuts supplied with controller and field-supplied 2 hole grounding lug. **Failing to ground the controller box properly could result in damage to the equipment.**

TABLE 6
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 25
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 7
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 2100-725 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 26.

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 26
TEC-EYE Connection to Unit Control

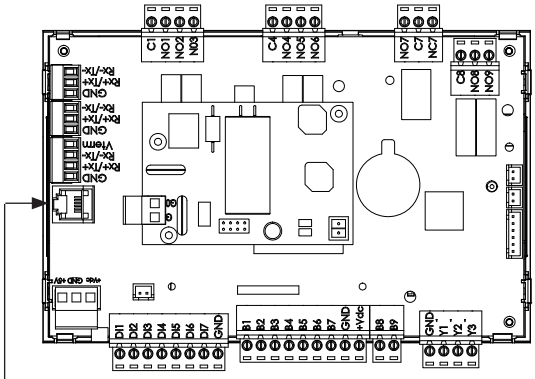


FIGURE 27
TEC-EYE (Bard P/N 8301-059) Display and Interface (Status Screen Shown)

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 27). 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 8 on page 41 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**

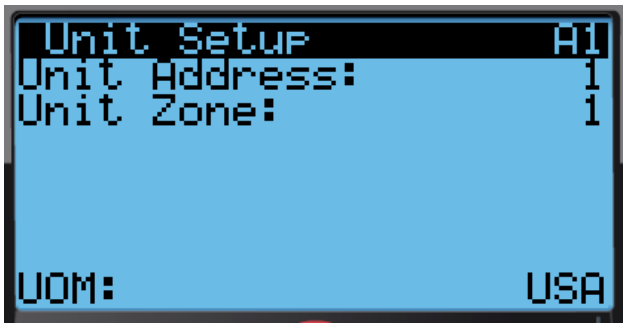
   Each unit must have a unique address for the system to operate correctly with the LC controller (*Ex: 1, 2, 3, ...14 depending on the number of units*). The unit only needs the address to be changed for the communication to work properly. The wall-mount unit address is displayed in the upper right corner on the Status screen on the TEC-EYE display (see Figure 27).

   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 28).
   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 28
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 28).
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 Self Test on Each Unit**

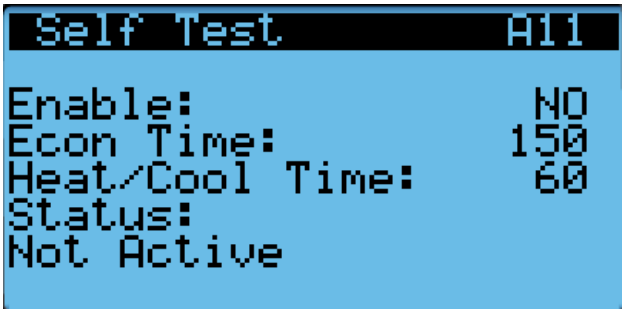
   Execute a self test on each unit to verify the equipment is functioning correctly. The self test parameters are not adjustable.

   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 **Self Test A11** screen.

5) Press ENTER key to scroll to **Self Test Enable** parameter (see Figure 29).

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

FIGURE 29
Executing Self 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 self 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. Self 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.

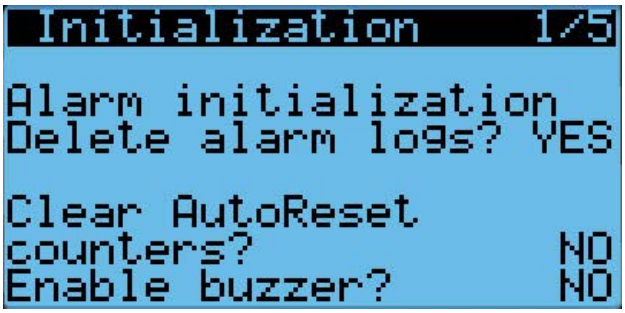
5) Press UP or DOWN keys to scroll to **Initialization 1/5**; press ENTER key.

6) Press ENTER key to scroll to **Delete alarm logs?** (see Figure 30).

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

8) Press ENTER key to clear all alarm logs.

FIGURE 30
Clearing Unit Alarm Logs



After each of the wall-mount units have been addressed, had a self 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 33).

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 31).

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 31
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 40.

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 32).

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

FIGURE 32
Enable/Disable Zone 1 Indoor Humidity Sensor

FIGURE 33
LC6000 Controller Display and Interface (Status Screen Shown)

LC6000 interface key functions are the same as those shown for the TEC-EYE in Figure 27 on page 32.

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 34).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 34
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 35).

FIGURE 35
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**:

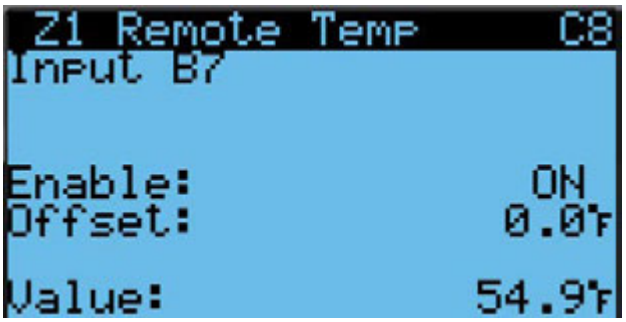
1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.
4) Press UP or DOWN keys to scroll to **Z1 Indoor Temp C7**.
5) Press ENTER key to scroll to **Enable** (see Figure 36).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

FIGURE 36
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 37).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

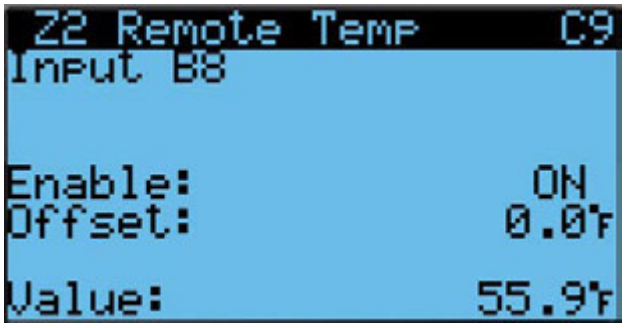
FIGURE 37
Enable/Disable Zone 1 Remote Temperature Sensor



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 38).
6) Press UP or DOWN key to change value to ON to enable sensor (or change value to OFF to disable sensor).

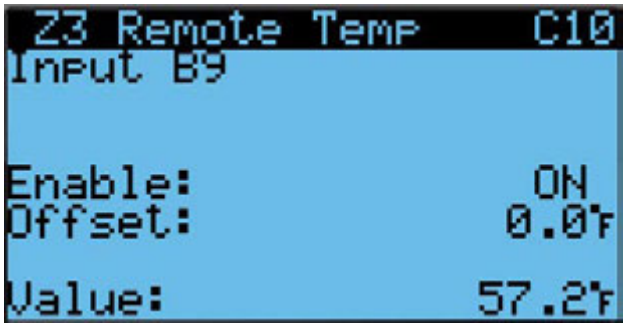
FIGURE 38
Enable/Disable Zone 2 Remote Temperature Sensor



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 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 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 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 Outdoor Air Humidity Sensor

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

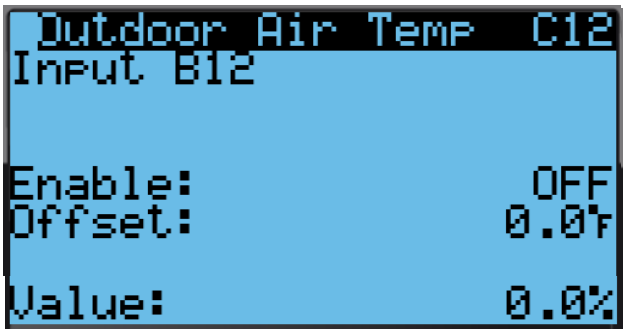
1) Press MENU key to go to the Main Menu screen.
2) Use UP or DOWN keys and ENTER key to enter USER password 2000.
3) Press UP or DOWN keys to scroll to **IO Config**; press ENTER key.

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

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

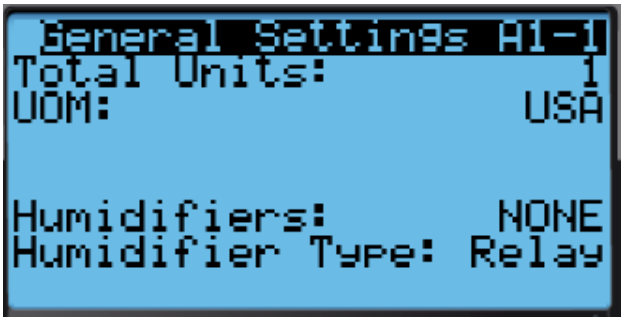
5) Press ENTER key to scroll to **Total Units** (see Figure 42).

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 42
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 2100-725.

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.

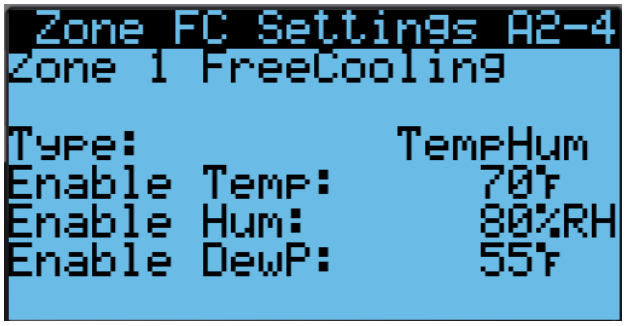
5) Press UP or DOWN keys to scroll to **Zone FC Settings A2-4** (Zone 1), **Zone FC Settings A3-4** (Zone 2) or **Zone FC Settings A4-4** (Zone 3).

6) Press ENTER key to scroll to **Type** (see Figure 43).

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

8) Press ENTER key to save.

FIGURE 43
Selecting Economizer Type



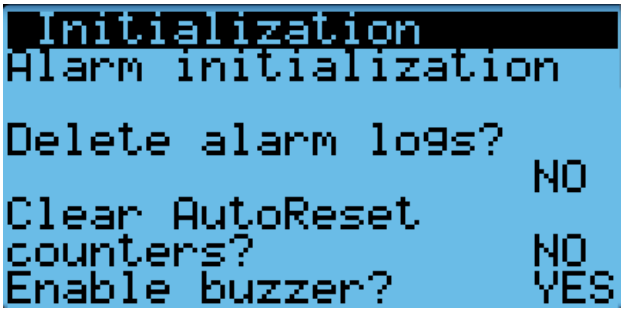
9. Clear Controller Alarm Logs

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 44).
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 44
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 self test results were satisfactory, the installation can now be considered “complete".

Additional programming information can be found in MULTI-TEC Service Instructions 2100-725 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)

Alarm Export: User (2000)

7 Day I/O Log: 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 45).
6. Press UP or DOWN keys to add or subtract to the sensor offset value.
7. Press ENTER key to save.

FIGURE 45
Adjusting Sensor Offset Value

TABLE 8
MULTI-TEC 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.
Self Test	Self test in operation.
Off by Alarm	All functions/modes of operation are disabled.
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.
Emergency Cool	Emergency cooling mode is active.
Emergency Off	Emergency off mode is active.

TABLE 9
LC6000 Status Messages

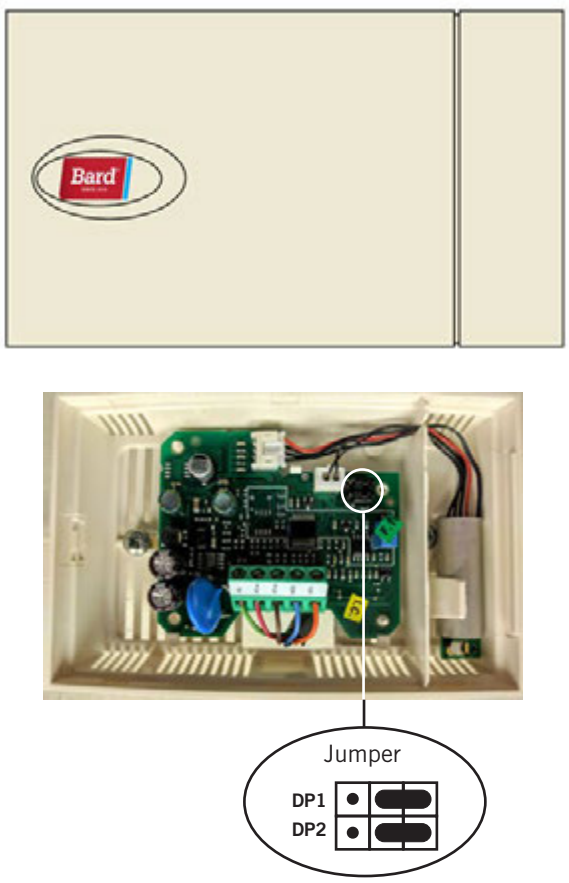
Message	Status #	Description
On	1	The LC6000 is ready and functioning properly.
Off by BMS	6	The LC6000 is being turned off by the Building Management System through Modbus TCP/IP.
Off by Keyboard	9	The LC6000 is turned off using the (D. On/Off) Menu on the PGD. All communicating units will be inactive.
Comfort Mode	11	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	12	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 for emergency cooling sequence.)
Emergency Vent	13	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.

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 46). Earlier versions of this sensor were installed so that the sensor wires entered through the top of the back of the sensor (see Figure 47). **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.**

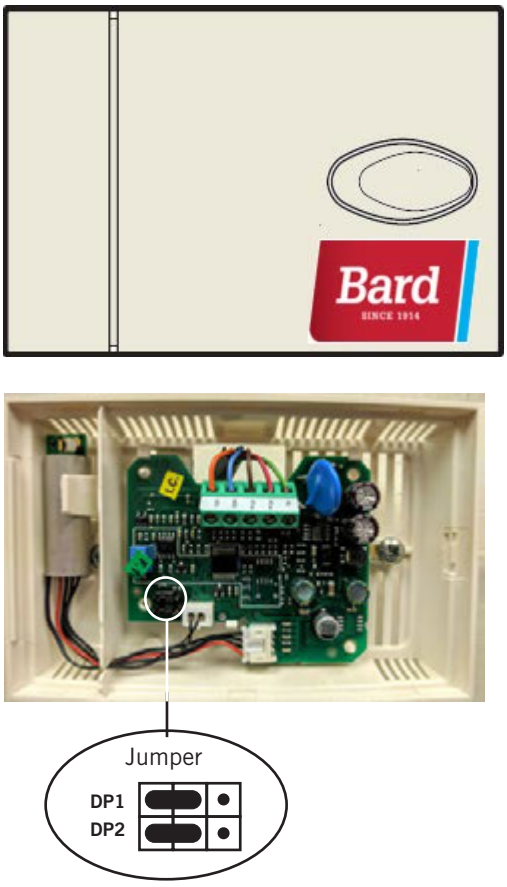
This applies to all indoor temperature/humidity sensors connected to the LC controller. See illustration mounted inside of sensor cover for further detail on jumper position.

FIGURE 46
Current Sensor Orientation
(Shielded Cable Wires Enter from Bottom)



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

FIGURE 47
Earlier Sensor Orientation
(Shielded Cable Wires Enter from Top)



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

Quick Start Guide

MULTI-TEC®/LC6000 Air Conditioning System

This quick start guide is designed to lead an installer through the steps necessary for setting up a Bard air conditioning system composed of MULTI-TEC wall-mount units paired with an LC6000 controller. See the latest versions of MULTI-TEC/LC6000 System Installation Instructions 2100-726, MULTI-TEC Service Instructions 2100-725 and LC6000 Service Instructions 2100-669 for more detailed information on the installation, service and maintenance of this Bard air conditioning system.

The TEC-EYE™ hand-held diagnostic tool and LC6000 controller will both be used in this installation. The TEC-EYE diagnostic tool is shipped inside the controller and a cable is included to connect it to the wall-mount unit control board.

NOTICE

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

SYSTEM SET-UP

Set up and configuration must be done to each MULTI-TEC wall-mount unit using the TEC-EYE hand-held diagnostic tool. Use the LC6000 controller for the remaining steps.

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.*

Address each wall unit and select unit zone and unit of measure (TEC-EYE)

The address of the unit being set up will be listed in the upper right hand corner on the status screen. The available addresses are 1-14.

1. Remove outer and inner unit control panel doors.
2. Connect TEC-EYE to wall-mount unit control board.
3. Press MENU key to access the Main Menu screen.
4. Press UP/DOWN/ENTER keys to enter password 1313.
5. Press UP/DOWN keys to scroll to **Sys Config**; press ENTER key.
6. Press ENTER key to scroll to **Unit Address.**
7. Press UP/DOWN keys to change address to value between 1 and 14.

   NOTE: *Each unit must have a unique address for the communication to work properly. Bard also recommends labeling each unit for ease in identification.*
8. Press ENTER key to save and scroll to **Zone**.
9. If desired, press UP/DOWN keys to change the value to the desired zone (1, 2 or 3).
10. Press ENTER key to scroll to **UOM** (unit of measure**)**.
11. Press UP/DOWN keys to change the value from **USA** to **SI**, **NC**, **LON**, **CAN** or **UK**. Units are preconfigured for each selection.
12. Press ENTER key to save.

Execute a run test on each unit to verify the equipment is functioning correctly (TEC-EYE)

1. Use UP/DOWN keys to scroll to **Run Test A11**.
2. Press ENTER key to scroll to **Run Test Enable** parameter.
3. Use UP/DOWN key to change value to **ON**. The run test will begin.

See most recent version of Installation Instructions 2100-726 if additional information on run testing units is needed.

Clear unit alarm logs on each unit (TEC-EYE)

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/DOWN/ENTER keys to enter password 1313.
3. Press UP/DOWN keys to scroll to **Settings**; press ENTER key.
4. Press UP/DOWN keys to scroll to **Initialization**; press ENTER key.
5. Press ENTER key to scroll to **Delete alarm logs?**.
6. Press UP/DOWN key to change value to **YES**; press ENTER key.

After first unit has been set up and configured, follow the above steps to set up and configure the remaining units.

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

Set LC Controller Date/Time (LC Controller)

1. Press MENU key to access the Main Menu screen.
2. Use UP/DOWN/ENTER keys to enter password 1313.
3. Press the UP/DOWN keys to scroll to the **Settings** menu; press ENTER key.
4. Press UP/DOWN keys to scroll to **Date/Time** menu; press ENTER key.

5. Press UP/DOWN keys to scroll to **Date/Time change**.
6. Press ENTER key to scroll to the desired value to be changed.
7. Press UP/DOWN keys to change the value.
8. Press ENTER key to save and scroll to top of screen.
9. Press UP/DOWN keys to scroll to **Timezone** (if applicable). Follow steps 6-8 to change timezone.
10. Press the ESCAPE key several times to return to Main Menu screen.

Configure sensors (LC Controller)

One remote temperature/humidity sensor is included with the controller. An additional remote indoor temperature sensor can be installed in Zone 1. Additional remote temperature/humidity sensors or temperature-only sensors (one per zone) can be installed in Zones 2 and 3 (if applicable). One optional outdoor temperature/humidity sensor can also be installed. The controller must be configured to match the installed sensors. The Zone 1 Indoor Humidity and Zone 1 Indoor Temperature sensors are enabled by default. The additional humidity and temperature sensors are disabled by default.

See Installation Instructions 2100-726 for information on configuring (enabling/disabling) sensors. If necessary, the sensors can be calibrated at this time too. For information on calibrating the sensors, see manual 2100-726.

See LC6000 Service Instructions manual 2100-669 for information on setting up emergency off, emergency ventilation and generator relays (if applicable).

Enter total number of units (LC Controller)

1. Press MENU key to go to the Main Menu screen.
2. Use UP/DOWN/ENTER keys to enter password 1313.
3. Press UP/DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP/DOWN keys to scroll to **General**; press ENTER key.
5. Press ENTER key to scroll to **Total Units**.
6. Press UP/DOWN keys to adjust value to correct number of units.
7. Press ENTER key to save.

Verify units are online (LC Controller)

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 LC Information screens.

To view these screens:

1. Press ESCAPE key to view the Status screen. (May need to be pressed more than once.)
2. Press UP/DOWN key until the Quick Menu in the lower right corner of the screen displays the Information icon (); press ENTER key.
3. Press UP/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.

Select economizer type for each zone (LC Controller)

Each zone can be configured to operate the economizers with different considerations. For more information on the different economizer choices, reference MULTI-TEC Service Manual 2100-725. The type of consideration can be changed 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 free cooling type for each zone:

1. Press MENU key to go to the Main Menu screen.
2. Use UP/DOWN/ENTER keys to enter password 1313.
3. Press UP/DOWN keys to scroll to **Sys Config**; press ENTER key.
4. Press UP/DOWN keys to scroll to **Zone 1**, **Zone 2** or **Zone 3**; press ENTER key.
5. Press UP/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**.
7. Press UP/DOWN keys to change economizer type to **None**, **Drybulb**, **TempHum** or **Enthalpy**.
8. Press ENTER key to save.

Clear controller alarm logs (LC Controller)

The LC6000 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/DOWN/ENTER keys to enter password 1313.
3. Press UP/DOWN keys to scroll to **Settings**; press ENTER key.
4. Press UP/DOWN keys to scroll to **Initialization**; press ENTER key.
5. Press ENTER key to scroll to **Delete alarm logs?**
6. Press UP/DOWN key to change value to **YES**; press ENTER key.
7. Press ESCAPE key several times to return to Main Menu screen.

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”.