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# INSTALLATION INSTRUCTIONS

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## 11EER WA Series Wall Mount Air Conditioner

Models:

W12AF-A W12AF-K



Bard Manufacturing Company, Inc.  
Bryan, Ohio 43506  
[www.bardhvac.com](http://www.bardhvac.com)

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# SAFETY INSTRUCTIONS

## READ ALL INSTRUCTIONS BEFORE USE

### Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read and follow all safety messages.

### 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.*

*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.*

**NOTICE**


**APPLIANCE ACCESSIBLE TO THE GENERAL PUBLIC.**

 **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.*

## **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**

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

***This appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)***

## **WARNING**

***Do not pierce or burn through copper.***

***Be aware that the refrigerant used in system may not contain an odor.***

***Ducts connected to appliance shall not contain a POTENTIAL IGNITION SOURCE.***

The following symbols are displayed on units.



This symbol indicates that the unit contains a mildly flammable refrigerant.

Refrigerant  
Safety Group  
A2L

This symbol indicates that the refrigerant used is classified as an A2L, or mildly flammable refrigerant.



This symbol indicates that the Operation Manual should be read carefully.



This symbol indicates that a service personnel should be handling this equipment with reference to the Installation Manual.



This symbol indicates that information is available such as the Operation Manual or Installation Manual.

## IMPORTANT SAFETY INSTRUCTIONS



### WARNING

**To reduce the risk of explosion, fire, death, electric shock, scalding or injury to persons when using this product, follow basic precautions, including the following:**

#### GENERAL

- The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- The refrigerant system is completely assembled and charged. All internal wiring is complete.
- The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.
- These instructions explain the recommended method to install the air-cooled self-contained unit and the electrical wiring connections to the unit.
- These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.
- While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Additional Publications for information on codes and standards.
- Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

#### INSTALLATION

- For appliances intended for use at altitudes exceeding 2,000 meters (6,562 feet), the maximum altitude of use shall be stated.
- Before use, the appliance must be properly installed as described in this manual.
- Contact the authorized service technician for repair or maintenance of this unit.
- Contact the installer for installation of this unit.
- The air conditioner is not intended for use by young children or invalids without supervision.
- Young children should be supervised to ensure that they do not play with the air conditioner.
- Installation work must be performed in accordance with the National Electric Code by qualified and authorized personnel only.
- Connect to a properly rated, protected, and sized power circuit to avoid electrical overload.
- Adhere to all industry recommended safety procedures including the use of long-sleeved gloves and safety glasses.
- Use care when unpacking and installing. The edges of the product may be sharp.
- Keep packaging materials out of the reach of children. These materials can pose a suffocation risk to children.
- Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 700°C and electric switching devices.

## IMPORTANT SAFETY INSTRUCTIONS



### WARNING

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#### OPERATION

- This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Use this appliance only for its intended purpose.
- Never attempt to operate this appliance if it is damaged, malfunctioning, partially disassembled, or has missing or broken parts.
- Do not tamper with controls.
- Keep all required ventilation openings clear of obstructions.
- Ducts connected to an appliance shall not contain a POTENTIAL IGNITION SOURCE.

# INSTRUCTIONS DE SÉCURITÉ

## LIRE TOUTES LES INSTRUCTIONS AVANT UTILISATION

### Votre sécurité et celle des autres sont très importantes.

Nous avons fourni de nombreux messages de sécurité importants dans ce manuel et sur votre appareil. Lisez et suivez toujours tous les messages de sécurité.

### Définitions ANSI Z535.5 :

**DANGER** : Indique une situation dangereuse qui, si elle n'est pas évitée, entraînera certainement la mort ou des blessures graves. Le mot « DANGER » doit être limité aux situations extrêmes. Les indications « DANGER » ne doivent pas être utilisées pour les risques de dégâts matériels, à moins qu'il n'existe un risque concomitant de blessures corporelles.

**AVERTISSEMENT** : Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves. Les indications « AVERTISSEMENT » ne doivent pas être utilisées pour les risques de dégâts matériels, à moins qu'il n'existe un risque concomitant de blessures corporelles.

**ATTENTION** : Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures à modérées. Les indications « ATTENTION », sans symbole d'avertissement, peuvent être utilisées pour alerter sur des pratiques dangereuses pouvant entraîner des dégâts matériels uniquement.

**REMARQUE** : cet avis concerne les pratiques n'entraînant aucune blessure corporelle. Le symbole d'avertissement ne doit pas être utilisé avec ce mot. Comme alternative à « AVIS », le mot « ATTENTION » sans symbole d'avertissement peut être utilisé pour indiquer un message non lié à des blessures corporelles.



**AVERTISSEMENT**

*Risque de choc électrique.*

*Ne pas faire fonctionner cet équipement sans qu'il soit relié à la terre et toujours débrancher les alimentations électriques avant de procéder aux opérations d'entretien.*

*Une électrisation peut entraîner des blessures graves ou la mort.*

**REMARQUE**


**APPAREIL ACCESSIBLE AU GRAND PUBLIC.**

**AVERTISSEMENT**

*Risque d'incendie.*

*Conserver un dégagement minimal de 6,35 mm/1/4 po entre le conduit d'air soufflé et les matériaux combustibles sur les 900 premiers millimètres (3 pi) du conduit.*

*Le non-respect de cette consigne entraîne des risques de dégâts matériels, de blessures corporelles ou de décès.*

**AVERTISSEMENT**

*Risque lié aux objets lourds.*

*Plusieurs personnes sont nécessaires à la manipulation de l'unité.*

*Le non-respect de cette consigne peut entraîner dégâts à l'unité ou des blessures graves.*



## AVERTISSEMENT

**Risque de choc électrique.**

**Ces tâches doivent être réalisées par une personne parfaitement qualifiée et formée.**

**Le non-respect de cette consigne peut entraîner des chocs électriques ou la mort.**



## ATTENTION

**Arêtes métalliques vives.**

**Faites attention et portez des dispositifs de protection appropriés pour éviter tout contact accidentel avec des arêtes vives.**

**Le non-respect de cette consigne peut entraîner des blessures corporelles.**



## AVERTISSEMENT

**N'utilisez pas de moyens pour accélérer le processus de dégivrage ou pour nettoyer, autres que ceux recommandés par le fabricant.**

**Cet appareil doit être entreposé dans une pièce sans sources d'inflammation fonctionnant en continu (par exemple : flammes nues, un appareil à gaz en fonctionnement ou un appareil de chauffage électrique en fonctionnement).**



## AVERTISSEMENT

**Ne percez pas ou ne brûlez pas à travers le cuivre.**

**Sachez que le réfrigérant utilisé dans le système peut ne pas contenir d'odeur.**

**Les conduits raccordés à l'appareillage ne doivent pas contenir de SOURCE D'INFLAMMATION POTENTIELLE.**

Les symboles suivants sont affichés sur les unités.



Ce symbole indique que l'unité contient un réfrigérant légèrement inflammable.

Refrigerant  
Safety Group  
A2L

Ce symbole indique que le réfrigérant utilisé est classé comme réfrigérant A2L ou légèrement inflammable.



Ce symbole indique que le manuel d'utilisation doit être lu attentivement.



Ce symbole indique qu'un membre du personnel de service devrait manipuler cet équipement en se référant au manuel d'installation.



Ce symbole indique que des informations sont disponibles telles que le manuel d'utilisation ou le manuel d'installation.



## INSTRUCTIONS DE SÉCURITÉ IMPORTANTES



### AVERTISSEMENT

**Pour réduire le risque d'explosion, d'incendie, de décès, de choc électrique, d'échaudure ou de blessures pour les personnes lors de l'utilisation de ce produit, suivez les précautions de base, notamment les suivantes :**

#### GÉNÉRALITÉS

- L'équipement couvert dans ce manuel doit être installé par des techniciens de service et d'installation formés et expérimentés.
- Cet appareil n'est pas destiné à être utilisé par des personnes (y compris des enfants) ayant des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, à moins qu'elles n'aient reçu la supervision ou l'instruction concernant l'utilisation de l'appareil par une personne responsable de leur sécurité.
- Le système de réfrigérant est complètement assemblé et chargé. Tout le câblage interne est complet.
- L'unité est conçue pour être utilisée avec ou sans conduits. Des brides sont prévues pour fixer les conduits d'alimentation et de retour.
- Ces instructions expliquent la méthode recommandée pour installer l'unité autonome refroidie à l'air et les connexions de câblage électrique à l'unité.
- Ces instructions et toutes les instructions emballées avec tout équipement distinct requis pour constituer l'ensemble du système de climatisation doivent être lues attentivement avant de commencer l'installation. Notez en particulier « Procédure de démarrage » et les étiquettes et / ou étiquettes attachées à l'équipement.
- Bien que ces instructions soient conçues comme un guide général recommandé, elles ne remplacent en aucune façon les codes nationaux et/ou locaux. Les autorités compétentes devraient être consultées avant que l'installation ne soit effectuée. Voir d'autres publications pour obtenir des renseignements sur les codes et les normes.
- La taille de l'unité pour une installation proposée devrait être basée sur le calcul de la perte de chaleur effectué selon les méthodes de Air Conditioning Contractors of America (ACCA). Le conduit d'air devrait être installé conformément aux Normes de la National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, et aux Systèmes de chauffage et de climatisation d'air chaud de type résidence, NFPA No. 90B. Lorsque les réglementations locales sont en contradiction avec les instructions, l'installateur doit respecter les codes locaux.

#### L'INSTALLATION

- Pour les appareils destinés à être utilisés à des altitudes supérieures à 2 000 mètres (6 562 pieds), l'altitude maximale d'utilisation doit être indiquée.
- Avant utilisation, l'apppliance doit être correctement installée comme décrit dans ce manuel.
- Communiquez avec le technicien d'entretien autorisé pour la réparation ou l'entretien de cette unité.
- Contactez le programme d'installation pour l'installation de cet appareil.
- Le climatiseur n'est pas destiné à être utilisé par de jeunes enfants ou des invalides sans surveillance.
- Les jeunes enfants devraient être surveillés pour s'assurer qu'ils ne jouent pas avec le climatiseur.
- Les travaux d'installation doivent être effectués conformément au Code national de l'électricité par du personnel qualifié et autorisé uniquement.
- Connectez-vous à un circuit d'alimentation correctement évalué, protégé et dimensionné pour éviter les surcharges électriques.
- Respectez toutes les procédures de sécurité recommandées par l'industrie, y compris l'utilisation de gants à manches longues et de lunettes de sécurité.
- Faites attention lors du déballage et de l'installation. Les bords du produit peuvent être tranchants.
- Gardez les matériaux d'emballage hors de la portée des enfants. Ces matériaux peuvent poser un risque d'étouffement pour les enfants.
- Les dispositifs auxiliaires qui peuvent être une SOURCE D'INFLAMMATION POTENTIELLE ne doivent pas être installés dans les conduits. Des exemples de telles SOURCES D'INFLAMMATION POTENTIELLES sont les surfaces chaudes dont la température dépasse 700 °C et les dispositifs de commutation électrique.

## INSTRUCTIONS DE SÉCURITÉ IMPORTANTES



### AVERTISSEMENT

#### OPÉRATION

- Cet appareil n'est pas destiné à être utilisé par des personnes (y compris des enfants) ayant des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, à moins qu'elles n'aient reçu une supervision ou une instruction concernant l'utilisation de l'appareil par une personne responsable de leur sécurité.
- Utilisez cet appareil uniquement aux fins prévues.
- N'essayez jamais de faire fonctionner cet appareil s'il est endommagé, défectueux, partiellement démonté ou s'il a des pièces manquantes ou cassées.
- Ne pas altérer les contrôles.
- Gardez toutes les ouvertures de ventilation nécessaires à l'écart des obstacles.
- Les conduits raccordés à un appareil ne doivent pas contenir de SOURCE D'INFLAMMATION POTENTIELLE.

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## GETTING OTHER INFORMATION AND PUBLICATIONS

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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 Winter and Summer Air Conditioning  
.....ACCA Manual J Residential

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

For more information, contact these publishers:

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

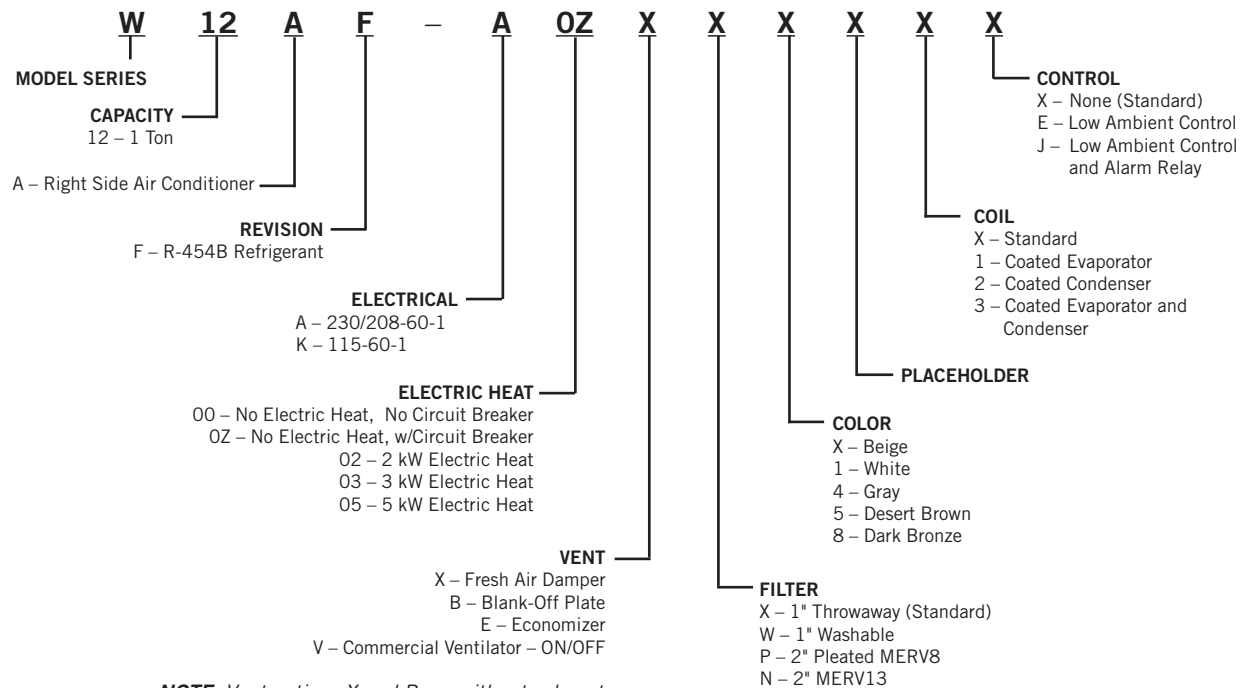
**ANSI**      **American National Standards Institute**  
11 West Street, 13th Floor  
New York, NY 10036  
Telephone: (212) 642-4900  
Fax: (212) 302-1286

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

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

# WALL MOUNT GENERAL INFORMATION

## AIR CONDITIONER WALL MOUNT MODEL NOMENCLATURE



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

## Shipping Damage

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

## General

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

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

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

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

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

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

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

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See page 11 for information on codes and standards.

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

## Duct Work

All duct work, supply and return, must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Maximum External Static Pressure (ESP) of Operation – Electric Heat Only table on page 36.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of 1" of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

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

Some installations may not require any return air duct. It is recommended that on this type of installation, a filter grille be located in the wall. Filters must be of sufficient size to allow a maximum velocity of 400 fpm.

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

## Filters

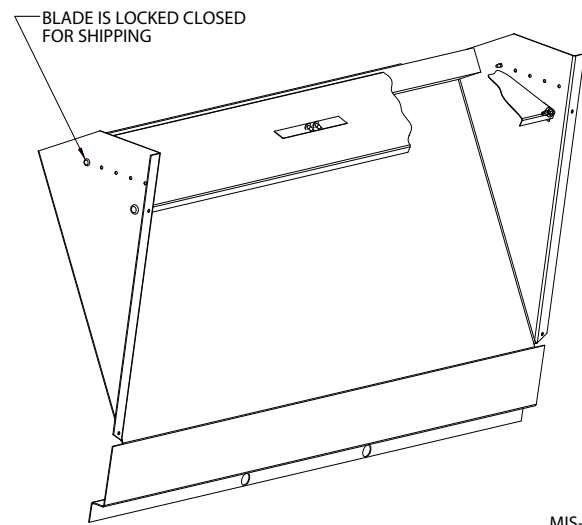
A 1" throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the service door. Additional 1" and 2" filters are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2" filter by bending down the metal tabs holding the 1" filter. There are two tabs on each side of the filter.

## Fresh Air Intake

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

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

**FIGURE 1**  
**Fresh Air Damper**



MIS-938

There is an adjustable slide on the side of the fresh air intake that can be adjusted to limit how far the damper opens so that the amount of fresh air that enters the structure is regulated.

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

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

# INSTALLATION

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## Basic Installation Design and Application Planning

Successful unit installations require proper planning and site inspection before installation begins. Before installing the wall mount unit, make sure that all service and airflow clearances are met and that the unit can meet all applicable code and regulation requirements. Provide an inspection of both the inside and outside of the structure by reviewing floorplans and/or visiting the installation site.

### Wall Construction

The wall must be inspected to ensure that the weight of the unit can be supported. Be sure to review all applicable construction codes and regulations including seismic requirements. When inspecting wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration. It is important that the side unit wall mounting lags and optional bottom bracket are supported by structural members inside the wall cavity. Concrete block and brick walls must be thoroughly inspected to ensure that they are capable of carrying the weight of the installed unit. Metal buildings must contain structural components to support the unit weight. If heavily corrugated siding is present, it may need to be trimmed and flashed similar to a window to provide a flat, even surface to attach and seal the unit to the wall. Heavy gauge corrugations that would be present on shipping containers and blast-proof structures may require the installation of a metal plate over the corrugated area. It is important that the unit area is weatherized and sealed to avoid air and water infiltration into the area between the unit and the wall.

### Outdoor Area Inspection

Inspect the outdoor area of the jobsite or review construction plans and locate the area where the wall mount is to be installed. The outdoor area must be free from obstructions including fences, bushes and walls that will hinder unit operation regarding outdoor condenser airflow and unit serviceability. Do not install units in enclosed areas that limit the amount of ambient temperature airflow. Warm air will exit the front condenser section of the unit, and outdoor ambient temperature air must be able to enter side intake condenser openings of the unit. Portable or modular building placement must be in a way that the wall mount units have a constant supply of outdoor air for proper unit operation. Make sure that the service panels of the unit are accessible. Inspect wall surfaces for obstructions that could hinder unit installation and servicing including outdoor electrical conduits, junction boxes, wall drains, vent hoods, windows, doors, overhangs and posts.

## Condensate Water Drainage

Review all codes and requirements for unit condensate drainage. A clear, flexible PVC drain hose (3/4" ID, 1" OD) extends from the drain pan in the upper section of the unit and extends down to the unit base. An opening is supplied towards the back of the unit base for the drain hose to pass through, and the hose extends 1" to 2" below the unit base. Water removed from the indoor air (condensate) will be expelled from the unit in large amounts during cooling operation through the hose. Units running in cooling operation in cold outdoor below freezing conditions can cause the condensate to freeze after leaving the drain hose. 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 ensure proper drainage throughout seasonal use.

## Indoor Ducted and Non-Ducted Applications

Air distribution inside the structure being conditioned plays an important role in making sure the area is a consistent temperature. Improper air distribution can result in areas being cooler or warmer, electrical equipment not receiving sufficient airflow or occupancy discomfort felt inside an area. Thermostat or indoor temperature sensor placement inside the area being conditioned also plays an important role in indoor climate control.

### Indoor Supply Airflow

Indoor installation areas must provide a non-restrictive path for the conditioned supply air to leave supply grilles and registers. Inspect the area to ensure that all indoor portions of the room or rooms will have access to supply air. Ductwork may be used to ensure proper air circulation and all provided ductwork guidelines and clearances must be followed. Non-ducted applications must use a supply louver grille installed over the supply opening inside the room. Be sure to adjust supply deflectors to properly disperse the conditioned supply air to all parts of the room. Avoid closing sections of the supply grilles which would cause unneeded supply duct pressurization.

### Indoor Return Airflow

A non-restrictive path for room air returning to the center section of the unit must be provided inside the room. Avoid placing objects including furniture, electronics equipment, equipment racks and cabinets directly in front of the unit return grilles and registers. Bard recommends at least 2' between solid objects and return grilles or registers. Ductwork may be used to ensure proper air circulation and all provided ductwork guidelines and clearances must be followed. Non-ducted applications must use a return louver grille installed over the return opening inside the room.

## Ducted Applications

Field fabricated supply and return duct work may be installed inside the structure being conditioned. A short supply and/or return stub duct may be connected to the unit supply and return flanges before unit installation to help with duct connections inside the structure. Supply and return ducts must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to conserve energy, reduce heat conductivity, and prevent condensation or moisture damage. Refer to Maximum External Static Pressure (ESP) of Operation – Electric Heat Only table on page 36. Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct work is installed in unheated spaces, it should be insulated with a minimum of 1" of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum. Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture from entering the wall cavity.

## Free Blow Applications

Some installations may not require extensive supply duct work throughout the structure and are referred to as free blow applications. A short field-fabricated supply duct must be used in the wall cavity to transition between the supply collar on the unit and the supply louver grille in the room. The duct must be properly insulated in order to conserve energy, reduce heat conductivity and prevent condensation or moisture damage. All joints must be taped or sealed to prevent air or moisture entering the wall cavity. Follow all clearances including distances to combustible materials and all instructions provided in this manual. A non-restrictive metallic supply air grille with deflectors is required for free blow applications. Contact the local Bard distributor or visit [www.bardhvac.com](http://www.bardhvac.com) for ordering information.

A metallic return air grille is required for non-ducted applications. The spacing between louvers on the grille shall not be larger than 5/8". It is recommended that a Bard return air grille kit is installed that is designed specifically for the wall mount product. Contact the local Bard distributor or visit [www.bardhvac.com](http://www.bardhvac.com) for ordering information. A field-supplied return grille that meets the 5/8" louver criteria and does not cause the unit to exceed the maximum specified external static pressure (ESP) may be used. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm. Filter return air grilles do not filter air being brought into the structure through ventilation options including fresh air dampers, ventilators, economizers and energy recovery ventilators. Be sure to install the return grille with the

louvers pointed downward towards the floor. This will help ensure return air is drawn upward from the floor and improve air circulation in the room.

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

## Thermostat or Indoor Temperature Sensor Placement

The location and installation of the thermostat or temperature sensor that monitors indoor temperature is very important regarding unit operation. Avoid placing the thermostat in an area exposed to direct sunlight or air from doorways leading outdoors. Use a piece of insulating material to close off conduit openings or holes in the wall surface for wire entry into the thermostat or temperature sensor. This will help avoid non-conditioned air from entering the thermostat and effecting temperature and/or humidity readings. As common practice, the thermostat or temperature sensor should measure the temperature of the air being returned to the unit, and not the conditioned air being supplied by the unit. Placing the thermostat or temperature sensor near a return air opening will normally result in optimal unit performance.

## Unit Installation

Make sure to have the proper tools at the work site that are needed for unit installation. The following steps are provided to ensure the unit is installed properly to the wall surface, and that the unit will provide years of service with minimal service requirements.

### Materials/Tools List

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.

- Appropriate safety gear including gloves and safety glasses
- 5/16" hex bit with drill driver
- Phillips head screwdriver
- Small straight (thermostat) screwdriver
- Tape measure
- Leveling device
- One (1) tube of caulk and caulk gun
- Utility knife
- Tools for cutting holes in the wall surface (if needed)
- Electrical components and wiring along with electrical tools
- Multimeter
- Wall fasteners for side flanges and top rain flashing.
- Duct tape and/or other duct sealing materials.



### Wall Preparation

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3 on page 18. Be sure the openings are square and level. Follow all clearances including distances to combustible materials and all instructions provided in this manual.
2. Review all electrical requirements provided in this manual and plan out electrical entrances into the building. Also plan electrical conduit routing and thermostat placement, if necessary.
3. Install necessary duct work and prepare the openings for unit installation.
4. Clean the exterior wall where the unit is to be installed and make sure it is able to provide a smooth, level, debris-free surface. Remove all construction debris from the supply, return and electrical hole cutting process.

### Wall Mount Installation to Wall Surface

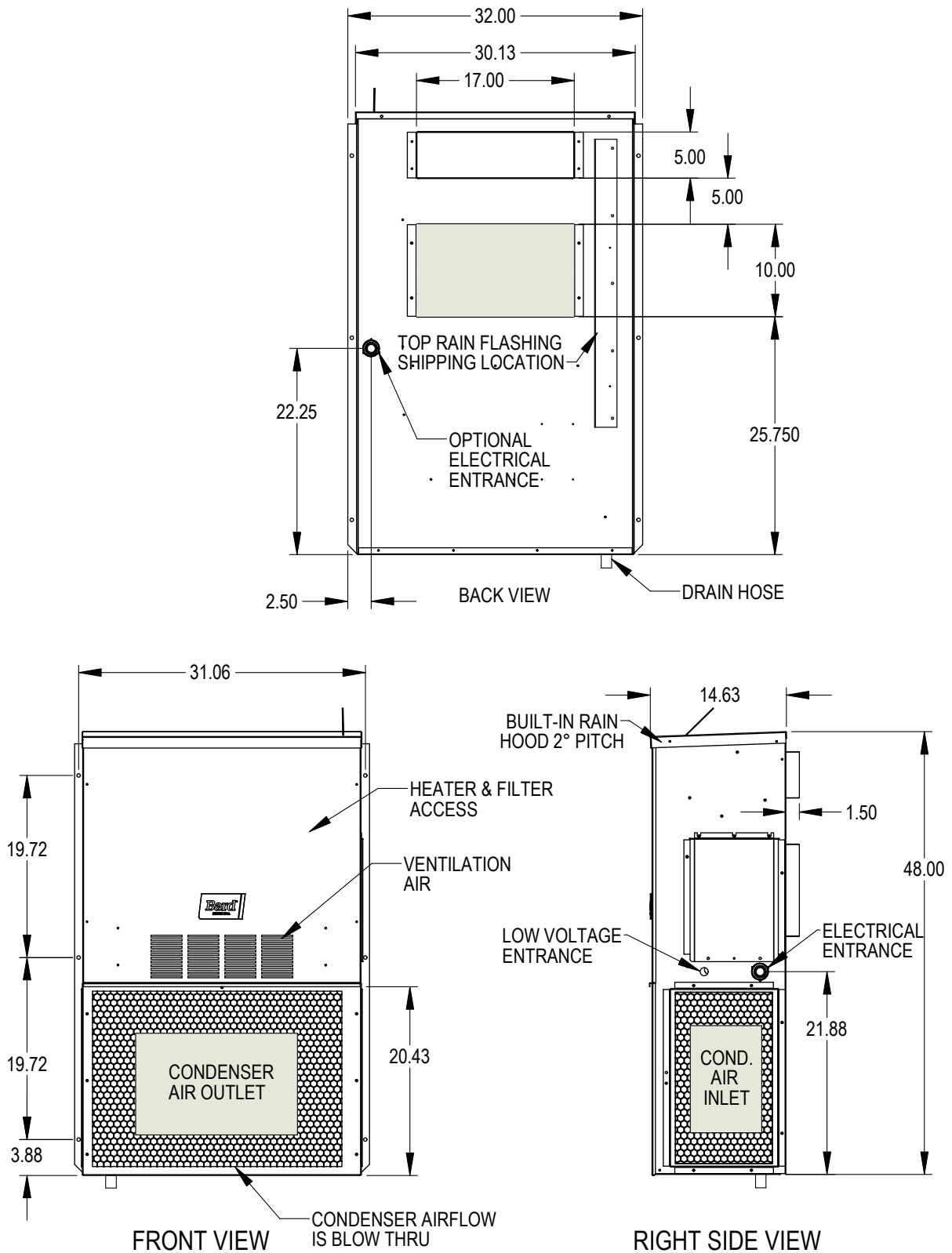
1. Remove packaging from unit and make sure the unit is not damaged before installation. A top rain flashing is supplied for field use and is mounted to the back of the unit for shipping. Remove the rain flashing before locating the unit against the wall. Top rain flashing is required to avoid water entering the area behind the unit that is against the wall. Review all requirements listed on unit labels and on serial plate located on the side of the unit.
2. Position the wall mount unit close to the wall surface where it will be installed. Install rain flashing at the top of the unit facing the wall by hooking the hem bend into the rear bend of the unit top (see Figure 3).
3. Apply a liberal amount of caulk on left and right cabinet side wall mount brackets and back of top rain flashing. Place unit back surface flush against wall. Unit must be level to ensure proper condensate drainage.
4. Units are secured to the wall by using field-supplied fasteners along each side of the wall mount through the built-in wall mounting brackets. It is the responsibility of the installer to select the proper fastener to secure the unit to the wall based on wall construction and applicable building codes. Typical installations may include 5/16" fasteners with 7/8" diameter flat washers. Be sure unit is securely mounted and all weight-bearing fasteners are attached to the weight supporting structural members of the wall.
5. Apply a bead of caulk between the back of the unit top and the front surface of the top rain flashing (see Figure 3).
6. Connect unit duct work from the inside of the building following all clearances and instructions provided. 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 use code approved duct tape or other sealing materials to seal the duct work to the unit.
7. On side-by-side installations, maintain a minimum of 20" clearance on right side to allow access to control panel and allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

**TABLE 1**  
**Clearance Required for Service Access and**  
**Adequate Condenser Airflow**

Model	Left Side	Right Side	Discharge – Front
W12AF	15"	20"	10'

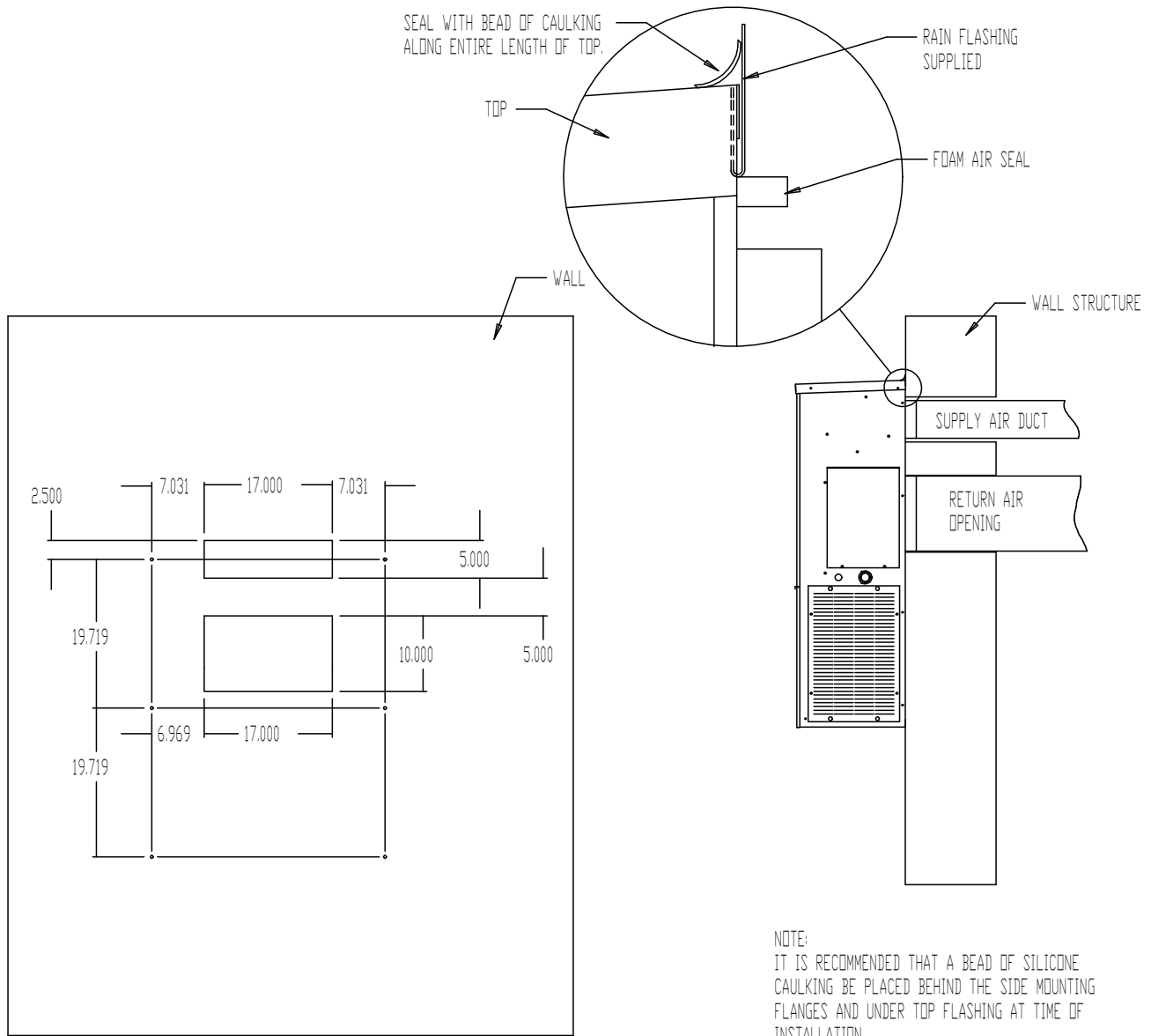


**FIGURE 2**  
**Unit Dimensions**



MIS-3599

**FIGURE 3**  
**Mounting Instructions**

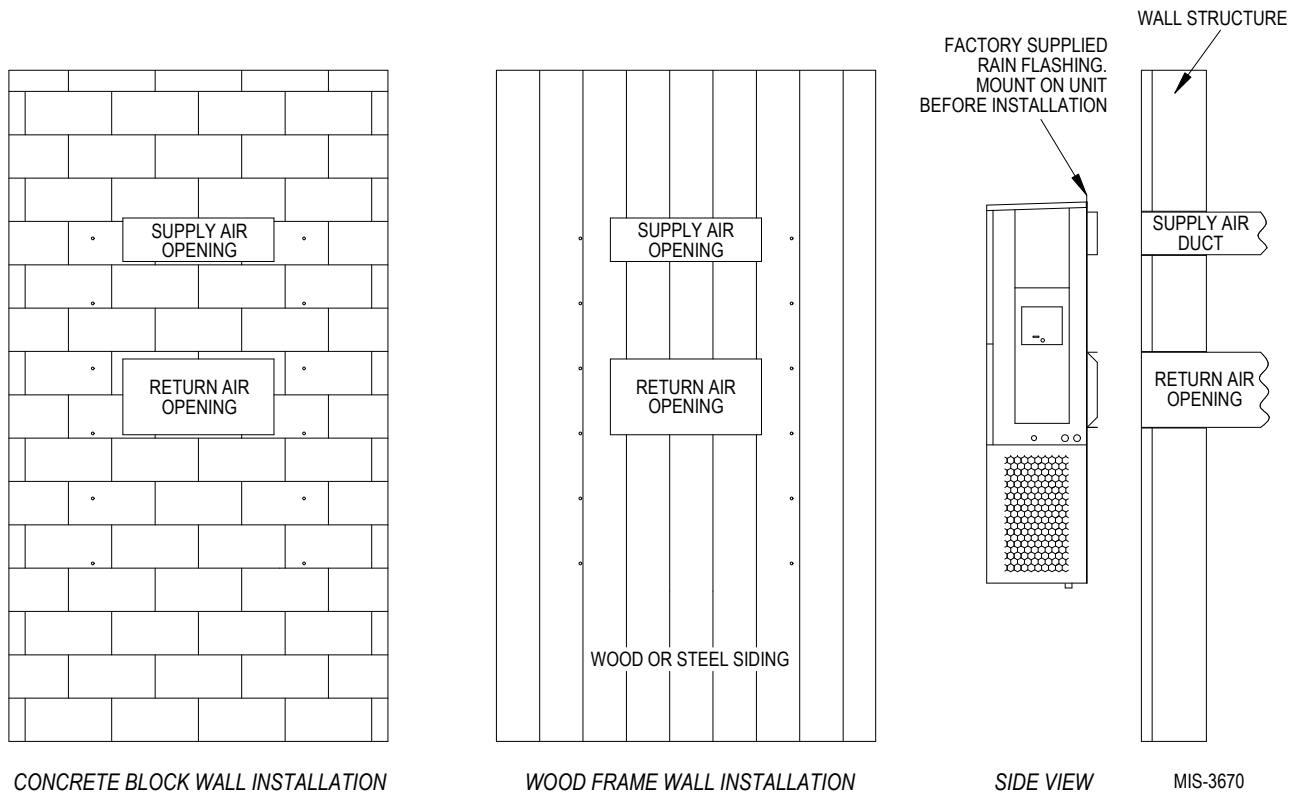


NOTE:  
IT IS RECOMMENDED THAT A BEAD OF SILICONE CAULKING BE PLACED BEHIND THE SIDE MOUNTING FLANGES AND UNDER TOP FLASHING AT TIME OF INSTALLATION.

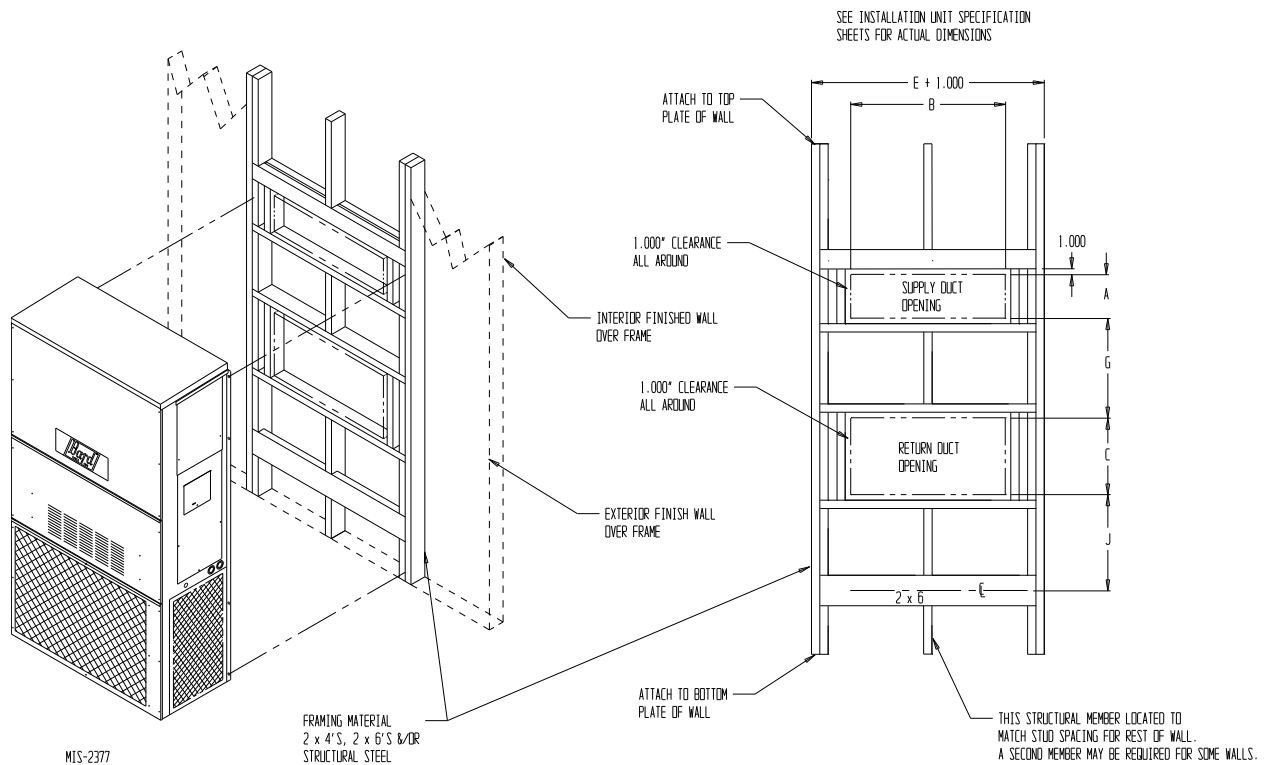
**WALL OPENING AND HOLE  
LOCATION VIEW**

**MIS-3600**

**FIGURE 4**  
**Wall Mounting Instructions**

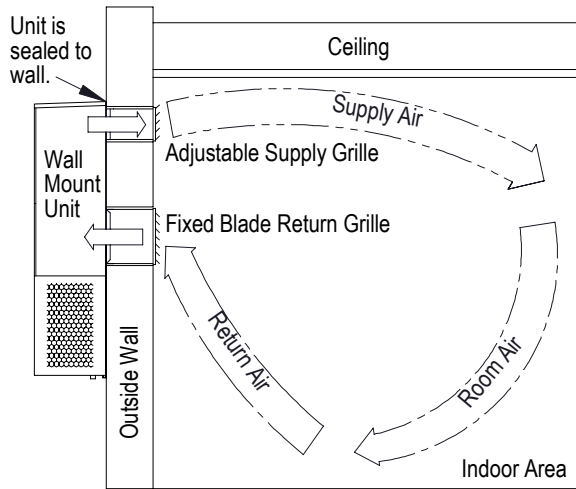


**FIGURE 5**  
**Wall Mounting Instructions**



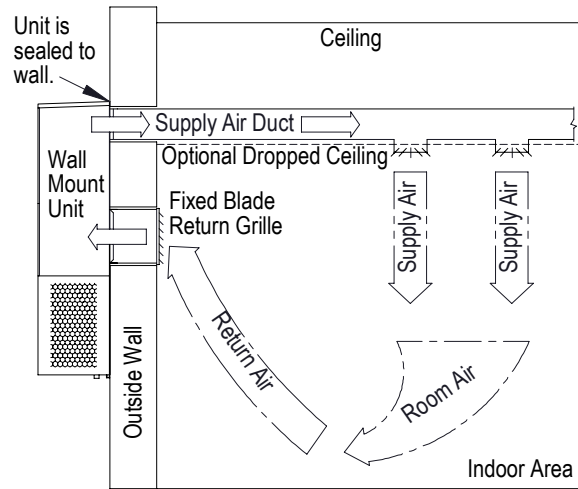
**FIGURE 6**  
**Common Wall Mounting Installations**

### Non-Ducted Installations



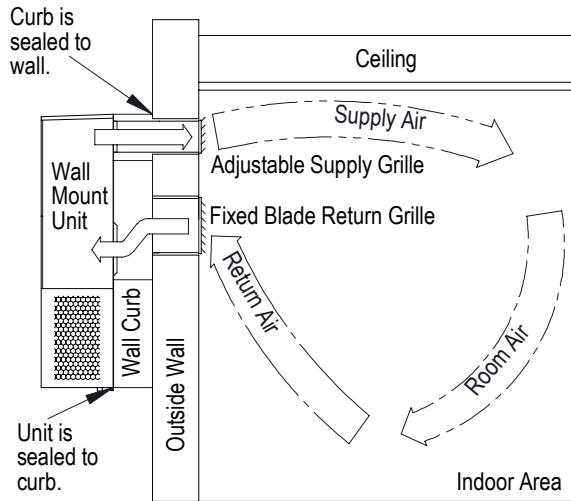
Non-ducted installations supply conditioned air into indoor room areas without extensive duct work. The supply airstream is directed by adjusting the 4-way supply grille to reach areas being conditioned. The supply air mixes with the room air and cools or heats occupants and/or equipment in the area.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

### Ducted Installations



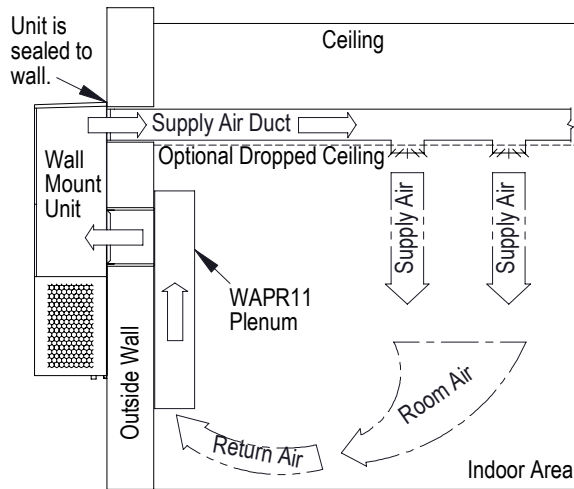
Ducted installations supply conditioned air into indoor room areas using solid or flexible ducts. The supply air is distributed throughout a single area or multiple areas. The supply air mixes with the room air and cools or heats occupants and/or equipment. Unconditioned room air is returned to the unit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

### Outdoor Wall Curb Installations



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

### WAPR11 Indoor Sound Plenum Installations



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

MIS-550 D

## Wiring – Main Power

Main electrical power must be supplied to the unit from a clean, reliable power source. Verify voltage being supplied to the unit is consistent during all times of the day and within the range specified for the unit in the unit specifications and on the unit serial plate. Voltage must be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

Refer to the unit serial plate and unit specifications for maximum fuse or circuit breaker size. Each outdoor unit is marked with a “Minimum Circuit Ampacity”. This means that the field wiring used must be sized to carry that amount of current. Depending on the installed kW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate.

All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked “Use Copper Conductors Only”. These instructions **must be** adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data on the serial plate, in the unit specifications and also in Table 8 on page 34 list fuse sizes for all models including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters. The unit rating plate lists a “Maximum Time Delay Relay Fuse” or circuit breaker that is to be used with the equipment. The correct type and size must be used for proper circuit protection and also to ensure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

## Wiring – Low Voltage

All 230/208V 1 phase and 3 phase equipment have dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are:

Tap: 240      Range: 253 – 216

Tap: 208      Range: 215 – 197

For 115V units, there is no tap selection available on the primary voltage transformer.

Tap: 120      Range: 104 – 126

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

For low voltage wiring, an 18 gauge copper, color-coded cable is recommended. See Table 5 on page 23 for more information.

## Low Voltage (24VAC) Connections

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

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

**G** terminal is the *indoor blower input.*

**Y1** terminal is the *1st Stage input for cooling.*

**Y2** terminal is the *2nd Stage compressor input for cooling (if equipped with an economizer) or Y2 disables Balanced Climate mode if the Y1-Y2 jumper is removed*

**B/W1** terminal is the *1st stage electric heat.*

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

**L** terminal is *24 volt alarm active output.*

For units equipped with an alarm relay:

**1 terminal** is the *normally closed contact on the relay.*

**2 terminal** is the *normally open contact on the relay.*

**3 terminal** is the *common contact on the relay.*

## Unit Shutdown Feature (Standard on All Models)

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

## Balanced Climate™ Feature (Standard on All Models)

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

To operate in Balanced Climate mode, a 2-stage cooling thermostat is required. The lower indoor airflow operation is overridden by utilizing a 2-stage thermostat. If the call for cooling is not satisfied within a given time frame or temperature differential (specified by the thermostat), the thermostat will send a signal to Y2 which then increases the blower speed back to the selected speed. See pages 35 – 36 for blower speed selection options.

**Refer to page 27 for additional Balanced Climate requirements and limitations.**

**TABLE 2**  
**Low Voltage Connections for DDC Control**

	Standard Units	Units w/ Economizers
Fan Only	Energize G	Energize G
1st Stage Cooling Mode/ Balanced Climate	Energize Y1, G	Energize Y1, G (Free Cooling or Compressor Cooling)
2nd Stage Cooling Mode/ Rated Indoor Airflow	Energize Y2 to override Balanced Climate mode when Y1-Y2 jumper is removed	Energize Y1, Y2, G (Compressor Cooling)
1st Stage Heating	Energize B/W1	Energize B/W1
2nd Stage Heating (if employed)	Energize B/W1, W2	Energize B/W1, W2
Ventilation	Energize A	Energize A

#### Ventilation Features (Optional)

See ventilation instructions provided with unit for low voltage wiring.

#### Alarm Relay Feature (Controls Option)

The alarm relay provides a set of NO (normally open) and NC (normally closed) pilot duty contacts that operate when the compressor control module locks out compressor operation because of a high or low system refrigerant pressure event.

#### Low Ambient Control (LAC)

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

#### Outdoor Temperature Switch and Freeze Protection Thermostat

An outdoor temperature switch and an evaporator freeze protection thermostat is supplied with all units that have a low ambient control. The outdoor switch disables Balanced Climate mode (if enabled) when the temperature drops below 50°F. This prevents potential evaporator coil freeze up issues. For units with mechanical dehumidification, this switch must

remain disconnected when Balanced Climate mode is not being used. Refer to unit wiring diagram. The freeze thermostat cuts out compressor operation if the evaporator begins to freeze up.

#### Refrigerant Leak Detection System (RDS)

The RDS continuously monitors air in the indoor section of the unit for leaked refrigerant. In the event of a refrigerant leak, the RDS will initiate mitigation actions to disperse the refrigerant and prevent potentially dangerous refrigerant concentration levels. The RDS will also provide a 24VAC alarm output signal on the "L" terminal of the unit low-voltage terminal strip.

Refer to page 29 for more information.

**TABLE 3**  
**Wall Thermostats**

Thermostat	Predominant Features
8403-060 (1120-445)	3 Stage Cool, 3 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual Changeover Dehumidification Output
8403-081 (BrightStat)	2 Stage Cool, 2 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual Changeover with Humidity and Occupancy Sensor BACnet (Thermostat option only permissible for units up to 12 kW electric heat)
8403-083 (BrightStat)	2 Stage Cool, 2 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual Changeover with Humidity (only) BACnet (Thermostat option only permissible for units up to 12 kW electric heat)
8403-089 (T4 Pro)	1 stage Cool, 1 stage Heat – Heat Pump 1 stage Cool, 1 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover
8403-090 (T6 Pro)	2 Stage Cool, 3 Stage Heat – Heat Pump 2 Stage Cool, 2 Stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual Changeover
8403-092 (T6 Pro Wi-Fi)	2 Stage Cool, 3 Stage Heat – Heat Pump 2 Stage Cool, 2 Stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual Changeover Wi-Fi
8403-095	1 Stage Cool, 2 Stage Heat – Heat Pump 1 Stage Cool, 1 Stage Heat – Conventional; Programmable/Non-Programmable Electronic Auto or Manual Changeover

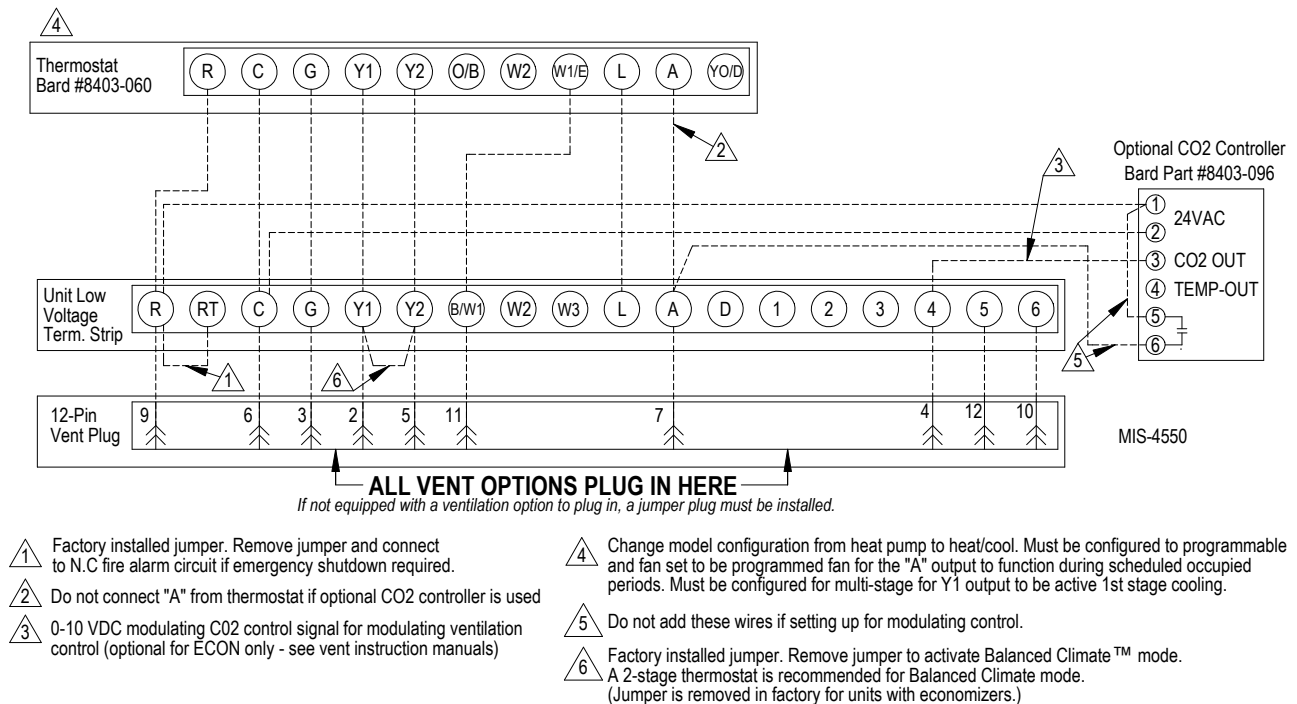
**TABLE 4**  
**CO<sub>2</sub> Controllers**

Part Number	Predominate Features
8403-096	Normally Open SPST relay closes-on-rise 24V dual wave length sensor. Default setting 950ppm, adjustable to 0-2000ppm Default off setting 1000ppm, adjustable to 0-200 ppm can be calibrated

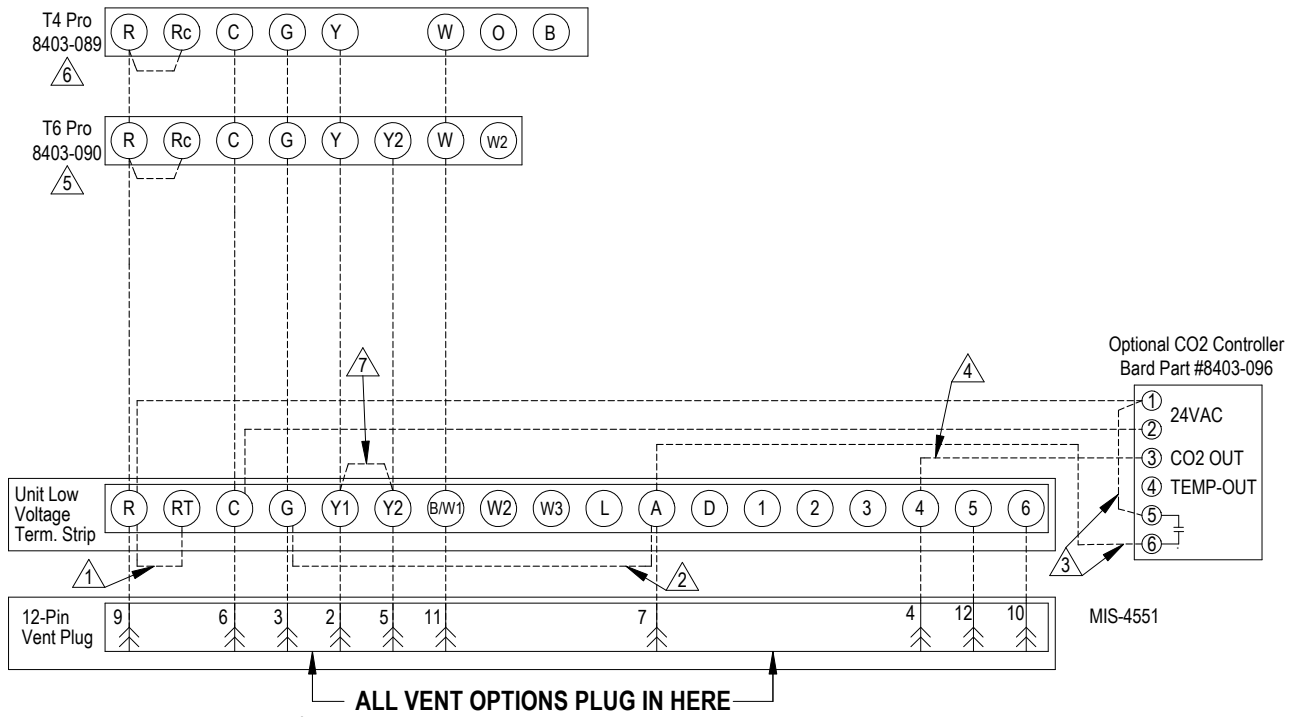
**TABLE 5**  
**Thermostat Wire Size**

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

**FIGURE 7**  
**Programmable Thermostat Connections**



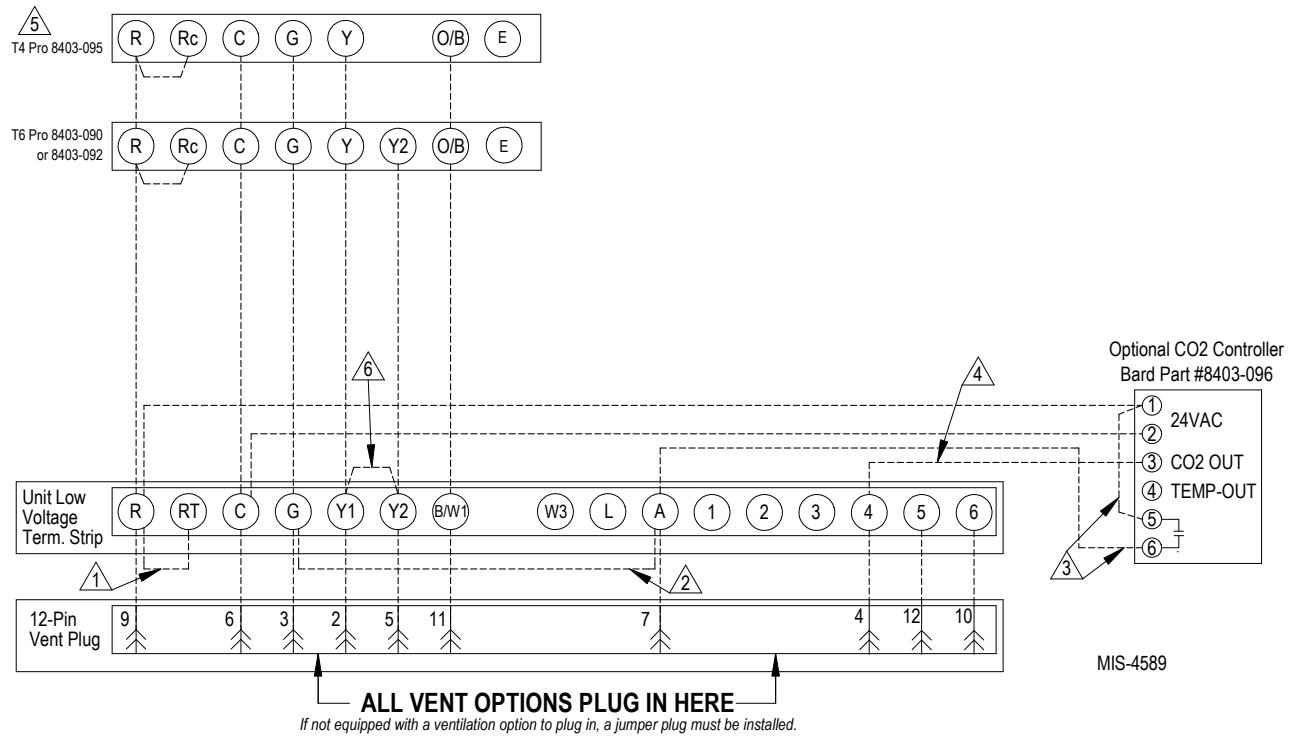
**FIGURE 8**  
**Non-Programmable Thermostat Connections**



- ⚠ 1 Factory installed jumper. Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.
- ⚠ 2 For vent operation, add jumper if optional CO2 controller is not used. Vent will run while blower is energized.
- ⚠ 3 Do not add these wires if setting up for modulating control. See note 7.
- ⚠ 4 0-10 VDC Modulating CO2 control signal for modulating ventilation control (Optional for ECON Only) - See vent installation manual.
- ⚠ 5 For 8403-058, change "system type", set up Function 1, From 5 (2 Heat/ 1 Cool heat Pump) to 6 (2 Heat / 2 Cool Conventional). For 8403-059, No change required.
- ⚠ 6 Thermostat will not work with units equipped with economizers.
- ⚠ 7 Factory installed jumper. Remove jumper to activate Balanced Climate™ Mode. A 2-stage thermostat is recommended for Balanced Climate mode. (Jumper is removed in factory for units with economizers.)



**FIGURE 9**  
**Non-Programmable Thermostat Connections**



# START UP

## NOTICE

These units require R-454B refrigerant and polyol ester oil.

### General

1. R-454B refrigerant is classified as an A2L, or mildly flammable refrigerant. Refer to A2L Refrigerant Safety Manual 2100-810 for information regarding safe practices for charging, recovering, decommissioning and general handling of A2L refrigerants.
2. Use separate service equipment to avoid cross contamination of oil and refrigerants.
3. Use recovery equipment rated for R-454B refrigerant.
4. Use manifold gauges rated for R-454B (800 psi/250 psi low).
5. R-454B is a zeotropic blend of HFC-32 and HFO-1234yf. Charge with liquid refrigerant.
6. R-454B has an ozone depletion potential of zero, but must be recovered due to its global warming potential.
7. R-454B compressors use polyol ester oil.
8. Polyol ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
9. A liquid line dryer must be used—even a deep vacuum will not separate moisture from the oil.
10. Limit atmospheric exposure to 15 minutes.
11. 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 recovering, evacuating (see manual 2100-810) and charging to the nameplate charge.

Since R-454B is a zeotropic blend, one component may leak off before another component in the event of a leak. This can cause significant changes to the concentration of each component in the system. For this reason, Bard Manufacturing does not recommend topping off the system charge.

**REMEMBER:** When adding R-454B refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to ensure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.

## WARNING

**Failure to conform to these practices could lead to damage, injury or death.**

### Safety Practices

1. Never mix R-454B 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-454B to leak check; the mixture is flammable.
4. Do not inhale R-454B—the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-454B. 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-454B in manifold sets, gauge lines or cylinders. R-454B 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.

### High Pressure Switch

All W\*\*AF wall-mounted air conditioner series models are supplied with remote resets for the high and low pressure switches. If tripped, the pressure switch may be reset by turning the thermostat off then back on again. High pressure switch settings: Opens 575 +/- 15 PSI, Closes 425 +/- 15 PSI.

## Condenser Fan Operation

**NOTE:** Certain models may be equipped with a low ambient control (LAC), and if so, 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.

## Service Hints

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

## Sequence of Operation

COOLING – Circuit R-Y1 makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. (See **NOTE** under **Condenser Fan Operation** concerning models equipped with low ambient control.) The G (indoor motor) circuit is automatically completed by the thermostat on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation. On a call for heating, circuit R-W1 makes at the thermostat pulling in heat contactor for the strip heat and blower operation.

### Balanced Climate™ Mode

Balanced Climate™ is a great comfort feature that can easily be applied under any normal circumstances. If the Bard air conditioning system is being set up in a typical environment where 72°F is the lowest cooling setpoint, remove the Y1/Y2 jumper and install a 2-stage cooling thermostat. This will increase the humidity removal up to 35% and provide a much more comfortable environment.

**If the application is likely to require air conditioning operation below 60°F outdoor conditions, a low ambient control (LAC) kit must be installed.** The LAC kit is equipped with an outdoor temperature switch that disables Balanced Climate mode when the outdoor temperature drops below 50°F. This prevents potential evaporator coil freeze up issues. The LAC kit also comes with an evaporator freeze protection thermostat that cuts out the compressor if the evaporator begins to freeze up.

**If the unit is being installed with any ventilation package, a Bard LAC kit must be installed.** Failure to utilize an LAC with any air conditioner can cause coil freeze up.

Balanced Climate can readily be applied to duct-free (supply and return air grille) applications. It may also be applied to ducted applications with **limited static of 0.10" ESP (total including both supply and return statics)**. Consult Bard Application Engineering for details prior to implementation.

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

## Vent Connection Plug

All units are equipped with a vent connection plug in the side of the control panel for the different ventilation packages to plug in to. If the compressor will not start and there is no "Y1" at the compressor control module, first check to make sure that either the optional vent is plugged into the vent connection plug or the supplied jumper plug is in place. **The unit will not operate without anything plugged in.** This plug is located on the side of the control panel behind the front vent door (behind the filter access door). If the unit is supplied with a factory-installed vent package, it will be plugged in but the jumper plug will also be tethered next to the connection for troubleshooting purposes, if necessary.

## Compressor Control Module (CCM)

The CCM is standard on all models covered by this manual.

### Features

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

### Delay-on-Make Timer

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

### Short Cycle Protection/Delay-on-Break

An anti-short cycle timer is included to prevent short cycling the compressor. This is adjustable from 30 seconds to 5 minutes via the adjustment knob (see Figure 10 on page 28). Once a compressor call is lost, the time period must expire before a new call will be initiated.

### Low Pressure Detection

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

### High Pressure Detection

High pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the high pressure switch opens, the CCM will de-energize the compressor. If the switch closes again, it will then restart the compressor after the delay-on-break setting has expired on the device. If the switch trips again during the same thermostat call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The red LED will light and stay on

until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

### Test Mode

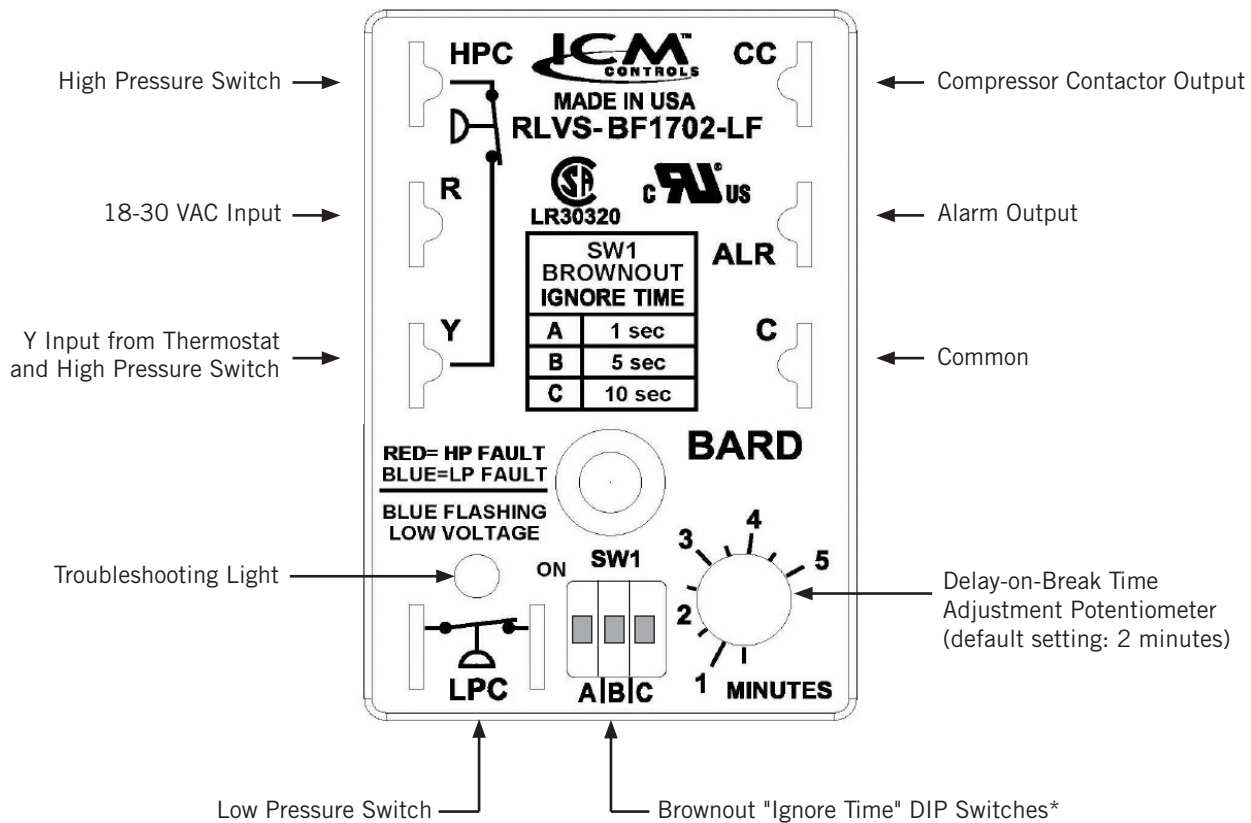
By rapidly rotating the potentiometer (POT) clockwise (see Figure 10), all timing functions will be removed for testing.

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

**FIGURE 10**  
**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".

for a time period should not be needed. The CCM is shipped with all the DIP switches in the 'off' or 'do not ignore' position (see Figure 10).

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 CCM 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 switch 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 power glitch may 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 34. 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 Shrader-type valves.

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

To change a Coremax valve without first removing the refrigerant, a special tool is required which can be obtained at [www.fastestinc.com/en/SCCA07H](http://www.fastestinc.com/en/SCCA07H). See the

replacement parts manual for replacement core part numbers.

## Refrigerant Leak Detection System (RDS)

This unit is equipped with a refrigerant leak detection system (RDS). This system monitors the air in the indoor section of the unit for refrigerant leaks. In the event of a leak, the RDS will enter mitigation mode, which prohibits function of the compressor and electric heaters (if applicable) and turns on the indoor blower in order to prevent the refrigerant from concentrating within the unit. The RDS is made up of three major components: Refrigerant sensor, RDS harness and DPDT relay (located in unit control panel). See Figure 11 on page 30.

### Why RDS?

R-454B refrigerant carries an "A2L" safety classification, meaning it is mildly flammable in certain concentrations. The purpose of the RDS is to prevent refrigerant from reaching potentially dangerous concentrations within the indoor section of the unit in the event of a refrigerant leak.

### Sequences of Operations

The refrigerant sensor has four operating modes: Power up and self test, normal, alarm state and sensor fault. During all modes of operation the sensor will continue to perform runtime diagnostics.

#### Power Up and Self Test

When the air conditioner receives power, the refrigerant sensor executes a series of self test diagnostics. This validates the integrity of the sensor's memory, embedded program, and power supply. This power up sequence only takes a few seconds.

#### Normal Operation

Once the refrigerant sensor's power up sequence is complete, the RDS begins normal operation. In this mode the refrigerant sensor is active and the air conditioner functions normally.

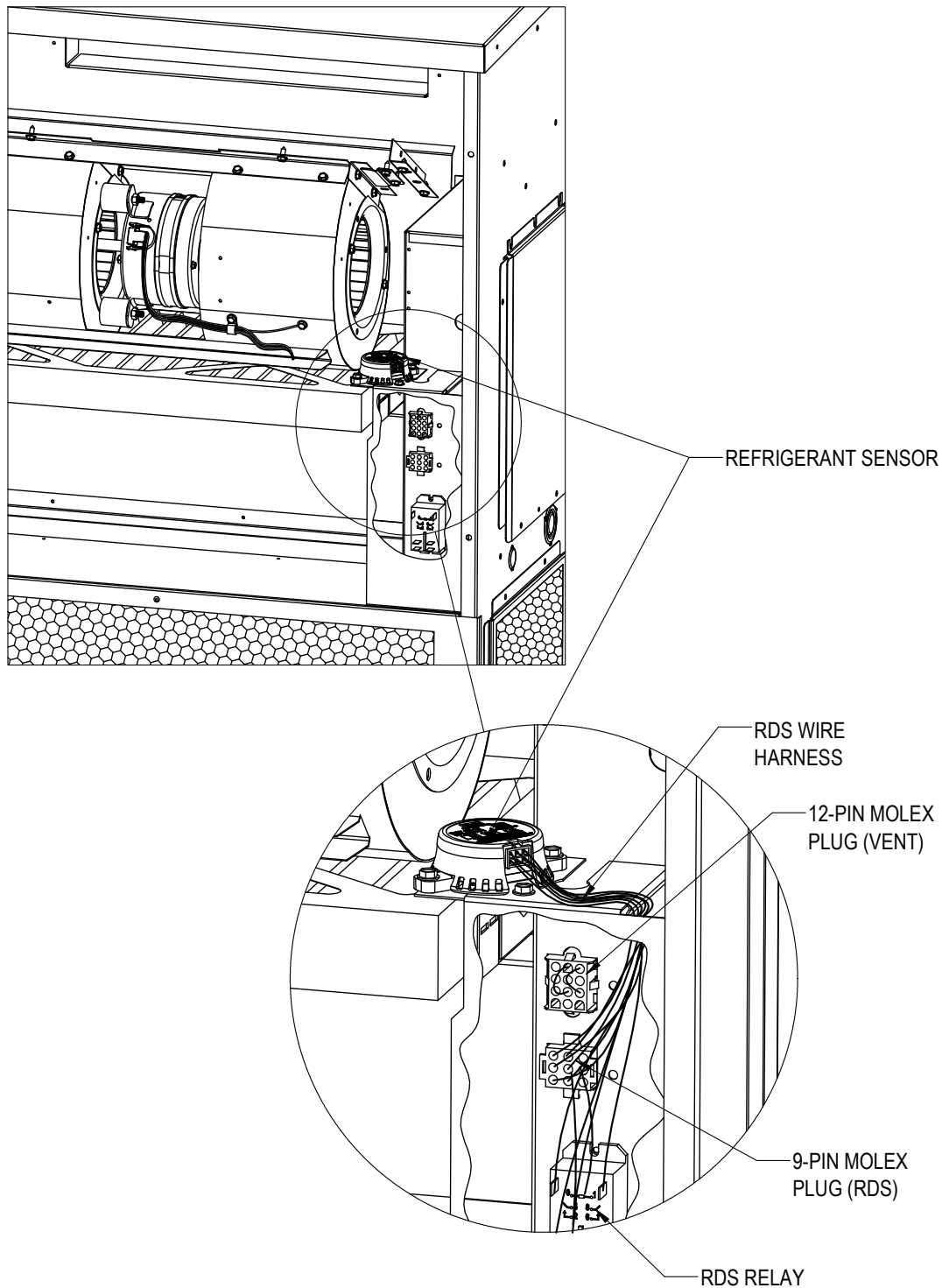
#### Alarm State

The refrigerant sensor has a factory-set alarm threshold limit value. When the sensor registers refrigerant at a concentration above this threshold, the sensor enters alarm state. In alarm state the internal relay within the refrigerant sensor is de-energized, which puts the RDS into mitigation mode.

#### Sensor Fault Mode

The refrigerant sensor performs continuous diagnostics on the sensor integrity (shorts, opens, out of range, communication errors) as well as the integrity of the on-board memory, programming, oscillator and voltage levels. If any of these diagnostics fail or the sensor becomes disconnected, the internal relay within the refrigerant sensor is de-energized, which puts the RDS into mitigation mode.

**FIGURE 11**  
**Refrigerant Leak Detection System**



MIS-4544 A



## Mitigation Mode

When the RDS enters mitigation mode, it initiates the following:

- The "G" terminal is energized on the low voltage terminal strip. This activates the indoor blower.
- The signal from "CC" on the compressor control module to the compressor contactor is interrupted. This stops compressor operation and prevents it from starting in the event of a call from the thermostat.
- The 24V common connection to all electric heat contactors (if applicable) is broken. This stops electric heat operation and prevents it from starting in the event of a heating call.
- The "L" terminal on the low voltage terminal strip is energized. This output may be used to trigger an external alarm or notify a building management system or thermostat that a leak has occurred.

## Alarm Reset



The refrigerant sensor will stay in alarm mode as long as the refrigerant concentration remains above the alarm threshold limit value. For the alarm to be reset, the sensor reading must be a minimum of 2.5% below the alarm threshold for a period of 5 minutes. The relay is then re-energized, and the unit returns to normal operation.

## RDS Diagnosis

The refrigerant sensor of the RDS features a status LED. When the sensor is powered up, an LED will indicate sensor status. The sensor LED will back-light the sensor and create a visible reflection on the blower partition. Status LED blink codes shown in Figure 12.

**NOTE:** *If the sensor status LED is not lit, the sensor is either not receiving power or may be faulty or damaged. Check harness connections and test internal relay. Refer to A2L Safety Manual 2100-810 for additional diagnostic information.*

**FIGURE 12**  
**Sensor Status LED Blink Code**

	Solid Green: Sensor Power Up and Self Test
	Blinking Green: Normal Operation
	Solid Red: Alarm State – Gas Detection
	Blinking Red: Sensor Fault

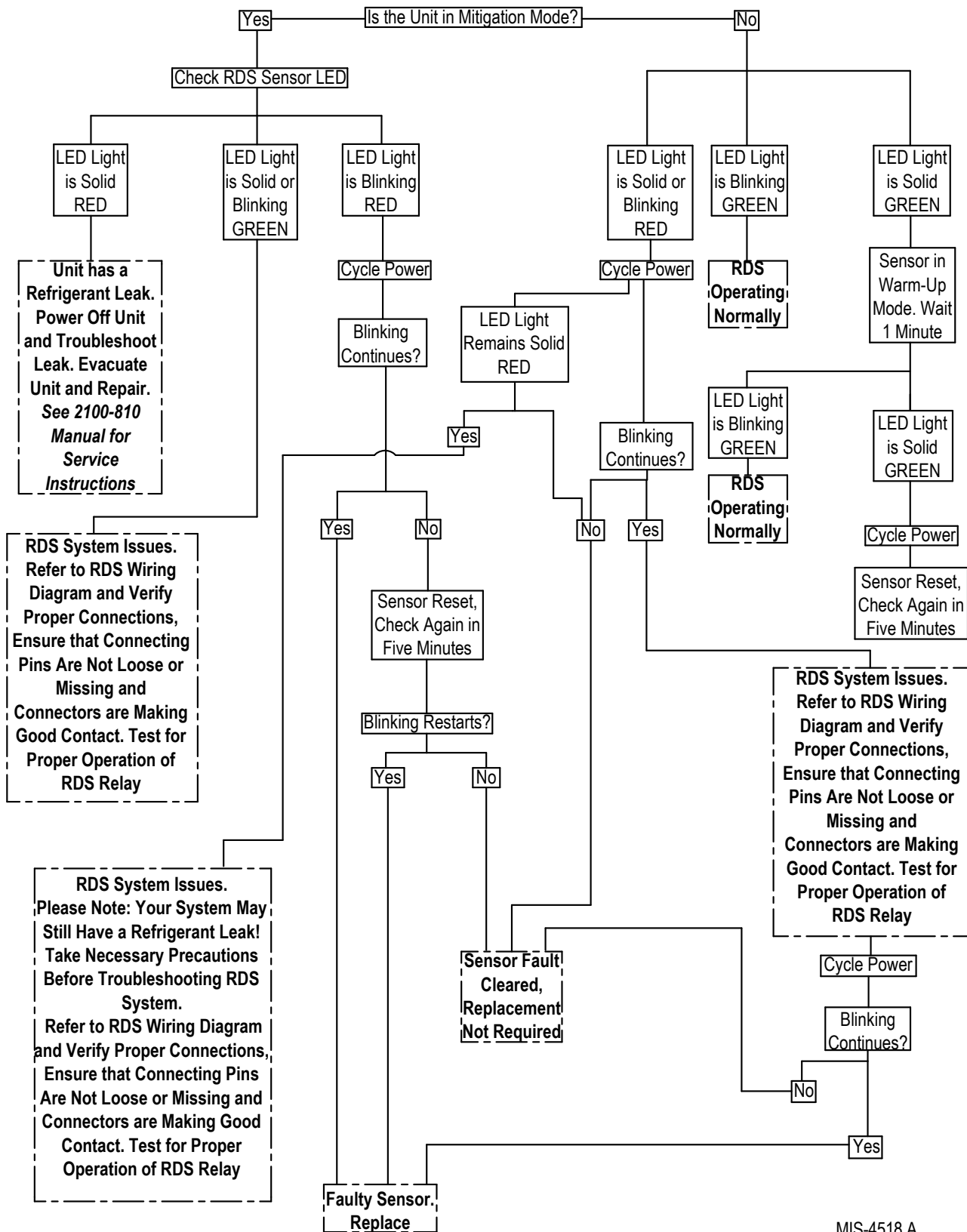


## Sensor End-of-Life

The refrigerant sensor has a rated life expectancy of 15+ years. This is not a set time length, but it is the expected time that the sensor should last without failing its internal checks. In the event that the sensor would reach its end-of-life, it will enter Sensor Failure Mode and the sensor will need to be replaced.

**The sensor must be replaced with a Bard-approved refrigerant sensor.** See unit replacement parts manual for the correct replacement sensor information.

**FIGURE 13**  
**Refrigerant Leak Detection System (RDS) Troubleshooting**



MIS-4518 A

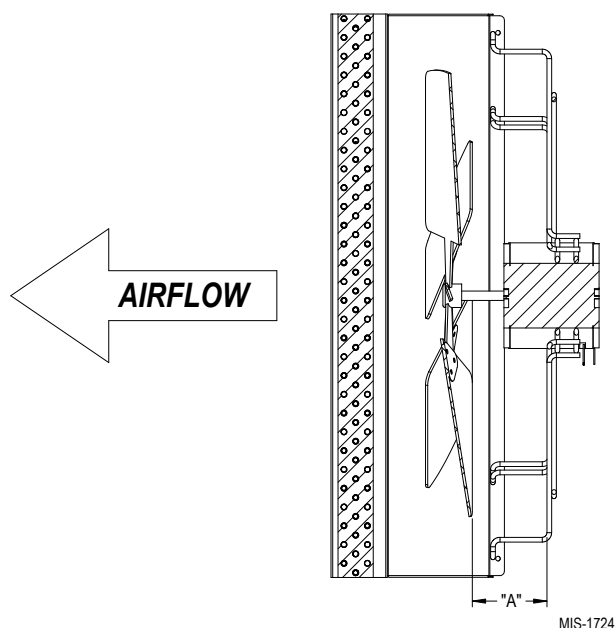


## Fan Blade Setting Dimensions

Shown in Figure 14 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 6 for unit specific dimension.

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

**FIGURE 14**  
**Fan Blade Setting**



**TABLE 6**  
**Fan Blade Dimensions**

Model	Dimension A
W12AF	2.25"

## R-454B Refrigerant Charge

This unit was charged at the factory with the quantity of refrigerant listed on the serial plate. AHRI capacity and efficiency ratings were determined by testing with this refrigerant charge quantity.

The pressure table presented on page 34 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, recover, evacuate and recharge the unit to the serial plate charge.

**TABLE 7**  
**Cooling Pressure – Standard Airflow**

Air Temperature Entering Outdoor Coil °F

Model	Return Air Temp (DB/WB)	Pressure	75	80	85	90	95	100	105	110	115	120	125	131
W12AF-A	75/62	Low Side	126	126	126	127	128	129	130	132	135	137	140	143
		High Side	287	305	325	345	367	390	414	439	465	493	521	557
	80/67	Low Side	134	134	135	136	137	138	140	142	144	146	149	153
		High Side	294	313	333	354	376	400	424	450	477	505	535	571
	85/72	Low Side	139	139	140	140	141	143	144	147	149	152	155	159
		High Side	305	324	345	367	390	414	439	466	494	523	553	591
W12AF-K	75/62	Low Side	116	119	122	125	128	130	132	135	136	138	140	142
		High Side	280	299	319	340	362	386	410	436	462	490	519	555
	80/67	Low Side	124	128	131	134	137	139	142	144	146	148	150	152
		High Side	287	307	327	349	372	396	421	447	474	503	532	569
	85/72	Low Side	129	132	135	138	141	144	147	149	151	153	155	157
		High Side	297	317	339	361	385	409	435	462	491	520	551	589

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 27.

**TABLE 8**  
**Electrical Specifications**

Model	Rated Volts & Phase	No. Field Power Circuits	Single Circuit	
			① Minimum Circuit Ampacity	② Maximum External Fuse or Circuit Breaker
W12AF-A0Z A03 A05	230/208-1	1 1 1	8 19 28	15 25 30
W12AF-K00 K02	115-1	1 1	15 25	20 25

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.

**NOTE:** The Maximum Overcurrent Protection (MOCP) value listed is the maximum value as per UL 60335 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 60335 allowable MOCP value, but still above the UL 60335 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.

## Setting Unit Airflow

The unit is set from the factory at the default speed. The unit has two selectable cooling speed taps that can be utilized. The default speed is the lowest cooling speed. The higher speed tap can be used for higher duct static applications so that the unit can maintain the recommended airflow as shown in Table 9. The higher speed can also be used when higher sensible cooling is desired. To change to the higher speed tap, replace the blue wire on the blower relay with the black wire. Refer to Table 11 on page 36 for the corresponding airflow of each tap. Set the unit duct static based on the highest airflow that the unit will run at.

**TABLE 9**  
**Recommended Airflow**

Model	Nominal Rated CFM*	Nominal Rated ESP*	Recommended Airflow Range	Factory Speed Connection
W12AF-A	425	0.1	350 - 475	Default
W12AF-K	425	0.1	350 - 475	Default

\* Rated CFM and ESP on factory speed connection.

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

Do not operate the unit in Balanced Climate mode if running high static applications as indicated in the blower performance table. If Balanced Climate mode is activated as described on page 21, the unit will run in this mode at all times unless there is a call for ventilation, electric heat or 2nd stage cooling from a 2-stage thermostat. At that time, the unit will automatically activate a higher speed tap.

## Blower Speeds

The ECM motor blower has three direct taps that are available for the motor, and are selected through different unit modes of operation. These modes are energized by 24VAC signals from the low voltage terminal block located inside the control panel by a thermostat or other controlling device.

Multiple motor speed taps may be energized simultaneously by 24VAC power during different modes of operation. The highest number speed tap energized takes priority with 3 being the highest and 1 being the lowest. See Table 10 for the corresponding blower speeds with the different modes of operation.

### Speed Tap 1 – Balanced Climate

Speed tap 1 is set as a lower than rated speed in the ECM motor. In order for Balanced Climate speed to be used during compressor cooling mode, the jumper between Y1 and Y2 must be removed. This means that if speed tap 1 is energized, the airflow amount will be lower than default airflow. Tap 1 is used when Balanced Climate is called for by energizing the Y1 terminal of the low voltage terminal block with 24VAC. Speed tap 1 is overridden if taps 2 or 3 are energized.

### Speed Tap 2 – Default Cooling & Heating

Speed tap 2 is set for rated speed in the motor. This means that if speed tap 2 is energized, the airflow amount will be the default airflow. Tap 2 is used by default when cooling is called for by energizing the Y1 terminal of the low voltage terminal block with 24VAC. The unit is shipped with the jumper between Y1 and Y2 installed and it must be removed to use Balanced Climate mode.

### Speed Tap 3 – Optional HI Cooling & Heating

Speed tap 3 is set to the highest speed in the ECM motor. This is a user-selectable airflow amount that will provide the highest rated airflow. Tap 3 is used for cooling operation if the blue wire is replaced with the black wire on the blower relay.

**TABLE 10**  
**Blower Speeds for Unit Operational Modes**

Unit Operation	Thermostat Inputs – 24VAC						Speed Taps		Blower Speed	Compressor Operation
	G	Y1	Y2	W1	A	D	1	2-3 <sup>1</sup>		
Blower Only	X							X	Vent/Blower Only	Off
Balanced Climate Cooling	X	X					X		Balanced Climate	On
Full Load Cool	X	X	X				X	X	Lo/Hi	On
1st Stage Heat				X				X	Lo/Hi	Off

<sup>1</sup> Fan speed is selectable through the blower relay. LO (default) or HI speeds can be used.

**TABLE 11**  
**Indoor Blower Performance**

	E.S.P. (In. H <sub>2</sub> O) ①	Balanced Climate™ Speed		Rated/Ventilation Speed ②		Optional HI Cooling & Heating Speed	
		Dry Coil	Wet Coil	Dry Coil	Wet Coil	Dry Coil	Wet Coil
W12AF-A	0.00	330	325	465	460	545	525
	0.10	315	305	450	435	495	470
	0.15	305	290	435	420	465	445
	0.20	285	270	415	400	440	415
	0.25	260	250	395	380	410	390
	0.30			375	355	380	360
	0.40			315	305	320	305
	0.50			245	245	255	245
W12AF-K	0.00	335	320	455	450	510	505
	0.10	295	280	450	435	525	505
	0.15	270	255	435	420	515	495
	0.20	250	235	415	405	500	480
	0.25	225	215	395	385	480	460
	0.30			370	365	455	435
	0.40			330	325	395	370
	0.50			300	295	340	305

① E.S.P. is the total combined external static pressure of both the supply and return ducts or grills.

② This is the speed set at the factory.

**TABLE 12**  
**Electric Heat**

Models	W12AF-A				W12AF-K	
	240V		208V		115V	
	A	① BTU	A	① BTU	A	① BTU
02					16.0	6,300
03	12.0	9,400	10.8	7,700		
05	20.0	15,700	18.0	12,800		

① With blower watts included

**TABLE 13**  
**Maximum ESP of Operation – Electric Heat Only**

Model	W12AF	
Outlet	Front	
Speed	High	Low
-A02	.5	.5
-A03	.5	.5
-A05	.5	.5
-K00	.5	.5
-K02	.5	.5

Values shown are for units equipped with standard 1" throwaway filter or 1" washable filter.

Derate ESP by .15 for 2" pleated filters.

**TABLE 14**  
**Vent and Control Options**

Part Number	Description	All Models
CMA-39	Low Ambient Control	X
BOP-1A	Blank Off Plate	X
BFAD-1	Barometric Fresh Air Damper	X
CRVS-1B	Commercial Ventilator - Spring Return	X
JIFM-1B	Economizer with Exhaust	X