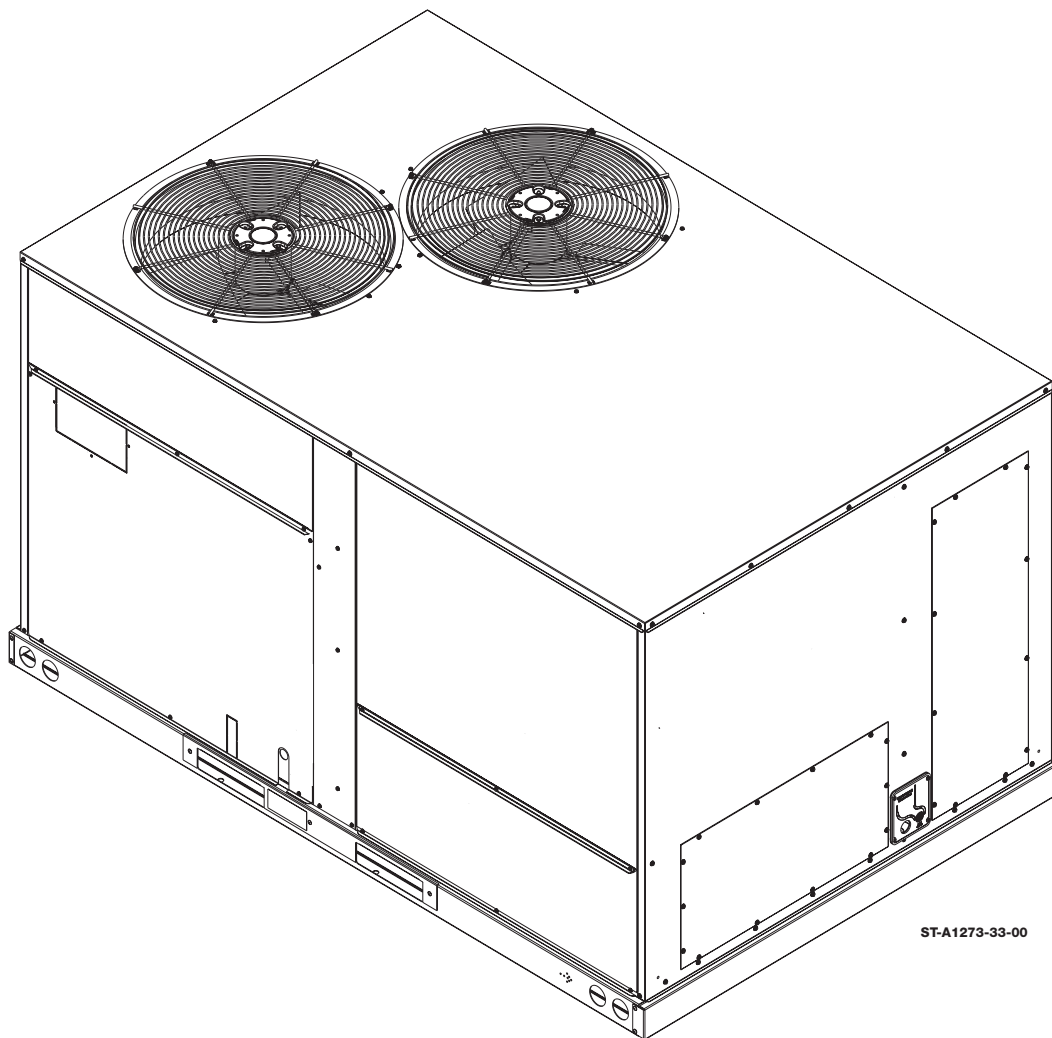


INSTALLATION INSTRUCTIONS

FOR PACKAGED HEAT PUMP UNITS

(-)HPD SERIES 7.5, 8.5 & 10 TON [26.4, 29.9 & 35.2 [KW]
60 HZ MODELS
WITH R-454B REFRIGERANT



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DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP
IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

▲ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

▲ WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

B000192

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A. IMPORTANT SAFETY AND GENERAL INFORMATION

A.1 Introduction

This booklet contains the installation and operating instructions for your 7.5 ton, 8.5 ton and 10 ton packaged heat pump unit. There are some precautions that should be taken to ensure proper operation. Improper installation can result in unsatisfactory operation or dangerous conditions.

Read this booklet and any instructions packaged with separate equipment required to make up the system prior to installation. Give this booklet to the owner and explain its provisions. The owner should retain this booklet for future reference.

The images contained within this document may not be an exact representation of every unit, accessory, installation, etc. We reserve the right to change the content of this document at any time.

⚠ WARNING: The manufacturer's warranty does not cover any damage or defect to the heat pump caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the air conditioner.

You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

A.2 Agency Performance Audit and Efficiency Testing Notice

NOTICE: BREAK-IN PERIOD

Prior to agency testing, run the compressor for 20 hours at 115°F outdoor ambient temperature and 80°F dry bulb / 75°F wet bulb indoor ambient temperature.

NOTICE: EFFICIENCY TESTING NOTICE

For the purposes of verifying or testing efficiency ratings, the test procedure in Title 10 Appendix A to Subpart F of Part 431 (Uniform Test Method for Measurement of Energy Consumption of Air-Cooled Small ($\geq 65,000$ Btu/h), Large, and Very Large Commercial Packaged Air Conditioning and Heating Equipment), and the clarifying provisions provided in the standards listed on this page that were applicable at the date of manufacture should be used for test set up and performance.

SETUP

- ASHRAE 37 - 2009 (RA 2019)

PERFORMANCE:

- ANSI/ASHRAE 90.1 - 2022
- AHRI Operations for Unitary Large AC Equipment 340/360 (2022)

SAFETY

UL 60-335-2-40 4th Edition

QUALITY

ISO 9001: 2015

A.3. Importance of a Quality Installation

Optimal system performance and longevity depend upon a quality and proper installation. Failure to properly setup and commission this unit could result in undesirable operation and subsequent faults and potential failures.

Carefully follow all guidelines listed in the manual and industry best practices. Conform to all local code requirements. Contact your local technical representative with any questions or concerns.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment must be on site. A dry powder CO2 fire extinguisher must be near the charging area at all times during installation, commissioning, service, and decommissioning.

A. IMPORTANT SAFETY AND GENERAL INFORMATION

A.3.1. Working Personnel Qualifications

Every installation, maintenance, service, and repair working procedure must be conducted by qualified personnel who have been trained in operating and servicing units that employ flammable refrigerants such as R-454B.

Examples of working procedures include but are not limited to:

- Breaking into the refrigeration circuit
- Opening sealed components
- Opening ventilated enclosures

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

A.4. Importance of Air Flow and Setup

Optimal system performance is also dependent upon having the ideal airflow across the condensing and evaporating coils, and upon matching the charge weight to the manufacturer's spec for the unit. Improper or restricted air flow, and incorrect charge weight, will hinder the performance of the unit. Please refer to the manufacturer's recommended clearances for setting the unit and the included guide for setting air flow. Refer to the rating plate for the charge weight.

A.5. Checking Product and Inspection

Upon receiving the unit, inspect it for any damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. **IMPORTANT:** Check the unit model number, heating size, electrical characteristics, and accessories to determine if they are correct.

B. GENERAL SPECIFICATIONS

B.1 Safety Warnings

⚠️WARNING: The manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the air conditioner. You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

⚠️WARNING: Disconnect all power to the unit before starting maintenance. Failure to do so can result in severe electrical shock or death

⚠️WARNING: Do not, under any circumstances, connect return ductwork to any other heat producing device such as a fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, property damage, severe personal injury or death.

⚠️WARNING: The unit must be permanently grounded. A grounding lug is provided in the electric heat access area for a ground wire. Failure to ground this unit can result in fire or electrical shock causing property damage, severe personal injury or death.

⚠️WARNING: Only electric heater kits supplied by this manufacturer as described in this publication have been designed, tested, and evaluated for use with this unit. Use of any other manufactured electric heaters installed within this unit may cause hazardous conditions resulting in property damage, fire, bodily injury or death.

⚠️DANGER: Risk of fire or explosion. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.

⚠️WARNING: Risk of fire or explosion. Dispose of properly in accordance with Federal Or Local Regulations. Flammable refrigerant used.

⚠️DANGER: Risk of fire or explosion. Flammable refrigerant used. Consult the repair manual/owner's guide before attempting to service this product. All safety precautions must be followed.

⚠️DANGER: Risk of fire or explosion due to flammable refrigerant used. Follow handling instructions carefully in compliance with National Regulations.

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

⚠️WARNING: The 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.

⚠️WARNING: Be aware that refrigerants may not contain an odor.

⚠️WARNING: If this unit is connected via an air duct system to one or more rooms with an area less than the specified minimum area, that room shall be without continuously operating flames or other potential ignition sources. See **Appendix F - A2L Refrigerant Installation Safety Data**.

⚠️WARNING: Auxiliary devices which may be a potential ignition source shall not be installed in the ductwork.

⚠️WARNING: If this unit is connected via duct to one or more rooms, only auxiliary devices approved by the manufacturer that are declared suitable with A2L refrigerants shall be installed in the connecting ductwork.

⚠️WARNING: Appliance shall be installed, operated, and stored in a room with a floor area larger than 'X'm². See **Appendix F - A2L Refrigerant Installation Safety Data**.

B. GENERAL SPECIFICATIONS

B.2. Major Components

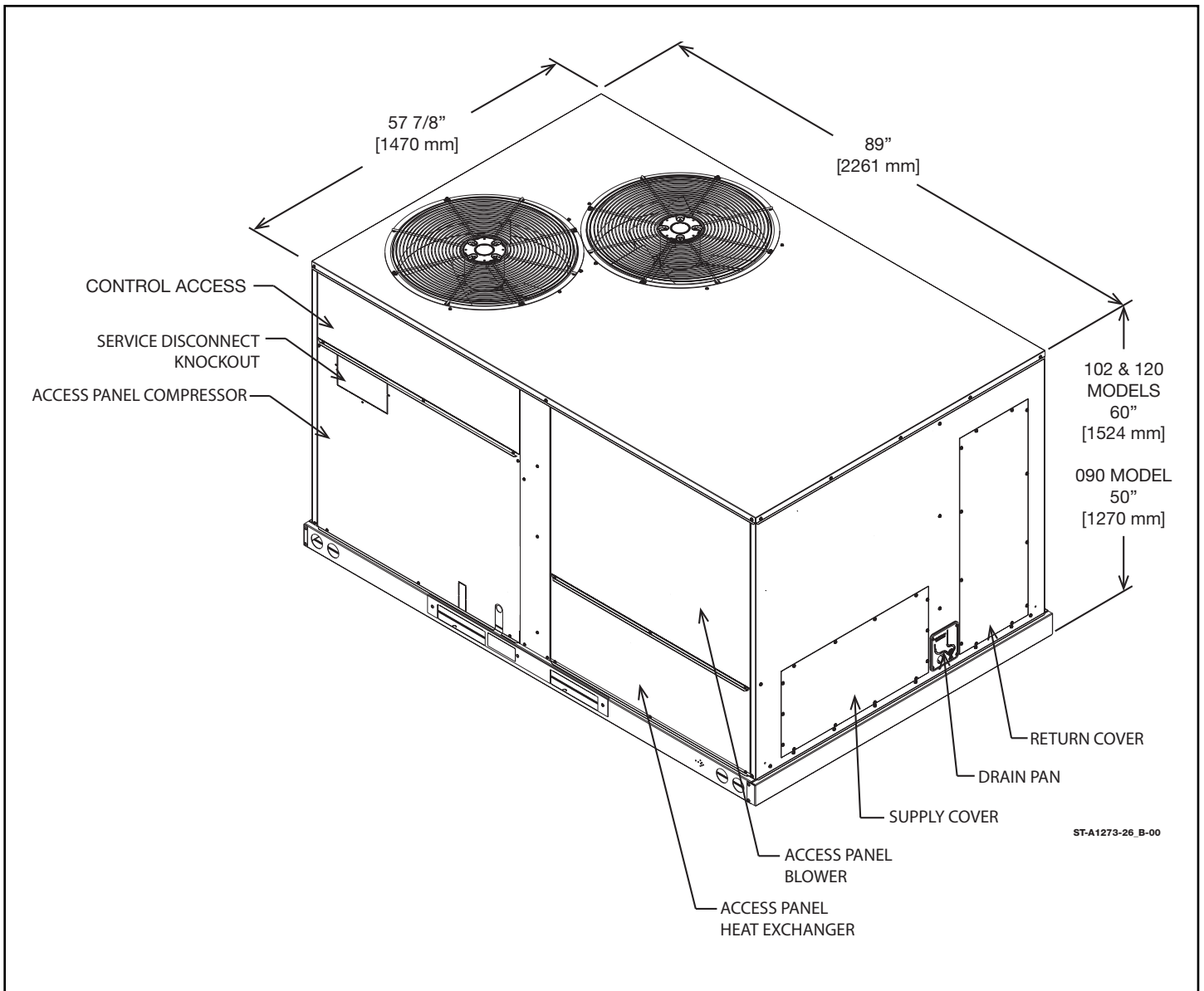
The unit includes a hermetically-sealed refrigerating system consisting of a scroll compressor, condenser coil, evaporator coil with TXV, a reversing valve, a circulation air blower, a condenser fan, and all necessary internal

electrical wiring. The refrigeration system of these units is factory evacuated, charged, and performance tested. Refrigerant amount and type are indicated on rating plate.

B.3. Product Data Information

B.3.1. Dimensional Information

IMPORTANT: This unit must be mounted level in both directions to allow water to drain from the condenser section and condensate pan.

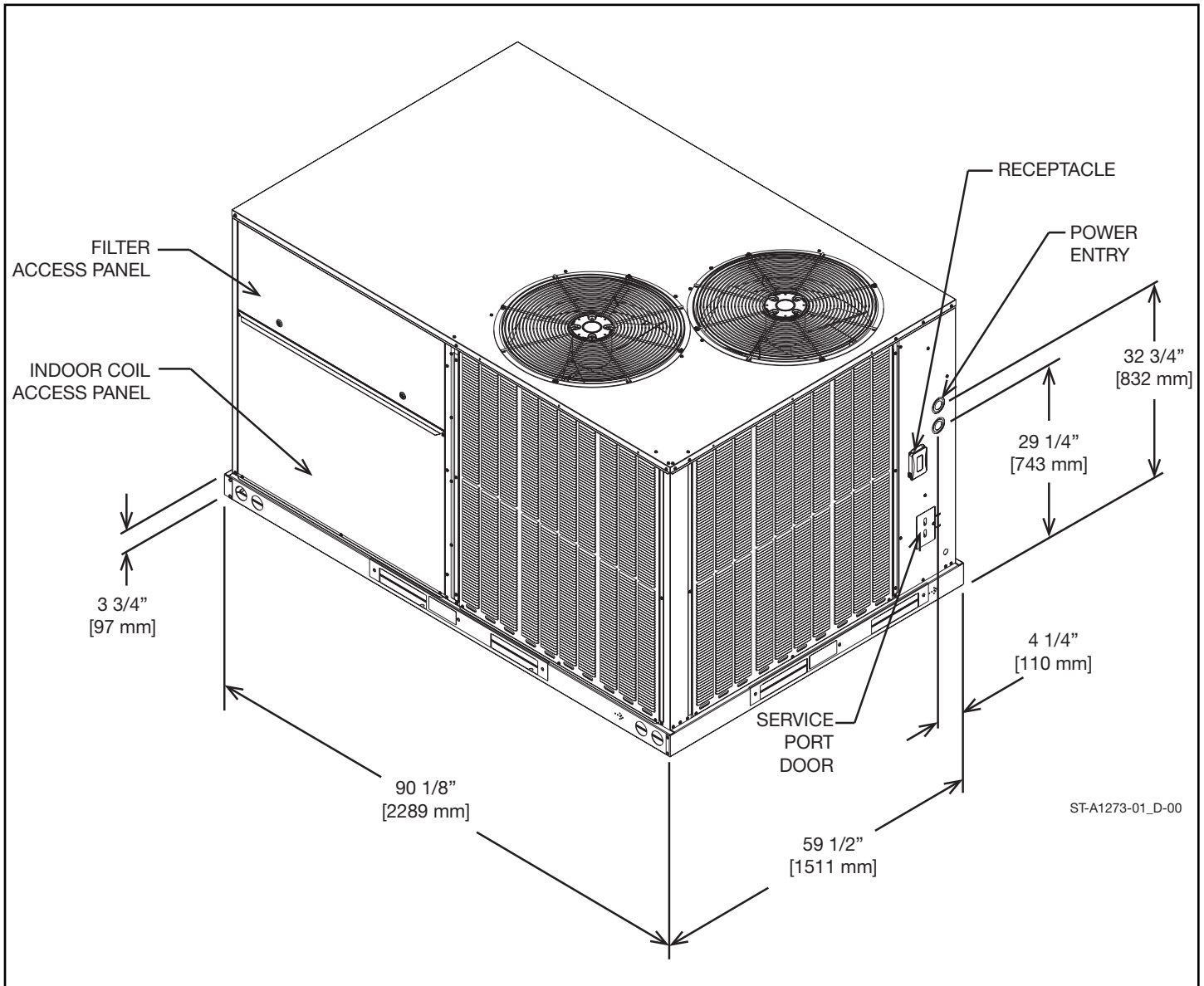


B. GENERAL SPECIFICATIONS

B.3. Product Data Information

B.3.1. Dimensional Information (Cont.)

IMPORTANT: This unit must be mounted level in both directions to allow water to drain from the condenser section and condensate pan.



B.3.2. Product Specifications

The packaged Heat Pump rooftop unit is available with 10, 15, 20, 30 or 40 KW electric heat input (either factory installed or field installed). Cooling capacity is 7.5, 8.5, and 10 nominal tons. Units are convertible from horizontal supply/return to bottom supply/return by relocation of supply/return cover panels. See section **C.3.5. Cover Panel Installation/ Conversion Procedure** for more details.

The units are weatherized for mounting outside of the building.

⚠ WARNING: Units are not design certified to be installed inside the structure. Doing so can cause inadequate unit performance as well as property damage or death.

B. GENERAL SPECIFICATIONS

B.3. Product Data Information

B.3.3. General Data

See [Appendix A](#) towards the end of this manual for General Data.

B.3.4. Electrical Data Reference

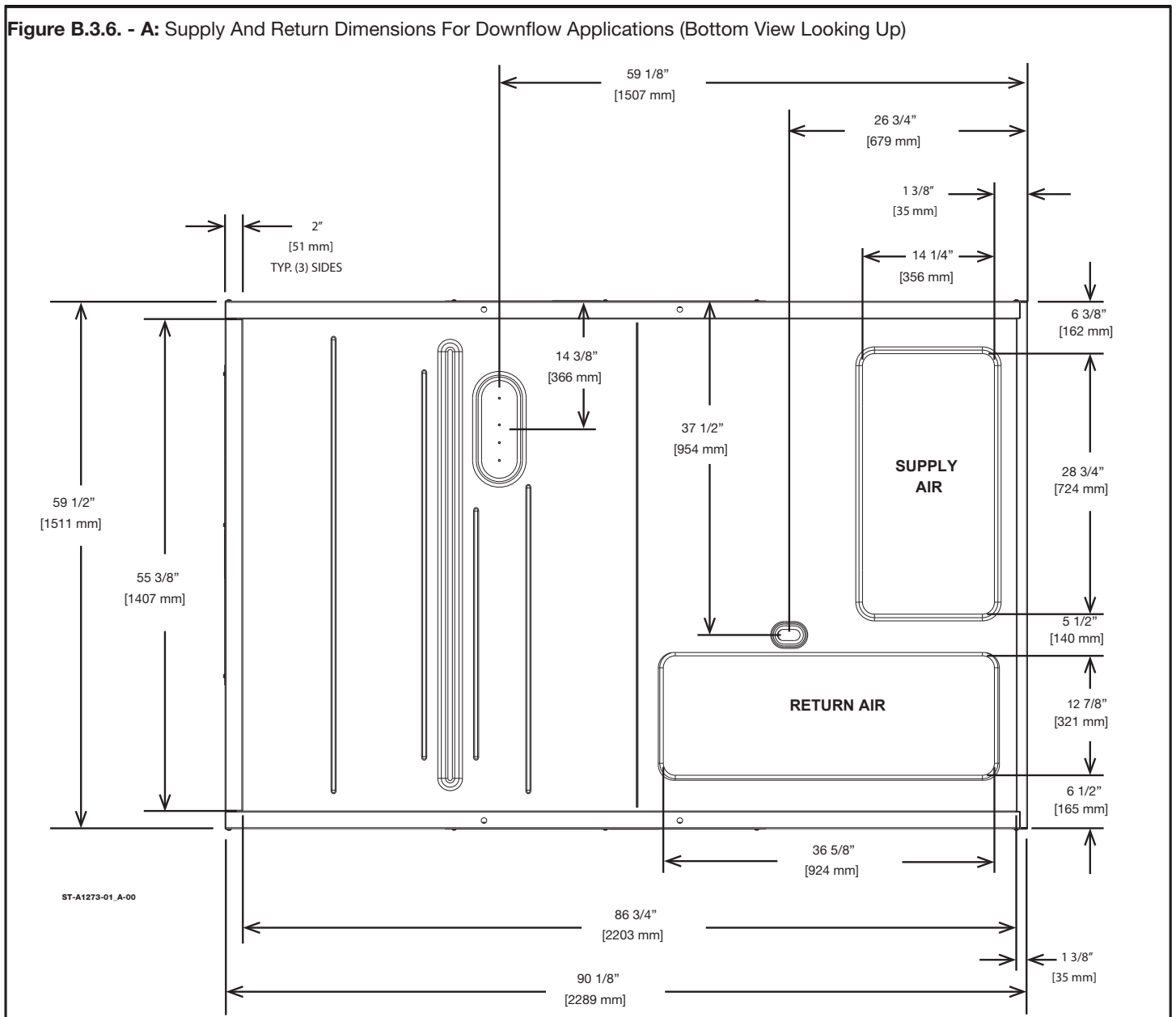
See [Appendix B](#) towards the end of this manual for Electrical Data.

B.3.5. Air Flow Performance Data

See [Appendix C](#) towards the end of this manual for Air Flow Performance Data.

B.3.6. Supply and Return Duct Dimensions

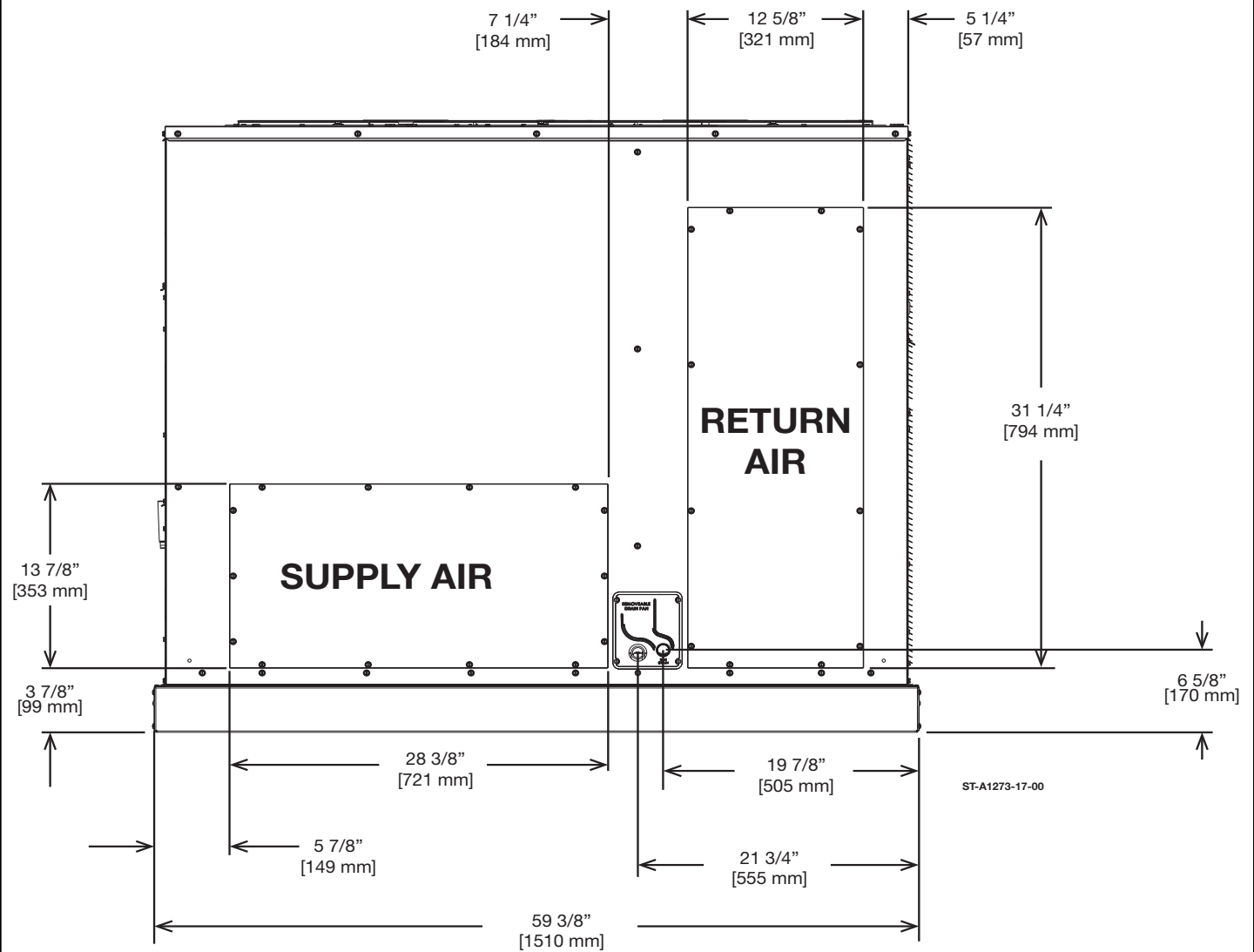
Figure B.3.6. - A: Supply And Return Dimensions For Downflow Applications (Bottom View Looking Up)



B. GENERAL SPECIFICATIONS

B.3.6. Supply and Return Duct Dimensions

Figure B.3.6. - B: Supply And Return Dimensions For Horizontal Applications



B. GENERAL SPECIFICATIONS

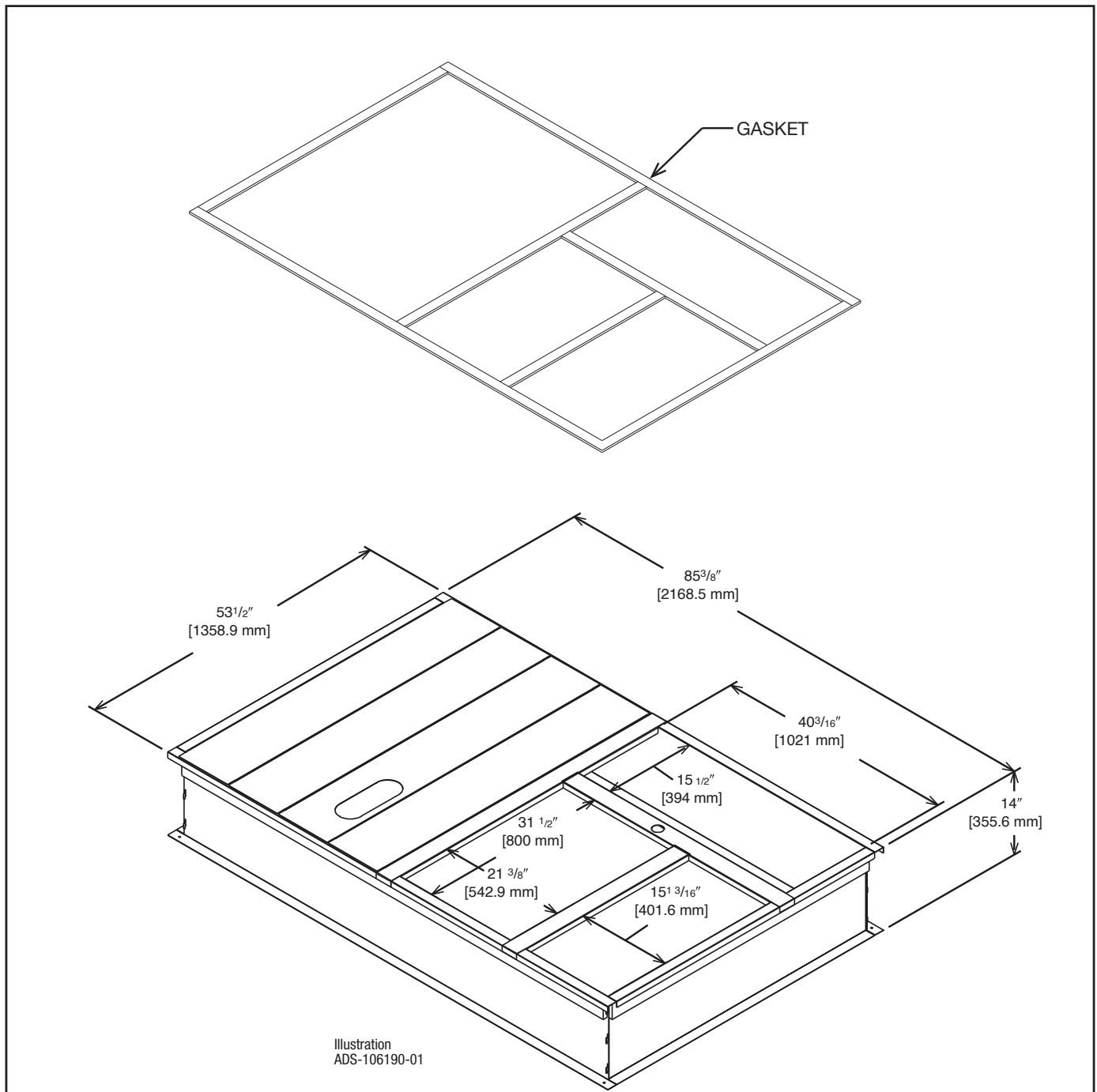
B.3. Product Data Information

B.3.7. Curb Dimensions

NOTE: See Section C.3.3. Rooftop

Installation for more information for installing the unit on a curb.

Figure B.3.7. – A: Roofcurb Complete Assembly



C. INSTALLATION OF THE UNIT

C.1. General

C.1.1. Installation

Install this unit in accordance with local and national standards. Any and all work must be done by authorized personnel.

C.1.2. Pre-Installation Checkpoints

Before attempting any installation, carefully consider the following points:

- Structural strength of supporting members (Rooftop Installation)
- Clearances and provision for servicing
- Power supply and wiring
- Air duct connections and sizing
- Drain facilities and connections
- Location for minimum noise and vibration

C.2. Tool and Refrigerant

A leak detection system is installed in this unit. The unit must be powered at all times except during service.

This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

C.2.1. Tools Required for Installing and Servicing R-454B Models

Manifold Sets:

- Up to 800 PSIG High Side
- Up to 250 PSIG Low Side
- 550 PSIG Low Side Retard

Manifold Hoses:

- Service Pressure Rating of 800 PSIG
- Zero-loss fittings

Recovery Cylinders:

- 400 PSIG Pressure Rating

Dept. of Transportation

- 4BA400 or BW400

C.2.2. Specifications of R-454B

All units are factory charged with R-454B Refrigerant.

Application: R-454B is not a drop-in replacement for R-410A. Equipment designs must accommodate the safety group A2L of R-454B. It cannot be retrofitted into R-410A units.

Physical Properties: R-454B has an atmospheric bubble point of 59.6°F [50.9°C] and an atmospheric dew point of -58.0°F [-50.0°C]. Its bubble point saturation pressure at 77°F

[25°C] is 213 psig [1469 kPa] and dew point saturation pressure at 77°F [25°C] is 205 psig [1415 kPa].

Pressure: The pressure of R-454B is similar to that of R-410A. Recovery and recycling equipment, pumps, hoses, and the like must have design pressure ratings appropriate for R-454B. Manifold sets need to range up to 800 psig [5,516 kPa] high-side and 250 psig [1,724 kPa] low-side with a 550 psig [3,792 kPa] low-side retard. Hoses need to have a service pressure rating of 800 psig [5,516 kPa]. Recovery cylinders need to have a 400 psig [2,758 kPa] service pressure rating, DOT 4BA400 or DOT BW400.

Flammability: R-454B is classified as safety group A2L, where the 2L indicates flammability class.

R-454B and air should never be mixed in cylinders or supply lines or be allowed to accumulate in storage cylinders. Leak checking should never be done with a mixture of R-454B and air.

C.2.3. Quick Reference Guide for R-410A

Ensure that servicing equipment is designed to operate with R-454B.

- Refrigerant R-454B operates at pressures similar to R-410A. However, it is classified in safety group A2L. Ensure that servicing equipment is compatible with R-454B.
- Refrigerant cylinders are no longer color-coded. R-454B refrigerant cylinders are light green grey in color with a red band on the shoulder or top of the cylinder to indicate flammability.
- R-454B, as with other HFCs is only compatible with POE oils.
- Vacuum pumps will not remove moisture from POE oil.
- R-454B systems are to be charged with liquid refrigerants.
- Do not install a suction line filter drier in the liquid line.
- A liquid line filter drier is standard on every unit.
- Desiccant (drying agent) must be compatible for POE oils and R-454B.

C. INSTALLATION OF THE UNIT

C.2.4. Evaporator Coil/TXV

The thermostatic expansion valve is specifically designed to operate with R-454B. **The existing evaporator must be replaced with the factory specified TXV evaporator specifically designed for R-410A.**

⚠ WARNING: Disconnect all power to unit before starting maintenance. Failure to do so can cause electrical shock resulting in personal injury or death. Regular maintenance will reduce the buildup of contaminants and help to protect the unit's finish.

C.2.5. Minimum Room Area

Because this unit uses R-454B refrigerant, UL requires a minimum room area for the total conditioned space (TAmin) that is supplied by this equipment.

The UL Safety Standard defines an individual room area as the room area enclosed by floors, walls, partitions, and doors of the space where the unit is installed, also as the room area into which refrigerant can leak. Each room/conditioned space will need to be considered for the total area requirements.

The minimum room area of the total conditioned space for each base model is listed in **Appendix H – A2L Refrigerant Installation Safety Data.**

C.2.6. No Ignition Sources

When performing work that involves exposing any pipework, no person working on or near the refrigerant system may use any ignition sources that could lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept far away from the site during installation, repair, removal, or disposal, during which refrigerant can possibly be released into the surrounding space. Before work takes place, the area around the equipment must be surveyed to ensure that there are no flammable hazards or ignition risks. Additionally, “No Smoking” signs must be displayed.

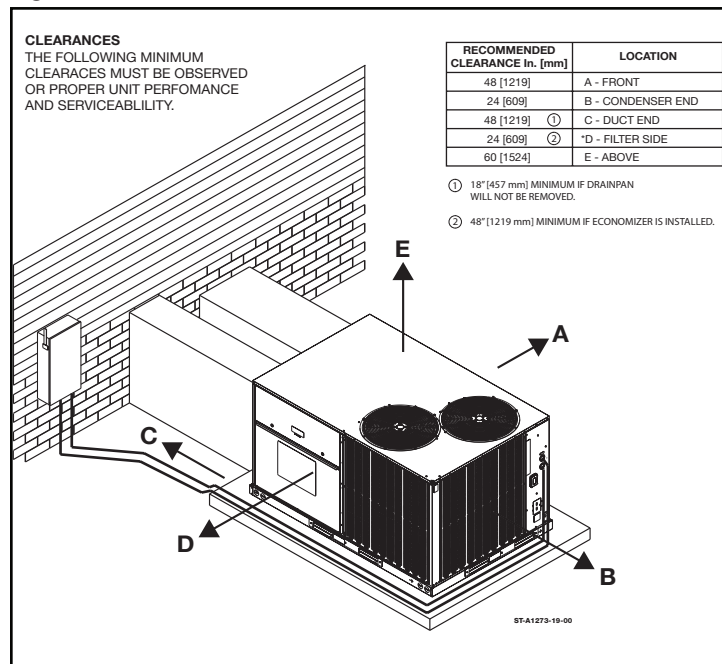
C. INSTALLATION OF THE UNIT

C.3. Choosing a Location

C.3.1. Unit Location: Allowable Clearances and Operational Issues

The unit location must comply with the allowable clearances listed in **Figure C.3.1. - A**. Failure to comply with the recommended clearances may result in operational issues such as decreased capacity, restricted condenser airflow, and condenser motor fatigue.

Figure C.3.1. - A: Allowable Clearances



C.3.2. Outside Installation

⚠ WARNING: These units are designed certified for outdoor installation only. Installation inside any part of a structure can result in inadequate unit performance as well as property damage.

1. Select a location where external water drainage cannot collect around unit.
2. Provide a level slab sufficiently high enough above grade to prevent surface water from entering the unit
3. Locate the unit to provide proper access for inspection and servicing as shown in **Figure C.3.1. - A**.
4. Locate unit where operating sounds will not disturb owner or neighbors.
5. Locate unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Do not locate unit in an area where excessive snow drifting may occur or accumulate.
6. Where snowfall is anticipated, the height of the unit above the ground level must be considered. Mount unit high enough to be above anticipated maximum area snowfall.

7. Select an area which will keep the areas of the vent, air intake, and A/C condenser fins free and clear of obstructions such as weeds, shrubs, vines, snow, etc. Inform the user accordingly.

C.3.3. Rooftop Installation

1. Before locating the unit on the roof, make sure that the roof structure is adequate to support the weight involved. (See Electrical & Physical Tables in this manual.) **THIS IS VERY IMPORTANT AND IS THE INSTALLER'S RESPONSIBILITY.**

2. For rigging and roofcurb details, see **Section C.4.3.**

3. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

IMPORTANT: If unit will not be put into service immediately, block off supply and return air openings to prevent excessive condensation.

C.3.4. Corrosive Environments

The metal parts of this unit may be subject to rust or deterioration in adverse environmental conditions. This oxidation could shorten the equipment's useful life. Salt spray, fog or mist in seacoast areas, sulfur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

If the unit is to be installed in an area where contaminants are likely to be a problem, give special attention to the equipment location and exposure.

1. Avoid having lawn sprinkler heads spray directly on the unit cabinet.
2. In coastal areas, install the unit on the side of the building away from the waterfront.
3. In some situations, fencing or shrubs may give some protection against contaminants. Be mindful of the allowable clearances.
4. Frequent washing of the cabinet, fan blade, and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.
5. Regular cleaning and waxing of the cabinet with an automobile polish will provide some protection.
6. A good liquid cleaner may be used several times a year to remove matter that will not wash off with water.

Several different types of protective coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer. The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

C. INSTALLATION OF THE UNIT

Figure C.3.5. – A: Cover Gasket Detail

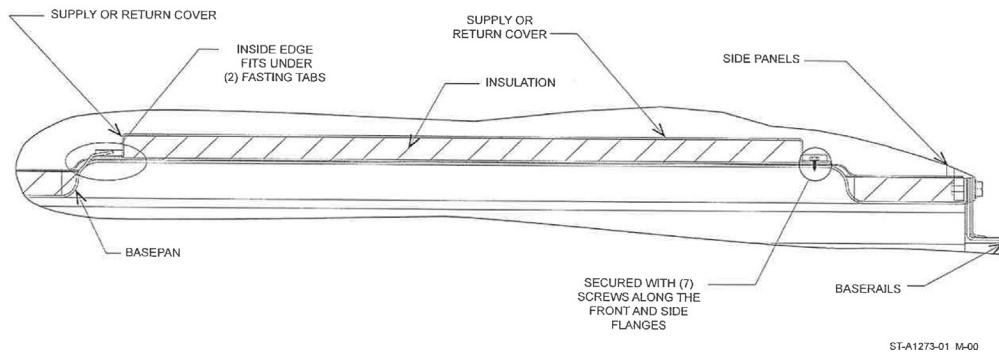
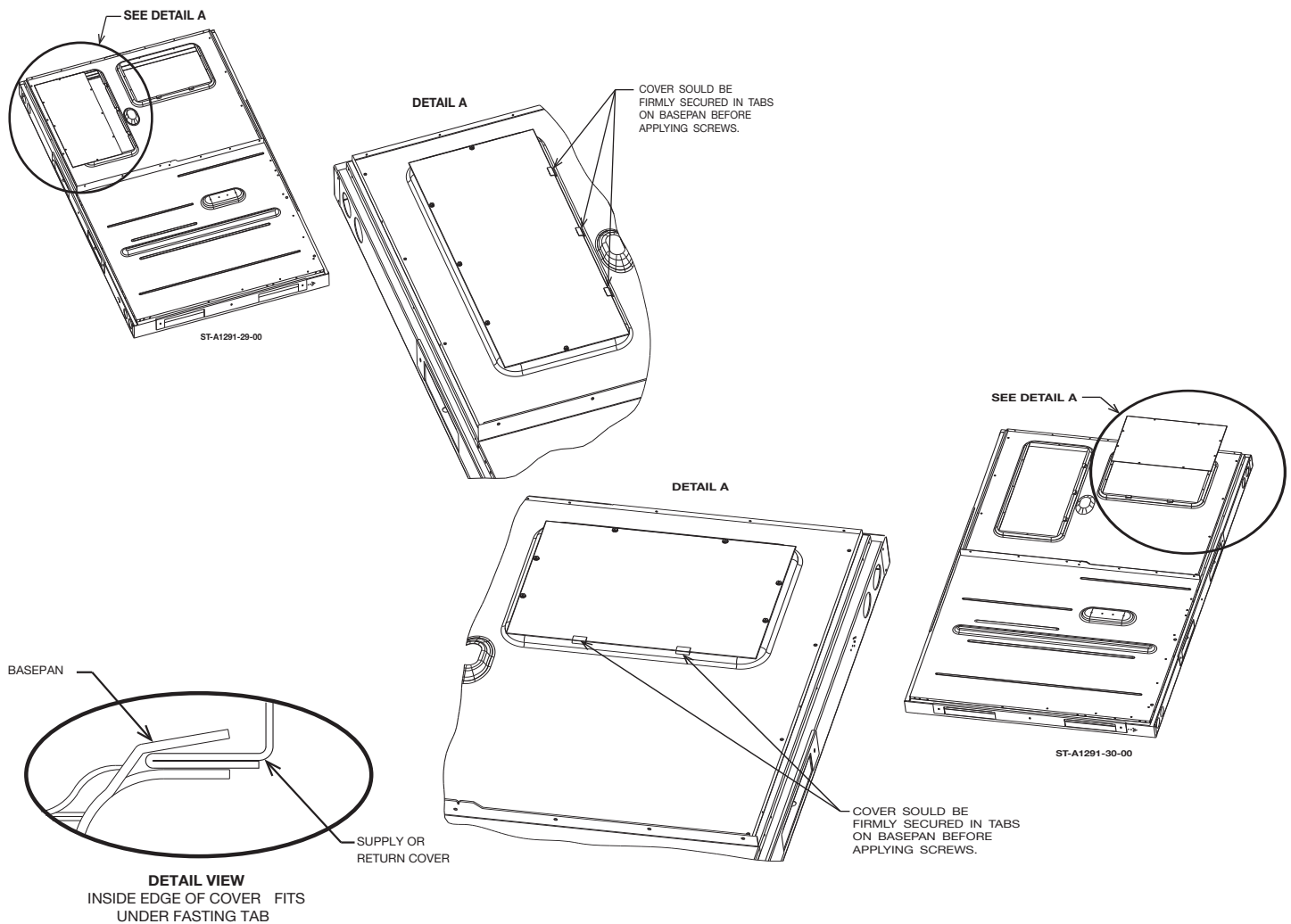


Figure C.3.5. – B: Downflow to Horizontal Conversion



C.3.5. Cover Panel Installation/Conversion Procedure

FROM DOWNFLOW TO HORIZONTAL

1. Remove the covers from the supply and return openings on the unit. **See Figure B.3.6. – B** for reference.
2. Install the covers over the supply and return openings in the basepan, painted side up, inserting the leading flange under the bracket provided. Place the back flange to top of the front bracket provided. **See Figure C.3.5. – A** for reference.
3. Secure the return and supply cover to front bracket with screws.

C. INSTALLATION OF THE UNIT

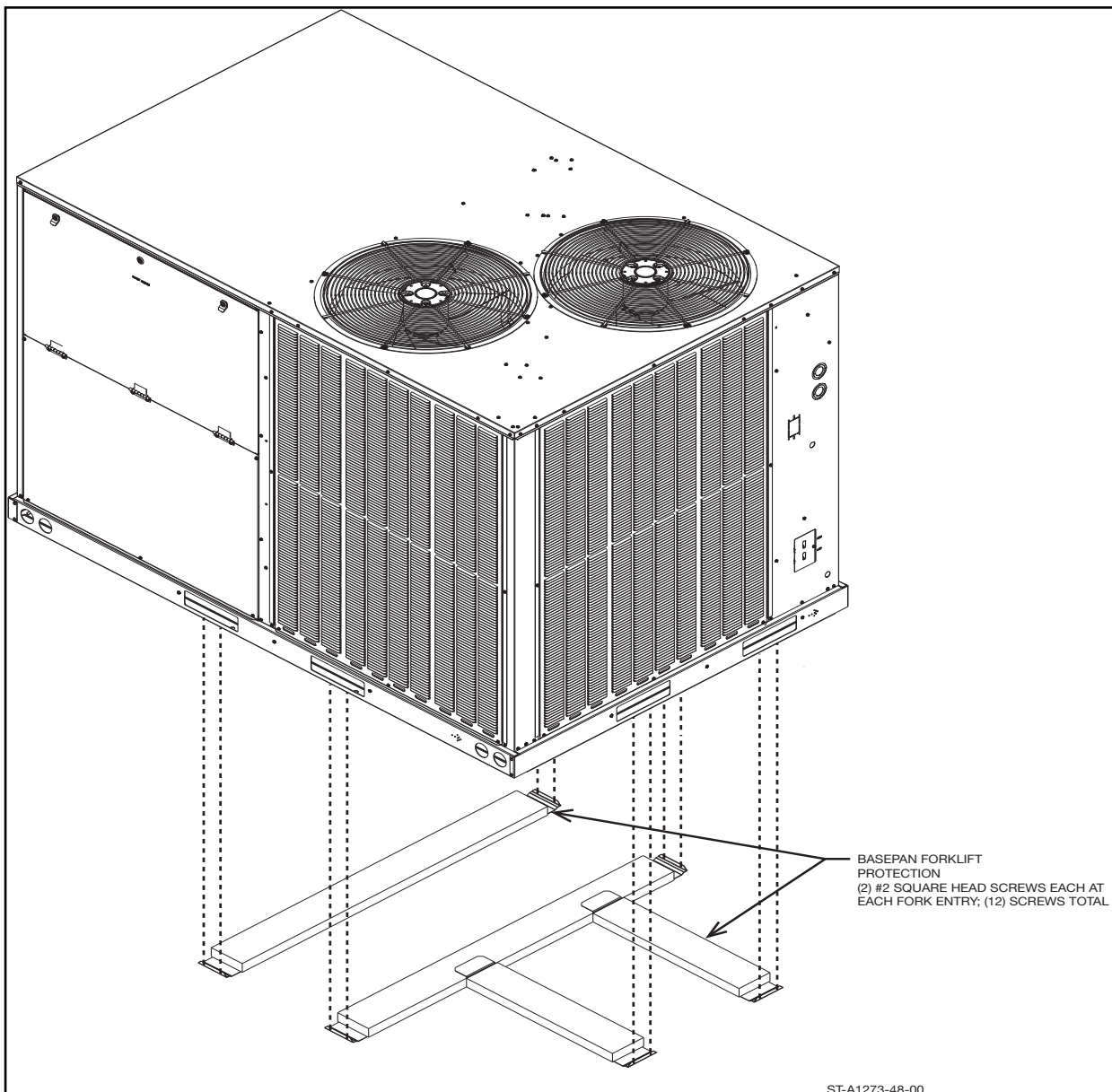
C.4.Setting the Unit

C.4.1. Removing Shipping material

There will be three types of shipping material that will need to be removed: the wood board basepan protection underneath, the wooden skid on top, and the condenser coil protection (on non-louver panel units).

- **Woodboard Basepan Protection** – Remove the screws that attach the metal brackets for each of the forklift fork-entry points, and remove the brackets. This will release the protection boards from underneath, and it may be removed when the unit is lifted.
- **Shipping Screws** – Shipping screws are type #2 square head screws.

Figure C.4.1. – A: Basepan Protection Assembly

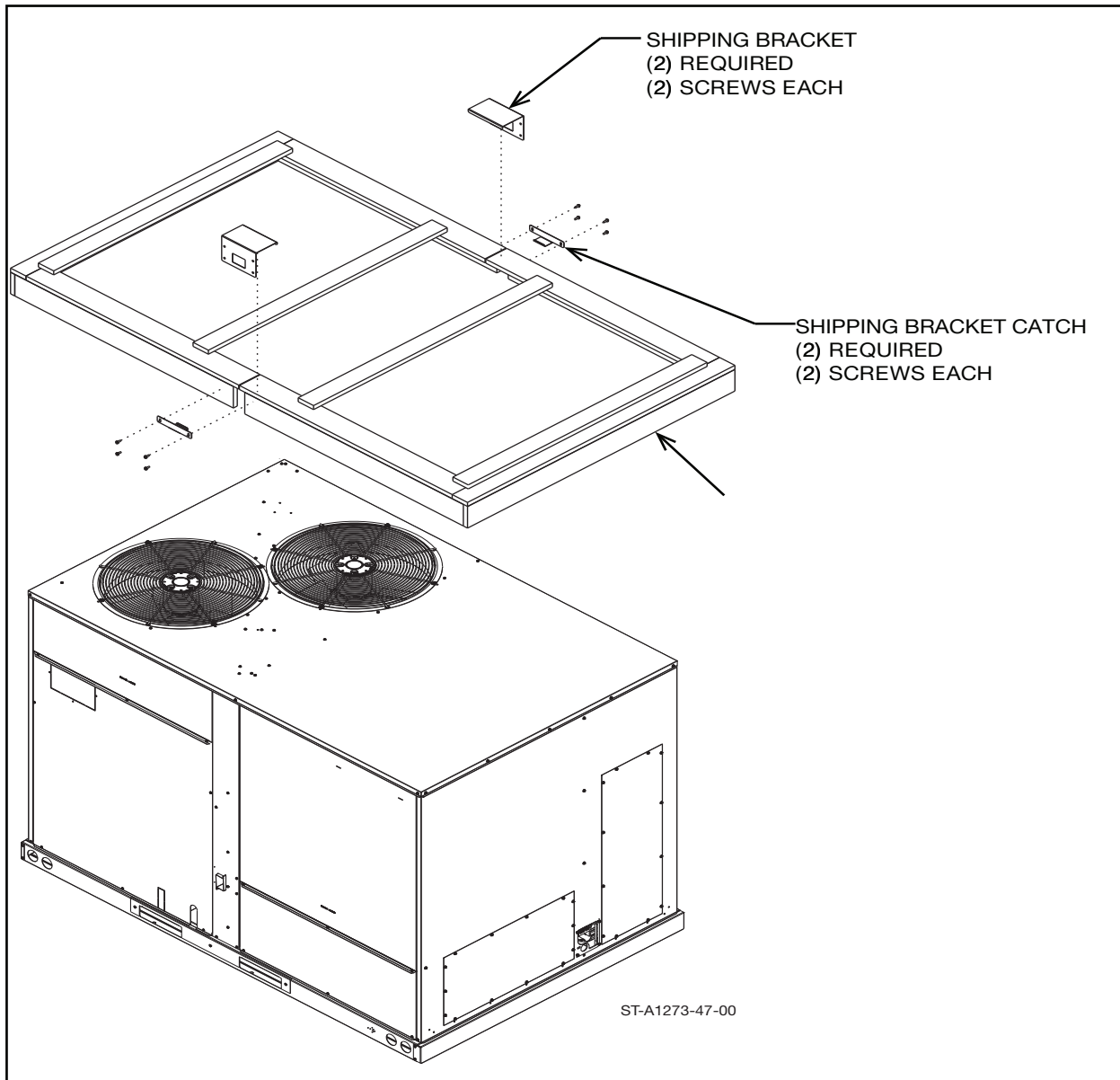


C. INSTALLATION OF THE UNIT

- **Wooden Skid** – Remove the screws from the metal brackets located in the middle along both long sides of the unit. This will detach the two sections of the wooden skid and allow them to be lifted off.

If the unit is to be lifted by a crane, it is recommended to leave the top skid on until after the unit is on the roof to provide extra protection if spreader bars are not used.

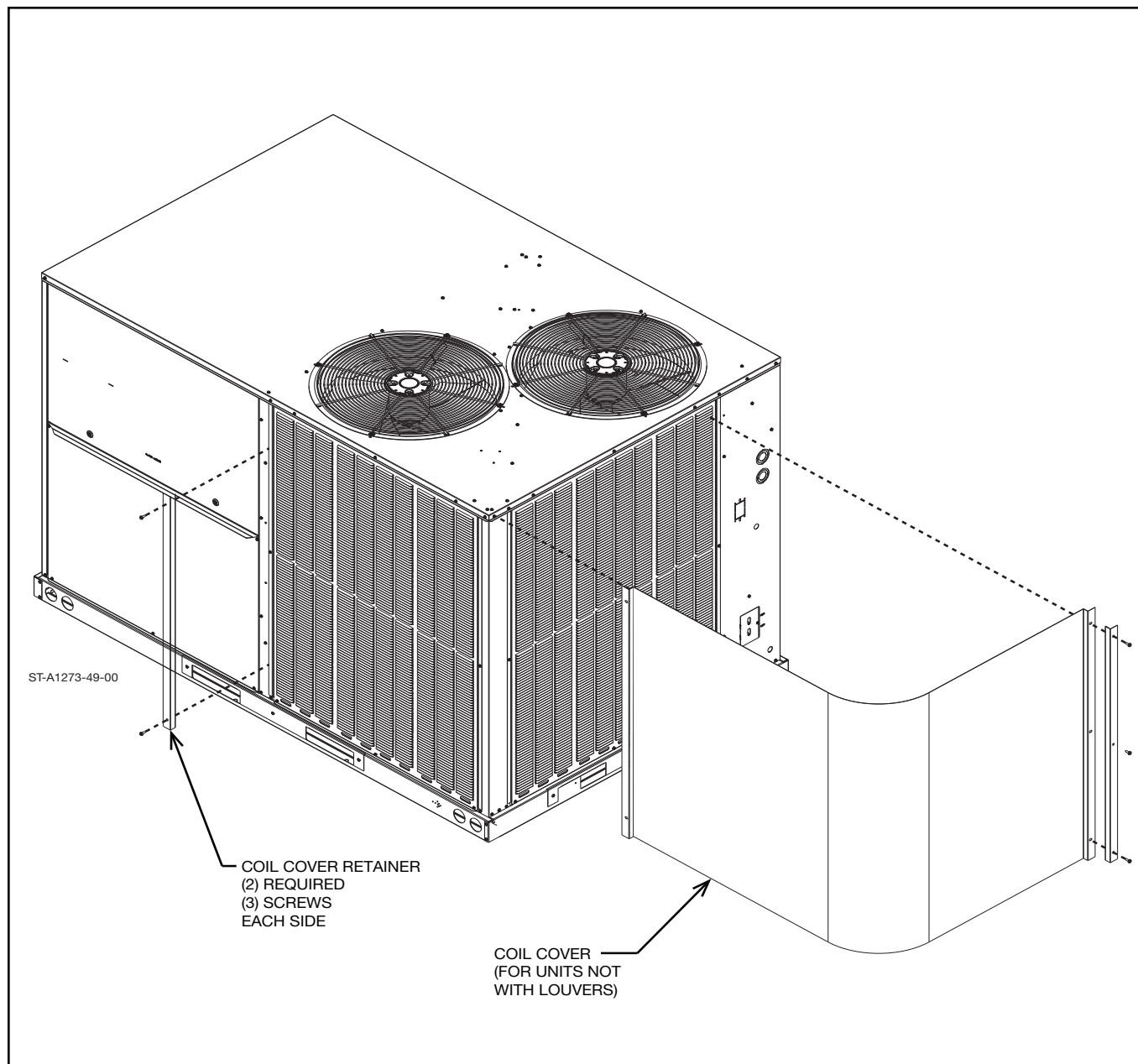
Figure C.4.1. – B: Wooden Skid Assembly



C. INSTALLATION OF THE UNIT

- **Condenser Coil Protection** – Remove the screws along the perimeter of the coil protector. This will allow the protector to be removed. If the unit has louver panels, it will not have the condenser coil protection.

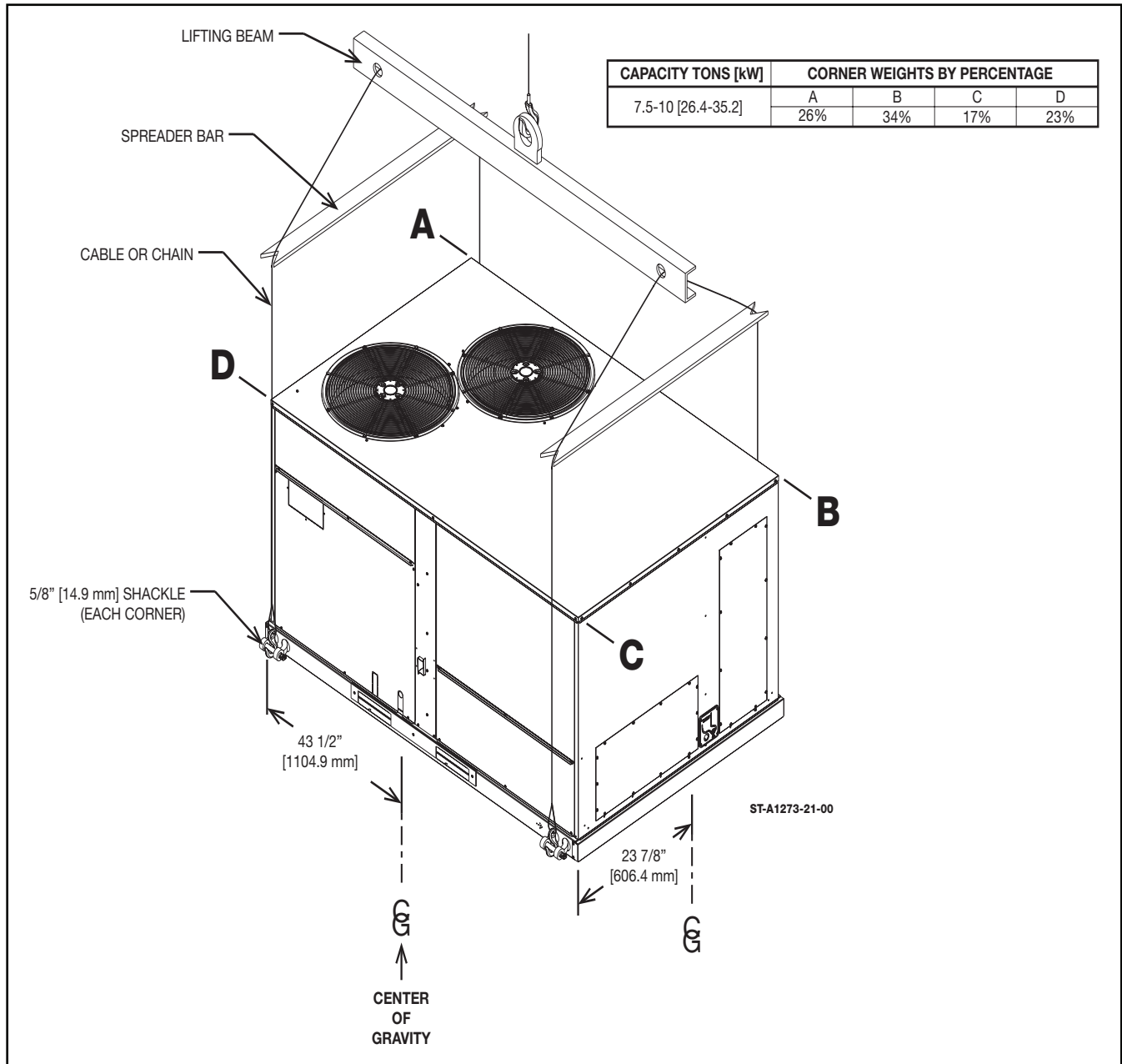
Figure C.4.1. – C: Condenser Coil Protection Assembly



C. INSTALLATION OF THE UNIT

C.4.2. Lifting the Unit

Figure C.4.2. – A : Lifting Detail



C.4.3. On a Roof Curb

Refer to **Figure C.3.1. - A** in section **C.3.1. "Unit Location: Allowable Clearances and Operational Issues"** before installing the unit on a roof curb.

Only use manufacturer-approved roofcurb products for the unit.

C.4.3.1. Installing the Roof Curb

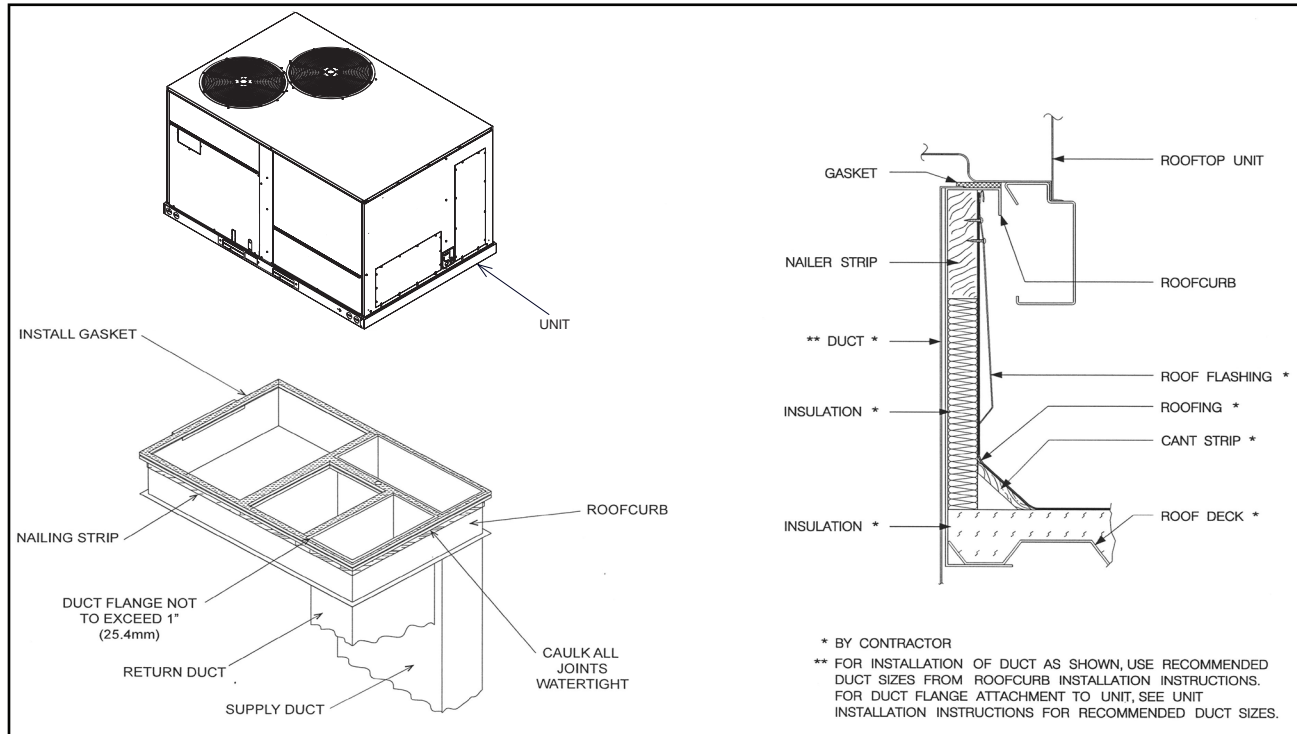
Refer to the separate Installation Instructions for installing a roof curb.

- 14" and 21" Roofcurb
- Roofcurb Adapter

C. INSTALLATION OF THE UNIT

C.4.3.2. Setting the Unit

Figure C.4.3.2. - A: Setting the unit on Roofcurb Assembly



C.4.3.3. High Wind and Seismic Tie-Down Methods

The units must be secured in compliance with ASCE 7-10 and the Florida Building Code 5th Edition. Please refer to **Appendix J: Unit Tie-Down Methods**.

C.4.4. On a Slab

C.4.4.1. Setting the Unit

Set the unit on a stable concrete pad with adequate clearances around the sides of the unit, and make sure the unit is level before securing.

Before setting/securing the unit, use this opportunity to convert the unit from a downflow configuration to a sideflow configuration if necessary. Refer to section **C.3.5. Cover Panel Installation/Conversion Procedure**.

C.4.4.2. High Wind and Seismic Tie-Down Methods

Slab-installed units must also be secured in compliance with ASCE 7-10 and the Florida Building Code 5th Edition. Please refer to **Appendix J: Unit Tie-Down Methods**.

C.5. Installing Condensate Drain

IMPORTANT: Install a condensate trap to ensure proper condensate drainage. See **Figure C.5.1 - A** for reference.

The condensate drain pan has a threaded female 3/4 inch NPT (11.5 TPI) connection. Drain line must be no smaller than drain pan outlet and adequately sized to accommodate the condensate discharge from the unit. Drain line must be routed to an acceptable drain or outdoors in accordance with local codes. Consult local codes or ordinances for specific requirements of condensate drain piping and disposal.

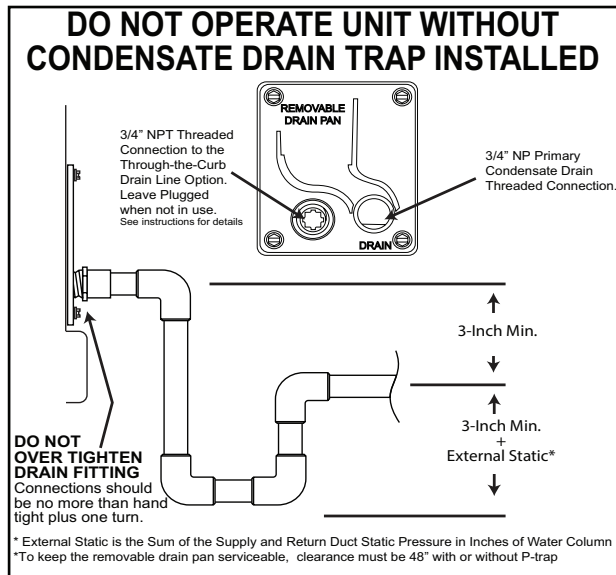
DO NOT connect condensate drain line to a closed sewer pipe.

C.5.1. Determine Drain Trap Height Requirement

The drain line should be a minimum of 3 inches deep, plus 1 inch for every inch of external static pressure from the blower and duct system. For Example, if the external duct static is 1 inch of water column, the drain trap from the bottom of the trap to the bottom of the drain outlet should be 4 inches, the drain outlet should be 3 inches below the drain connection on the condensate pan. Ensure the outlet of the trap is routed to a suitable drain location as required by local code. See **Figure C.5.1 - A** for reference.

C. INSTALLATION OF THE UNIT

Figure C.5.1 – A: Condensate Drain Tap



C.5.2. Keeping the Condensate Drain Pan Serviceable

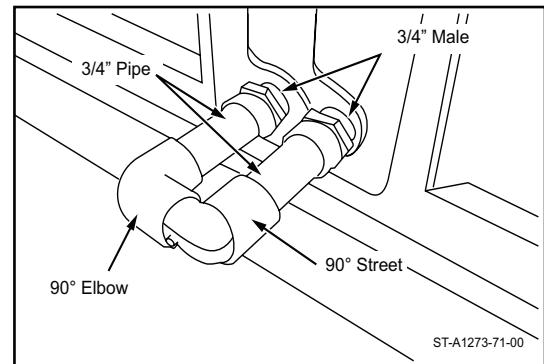
To use the removable drain pan feature of this unit, some of the condensate line joints should be assembled for easy removal and cleaning. Drain line **MUST NOT** block service access panels.

C.5.3. Connecting the Drain trap

- Use a thin layer of Teflon tape or paste on drain pan connections and install only hand tight.
- Do not over tighten drain pan connections as damage to the drain pan may occur.
- Drain line must be routed to an acceptable drain or outdoors in accordance with local codes.
- Drain line should slope away from unit a minimum of 1/8" per foot to ensure proper drainage.

C.5.4. Connecting the Drain to the through the Curb Option

The through the curb drain option is available for installations in freezing conditions or that do not want water draining on the roof. Use adapters and elbows to turn out of the drain opening on the right and into the curb drain opening on the left. Under the unit connect a 3/4" male threaded fitting, use thread sealant, into the opening between the supply and return duct openings under the unit. Install a properly sized drain trap in the conditioned space of the building and route to a suitable drain location as code requires.



C.5.5. Freezing Condition Considerations

- Drain line may need insulation or freeze protection in certain applications.
- Drain line should slope away from unit a minimum of 1/8" per foot to ensure proper drainage.

C.6. Final Installation Inspection

C.6.1. Remove Shipping Material

Before the unit is secured to the slab/roofcurb, check that all shipping material has been removed. See **Section C.4.1.** for how to remove shipping material.

NOTE: Failure to remove the condenser coil protector on non-louver panel units will negatively impact performance and be harmful to system components. Failure to remove the cardboard basepan protector will block all indoor airflow for downflow configurations.

Open all compartments to ensure there are no tools or other misc parts remaining in the unit from setup. This is most important on the blower section to avoid damage to the blower assembly.

C.6.2. Checking Level and Slope

This unit must be mounted level in both directions to allow water to properly drain from the condenser section and condensate pan.

C.6.3. Condensation and Sweating

In certain regions or climates, portions of the exterior of the unit may condensate or sweat during cooling operation. This is normal and expected.

D. DUCT AND VENTING

D.1. Air Flow and Static Pressure

See **Appendix C** towards the end of this manual for Air Flow Performance Data. For Air Flow adjustment and set up, see section **J.3. “Checking and Adjusting Air Flow”**.

D.2. Duct Requirements and Best Practices

The installation contractor should fabricate ductwork in accordance with local codes.

Use industry manuals as a guide when sizing and designing the duct system.

Contact Air Conditioning Contractors of America, www.acca.org for more information.

⚠ WARNING: DO NOT, under any circumstances, connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury, property damage or death.

⚠ WARNING: Only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

Place the unit as close to the conditioned space as possible allowing clearances as indicated. Run ducts as directly as possible to supply and return outlets. Use of non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission is recommended.

On ductwork exposed to outside temperature and humidity, use a minimum of 2” of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2” of insulation. Half-inch to 1” thick insulation is usually sufficient for ductwork inside the air conditioned space.

Provide balancing dampers for each branch duct in the supply system.

Properly support ductwork from the structure.

IMPORTANT: In the event that the return air ducts must be run through an “unconfined” space containing other fuel burning equipment, it is imperative that the user/business owner must be informed against future changes in construction which might change this to a “confined space.” Also, caution the user/business owner against any future installation of additional equipment (such as power ventilators, clothes dryers, etc.), within the existing unconfined and/or confined space which might create a negative pressure within the vicinity of other solid, liquid, or gas fueled appliances.

D. DUCT AND VENTING

D.2.1. Supply Duct Systems

A properly designed supply duct system, meeting all local codes and best practices, must be installed to ensure proper air flow and minimize the static pressure on the blower.

The supply duct opening for roof curb installations is 28 3/4" x 14 1/4", the supply duct opening for horizontal ducted installations is 28 3/8" x 13 7/8". See **Figure B.3.6. – A and – B** for reference. The installer is responsible for verifying all dimensions before unit installation.

D.2.2. Return Duct Systems

A properly designed return duct system, meeting all local codes and best practices, must be installed to ensure proper air flow and minimize the static pressure on the blower.

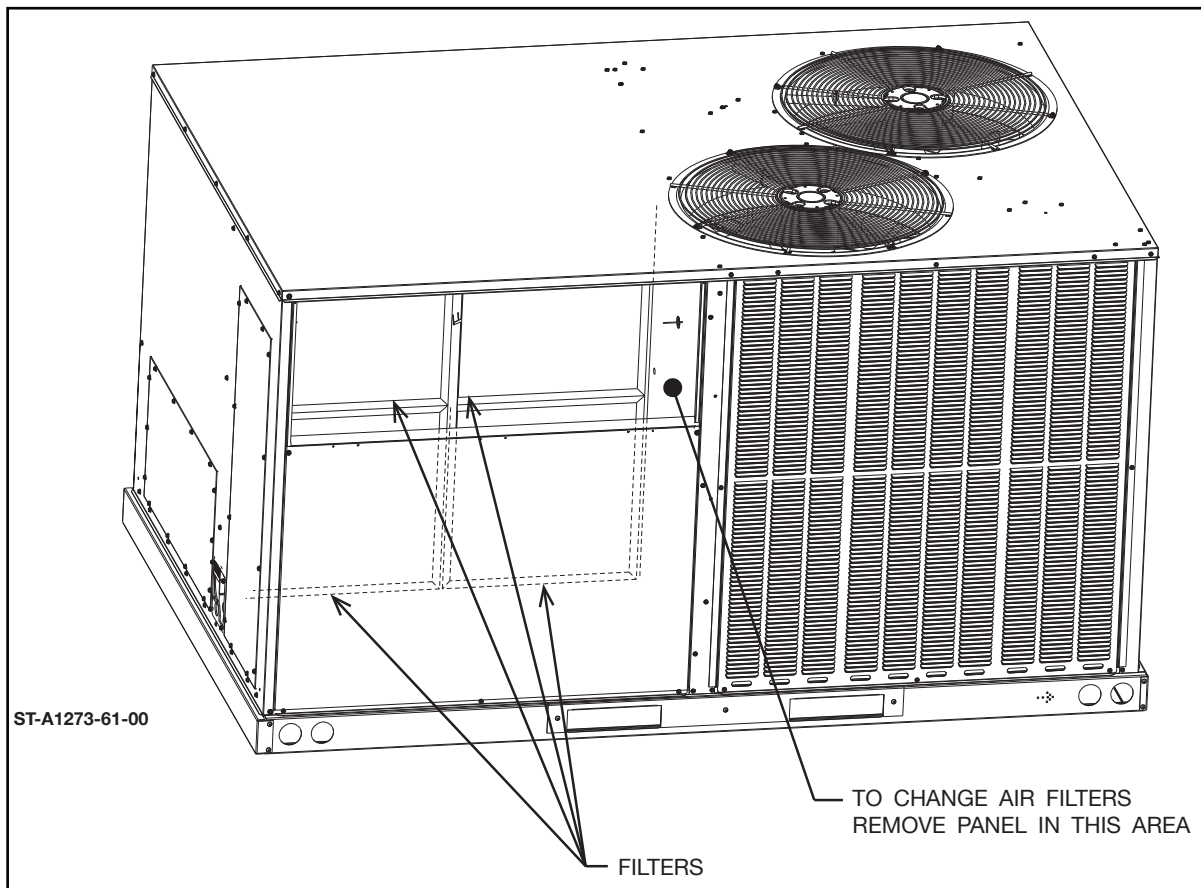
The return duct opening for roof curb installations is 36 5/8" x 12 7/8", the return duct opening for horizontal ducted installations is 36 3/8" x 12 5/8". See **Figure B.3.6. – A and – B** for reference. The installer is responsible for verifying all dimensions before unit installation.

D.2.3. Isolation for Noise Abatement

Noise from operational vibration can occur with this equipment, the use of flexible duct adapters and vibration damping curb adapters maybe required depending upon the building type and use. Consult with a local mechanical engineer on the duct and building design to determine if any noise abatement solutions need to be considered before installation.

D.3. Filters

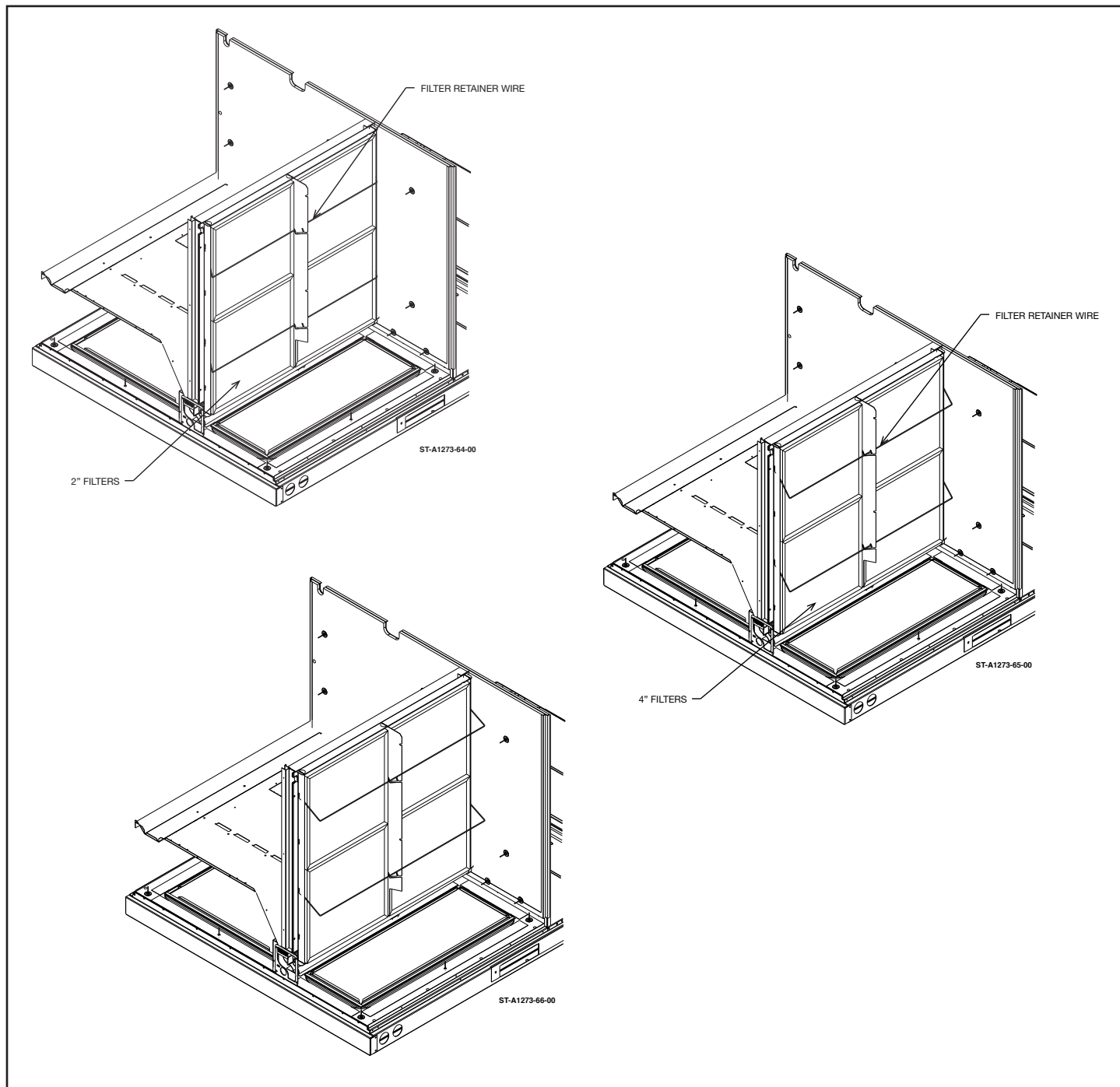
D.3.1. Installing Filters



D. DUCT AND VENTING

D.3. Filters

D.3.1. Installing Filters (Cont.)



This product will accept both 2" and 4" filters. A new unit ships with four 2" x 20" x 20" filters. For units with an economizer, only use 2" filters due to fitment clearances. To replace filters, follow these steps:

1. Remove "Filter Access" panel.
2. Pull downwards on retainer wire and rotate upwards to unlock filters.
3. Secure retainer wire in notch.

4. Remove and discard current filters.
5. Install new filters with airflow arrow pointing towards evaporator coil.
6. Rotate retainer wire downward to original position and secure in notch.
7. Install "Filter Access" panel.

D. DUCT AND VENTING

D.4. Economizers and Fresh Air Dampers

D.4.1. Economizer Information

ECONOMIZERS - Mechanical devices used to make the Heating Ventilation and Air Conditioning (HVAC) unit more efficient by regulating the return air and outside air. Economizers for this product come in several configurations.

The Downflow Economizer is designed specifically for units set up in a downflow configuration. The downflow economizer fits inside the package unit and sits over the return-air opening along the bottom of the unit. All economizers are equipped with horizontal gear driven blades and a gravity relief damper (Barometric Relief).

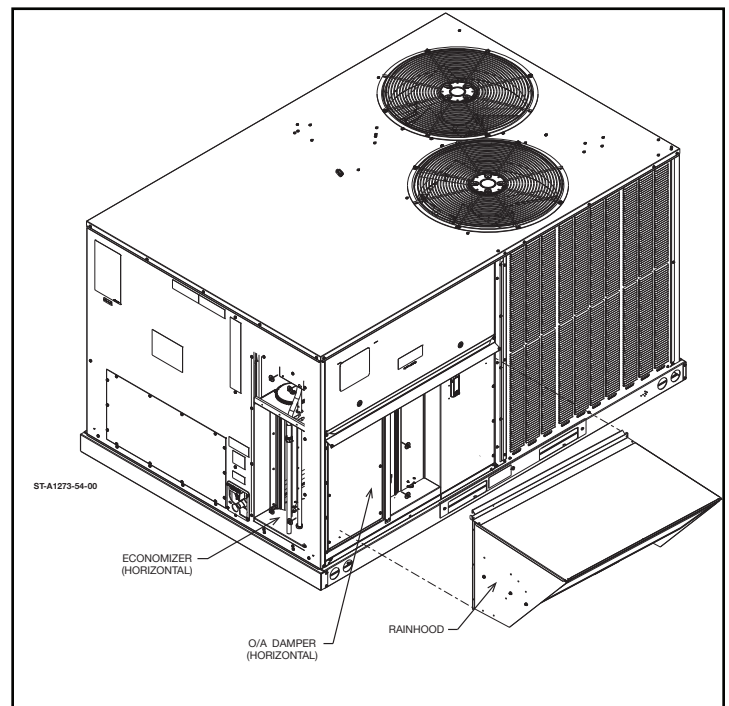
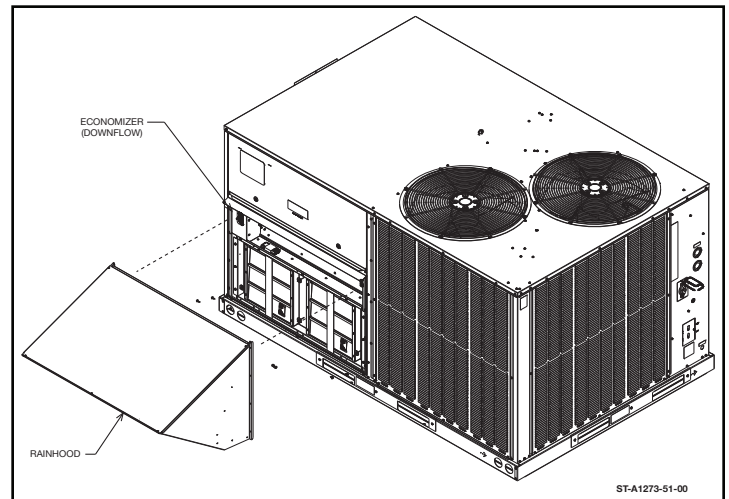
The Horizontal Economizer is designed specifically for units set up in a horizontal flow configuration. The horizontal economizer utilizes independently actuated return-air and fresh air dampers to enable the most efficient handling of air achievable with this platform. The horizontal economizer also includes an externally mounted (to the duct work) barometric relief damper.

All units with economizers come shipped from the factory with a parts bag and a separate document for Economizer Installation & Operation instructions. Refer to that document for information on how to install the economizer, connect the controls, and adjust the airflow. Accessory economizers purchased separately will also come with the parts bag and instructional document.

For reference, the Installation Instructions for economizers may be found in the parts bag of the unit for factory installed economizers, in the box with the field installed economizer, or on the manufacturer's website for the product.

Refer to **Section J.1.1.1. Refrigerant Leak Detection System** for instructions on how to relocate the factory-installed A2L sensor when a field-installed economizer is installed in this unit.

Figure D.4.1. – A: Downflow Economizer with Hood



Note: Louver protections are optional.

D. DUCT AND VENTING

D.4.2. Fresh Air Dampers

MANUAL DAMPER HOODS – Manual damper hoods are often installed as a low cost substitute for an economizer.

The blade inside the hood is manually set to restrict the opening by introducing Static Pressure, thereby balancing the outside air with the return air entering the RTU.

The drawback to a manual damper is that it is open 24 hours a day, 365 days a year. Therefore, it introduces outside air during occupied and unoccupied modes increasing the load on the rooftop unit.

MOTORIZED DAMPER HOODS – A motorized damper is economical, and provides more comfort than a manually adjusted hood damper.

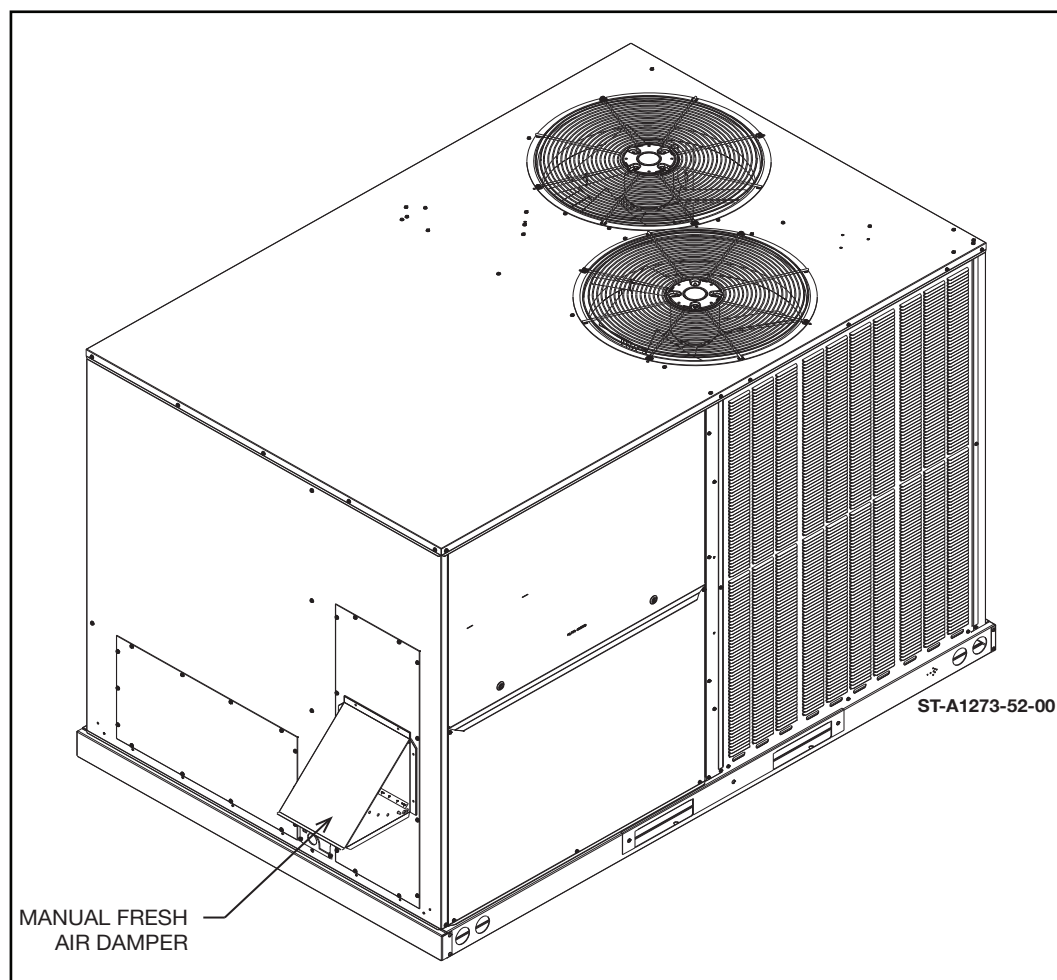
The motorized damper is coupled to an actuator, and designed to open when the RTU fan is running, and close when the fan is off. The advantage of the motorized damper is that the outside air is no longer a factor once the RTU fan is cycled off.

By connecting a Timer, CO2 Sensor or Smoke Detector in series between the RTU fan ("G" on the Thermostat) and actuator, the damper can be controlled during "Unoccupied" hours, or allow the damper to only introduce outside air during "On-Demand Occupancy."

Fresh Air Dampers come shipped with a separate document for Installation & Operation instructions. Refer to that document for information on how to install and adjust the dampers.

For reference, the Installation Instructions for Fresh Air Dampers may be found in the parts bag for the factory installed damper, in the box for field installed dampers, or on the manufacturer's website.

Figure D.4.2. – A: Fresh Air Damper

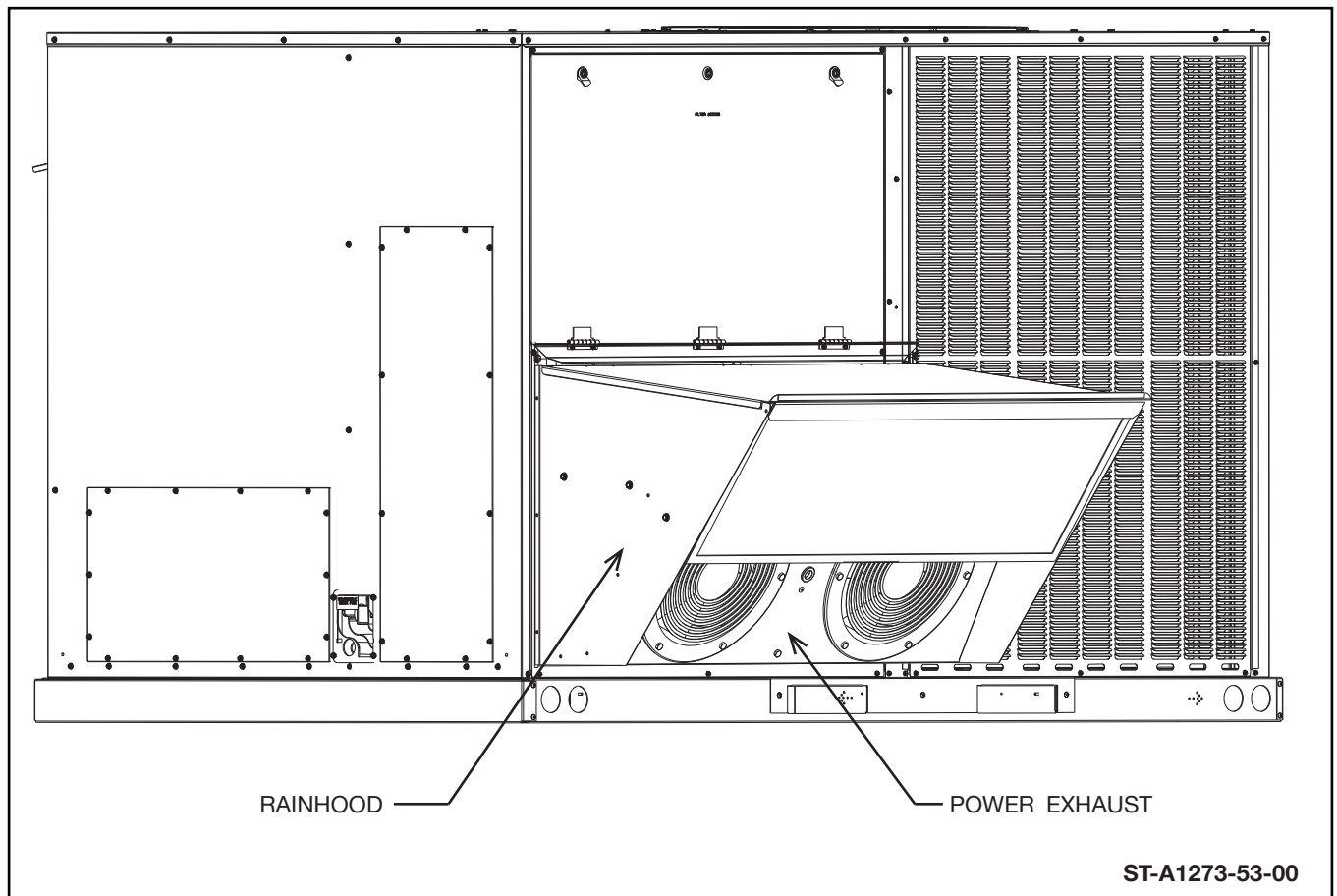


D. DUCT AND VENTING

D.4.3. Powered Exhaust

POWER EXHAUST - This field-installed accessory is a motorized fan designed to remove air from the conditioned space efficiently. While this is useful for removing a high positive pressurization, caution must be taken in the setup of the system to avoid creating a negative pressure within the conditioned space. If negative pressure occurs, leaky windows, doors, and electrical fixtures will allow the outside air to creep in causing drafts or hot spots within a room.

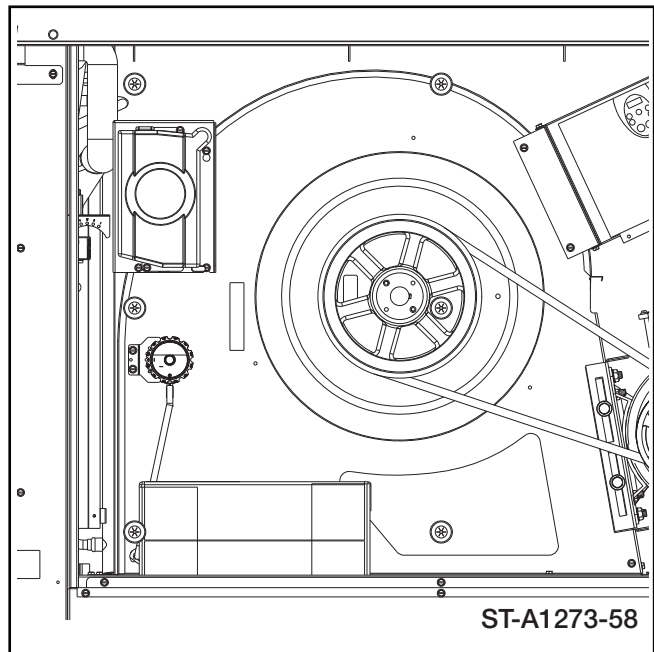
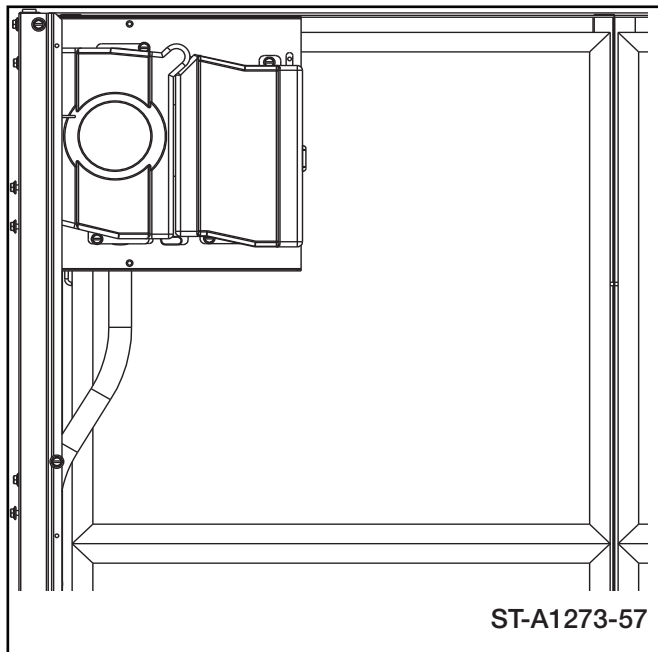
Figure D.4.3. – A: Powered Exhaust



D. DUCT AND VENTING

D.5. Smoke Detectors

Figure D.5. – A: Smoke Detector Assembly



D.5.1. Supply Duct Smoke Detectors

D.5.1.1. Field Installed – Installation, Wiring and setup

Field install Supply and Return Duct Smoke Detectors come shipped with a separate document for Installation & Operation instructions. Refer to the separate Installation Instructions for installing, wiring, and setup of a supply and return smoke detector.

D.5.1.2. Factory Installed – Inspection and setup

Inspect the smoke detector assembly for any damage during shipping. Use **Figure D.5. – A** for reference. Confirm that all wiring connections are still secure. Refer to the separate Installation Instructions for smoke detector for wiring diagrams and additional assembly instructions.

D.5.1.3. Field Installed 3rd Party Smoke Detectors or Fire Control Panels

See **Section F.1.2.** for the proper connection points for a remote smoke detector. **DO NOT** break 24vac to the Thermostat: shutdown will not occur. **DO NOT** break 24vac from the transformer: it can overload the smoke detector controls.

D.5.2. Remote Smoke Detection Reference

Refer to **Section F.1.2. Occupancy and Remote Smoke Detector Connections** for Non-DDC connections.

Refer to **Section F.2.5.2. Remote Smoke Detector/Fire Control Connection** for DDC connections.

E.1. Electrical Safety Information

E.1.1. Information on Power Supply

⚠ WARNING: Turn off the main electrical power at the branch circuit disconnect closest to the unit before attempting any wiring. Failure to do so can cause electrical shock resulting in personal injury or death.

1. All wiring should be made in accordance with the **National Electrical Code**. Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to the unit's **RATED VOLTAGE REQUIREMENT**. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C., C.E.C. or local codes.

2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On **three phase units**, phases must be balanced within 3%.

3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from the **N.E.C.** using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable in **Figure F. – A** from the unit disconnect to unit.

4. For through the base wiring entry reference **Figure F.3. – A: Power and Control Routing**. All fittings and conduit are field supplied for this application. Reference the chart with **Figure F.3. – B: Hole Sizing for Conduit** for proper hole and conduit size.

NOTES:

1. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from **Appendix B “Electrical Data”** or the unit rating plate for circuit ampacity and the National Electrical Code to determine proper wire sizing. From the unit disconnect to unit, the smallest wire size allowable in **Figure F. – A** for the circuit ampacity may be used, as the disconnect must be in sight of the unit.

2. Wire size based on 75°C rated wire insulation for 1% voltage drop.

3. For more than 3 conductors in a raceway or cable, see the National Electrical Code (or C.E.C. in Canada) for derating the ampacity of each conductor.

IMPORTANT: This unit is approved for use with copper conductors only connected to unit contactor.

WARRANTY MAY BE JEOPARDIZED IF ALUMINUM WIRE IS CONNECTED TO UNIT CONTACTOR.

E. ELECTRICAL

E.1.1. Information on Power Supply (cont.)

Special instructions apply for power wiring with aluminum conductors:

Warranty is void if connections are not made per instructions.

Attach a length (6" or more) of recommended size copper wire to the unit contactor terminals L1, L2 and L3 for three phase.

Refer to the National Electric Code (NEC) for sizing wire to electric heat / single point. See Appendix E - Heater Kit Characteristics for additional info.

Splice copper wire pigtails to aluminum wire with U.L. recognized connectors for copper-aluminum splices. Please exercise the following instructions very carefully to obtain a positive and lasting connection:

1. Strip insulation from aluminum conductor.
2. Coat the stripped end of the aluminum wire with the recommended inhibitor, and wire brush the aluminum surface through inhibitor. INHIBITORS: Brundy-Pentex "A"; Alcoa-No. 2EJC; T & B-KPOR Shield.
3. Clean and recoat aluminum conductor with inhibitor.
4. Make the splice using the above listed wire nuts or split bolt connectors.
5. Coat the entire connection with inhibitor and wrap with electrical insulating tape.

NOTE: Wiring to be done in the field between the unit and devices not attached to the unit, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise (35°C)] when installed in accordance with the manufacturer's instructions.

E.1.2. 208/230 Volt Operation and Required Adjustments

E.1.2.1. Low Voltage Transformer Tap

Adjustment for 208 Volt

Transformer is factory wired for 230 volts on 208-230 volt models and must be changed for 208 volt applications. See unit wiring diagram for 208 volt wiring.

E.1.3. 460 Volt Operation

460V units will not require any additional setup.

E.1.4. 575 Volt Operation

575 Volt operation is not available for this unit.

E.1.5. Potential Ignition Sources

The UL safety standard defines potential ignition sources as hot surfaces, flames, and current carrying devices which can be the source of arcing or sparking.

In case any internal electrical components need to be replaced, those replacement parts must be ordered from the unit manufacturer's website to ensure that the internal electrical components are not potential ignition sources.

Examples of internal electrical components include contactors, relays, and control boards. This is not an exhaustive list. For the safety of customers and technicians, refer to the unit manufacturer's website for proper unit component replacement.

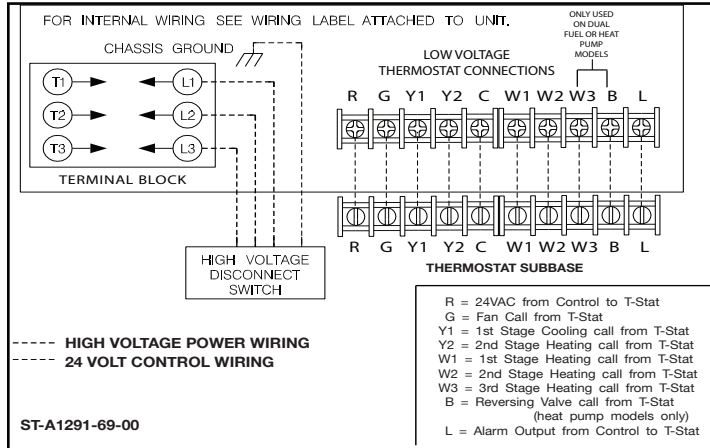
E. ELECTRICAL

E.2. Electrical Data

See **Appendix B** towards the end of this manual for Electric Data.

E.3. Electrical Connections

Figure E.3. – A: Typical Thermostat Wiring



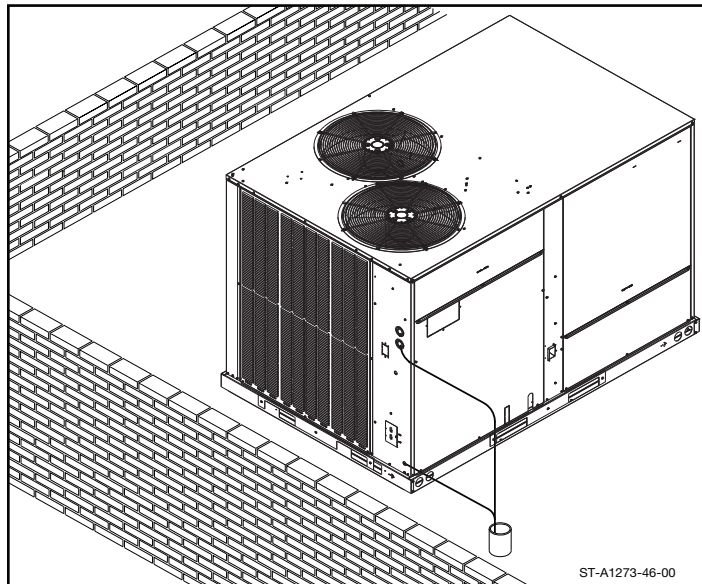
Use to **Appendix B** “Electrical Data” and National Electrical Code for circuit ampacity to determine proper wire sizing.

Refer to **Figure F.3. – A: Power and Control Routing** for location of wiring entrances, and **Figure F.3. – B: Hole Sizing for Conduit.**

E.3.1. Field Supplied Disconnect

The field supplied service disconnect will come with a separate Installation Instruction document. Please refer to that document for more information.

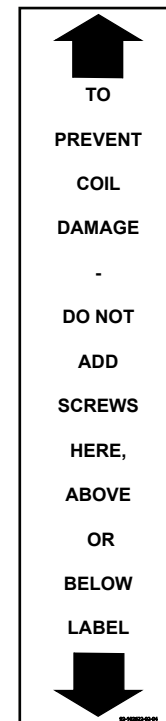
Figure E.3.1.1. – A: Standard Location for Mounting Disconnect



E.3.1.1. Mounting Disconnect on Cabinet

Attach the disconnect to the top of the left hand side of the control box, above the knockouts and refrigerant test ports. Do not use screws above or below the label specifying “TO PREVENT COIL DAMAGE – DO NOT ADD SCREWS HERE, ABOVE, OR BELOW LABEL” as hidden coil and tubing could be damaged. An example of this label is shown below.

Figure E.3.1.1. – B: Label Showing Where to NOT Use Screws



E.3.1.2. Routing Wires into Cabinet

See **Figure F.3. – A: Electrical and Piping Routing** for conduit entry points and routing locations for wiring into the control box.

See **Figure E.3. – A: Typical Thermostat Wiring** for wiring to the contactor and thermostat in the control box.

E. ELECTRICAL

E.3.1.3. Routing Wires through Curb (Option)

Use liquid tight connectors and tubing to connect the electrical and low voltage control cables between the base of the cabinet at the raised section (See **Figure B.3.6. - A: Supply And Return Dimensions For Downflow Applications** for location of raised section) and bottom of the control panel. Conduit and fittings must meet all applicable codes.

Use Silicon and gaskets to seal the connection at the base pan

E.3.1.4. Connecting to Contactor terminal blocks

The recommended torque for securing wiring to the contactor is **40 in-lb**.

See **Figure E.3. – A: Typical Thermostat Wiring** for wiring to the contactor.

E.3.2. Factory Installed Disconnect

Refer to **Appendix H** for the unit wiring diagrams, and to **Figure F.3. – A** for locations to route wires into the cabinet or through the curb/basepan of the unit.

E.3.2.1. Routing Wires into Cabinet

Refer to **Section E.3.1.1.** and/or **Section F.3.** for routing wires into the cabinet with a factory installed disconnect.

E.3.2.2. Routing wires through Curb (Option)

Refer to section **E.3.1.3.** for routing wires through the curb with a factory installed disconnect.

E.3.3. Connecting the Convenience Outlet

E.3.3.1. Non-powered

The non-powered convenience outlet, if purchased as an option for the unit, will come shipped in a box within the blower compartment of the unit. It will need to be removed and installed into its proper configuration.

For connecting the non-powered convenience outlet and all other information, refer to the installation instructions for the accessory.

E.3.4. Checking Phase and Motor Rotation

When using 3 phase power the only device that is rotation dependent is the compressor. The outdoor fan and indoor blower do not require any adjustment and will turn backwards if the phase is incorrect. Verify the direction of rotation for the indoor blower motor before starting up the compressors.

E.3.4.1. Checking Phase with VFD Drive

On any belt drive units with a Variable Frequency Drive, VFD, the motor will always rotate in the correct direction.

Correction phase must be checked by the operation of the compressor. It is recommended that a phase rotation meter be used to verify the system is connected properly to the three-phase power. This helps prevent compressor damage.

E.3.5. Grounding Requirements

Refer to local codes as required. Must be grounded to a common earth ground.

National Electric Code (NEC) / International Building Code / Canadian Electrical Code

A diagram of the internal wiring of this unit is located on the inside of control access panel and in this manual. If any of original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be same as original wiring.

The low voltage wiring should be sized as shown in **Figure F. – A: Field Wire Size for 24VAC Thermostat Circuits.**

F. CONTROL / THERMOSTAT WIRING

F.1. Non-DDC Control Inputs

Figure F. - A

FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS						
THERMOSTAT LOAD - AMPS	SOLID COPPER WIRE - AWG.					
	16	14	12	10	10	10
	16	14	12	12	12	10
	16	16	14	12	12	10
LENGTH OD RUN - FEET (1)	50	100	150	200	250	300

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(1) THE TOTAL WIRE LENGTH IS THE DISTANCE FROM THE FURNACE TO THE THERMOSTAT AND BACK TO THE FURNACE.

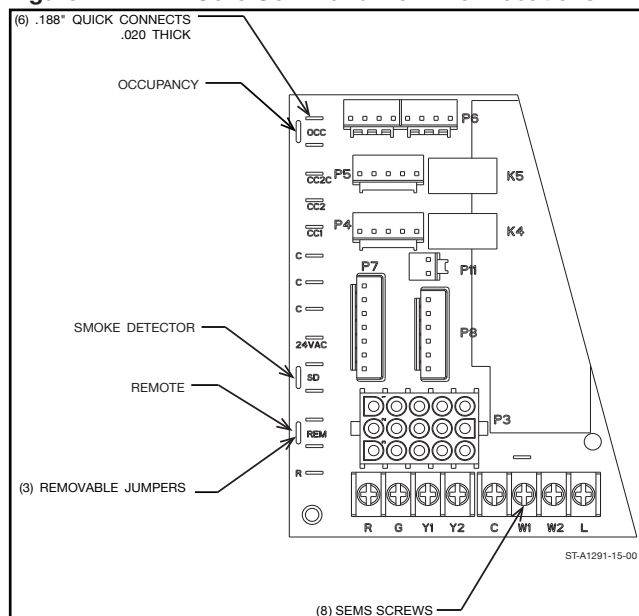
NOTE: DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

F.1.1. T-Stat Field Connections

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires through the control entry opening (**Figure F.3. – A: Electrical and Piping Routing**) and connect to the low voltage thermostat connections (see **Appendix H** for wiring diagrams and **Section F.1.** for T-Stat field connections). Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for “heater” selection or adjustment.

Refer to **Appendix H** for the unit wiring diagrams and to **Figure E.3. – A: Typical Thermostat Wiring**.

Figure F.1.1. - A: Core Command Terminal Locations



F.1.2. Occupancy connections / Remote connections / Etc

Figure F.1.2. – A: Occupancy and Remote Connections

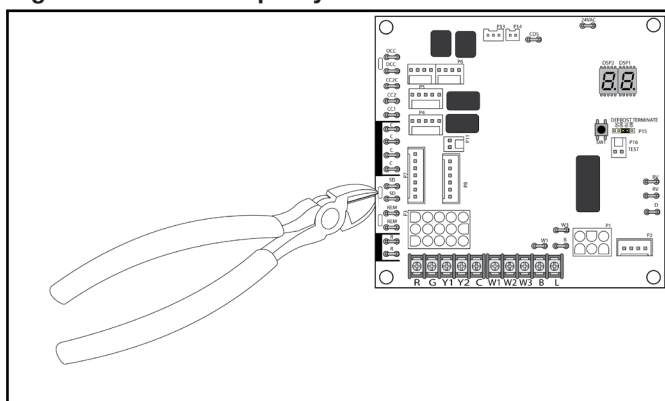


Figure F.1.2. – B: Non-DDC Board

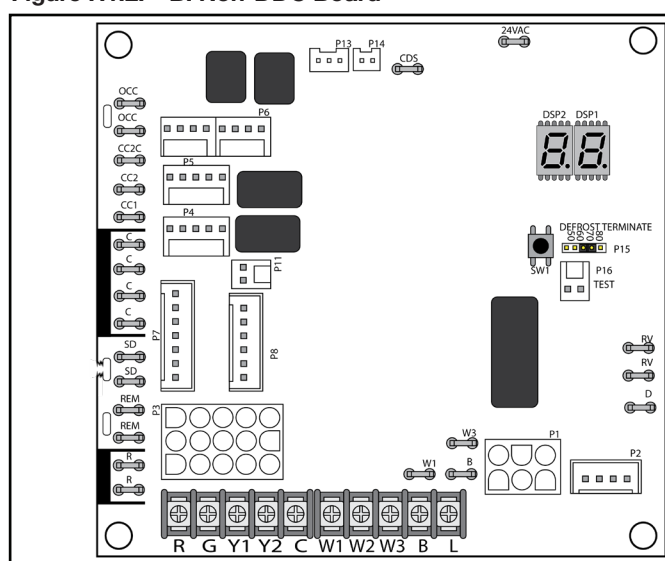
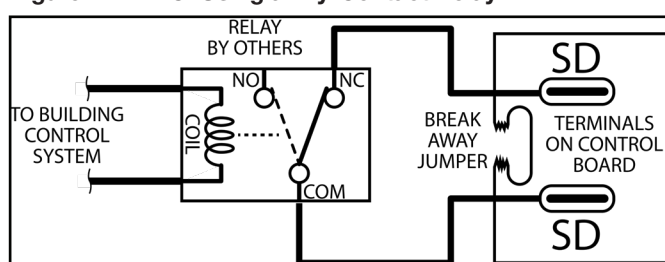


Figure F.1.2. – C: Using a Dry-Contact Relay



NOTE: This is an example of breaking the jumper for Smoke Detector connections, apply the same process for the Occupancy and/or Remote connections.

These features are only available on the Non-DDC Furnace, Heat pump, or cooling only control boards.

OCC – Occupancy Control. This feature shuts down the dampers on the economizer or motorized damper option when outdoor/fresh air is not required for the building. Locate

F. CONTROL / THERMOSTAT WIRING

the terminals at the left side of the board mark “OCC”. See **Figure F.1.2. – A: Occupancy and Remote Connections** for reference.

For connecting Remote Smoke Detectors or Fire Control Panels to this control DO NOT break the 24VAC to the thermostat or from the power supply transformer. Either could cause an undesirable operating condition that would not shut the unit down in the event of an emergency situation. See the instructions for the type of control board this unit is equipped with.

Using cutters or a small screw driver, break the edge of the board between the to terminals marked with “OCC”. Use 3/16” blade connector, and a minimum of 18AWG wire to connect to a Normally Closed Dry Contact Relay or Switch. Do not connect multiple control boards to the same dry contact relay or switch.

REM – Remote Shutdown Control. This feature allows the unit to be turned off remotely ignoring the thermostat calls for cooling or heat. Locate the terminals at the left side of the board mark “REM”. See **Figure F.1.2. – A: Occupancy and Remote Connections** for reference.

Using cutters or a small screw driver, break the edge of the board between the to terminals marked with “REM”. Use 3/16” blade connector, and a minimum of 18AWG wire to connect to a Normally Closed Dry Contact Relay or Switch. Do not connect multiple control boards to the same dry contact relay or switch.

F.1.3. Connecting a Smoke Detector

F.1.3.1. Core Command Connection

SD – Remote Smoke Detection. This feature allows for the proper shutdown of the controls in the event of an emergency situation. Locate the terminals at the left side of the board mark “SD”. See **Figure F.1.2. – A: Occupancy and Remote Connections** for reference.

Using cutters or a small screw driver, break the edge of the board between the to terminals marked with “SD”. Use 3/16” blade connector, and a minimum of 18AWG wire to connect to a Normally Closed Dry Contact Relay, or in common Fire Control Panels and Smoke Detectors, the Auxiliary Connections for C and NC. See the instructions for the remote devices. Do not connect multiple control boards to the same dry contact relay.

F.1.3.2. DDC Control Connection

In the air-filter section or on the side economizer, locate the 12-pin Molex jumper plug with the long Red, short Yellow and Orange wire loops; see **Figure F.2.5.2. – A** for reference. Cut the Red wire loop and connect these to a minimum of 18AWG wire that will be connected to a Normally Closed

Dry Contact Relay, or in common Fire Control Panels and Smoke Detectors, the Auxiliary Connections for C and NC. See the instructions for the remote devices. Do not connect multiple control boards to the same dry contact relay.

F.2. DDC Control Inputs

F.2.1. 24VAC Thermostat Control/Operation

Figure F.2.1. - A 24VAC Thermostat Circuits

FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS						
THERMOSTAT LOAD - AMPS	SOLID COPPER WIRE - AWG.					
	16	14	12	10	10	10
	16	14	12	12	12	10
	16	16	14	12	12	10
THERMOSTAT LOAD - AMPS	LENGTH OF RUN - FEET (1)					
	50	100	150	200	250	300

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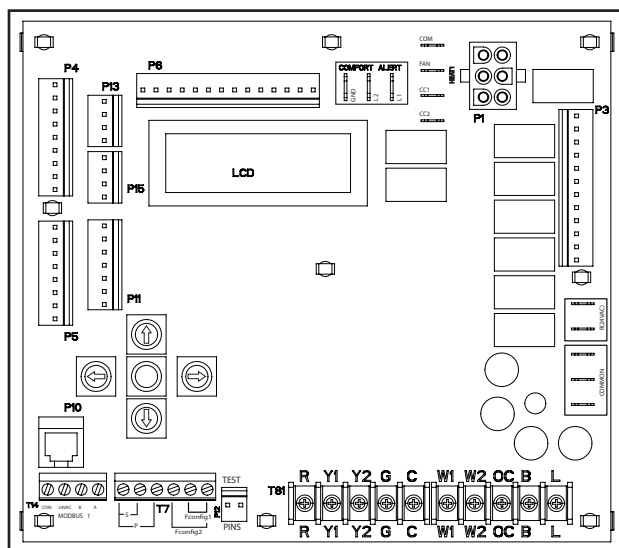
(1) THE TOTAL WIRE LENGTH IS THE DISTANCE FROM THE FURNACE TO THE THERMOSTAT AND BACK TO THE FURNACE.

NOTE: DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires through the control entry opening (**Figure F.3. – A: Electrical and Piping Routing**) and connect to the low voltage thermostat connections (see **Appendix H** for wiring diagrams). Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for “heater” selection or adjustment.

F.2.2. DDC Automated Stand-Alone Operation.

Figure F.2.1. - B: Clear Control Terminal Locations



F. CONTROL / THERMOSTAT WIRING

F.2.2.1. Setting the Unit Up: Mode Settings

The unit will need to be configured as follows.

1. The Mode must be set to Auto. This will allow the unit to automatically switch between heating and cooling operation based on the return air temperature or space temperature sensor, if installed (See Section **F.2.3. External Sensor Connections**).

The following Automatic Modes can be selected:

AUTO - run both heating and cooling.

Cool Only - run only cooling.

Heat Only - run only heating.

Fan Only - run only the fan with no heating or cooling.

2. To select the Mode, use the right arrow key to navigate to "MODE," press the middle button and use the up and down arrow keys to select the desired operating mode for the unit, and then press the middle button to confirm. Control by Thermostat (Ctrl by Tstat) is not an automatic operation mode.
3. Next the Occupancy Control must be set up. While in the Mode Menu, use the down arrow key to navigate to the Occupancy Menu option. Press the middle button to change the setting and use the up and down arrows to select the option required by the application. Then, press the middle button to confirm the setting.
 - If the system is going to run in stand-alone mode with no external inputs for Occupancy control (refer to section **F.2.2. DDC Automated Stand-Alone Operation**), set the occupancy to "occupied." In this setting, the system will run in a continuous occupied state and the operation of the fan will be based on the indoor fan mode. Refer to section **F.2.2.2. Indoor Fan Mode**.
 - If "unoccupied" is selected, the unit will run in a continuous state of unoccupied, and only turning on the fan when heating or cooling for the unoccupied setpoint is needed. In this mode, if a zone sensor with an override button is installed (refer to section **F.2.3.2. Zone Sensor Occupancy Override**), then the unit can be triggered to run in an occupied mode based on the tenant override timer. The zone sensor occupancy button will also trigger an occupied state for all occupancy control modes.
 - If "local switch" is selected, then the unit will look for an external 24VAC input on the OC terminal of the T8 terminal strip. This 24VAC source can be from an external time clock or building occupancy controller. When 24VAC

is applied to the OC terminal, the unit will enter an occupied state of operation.

- If "network" is selected, the unit will look for an occupancy command coming from a Building Management System through the Modbus interface of the control board. Optional BACnet or LonTalk translator cards will carry this function as well.

For information on setting up the system for stand-alone operation, including preparing the unit for Building Management Control, refer to section **F.2.2. DDC Automated Stand-Alone Operation** and **F.2.4. Building Management/Control Connections Using DDC**.

F.2.2.2. Indoor Fan Mode

If the unit is running in an occupied state, the system does not have to continuously run the fan. In the Mode Menu, use the down arrow to navigate to "Indoor Fan Mode." There are two selectable options: continuous and auto-mode. Continuous will run the fan continually in the occupied mode, while auto-mode will only run the fan when there is a call for heating or cooling.

F.2.2.3. Occupancy Control External Input 24VAC

Occupancy can be triggered externally to the unit via a 24VAC input on the OC terminal of the T8 thermostat terminal strip. To connect, run the wire from the "R" 24VAC terminal and the "OC" terminal to an occupancy controller in the building. The control needs to have a dry contact relay. When the relay is closed, 24VAC will be passed to the OC terminal and trigger the unit into an occupied operating mode. When the relay is open, the 24VAC to the OC terminal will be lost and the unit will run in an unoccupied state.

F.2.2.4. Temperature Setpoints

There are two temperature setpoints for occupied and unoccupied modes, heating and cooling.

Using the control board's navigation buttons, proceed to the Setpoints Menu and use the down arrow key to select "occupied or unoccupied cool and heat setpoints." Press the middle button to select the first setpoint and use the up and down arrow keys to adjust the setpoint as required for the application. Then, press the middle button to confirm the setting and advance to the second setpoint. Again, use the up and down arrow keys to adjust the setting, and press the middle button to confirm this setpoint and the settings for the occupancy mode.

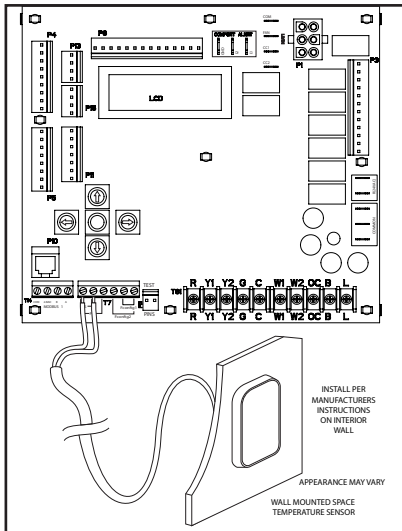
There is an automatic temperature differential between heating and cooling. This is adjusted and set in the "Cool Diff" and "Heat Diff" menu items.

F. CONTROL / THERMOSTAT WIRING

F.2.3. External Sensor Connections

F.2.3.1. Space Temperature Sensor

Figure F.2.3.1. - A: Space Temperature Sensor



1. When using a DDC unit with Clear Control in conjunction with a Building Management System or an Automated Operational Mode, the use of a Space Temperature Sensor can greatly improve the accuracy and operation of the unit in maintaining the comfort in the space in both cooling and heating.
2. The space temperature sensor requirements is a 10k type II sensor.
3. Install the sensor on an interior wall in the space served by the packaged unit and connect the wires according to the manufacturer's instructions of the sensor type and style selected.
4. Run these wires from the sensor to the control panel of the unit.
5. After routing the sensor wires through the control panel and to the control board, strip 1/4" of insulation off the ends of the wires.
6. At the control board, locate the T7 green terminal strip. Loosen the two screw terminals marked with "S" (the two left most terminals), insert one of each of the two wires into the terminal opening on the bottom of the strip, and tighten the screw terminal. The connections are not polarity specific, either wire can be connected to either terminal, unless a setpoint adjustment option is used, and they will use a shared common, the left most terminal. See the sensor manufacturer's instructions for details.

7. Verify the sensor is reading properly, power up the unit, use the left arrow key to navigate to the Temperatures Menu. Use the down arrow key to go to the space temp option, it should be showing a temperature reading. Use a test instrument to verify the air temperature at the sensor is within 1 to 3 degrees of the reading on the control board. An incorrect type sensor, excessive wire length, or bad connections will cause a significant discrepancy in the readings.
8. For more accurate operation, use the Space Temp Offset menu option to adjust the sensor reading on the Clear Control by +/-3 degrees to match the reading on the test instrument.
9. If the Clear Control is in the control by Thermostat Mode, the Space Temperature sensor will not be used for the operation of the unit.

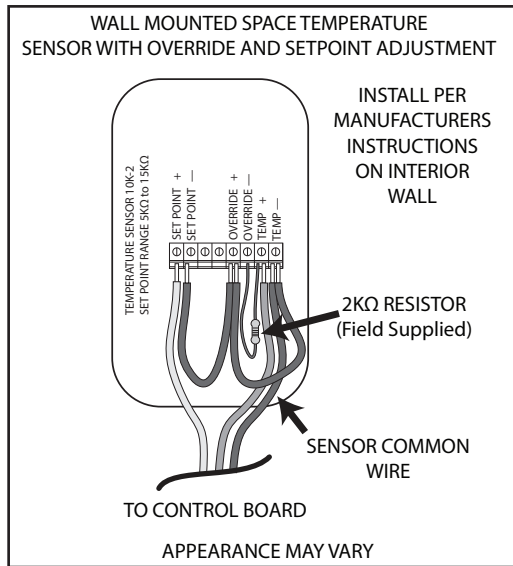
F.2.3.2. Zone Sensor Occupancy Override

If the wall sensor has an override button for triggering occupancy, the override button needs to be set up as follows. The override trigger is looking for a 1.2 to 1.6 Ohm resistance across the space temperature sensor input.

1. Depending on the design of the sensor, some provide separate connections for the override output. If this is the case, use a short piece of wire to connect one side of the override output to one side of the temperature sensor output, and then use a 2k Ohm resistor (field-supplied) as the jumper from the other leg of the override output and the other temperature output wire.
2. Prerequisites: Occupancy Control must be set to Unoccupied, Network when controlled through a BMS or Local Switch and there is a 24VAC Input on the OCC terminal, such as using a time based controller. Units set to "Occupied" in the Occupancy Menu, the override button will have no effect, since the button triggers occupancy.
3. To adjust how long the override lasts, navigate to the Time Delays Menu and use the down arrow to select the Tenant Override Timer (Ten Ovr. Time), press the middle button to adjust the time between the required range of 2 to 6 hours.

F. CONTROL / THERMOSTAT WIRING

Figure F.2.3.2. - A: Common Sensor Back Plane - Setpoint and 2k Override.



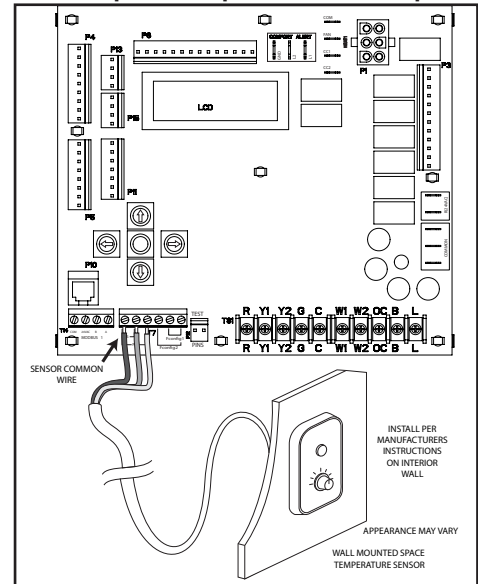
F.2.3.3. Set-Point Adjustment

In an Automatic Operation Mode or controlled by a BMS, a zone sensor with a setpoint adjustment is used to vary or adjust the setpoint temperature for the space that the unit is serving. This does require some specific setup to configure the operation and limitations for the adjustment range.

The zone sensor must have a setpoint adjustment range of 5k to 15k Ohms of resistance to provide the 55°F to 90°F set point adjustment range. Zone control devices with other resistance ranges are not compatible and will not function properly with the Clear Control and can cause operational errors or shutdown.

At the control board, locate the T7 green terminal strip. Loosen the two screw terminals marked with “P” (the left most and third from the left terminals), insert one of each of the two wires into the terminal opening on the bottom of the strip and tighten the screw terminal. The connections are polarity specific, and commonly connected with a temperature sensor. The setpoint adjustment and temperature sensor will use a shared common, the left most terminal. Refer to the sensor manufacturer’s instructions for details for connections at the sensor.

Figure F.2.3.3. - A: Space Temperature with Setpoint



Once the sensor is connected and installed, power up the unit. The following menu items need to be setup and adjusted according to the requirements for the application.

Prerequisites, the unit must be set up in Automatic Mode or configured to operate with a Building Management System. The setpoint adjustment will not function if the unit is set to “Control by Thermostat.”

1. Power on the unit and proceed to the Setpoints Menu. Use the down arrow key to navigate to the Setpoint Adjust Enable (Stpnt Adj Enable) menu item, press the middle button, and use the up or down arrow key to select “Enable,” press the middle button again to confirm.
2. At the remote sensor, adjust the setting to the middle position and notate the temperature value. Commonly, it is 76°F, but this reading may vary by manufacturer. See their instructions on determining the middle temperature value.
3. At the Clear Control, navigate to the Setpoint Adjust menu item, press the middle button, and use the up and down arrows to select the temperature that the remote sensor is set to. Then, press the middle button to confirm the setting. This set is important to ensure that adjustment and control setpoint temperature align, especially with remote sensors that have a display or marked temperature value.

F. CONTROL / THERMOSTAT WIRING

4. Navigate to the Set Cool Limit menu item. This setting allows the installer to limit the lowest cooling setpoint allowed. Press the middle button and use the up and down arrows to adjust as required by the application, press the middle button to confirm the setting. The range is 55°F to 89°F.
5. Navigate to the Set Heat Limit menu item, this setting allows the installer to limit the highest heating setpoint allowed. Press the middle button and use the up and down arrows to adjust as required by the application. Then, press the middle button to confirm the setting. The range is 56°F to 90°F.

F.2.4. Building Management/ Control Connections Using DDC

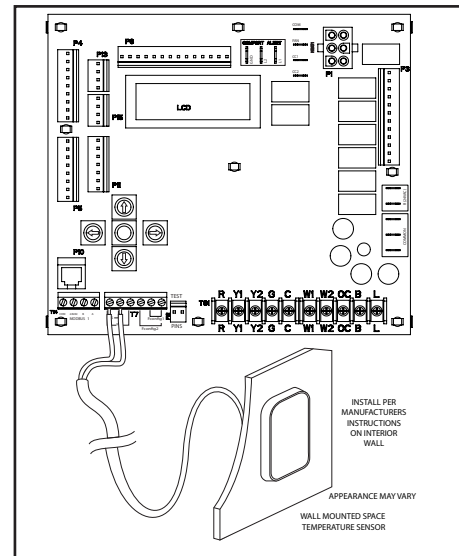
In an application where a third party building management/controls are in use or will be incorporated, units with the integral Rooftop Unit Controller (RTU-C) are communication compatible with the system that supports the BACnet Application Specific Controller device profile, LonMark Space Comfort Controller functional profile, or LonMark Discharge Air Controller functional profile. This is accomplished with a field installed BACnet or LonMark communication module. Refer to the Clear control/DDC manual for more detail.

F.2.5. Smoke Detection Shutdown

The DDC system is designed with an option to trigger and shutdown the unit during a Smoke Fault Condition, as triggered by a factory smoke detector. See the following two sections for more information.

The operation of the smoke fault system can be changed dependent on what is required by the application. Navigate to the Economizer Menu and use the down arrow key to select the Smoke Detection option. The passcode, 5555, is required. Enter the password, press the middle button, use the up arrow key to set the first digit to 5, then press the middle button to confirm and move to the next character. Repeat until all 4 characters are entered. If successful, "Access Granted" will display. Then press the down arrow key to select Smoke Options. These options will change the operation as follows:

Figure F.2.3.5. - A: Remote Duct Sensor



Shutdown - Stops all operations and turns off the indoor fan.

Pressurize - Ramps the VFD to full speed, opens the economizer up 100%, stops all heating and cooling functions.

Purge - Ramps the VFD to full speed, opens the economizer up 100%, turns on the power exhaust, stops all heating and cooling functions.

Purge with Heat - Ramps the VFD to full speed, opens the economizer up 100%, turns the heating system on full capacity.

Exhaust - Stops all operations, cooling, heating, and indoor fan, opens the economizer up 100% and turns on the power exhaust system.

F. CONTROL / THERMOSTAT WIRING

F.2.5.1. Factory Smoke Detector Kit

If a field or factory installed smoke detector kit is used, the kit contains a wiring harness that connects to the 12-Molex plug in the economizer section in place of the 3-wire jumper plug. Retain the jumper plug for future service or maintenance. Use a zip tie to secure the jumper plug to the main wiring harness. Remote fire control panels or other options for the smoke detector will connect directly to the smoke detector controls. Refer to the instructions with those accessories for more information.

F.2.5.2. Remote Smoke Detector/Fire Control Connection

In the air-filter section or on the side economizer, locate the 12-pin Molex jumper plug with the long Red, short Yellow and Orange wire loops; see **Figure F.2.5.2. - B** for reference. Cut the Red wire loop and connect these to a minimum of 18AWG wire that will be connected to a Normally Closed Dry Contact Relay, or in common Fire Control Panels and Smoke Detectors, the Auxiliary Connections for C and NC. See the instructions for the remote devices. Do not connect multiple control boards to the same dry contact relay.

Figure F.1.5.3. – A: Wiring Harness location in Air-Filter Section

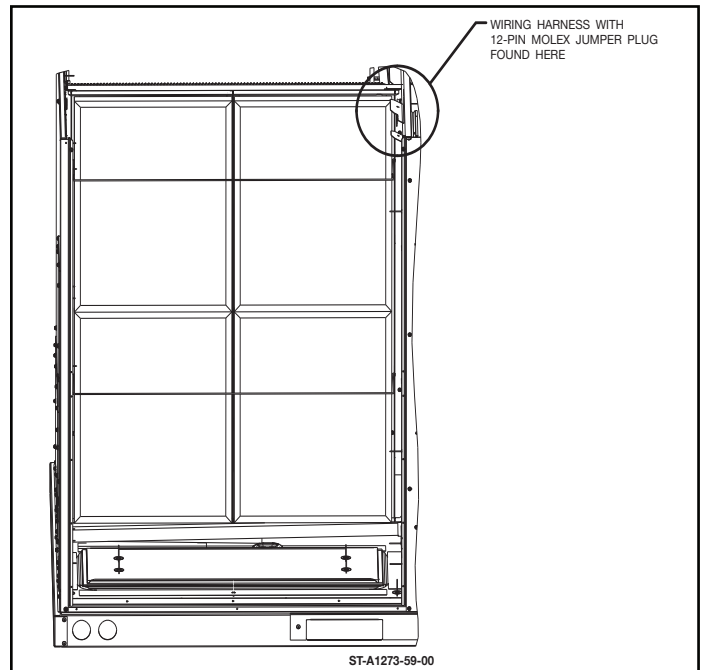
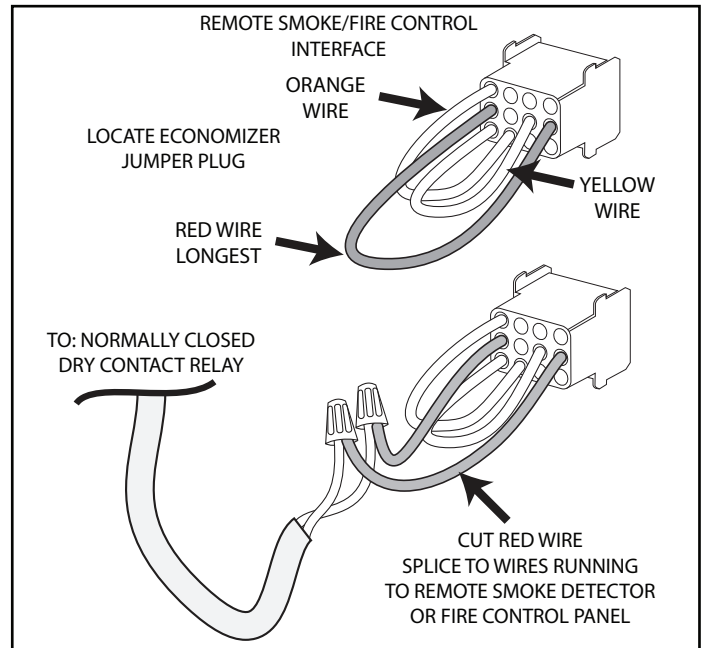


Figure F.2.5.2. – B: Smoke Detector Connection (DDC)



F. CONTROL / THERMOSTAT WIRING

F.3. Routing Control Wiring

Figure F.3. – A: Electrical and Piping Routing

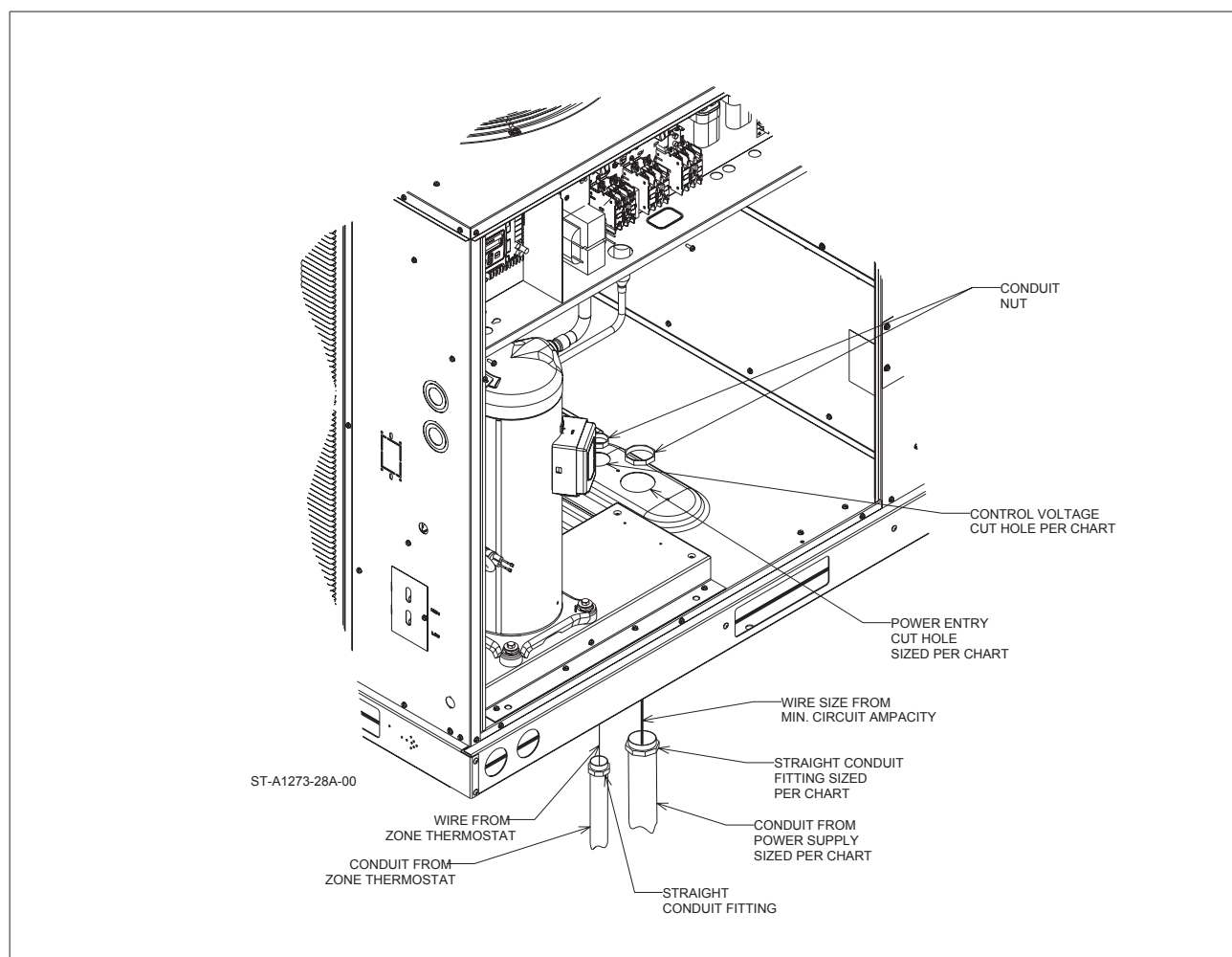


Figure F.3. – B: Hole Sizing for Conduit

	WIRE SIZE, AWG											
	14	12	10	8	6	4	3	2	1	0	00	000
CONDUIT SIZE	1/2"	1/2"	1/2"	3/4"	1"	1"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	2"	2"
HOLE SIZE	7/8"	7/8"	7/8"	1-31/32"	1-23/64"	1-23/64"	1-23/32"	1-23/32"	1-31/32"	1-31/32"	2-15/32"	2-15/32"

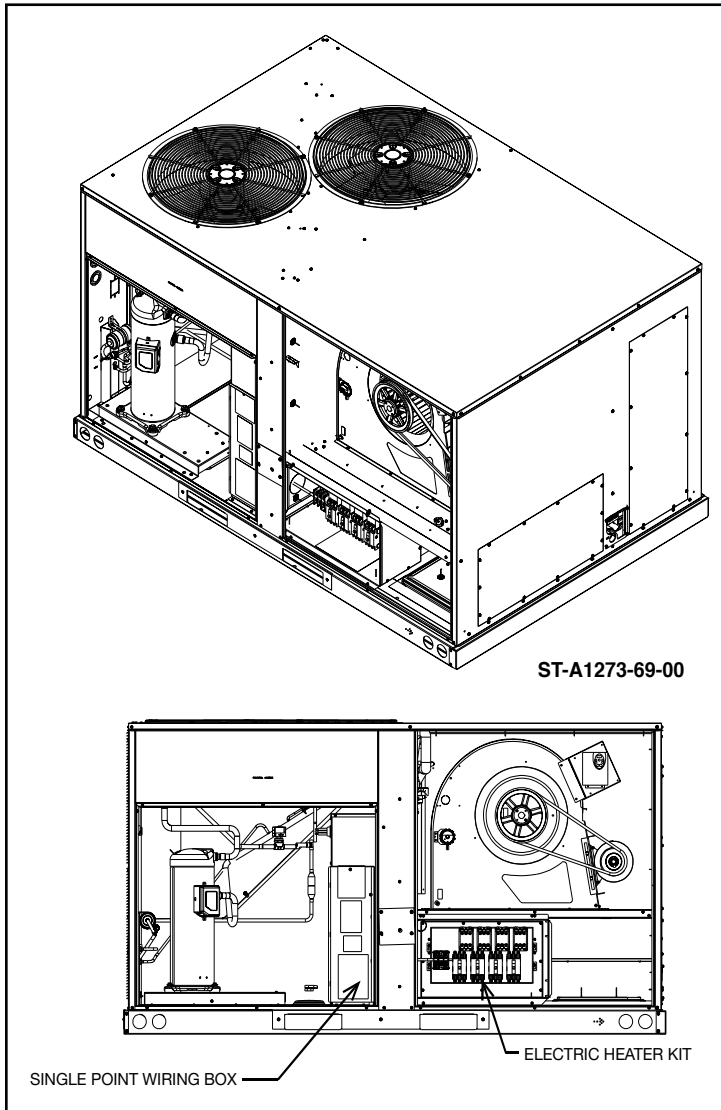
NOTES: 1. DETERMINE REQUIRED WIRE SIZE FROM MINIMUM CIRCUIT AMPACITY SHOWN IN INSTALLATION & OPERATING INSTRUCTION.
 2. BOTTOM POWER ENTRY WILL NOT ACCOMMODATE WIRE LARGER THAN #2 AWG (SHADED AREA).

F.4. Measuring Control Voltage Loads

Use a voltmeter to measure the low voltage and low voltage amp draws during operation. Accessories, such as remote smoke detectors and excessive wire length, can increase the amp draw on the low voltage wiring. Verify that the total amp draw on the 24Vac side is less than 0.3A in full operation.

H. ELECTRIC HEAT

Figure H. - A: Electric Heat with Single Point Wiring



H.1. Factory Installed Electric Heat

Units shipped with factory installed electric heat will come with a separate document (included in the parts bag) with details regarding the electric heater kits. Refer to this document for diagrams and additional info. Refer to **Appendix E** for heater kit characteristics such as Minimum Circuit Ampacity and Max Fuse sizes.

H.2. Field Installed Electric Heat

Electric heater kits will be shipped with their own installation document in the box. Use the instructions supplied with the kit for best practice. Install all electric heat kits in accordance with the National Electric Code. Refer to **Appendix E** for manufacturer-approved heater kit characteristics such as Minimum Circuit Ampacity and Max Fuse sizes. A single point kit may be required depending on application.

J. STARTUP AND OPERATION

J.1. Final Inspection

J.1.1. Check for Refrigerant Leaks

Before beginning any work on the system or conducting any hot work, ensure that the area is in the open or that it is adequately ventilated. Ventilation must continue while the unit is being worked on. Ventilation is required to safely disperse any released refrigerant into the atmosphere.

Inspect the unit for any damage to the coils and tubing that could cause a leak.

Under no circumstances shall potential sources of ignition be used to search for or detect refrigerant leaks. A halide torch or any other detector using a naked flame must not be used.

Electronic leak detectors may be used to detect refrigerant leaks, but the sensitivity may not be accurate and may need recalibration to accurately detect R-454B. Before use, ensure that the detector is not a potential ignition source and is suitable for R-454B.

Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and must be calibrated to R-454B.

Leak detection fluids are also suitable but do not use detergents containing chlorine. Examples of leak detection fluids are the bubble method and fluorescent method agents.

If a leak is suspected, all naked flames must be extinguished.

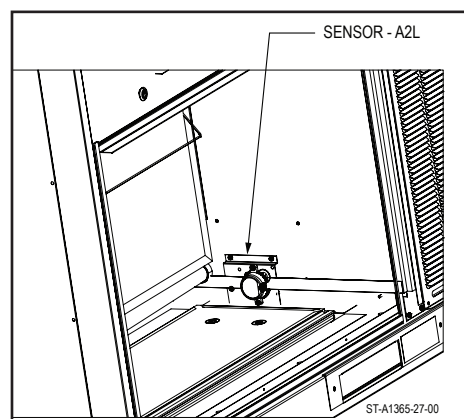
If a refrigerant leak is found that requires brazing, all of the refrigerants must be removed from the system.

J.1.1.1. Refrigerant Leak Detection System

The refrigerant leak detection system will continuously monitor the air for a refrigerant leak. If the leak detection system detects a leak, the system will begin mitigation procedures: the blower will turn on and the compressors will shut down. Note: Gas or electric heat functions may continue during mitigation.

At the end of 15 years or if the refrigerant leak detection system becomes inoperable, the leak detection system must be replaced with components specified by the unit's manufacturer. Refer to the manufacturer's website for replacement components. Refer to the alarm code diagnostics section for refrigerant leak detection system error codes.

Figure J.1.1.1. – A: A2L Sensor Location



If a vertical field-installed economizer will also be installed during the unit installation, the A2L leak detection sensor must be relocated by completing the following steps:

1. Remove the indoor coil access panel assembly and the filter access panel assembly.
2. Disconnect the wire harness attached to the A2L refrigerant detection sensor.
3. Uninstall the A2L refrigerant detection sensor from the bracket by removing the screws securing the sensor to the bracket.
4. Using the same screws, mount the A2L refrigerant detection sensor to the economizer as shown in **Figure J.1.1.1. – B: Alternate A2L Sensor Location**

NOTE: **Figure J.1.1.1.-B** does not depict every economizer/A2L refrigerant detection sensor available for use in this unit, and only shows one potential unit configuration.

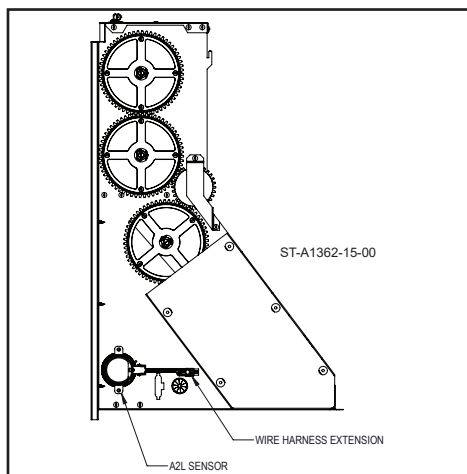
5. Connect the extension harness provided with the field-installed economizer to the wire harness that was disconnected in Step 2. The wire harness will still be connected to the bracket.
6. Route the wire harness along the bulkhead to the unit exterior for visibility.
7. Install the economizer partway, with approximately 4 inches extended outside the unit, leaving access to the A2L refrigerant leak detection sensor. Then, connect the wire harness.

CAUTION: Do not pull the wire harness as this may cause damage to the harness and break the wire ties that hold the wire harness in place.

8. Complete the field-installed economizer's installation according to the economizer Installation and Operation Manual shipped with the accessory.

J. STARTUP AND OPERATION

Figure J.1.1.1 – B: Alternate A2L Sensor Location



J.1.1.2. Operation When a Leak is Detected

When the unit receives a signal from the A2L sensor, circulation airflow is activated, and the control board will display an error (for DDC units) or a fault code (for Non-DDC units). The following mitigation actions will also be activated:

1. Energize the indoor blower of the appliance to deliver indoor airflow at or above the minimum airflow. See **Appendix H – A2L Refrigerant Installation Safety Data**.
 - a. The fans will be energized following the input signal to turn on the fan(s).
2. The system de-energizes compressor operation.
3. Activate additional mechanical ventilation, if applicable.

The above-mentioned actions will continue for at least 5 minutes after the leak detection system begins mitigation. If the leak is no longer detected, the leak detection system will reset. If the leak is still present, mitigation actions will continue for another 5 minutes. This cycle will repeat until no leak is detected.

For DCC units, user-selectable Fan Off Delay will remain in effect after the A2L sensor triggers the mitigation procedure.

J.1.1.3. Removal and Evacuation of Refrigerant

The refrigerant charge must be recovered into R-454B recovery cylinders. The unit system must be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants, such as R-454B, again. DO NOT USE compressed air or oxygen for purging R-454B refrigerant systems.

Refrigerant purging is achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to the atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to the atmospheric pressure to enable work to take place.

The outlet for the vacuum pump must not be close to any potential ignition sources.

Ventilation is required during removal and evacuation.

When breaking into the refrigeration circuit for any reason, this procedure must be followed:

1. Ensure there is no power to the unit.
2. With an accurate scale, ½ oz., set the refrigerant recovery cylinder in the upright position.
3. Connect the recovery cylinder to the unit using the service valves.
4. Evacuate refrigerant from the unit until the vacuum pump reads a minimum of 500 microns.
5. Purge the refrigeration circuit with inert gas until there is no refrigerant within the system.
6. Evacuate the circuit again.
7. Once all inert gas is removed, pull a vacuum on the unit to check for any leaks in the system.
8. If leaks are present, spray a soapy substance over the refrigeration circuit. Bubbles will help locate the leak.
 - a. Patch the leak and pull a vacuum again.
 - a. If leaks are still detected, repeat steps seven and eight.
9. If no leaks are present, charge the system as directed in the next section.
10. Remove the vacuum pump from suction, discharge, and liquid shut-off.

J.1.2. Check Level of Unit

Refer to **Section C.6.2** for setting/checking the level of the unit.

J.1.3. Check Electrical Connections for Proper Torque

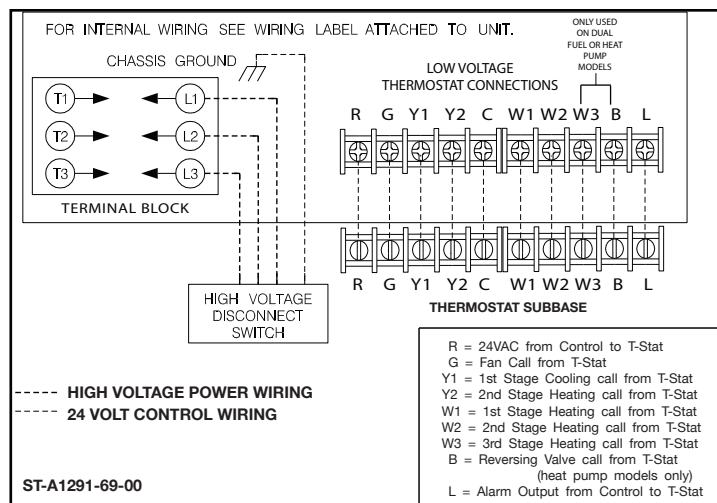
Use an Inch Pound rated torque wrench to ensure proper torque. DO NOT CONFUSE THIS WITH A FOOT POUND RATED WRENCH, damage will occur.

J. STARTUP AND OPERATION

Recommended torques for securing wiring:

- To the contactor: 40 in-lb.
- From the T-stat to the control board: 8.0 in-lb.

Figure J.1.3. – A: Where to Wire for Thermostat



J.1.4. Check Control Cables For Proper Connection

Verify all cables are seated and connected in the unit as some might come loose during shipping and transport.

J.1.5. Check Filter Installation

Verify that filters are seated and oriented correctly in the unit as some might come displaced during shipping and transport. Refer to **Section D.3.** for more information on filters and filter installation.

J.1.6. Check Condensate Drain Installation

Verify the Condensate Drain Trap is a minimum of 3 inches deep, plus the Blower Fan Static Pressure. Verify the Outlet of the drain trap is a minimum of 3 inches below the outlet of the drain pan. Ensure the outlet of the trap is routed to a suitable drain location as required by local code. Refer to **Section C.5** and **Figure C.5.1 – A** for more information.

J.1.7. Check Blower Compartment for Accessories

Open all compartments to ensure there are no tools or other miscellaneous parts remaining in the unit from setup. This is most important on the blower section to avoid damage to the blower assembly.

J.1.8. Check Wiring

After completing refrigerant removal, evacuation, and charging, check that the internal and

field wiring will not be effects subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental, taking into account the effects of aging or continual vibration from sources such as compressors or fans.

J.2. Turning on Power for the First time

J.2.1. Checking for Proper 3-Phase Voltage

Verify that proper power has been supplied to the unit. This is critical for correct operation of the compressor.

J.2.2. Check For Proper Phase

Verify that the compressor is running correctly.

J.2.2.1. Standard Blower Rotation

See **Section E.3.4. Checking Phase and Motor Rotation** for more information.

J.2.2.2. VFD Blower Rotation

As a reminder, all units with a VFD driven blower motor will have the correct rotation, even if the phase to the unit is wired incorrectly. See **Section E.3.4.1. Checking Phase with VFD Drive** for more information.

J.2.3. Checking Low (Control) Voltage

Use a voltmeter to measure the low voltage and low voltage amp draws during operation. Accessories, such as remote smoke detectors and excessive wire length, can increase the amp draw on the low voltage wiring. Verify that the total amp draw on the 24VAC side is less than 0.3A in full operation. Refer to **Figure F. – A** for proper low voltage wire lengths.

J.2.4. Units with a Blower VFD

No adjustments required for installation or operation of this unit.

J.2.4.1. VFD Model

The following VFD brands and models could be installed in the unit.

- Control Tech C200
- Schneider ATV320U or ATV320U
- Delta MS23, MS43, or MS53
- Mitsubishi FR-E820, FR-E840. or FR-E860

J. STARTUP AND OPERATION

J.2.4.2. Replacement

The VFD is horsepower and voltage specific. Therefore, replacement must be the same model as the existing. A preprogrammed VFD is recommended and available from ProStock.

J.2.4.3. General Information

The purpose of the VFD is to allow low airflow in Fan Only (G) and First Stage Cooling (Y1) operation of a two stage unit. Unit air balancing should be performed at 100% airflow (60 Hz at VFD) during a W1, W2, or Y2 call by adjusting the blower motor sheave. First Stage Cooling and Fan Only speeds are independently adjustable at the RTU-C. The VFD display will indicate an equivalent value in Hz (i.e. Low Cool adjusted to 60% at RTU-C will display as 36Hz at the VFD). A 20 second (adjustable at the VFD) ramp-up or ramp-down is used whenever the blower speed is increased or decreased. Low speed blower operation first ramps to 75%, to close fan proving switch, before ramping to the desired speed. Since the VFD operates on 24VDC control voltage, a blower relay (with 24VAC across the coil) is used to turn the VFD on. Blower speeds are changed via Modbus communication from the RTU-C.

For more information see the **VFD I&O Manual** shipped with the unit.

J.3. Checking and Adjusting Air Flow

For Economizer and Diffuser Pressure Drop Data, please refer to the end of **Appendix C: Airflow Performance Data.**

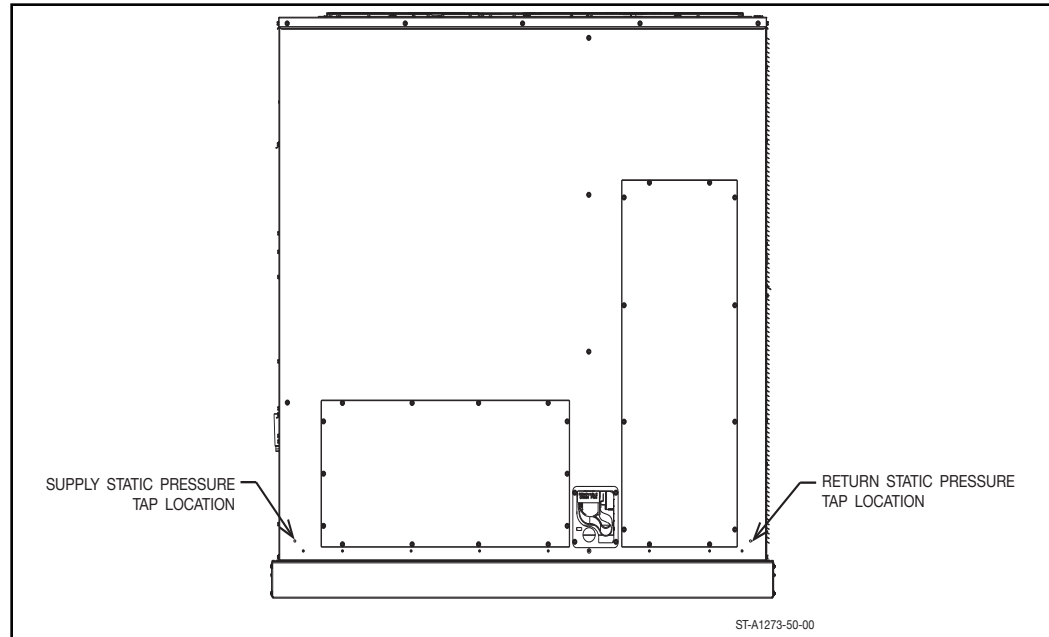
J.3.1. Static Pressures and Measurements

- To measure the static pressure of the system, find the locating dimples near the supply/return duct openings, and drill a hole to the size necessary for the test probe. The location of these dimples are shown in **Figure J.3. - A.**
- NOTE: After taking airflow measurements, seal these openings per best practice to prevent airflow leakage and water entry into the unit.
- NOTE: Drilling test tap locations in other panels or doors could put the test probe in a turbulent zone, providing false readings.

J.3.1.1. Using Tools

Use a calibrated manometer to measure the static pressure of the blower. Insert the meter probe into the tap location. Make sure any economizer or outside air dampers are closed and run the fan at the maximum, full speed setting. Record the reading for the return air and supply air separately.

Figure J.3. – A: Static Pressure and Air Temp Measurement Location

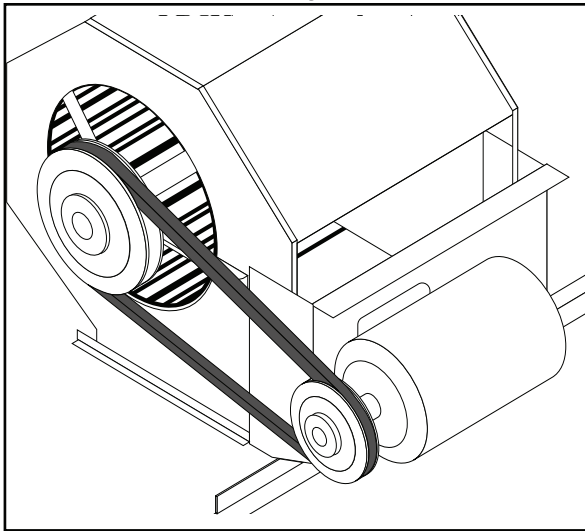


J. STARTUP AND OPERATION

J.3.2. Air Flow Measurements and Adjustments

- Measure the supply/return static to get the unit static pressure by drilling out the dimple locations shown in **Figure J.3.2 - A.**
- Take the measured static pressure and match to the static listed on the airflow table to find your CFM. Use the charts and guide provided in the Installation and Operation instructions provided with the unit to calculate the air flow, against the measured static pressures and number of turns on the adjustable blower sheave. Verify the measured air flow against the charts.

Figure J.3.2. – A: Blower Assembly and Motor



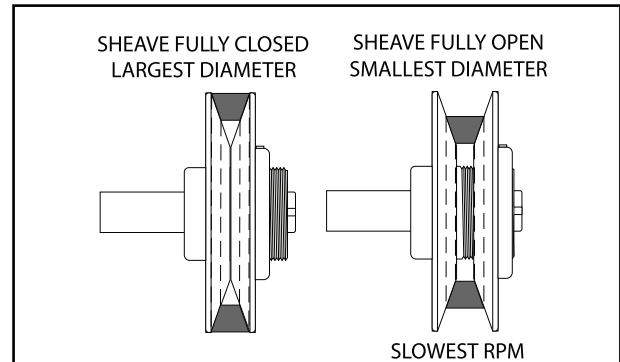
If adjustment is needed, turn off the power to the entire system, and adjust the adjustable blower sheave. To do this, loosen the belt tension and remove the belt. Using an Allen wrench to loosen the set screw on the end of the adjustable blower sheave, turn the blower sheave in until it is full closed.

Using the charts determine the total number of turns needed on the sheave. Make those turns in half turn increments, once set, align the set screw with the Flat section on the sheave threads. Tighten the set screw to secure the sheave.

Reinstall the belt and tension properly and power on the system. Allow the thermostat to call for a fan, make sure the VFD ramps the blower to 100% or 60hz.

Once the fan is at full speed, measure the air flow and static pressure, compare against the charts. If additional adjustment is needed, repeat the adjustment procedure.

Figure J.3.2. – B: Adjustable Blower Sheave



J.3.2.1. Adjusting Fresh Air Flow with Economizer

See the above sections for measuring airflow, and refer to the I&O included with the Economizers for more information on adjusting airflow.

These I&Os can also be found on the manufacturer's website.

J.3.2.2. Adjusting Fresh Air Flow with Damper

All dampers are field install accessories. See the above sections for measuring airflow, and refer to the I&O included with the fresh air dampers for more information on adjusting airflow.

Refer to local building codes for any fresh air requirements.

These I&Os can also be found on the manufacturer's website.

J. STARTUP AND OPERATION

J.4. Checking Cooling Operation

COOLING SEQUENCE OF OPERATION

A. Call for first-stage cooling

1. The zone thermostat contacts close, and a call for first-stage cooling is initiated.
2. Inputs 'Y1' and 'G' to the control are energized.
3. The control senses input to 'Y1' and 'G'. After a 1 second delay, the control energizes both the indoor blower and first stage compressor.
4. The control enters the normal operating loop where all inputs are continuously checked.
5. Zone thermostat is satisfied.
6. The blower will continue to run for a preset period of time after the zone thermostat is satisfied.
7. The control goes into standby mode displaying a "O".

B. Call for second stage cooling. After first stage cooling established; starting from A6.

1. If a call for second stage cooling is initiated after a call for first stage cooling is established, the control energizes 'Y2' and energizes the second stage compressor.
2. Then the control enters the normal operating loop where all inputs are continuously checked.

C. Second stage satisfied and first stage still called for; starting from B2.

1. 'Y2' is de-energized and the second compressor stage is de-energized.

D. First stage and second stage called simultaneously.

1. The zone thermostat contacts close, and a call for first and second stage cooling is initiated.
2. Inputs 'Y1', 'Y2' and 'G' to the control are energized.
3. The control senses 'Y1', 'Y2' and 'G'. After a 1 second delay, the control energizes the indoor blower, and the first and second compressor stages.

E. First stage and second stage removed simultaneously.

1. Upon a loss of 'Y1' and 'Y2', the compressor is de-energized. The control de-energizes the indoor blower relay, and cuts off the blower after an indoor blower delay.

2. The control goes into standby mode displaying a "O".

CONTINUOUS FAN MODE

A 'G' input only indicates a zone thermostat call for continuous indoor blower operation.

TIME DELAY BYPASS for non-DDC units

The Time Delay Bypass resets the ICC (Integrated Compressor Control) from any lockout mode or bypasses the compressor anti-short cycle delay timer. To bypass the time delay, press the SW1 button with an insulated probe for 1 second and then release.

FAULT RECALL OPERATION for non-DDC units

To enter FAULT RECALL mode, press the SW1 button with an insulated probe for 2 seconds and release. Upon entering and exiting the FAULT RECALL mode, the top bottom segments of the 7-segment display will be activated. The ICC will automatically scroll through the stored faults on the 7-segment display. Each fault is displayed one time with the top segment of the 7-segment display activated between faults. Each fault is displayed with the most recent fault displayed first. An "O" will be displayed when no faults are stored. The ICC will automatically exit the FAULT RECALL mode after displaying stored faults.

An example of one LPC fault and one HPC fault scrolled on the display is shown as: "21"23"

CLEAR FAULT HISTORY for non-DDC units

To clear FAULT HISTORY, press the SW1 button with an insulated probe for 5 seconds and release. The top and bottom segments of the 7-segment display will be activated and flash to indicate the history has been cleared.

Example: =====

TEST MODE for DDC Units

For units with DDC, there is a "Run Test" mode that will aid in diagnostics during installation. Please refer to the CLEAR CONTROL MANUAL for more info, which can be found on the manufacturer's website.

J. STARTUP AND OPERATION

J.4.1. Checking Refrigerant Pressures

This unitary packaged system comes fully charged and tested with R-454B refrigerant from the factory. Adjustment of the refrigerant charge is not required. If the unit is suspected of not having the proper refrigerant charge, any adjustment must not exceed 2% of the total refrigerant weight listed on the rating plate of the unit and should not supersede correctly weighed-in refrigerant.

See **Section C.2.1. Tools Required for Installing and Servicing R-454B Models.**

J.4.1.1. Refrigerant Pressure Charts

See **Appendix G** towards the end of this manual for Refrigerant Pressure Charts.

J.4.2. Checking Sub Cooling for Adjusting Charge Weight

When breaking into the refrigeration circuit for any reason the procedure included in section **J.1.1.3. Removal and Evacuation of Refrigerant** must be followed.

Prior to recharging the system, complete a leak check and purge the system with inert gas as detailed in **J.1.1.3. Removal and Evacuation of Refrigerant.**

See **Appendix G** towards the end of this manual for Refrigerant Charging Charts.

Note: Factory charge chart and/or design target subcooling are for gross charge verification.

Charge verification instructions:

1. Allow the unit to operate for 15 minutes before checking or adjusting the charge.
2. Ensure that the contamination of different refrigerants does not occur when using charging equipment. Hoses or lines must be as short as possible to minimize the amount of refrigerant contained in them.
3. Ensure that the unit is properly grounded.
4. Return air temperature must be within comfort conditions (72°F - 82°F).
5. Remove caps from the high-side and low-side pressure service fittings.
6. Cylinders must be kept in an upright position for the entirety of the testing and charging procedure.
7. Record the following measurements:
 - a. High-side pressure at service fitting
 - b. Liquid line temperature
8. Using R-454B refrigerant saturation T-P tables, find the corresponding refrigerant saturation temperature relative to the

measured high-side pressure.

9. To determine subcooling, subtract the liquid line temperature measured in Step 7 from the saturation temperature found in Step 8.
10. Compare the subcooling result from Step 9 to the subcooling table located on the unit or in the I&O manual.
11. If the subcooling value from Step 9 is more than 1°F above the value listed in the subcooling table, remove charge to match the value listed in the table, $\pm 0.5^\circ\text{F}$.
 - a. Take extreme care not to overfill the refrigerating system.
12. If the subcooling value from Step 9 is more than 1°F below the value listed in the subcooling table, add charge to match the value listed in the table, $\pm 0.5^\circ\text{F}$.
 - a. Take extreme care not to overfill the refrigerating system.

After charging is complete, a leak test must be done. Before leaving the site an additional leak test must also be done at the end of the installation. Refer to J.1.1.3. Removal and Evacuation of Refrigerant

J.4.2.1. Measuring Air Temperature and Liquid Line Temperature

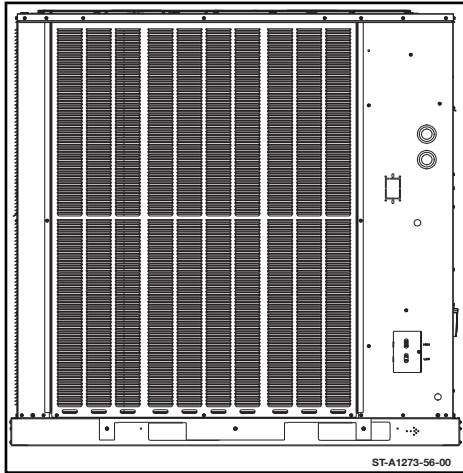
Measuring air temperature:

1. Insert a thermometer in the supply air duct as close to the unit as possible.
 2. Insert a thermometer in the return air duct as close to the filters as possible.
 3. If preferred, use the locations shown in **Figure J.3. – A: Static Pressure and Air Temp Measurement Location** instead of the supply/return ductwork.
 4. Operate the unit for a minimum of 15 minutes in cooling mode.
 5. When the thermometer in the supply air duct stops changing (approximately five minutes), subtract the return air temperature from the supply air temperature. This is the cooling mode temperature difference.
- If the measured temperature difference is not reducing, or if the return air is not reaching the thermostat set point, the air flow is too low. Airflow must be increased by either removing the restrictions in the duct system, or by changing the air flow. See **Section J.3.2. Air Flow Measurements and Adjustments** for changing air flow.

J. STARTUP AND OPERATION

IMPORTANT: Some high-efficiency filters have a greater than normal resistance to airflow. This can negatively affect airflow. **BE SURE TO CHECK THE AIRFLOW** if using any filter other than the factory-provided filter.

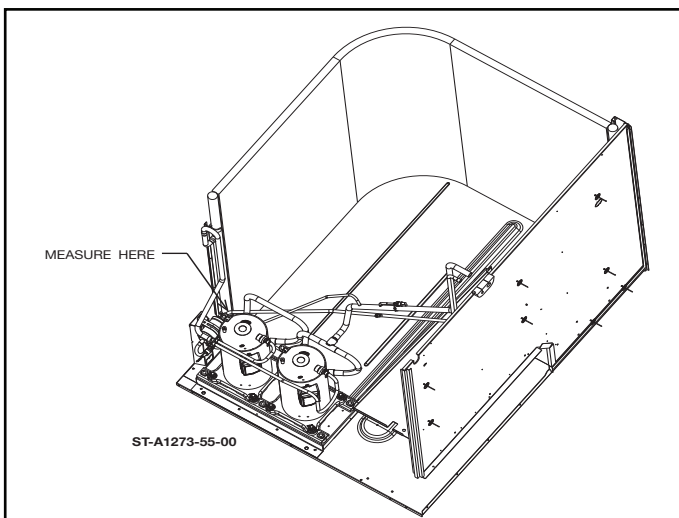
Figure J.4.2.1. –A: Service Port Location



Measuring line temperature:

1. Attach a thermometer or thermocouple to the liquid refrigerant line right after the filter-dryer. See **Figure J.4.2.1. - A**.
2. Operate the unit for a minimum of 15 minutes in cooling mode.
3. When the measurement of the temperature stops changing (approximately five minutes), record the temperature.

Figure J.4.2.1. – A: Line Temperature Measurement Location



J.4.3. Measuring Compressor Electrical Loads

See **Appendix B** towards the end of this manual for Compressor Electrical Data.

J.5. Checking Heating Operation

J.5.1. Checking Electric Heat Operation

Electric heater kits will have their own separate instructional document. For factory installed heater kits the document will be found in the parts bag, and for field installed heater kits the document will be found in the box. Refer to these documents for any info regarding checking electric heat operation.

J.5.2. Checking Heating Mode Operation

With thermostat in the heat mode, fan auto and the room temperature lower than the thermostat setting:

- A. Indoor blower contactor is energized through thermostat contact (G).
- B. Compressor contactor is energized through thermostat contact (Y1). A 5 minute short cycle delay is standard on this unit. Compressor will start immediately if test pins on the defrost board are shorted and released.
- C. Reversing valve is energized in the heating mode through thermostat contact (B).
- D. Economizer enthalpy control (if installed) is electrically bypassed with the heat pump control relay during heating operation.
- E. Should the heat requirement be more than the heat pump can supply, a portion of the electric heat accessory (if supplied) is energized through thermostat contact (W3).
- F. The system will continue in heating operation as long as all safety controls are closed, until the thermostat is satisfied.
- G. The unit will function in a defrost mode, reversing the refrigerant cycle to cooling and energizing the electric heat (if supplied) as required through the defrost relay.
- H. If the refrigerant system becomes inoperable during a need for heating, the thermostat may be set to emergency heat which will energize the electric heat (if supplied).

At initial start-up or after extended shutdown periods make sure the crankcase heater is energized for at least 12 hours before the compressor is started.

J. STARTUP AND OPERATION

J.5.3. Demand Defrost Control and High/Low Pressure Controls

The demand defrost control monitors the outdoor ambient temperature, outdoor coil temperature and the compressor run time to determine when a defrost cycle is required.

Enhanced Feature Demand Defrost Control: This defrost control has high and low pressure control inputs with unique pressure switch logic built into the microprocessor to provide compressor and system protection without nuisance lockouts. The control cycles the compressor off for 30 seconds at the beginning and the end of the defrost cycle to eliminate the increased compressor noise caused by rapidly changing system pressures when the reversing valve switches. See next page for diagnostic flash codes and sensor resistance values at various temperatures.

DEFROST INITIATION

A defrost will be initiated when the three conditions below are satisfied:

1. The outdoor coil temperature is below 35°F as measured by a good coil sensor,
2. The compressor has operated for at least 34 minutes with the outdoor coil temperature below 35°F and
3. The measured difference between the ambient temperature and the outdoor coil temperature is greater than the calculated difference determined by the defrost control microprocessor.

DEFROST TERMINATION

Once a defrost is initiated, the defrost will continue until fourteen minutes has elapsed or the coil temperature has reached the selected termination temperature. The factory setting is 70°F but can be changed to 50°F, 60°F, or 80°F by relocating the jumper on the control board.

TEMPERATURE SENSORS

The coil sensor is located on the outdoor coil near the point fed by the distribution tubes from the expansion device, on the top most cross-over tube. The ambient air sensor is located outside the control box so it can sense outdoor temperatures.

If the ambient sensor fails, the defrost control will initiate a defrost every 34 minutes of compressor run time with the coil temperature below 35°F.

If the coil sensor fails, the defrost control will not initiate a defrost.

TEST MODE

The test mode is initiated by shorting the TEST pins. The unit must have an active heat pump heating call to enter the test mode. In this mode of operation, the enable temperature is ignored and all timers are sped up. To initiate a manual defrost, short and hold the TEST pins. Remove the short when the system switches to defrost mode after the compressor noise abatement delay. The defrost will terminate on time (14 minutes) or when the termination temperature has been reached.

Test Sequence of Operation:

- 1) Provide a heating call to the heat pump.
- 2) Short test pins to bypass anti-short cycle timer. (If unit is running, this step is not necessary.)
- 3) Short test pins and hold them shorted to enter defrost mode.
- 4) Release test pins once control exits noise abatement delay.
- 5) Monitor coil temperature when control exits defrost.
- 6) Unit should return to heating mode.

TROUBLESHOOTING DEMAND DEFROST

During the test mode the coil temperature should be monitored. If the system exits defrost at approximately the termination temperature, the control is operating normally. If not, check the coil and ambient temperature sensor resistances, using the sensor temperature vs. resistance table at the end of this section.

Immerse the sensor in water and measure the resistance of the sensor. At 35°F the resistance of the sensor should be approximately 30,000 ohms.

Ensure that the coil sensor is properly installed that is not loose or touching the cabinet.

HIGH/LOW PRESSURE CONTROL MONITORING - ENHANCED DEFROST CONTROL

Status of high and low pressure controls is monitored by the enhanced feature demand defrost control and the following actions are taken.

J. STARTUP AND OPERATION

High Pressure Control – Provides active protection in both cooling and heating modes at all outdoor ambient temperatures. The high pressure control is an automatic reset type and opens at approximately 610 psig and closes at approximately 420 psig. The compressor and fan motor will stop when the high pressure control opens and will start again if the high side pressure drops to approximately 420 psig where the automatic reset high pressure control resets. If the high pressure control opens 3 times within a particular call for heating or cooling operation, the defrost control will lock out compressor and outdoor fan operation.

Low Pressure Control – Provides active protection in both heating and cooling modes at all outdoor ambient temperatures. The low pressure control is an automatic reset type and opens at approximately 15 psig and closes at approximately 40 psig. Operation is slightly different between cooling and heating modes.

Cooling Mode: The compressor and fan motor will stop when the low pressure control opens and will start again when the low side pressure rises to approximately 40 psig after the low pressure control automatically resets. If the low pressure switch opens 3 times within a particular call for cooling operation, the defrost control will lock out compressor and outdoor fan operation.

Heating Mode: The compressor and outdoor fan motor will stop when the coil exceeds termination temperature, and will start again when the coil temperature reaches termination temperature or when the defrost cycle will begin. The compressor will be de-energized for 30 seconds at the beginning and end of the defrost cycle, and the compressor contactor will be re-energized after the 30 second delay.

If the low pressure switch trips 3 times within 120 minutes of operation during a particular call for heating operation, the defrost control will lock out the compressor and outdoor fan operation. The lock-out counter shall be reset after 120 minutes or when the call for heating operation ends. If a lock-out due to low pressure occurs at an outdoor ambient temperature below 5°F, the system will remain in lock-out until the outdoor ambient temperature rises to 5°F. This feature is necessary since the low

pressure control could possibly have opened due to the outdoor ambient being very low rather than an actual system fault.

J.6. Safety Checks

At all times the manufacturer's maintenance and service guidelines must be followed. If in doubt, contact the manufacturer's technical support for assistance.

Before leaving the installation site the following safety checks must be completed:

- Ensure all electrical components in this system are approved by the manufacturer.
- Confirm the actual refrigerant charge complies with the minimum room size requirements outlined in **Appendix H. A2L Refrigerant Installation Safety Data.**
- Ensure that the ventilation machinery and outlets are operating correctly and are not obstructed.
- If an indirect refrigerant circuit is being used, the secondary circuit must be checked for the presence of refrigerant.
- Ensure that all the equipment labels and markings are visible and legible. Markings, labels, and signs that are illegible must be corrected.
- Confirm that any refrigerating pipe or components are installed in a position where they are unlikely to be exposed to corrosion, unless the refrigerant-containing components are constructed of corrosion-resistant materials or are protected from corrosion.

Sensor vs. Temperature Resistance Table

Degrees C	Degrees F	Ohms
-20	-4	96,974
-10	14	55,298
0	32	32,650
10	50	19,903
20	68	12,493
25	77	10,000
30	86	8,056
40	104	5,324

K. TEST AND BALANCE

K.1. Air Flow Charts and Information

See **Appendix C** towards the end of this manual for Air Flow Performance Data.

K.2. Air Flow Adjustments

K.2.1. Blower Speed for 7.5-10 Ton Units

See **Section J.3.2. Air Flow Measurements and Adjustments** on how to increase the blower speed and increase airflow for the 7.5-10 T units.

K.2.2. Economizer Adjustments

Do not fix a minimum position on an economizer, set the minimum position through the control board only. See the instructions provided with the economizer for more info.

N.1. Diagnostics Chart

N.1.1. Cooling Diagnostics Chart

▲ WARNING

DISCONNECT ALL POWER TO UNIT BEFORE SERVICING. CONTACTOR MAY BREAK ONLY ONE SIDE. FAILURE TO SHUT OFF POWER CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	- Power off or loose electrical connection - Thermostat out of calibration-set too high - Defective contactor - Blown fuses - Transformer defective - High pressure control open (if provided) - Interconnecting low voltage wiring damaged	- Check for correct voltage at compressor contactor in control box - Reset - Check for 24 volts at contactor coil - replace if contacts are open - Replace fuses - Check wiring-replace transformer - Reset-also see high head pressure remedy- - Replace thermostat wiring
Condenser fan runs, compressor doesn't	- Run capacitor defective (single phase only) - Loose connection - Compressor stuck, grounded or open motor winding open internal overload. - Low voltage condition	- Replace - Check for correct voltage at compressor - check & tighten all connections - Wait at least 2 hours for overload to reset. If still open, replace the compressor. At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.
Insufficient cooling	- Improperly sized unit - Improper airflow - Incorrect refrigerant charge - Air, non-condensibles or moisture in system - Incorrect voltage	- Recalculate load - Check - should be approximately 400 CFM [188.78 L/s] per ton. - Charge per procedure attached to unit service panel. - Recover refrigerant, evacuate & recharge, add filter drier - At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.
Compressor short cycles	- Incorrect voltage - Defective overload protector - Refrigerant undercharge	- At compressor terminals, voltage must be $\pm 10\%$ of nameplate marking when unit is operating. - Replace - check for correct voltage - Add refrigerant
Registers sweat	- Low evaporator airflow - Room thermostat set too low	- Increase speed of blower or reduce restriction - replace air filter - Raise thermostat set point
High head-low vapor pressures	- Restriction in liquid line, expansion device or filter drier - Flow check piston size too small - Incorrect capillary tubes	- Remove or replace defective component - Change to correct size piston - Change coil assembly
High head-high or normal vapor pressure - Cooling mode	- Dirty condenser coil - Refrigerant overcharge - Condenser fan not running - Air or non-condensibles in system	- Clean coil - Correct system charge - Repair or replace - Recover refrigerant, evacuate & recharge
High head-high or normal vapor pressure - Heating mode	- Low air flow - condenser coil - Refrigerant overcharge - Air or non-condensibles in system - Dirty condenser coil	- Check filters - correct to speed - Correct system charge - Recover refrigerant, evacuate & recharge - Check filter - clean coil
Low head-high vapor pressures	Defective Compressor valves	Replace compressor
Low vapor - cool compressor - iced evaporator coil	- Low evaporator airflow - Operating below 65°F outdoors - Moisture in system - Liquid line limiting refrigerant flow	- Increase speed of blower or reduce restriction - replace air filter - Add Low Ambient Kit - Recover refrigerant - evacuate & recharge - add filter drier - Replace drier
High vapor pressure	- Excessive load - Defective compressor	- Recheck load calculation - Replace
Fluctuating head & vapor pressures	- Severe overcharge - Air or non-condensibles in system	- Adjust refrigerant charge - Recover refrigerant, evacuate & recharge
Gurgle or pulsing noise at expansion device or liquid line	Air or non-condensibles in system	Recover refrigerant, evacuate & recharge

N. DIAGNOSTICS

N.2. Alarm Codes – Full List

Alarm Codes		
CODE	Description	FAULT LEVEL
0	STAND BY	None
c	COMPRESSOR ON - Low (Flashing if in time delay)	None
C	COMPRESSOR ON - High (Flashing if in time delay)	None
E	Economizer Cooling - No Compressor	None
F	CONTINUOUS FAN	None
h	GAS HEAT ON - LOW-FIRE	None
H	GAS HEAT ON -HIGH-FIRE	None
4	Comfort Alert Code 4 for Compressor Circuit 1	Shutdown
5	Comfort Alert Code 5 for Compressor Circuit 1	Shutdown
6	Comfort Alert Code 6 for Compressor Circuit 1	Shutdown
7	Comfort Alert Code 7 for Compressor Circuit 1	Shutdown
8	Comfort Alert Code 8 for Compressor Circuit 1	Shutdown
9	Comfort Alert Code 9 for Compressor Circuit 1	Shutdown
11	FAILED IGNITION	Problem
12	LO FLAME SENSE	Warning
13	FLAME LOST	Problem
14	UNEXPECTED FLAME	Shutdown
15	HIGH-FIRE GAS VALVE IMPROPER VOLTAGE	Problem
20	REFRIGERANT LOW PRESSURE SWITCH OPEN - CIRCUIT 1	Problem
21	REFRIGERANT LOW PRESSURE SWITCH OPEN - CIRCUIT 2	Problem
22	MAIN LIMIT OPEN	Problem
29	REFRIGERANT HIGH PRESSURE SWITCH OPEN - CIRCUIT 1	Problem
30	REFRIGERANT HIGH PRESSURE SWITCH OPEN - CIRCUIT 2	Problem
33	MRLC (Rollout Limit) OPEN	Problem
34	Comfort Alert Code 4 for Compressor Circuit 2	Shutdown
35	Comfort Alert Code 5 for Compressor Circuit 2	Shutdown
36	Comfort Alert Code 6 for Compressor Circuit 2	Shutdown
37	Comfort Alert Code 7 for Compressor Circuit 2	Shutdown
38	Comfort Alert Code 8 for Compressor Circuit 2	Shutdown
39	Comfort Alert Code 9 for Compressor Circuit 2	Shutdown
40	Refrigerant Leak Detection System	Shutdown
42	Invalid Thermostat Selection	Warning
44	LOW-FIRE NEGATIVE PRESSURE CONTROL CLOSED	Problem
46	LOW-FIRE NEGATIVE PRESSURE CONTROL OPEN	Problem
49	FREEZE SWITCH OPEN - CIRCUIT 1	Problem
50	FREEZE SWITCH OPEN - CIRCUIT 2	Problem
55	2nd stage COMBUSTION PRESSURE SWITCH CLOSED	Problem
57	HIGH-FIRE NEGATIVE PRESSURE CONTROL CLOSED	Problem
59	Condensate Drain Plugged	Shutdown
61	HIGH-FIRE NEGATIVE PRESSURE CONTROL OPEN	Problem, Shutdown
83	Condenser Coil Temp Sensor Fail-OAT	Problem
84	Outdoor Air Temperature Sensor Fail-OAT	Problem
88	Emergency Stop Fault	Shutdown
93	CONTROL Fault	Shutdown
97	Smoke Detection	Shutdown

N. DIAGNOSTICS

N.2.1. Cooling Alarm Codes and Diagnostics

All core Command come standard with a 7-segment diagnostic display. During standby mode with no fault codes present, the display will read "0" (zero). During normal thermostat heating, cooling or continuous fan operation, a letter will be displayed to describe the mode of operation as follows:

C = Cooling

F = Continuous Fan Operation

When the control senses a fault present, it will display a code to help in diagnoses. A list of normal operating codes and potential fault codes follows:

Alarm Codes - Cooling Only		
CODE	DESCRIPTION	FAULT LEVEL
0	Standby	None
c	Compressor On – Low (Flashing If In Time Delay)	None
C	Compressor On – High (Flashing If In Time Delay)	None
E	Economizer Cooling – No Compressor	None
F	Continuous Fan	None
4	Comfort Alert Code 4 For Compressor Circuit 1	Shutdown
5	Comfort Alert Code 5 For Compressor Circuit 1	Shutdown
6	Comfort Alert Code 6 For Compressor Circuit 1	Shutdown
7	Comfort Alert Code 7 For Compressor Circuit 1	Shutdown
8	Comfort Alert Code 8 For Compressor Circuit 1	Shutdown
9	Comfort Alert Code 9 For Compressor Circuit 1	Shutdown
20	Refrigerant Low Pressure Switch Open – Circuit 1	Problem
29	Refrigerant High Pressure Switch Open – Circuit 1	Problem
49	Freeze Switch Open – Circuit 1	Problem
59	Condensate Drain Plugged	Shutdown
83	Condenser Coil Temp Sensor Fail-Oct	Problem
84	Outdoor Air Temperature Sensor Fail-Oat	Problem
88	Emergency Stop Fault	Shutdown
93	Control Fault	Shutdown
97	Smoke Detection	Shutdown

The method for displaying a two-digit fault is to display the first digit for one second immediately followed by the second digit – which is also displayed for a duration of one second. A ½ second pause is then displayed. Cycle repeats until the fault is cleared. Each fault is flashed

(displayed) a minimum of two times even if the fault condition has cleared before the fault can be displayed twice.

Normal Operation Mode:

0	Displayed anytime there is no fault present and no thermostat call present
c	COMPRESSOR ON - Low (Flashing if in time delay)
C	COMPRESSOR ON - High (Flashing if in time delay)
E	When the system uses Economizer Cooling with No Compressor
F	Displayed anytime thermostat calls for continuous fan

N. DIAGNOSTICS

Fault Codes with Descriptions and Solutions:

Alarm Codes - Cooling Only		
CODE	DESCRIPTION	FAULT LEVEL
0	STANDBY	None
c	COMPRESSOR ON – Low (Flashing if in time delay)	None
C	COMPRESSOR ON – High (Flashing if in time delay)	None
E	Economizer Cooling – No Compressor	None
F	CONTINUOUS FAN	None
4	Comfort Alert Code 4 for Compressor Circuit 1	Shutdown
	ALARM Designation: Locked Rotor Circuit 1	
	DESCRIPTION:	
	1. Circuit 1 shutdown and retry after Anti-Short Cycle Delay (ASCD) Maximum is 3 attempts.	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Low line voltage	
	2. Excessive Refrigerant in compressor	
	3. Seized bearings in compressor	
5	Comfort Alert Code 5 for Compressor Circuit 1	Shutdown
	ALARM Designation: Open Circuit 1	
	DESCRIPTION:	
	1. Circuit 1 shutdown and retry after ASCD.	
	Note: This alarm is sent by the Comfort Alert Module only after the fault has been sensed for a minimum of 4 hours.	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Condensing unit power disconnect is open	
	2. Compressor circuit breaker or fuses are open	
	3. Compressor contactor has failed open High pressure switch is open and requires manual reset	
	4. Broken supply wires or connector is not making contact	
	5. Unusually long compressor protector reset time due to extreme ambient temperature	
	6. Compressor windings are damaged	
6	Comfort Alert Code 6 for Compressor Circuit 1	Shutdown
	ALARM Designation: Missing Phase Circuit 1	
	DESCRIPTION:	
	1. Circuit 1 shutdown	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Compressor fuse is open on one phase	
	2. Broken wire or connector on one phase	
	3. Compressor motor winding is damaged	
	4. Utility supply has dropped one phase	

N. DIAGNOSTICS

Fault Codes with Descriptions and Solutions:

Alarm Codes - Cooling Only		
CODE	DESCRIPTION	FAULT LEVEL
7	Comfort Alert Code 7 for Compressor Circuit 1	Shutdown
	ALARM Designation: Reverse Phase Circuit 1	
	DESCRIPTION:	
	1. Run outdoor and indoor fans continuously for circuit 1 and change mode of operation to Unoccupied Auto. This procedure prevents the Space Temperature from reaching extreme values.	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Compressor running backward due to supply phase reversal	
8	Comfort Alert Code 8 for Compressor Circuit 1	Shutdown
	ALARM Designation: Welded Contactor Circuit 1	
	DESCRIPTION:	
	1. Circuit 1 shutdown	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Compressor contactor has failed closed	
	2. Thermostat demand signal not connected to module	
9	Comfort Alert Code 9 for Compressor Circuit 1	Shutdown
	ALARM Designation: Low Voltage Circuit 1	
	DESCRIPTION:	
	1. Circuit 1 Shutdown and wait for voltage to return to operational levels.	
	SOLUTION/STATUS/Possible - Troubleshooting Information	
	1. Control circuit transformer is overloaded	
	2. Low line voltage to compressor	
20	DESCRIPTION: REFRIGERANT LOW PRESSURE SWITCH OPEN – CIRCUIT 1	Problem
	CAUSE:	
	1. Low evaporator airflow	
	2. Refrigerant undercharge	
	3. Restriction in liquid line, expansion device or filter drier	
	4. Operating below 65°F outdoors	
	5. Moisture in system	
	SOLUTION: The solution will depend on the cause.	
	1. Increase speed of blower or reduce restriction - replace air filter	
	2. Check for leaks - add refrigerant	
	3. Remove or replace defective component	
	4. Add Low Ambient Kit	
	5. Recover refrigerant - evacuate & recharge - add or replace filter drier	

N. DIAGNOSTICS

Fault Codes with Descriptions and Solutions:

Alarm Codes - Cooling Only		
CODE	DESCRIPTION	FAULT LEVEL
29	DESCRIPTION: REFRIGERANT HIGH PRESSURE SWITCH OPEN – CIRCUIT 1	Problem
	CAUSE:	
	1. Restriction in liquid line, expansion device or filter drier	
	2. Refrigerant overcharge	
	3. Condenser fan not running	
	4. Air or non-condensibles in system	
	SOLUTION: The solution will depend on the cause.	
	1. Recover refrigerant - evacuate & recharge remove or replace defective component	
	2. Remove refrigerant	
	3. Check voltage, Run Capacitor & Outdoor Motor Repair or replace	
	4. Recover refrigerant, evacuate & recharge	
40	REFRIGERANT LEAK DETECTION SYSTEM	Shutdown
	DESCRIPTION:	
	1. The refrigerant leak detection system detects an event and mitigation procedure occurs.	
	2. The mitigation procedure is triggered when no event occurs.	
	SOLUTION: The solution will depend on the cause.	
	1. Check for refrigerant leaks	
	2a. Organic compounds could be falsely triggering mitigation procedure. Check the installation location for potential contaminants.	
	2b. The sensor is faulty; replace the sensor	
49	FREEZE SWITCH OPEN – CIRCUIT 1	Problem
	DESCRIPTION:	
	1. Occurs when sensors are either open or shorted.	
	SOLUTION: The solution will depend on the cause.	
	1. Replace the sensor	
	2. Check sensor is installed correctly on control	
59	Condensate Drain Plugged	Shutdown
	DESCRIPTION:	
	1. Condensate line is blocked water inside of unit	
	SOLUTION: The solution will depend on the cause.	
	1. Remove blockage	
	2. Remove condensate pan and clean	

N. DIAGNOSTICS

Fault Codes with Descriptions and Solutions:

Alarm Codes - Cooling Only		
CODE	DESCRIPTION	FAULT LEVEL
83	Condenser Coil Temp Sensor Fail-OCT	Problem
	DESCRIPTION:	
	1. No defrost operation, but unit continues to operate in either heating or cooling.	
	SOLUTION: The solution will depend on the cause.	
	1. Extreme temperatures	
	2. Replace the sensor	
84	Outdoor Air Temperature Sensor Fail-OAT	Problem
	DESCRIPTION:	
	1. No defrost operation, but unit continues to operate in either heating or cooling.	
	2. The heat source continues to be heat pump, independently of the outdoor air temperature	
	SOLUTION: The solution will depend on the cause.	
	1. Extreme temperatures	
88	Emergency Stop Fault	Shutdown
	DESCRIPTION:	
	1. Complete shutdown	
	SOLUTION: The solution will depend on the cause.	
	1. Cannot be cleared by the 'Clear All Alarms" command. Must be cleared by changing the Emergency Stop Fault network value.	
93	CONTROL Fault	Shutdown
	DESCRIPTION:	
	1. Internal Control fault.	
	SOLUTION: The solution will depend on the cause.	
91	Smoke Detection	Shutdown
	DESCRIPTION:	
	1. RTU-C reads the smoke detection input as open -- complete shutdown.	
	SOLUTION: The solution will depend on the cause.	
	1. If not due to a fire, Replace the sensor, Check sensor is installed correctly on control	
	2. Check Smoke Detection Circuit, if no Smoke Detector is installed, ensure Economizer Smoke Bypass plug is installed	

N. DIAGNOSTICS

N.2.2. Non-Applicable Fault Codes

The controls used in this product are common with a few other product families. Because of this, there are several fault codes that are programmed into the controls but DO NOT APPLY to this product. If one of these fault codes appear, clear the fault and continue diagnostics. If the code persists, power down the unit and reapply power before continuing diagnostics.

These non-applicable fault codes are listed below:

Alarm Codes - NON-APPLICABLE FAULT CODES		
CODE	Description	FAULT LEVEL
h	GAS HEAT ON - LOW-FIRE	None
H	GAS HEAT ON -HIGH-FIRE	None
11	FAILED IGNITION	Problem
12	LO FLAME SENSE	Warning
13	FLAME LOST	Problem
14	UNEXPECTED FLAME	Shutdown
15	HIGH-FIRE GAS VALVE IMPROPER VOLTAGE	Problem
21	REFRIGERANT LOW PRESSURE SWITCH OPEN - CIRCUIT 2	Problem
22	MAIN LIMIT OPEN	Problem
30	REFRIGERANT HIGH PRESSURE SWITCH OPEN - CIRCUIT 2	Problem
33	MRLC (Rollout Limit) OPEN	Problem
34	Comfort Alert Code 4 for Compressor Circuit 2	Shutdown
35	Comfort Alert Code 5 for Compressor Circuit 2	Shutdown
36	Comfort Alert Code 6 for Compressor Circuit 2	Shutdown
37	Comfort Alert Code 7 for Compressor Circuit 2	Shutdown
38	Comfort Alert Code 8 for Compressor Circuit 2	Shutdown
39	Comfort Alert Code 9 for Compressor Circuit 2	Shutdown
42	Invalid Thermostat Selection	Warning
44	LOW-FIRE NEGATIVE PRESSURE CONTROL CLOSED	Problem
46	LOW-FIRE NEGATIVE PRESSURE CONTROL OPEN	Problem
50	FREEZE SWITCH OPEN - CIRCUIT 2	Problem
55	2nd stage COMBUSTION PRESSURE SWITCH CLOSED	Problem
57	HIGH-FIRE NEGATIVE PRESSURE CONTROL CLOSED	Problem
61	HIGH-FIRE NEGATIVE PRESSURE CONTROL OPEN	Problem, Shutdown

N. DIAGNOSTICS

N.2.5. VFD Codes

N.2.5.1. Yaskawa VFD Codes

Some units come equipped with a Yaskawa V1000 Variable Frequency Drive attached to the blower assembly in the blower motor compartment.

When the drive detects a fault, the ALM indicator LED remains lit without flashing. If the LED flashes, the drive has detected a minor fault or alarm. Conditions such as overvoltage or external faults can trip both faults and minor faults, therefore it is important to note whether the LED remains lit or if the LED flashes.

When the control senses a fault present, it will display a code to help in diagnoses. A list of normal operating codes and potential fault codes can be found below and on the following page.

More fault codes can be found on the manufacturer's website. In the blower compartment, on the right side VFD assembly there is a label that gives the model number of the VFD. Use that model number to find the VFD Installation Manual on the manufacturer's website.

V1000 Drive: <https://www.yaskawa.com/products/drives/industrial-ac-drives/microdrives/v1000-drive>

Z1000 Drive: <https://www.yaskawa.com/products/drives/hvac-drives/fan-pump-drives/z1000-drive>

Digital Operator Display	Name	Minor Fault Output (H2 - □□ = 10)
CE	MEMOBUS/Modbus Communication Error	YES
CrST	Can Not Reset	YES
dnE	Drive Disabled	YES
EF1 to EF7	External Fault (input terminal S1 to S7)	YES
HCA	Current Alarm	YES
LT-1	Cooling Fan Maintenance Alarm	No Output <1>
LT-2	Capacitor Maintenance Alarm	No Output <1>
LT-3	Soft Charge Bypass Relay Maintenance Time	No Output <1>
LT-4	IGBT Maintenance Time (50%)	No Output <1>
oH	Heatsink Overheat	YES
oH2	Drive Overheat	YES
oH3	Motor Overheat	YES
oL3	Overtorque 1	YES
oL4	Overtorque 2	YES
oL5	Mechanical Weakening Direction 1	YES
oS	Overspeed (for Simple V/f with PG	YES
oV	Overvoltage	YES
Pgo	PG Disconnect (for Simple V/f with PG)	YES

N. DIAGNOSTICS

N.2.5.1. Yaskawa VFD Codes (Cont.)

Digital Operator Display	Name
bUS	Option Communication Error
CE	MEMOBUS/Mobus Communication Error
CF	Control Fault
CPF02	A/D Conversion Error
CPF07	Terminal Board Communication Fault
CPF08	EEPROM Serial Communications Fault
CPF011	RAM Fault
CPF012	FLASH Memory Fault
CPF013	Watchdog Circuit Exception
CPF014	Control Circuit Fault
CPF016	Clock Fault
CPF017	Timing Fault
CPF018	Control Circuit Fault
CPF019	Control Circuit Fault
CPF020 or CPF21	RAM Fault
	FLASH Memory Fault
	Watchdog Circuit Exception
	Clock Fault
EF0	Option External Fault
EF1 to EF7	External Fault (input terminal S1 to S7)
Err	EEPROM Write Error
GF	Ground Fault
LF	Output Phase Loss
LF2	Current Imbalance
oC	Overcurrent
oH	Heat Sink Overheat
oH1	Heat Sink Overheat
oL1	Motor Overload
oL2	Drive Overload
oL3	Overtorque Detection 1
oL4	Overtorque Detection 2
oL5	Mechanical Weakening Detection 1
oL6	Overvoltage
oL7	Input Phase Loss
oL8	IGBT Short Circuit
oL9	Undervoltage
oL10	Control Power Supply Undervoltage
oL11	Soft Charge Circuit Fault

N.2.5. VFD Codes (Cont.)

This VFD Section may not be applicable to all unit configurations. See **Appendix H** towards the end of this manual for Low Voltage Connections for VFDs.

N.2.5.2. Mitsubishi VFD Codes

Some units come equipped with a Mitsubishi FR-E800 Variable Frequency Drive attached to the blower assembly in the blower motor compartment.

When the drive detects a fault, an “E” with a Three Character Fault Code will be displayed on the LED display (Example: E.LUP). The drive may not stop the drive from running unless it is not corrected. The drive will store the last 10 fault codes, a condensed list of fault codes and operating codes can be found below.

More fault codes can be found on the manufacturer’s website. In the blower compartment, on the right side VFD assembly there is a label that gives the model number of the VFD. Use that model number to find the VFD Installation Manual on the manufacturer’s website.

Operation Panel Indication	Code	Name
E.OC1	16 (H10)	Overcurrent trip during acceleration
E.OC2	17 (H11)	Overcurrent trip during constant speed
E.OC3	18 (H12)	Overcurrent trip during deceleration or stop
E.OV1	32 (H20)	Regenerative overvoltage trip during acceleration
E.OV2	33 (H21)	Regenerative overvoltage trip during constant speed
E.OV3	34 (H22)	Regenerative overvoltage trip during deceleration or stop
E.THT	48 (H30)	Inverter overload trip (electronic thermal relay function)
E.THM	49 (H31)	Motor overload trip (electronic thermal relay function)
E.FIN	64 (H40)	Heat sink overheat
E.UVT	81 (H51)	Undervoltage
E.ILF	82 (H52)	Input phase loss
E.OLT	96 (H60)	Stall prevention stop
E.SOT	97 (H61)	Loss of synchronism detection
E.LUP	98 (H62)	Upper limit fault detection
E.LDN	99 (H63)	Lower limit fault detection
E.BE	112 (H70)	Brake transistor alarm detection
E.GF	128 (H80)	Output side earth (ground) fault overcurrent
E.LF	129 (H81)	Output phase loss
E.OHT	144 (H91)	External thermal relay operation
E.PTC	145 (H91)	PTC thermistor operation
E.OPT	160 (HA0)	Option Fault

N. DIAGNOSTICS

N.2.5.3. Other Suppliers

Some units may be equipped with VFDs from other suppliers. In the blower compartment, on the right side of the VFD assembly, there is a label with the model number of the VFD. For more information about those VFDs, visit the appropriate website listed below

Delta MS300: https://downloadcenter.deltaww.com/en-US/DownloadCenter?v=1&CID=06&itemID=060101&downloadID=MS300&dataType=2&sort_expr=cdate&sort_dir=DESC.

Control Tech C200: <https://acim.nidec.com/en-us/drives/control-techniques/products/ac-drives/commander-c-general-purpose-drives>.

N.3. Common Mistakes

This is a list of common mistakes made during installation.

- Drain Pan connections, drain trap connected to the wrong outlet side, not connected at all, or insufficient trap depth.
- Connecting a W2 call only to try and get full heat all the time, Connect both W1 and W2 together if the job requirement or thermostat is setup for single stage heating.
- Connecting a Y2 call only to try and get full cooling all the time, Connect both Y1 and Y2 together if the job requirement or thermostat is setup for single stage cooling.
- Economizer connections, not installing the 3-wire jumper plug into the economizer wiring harness, if a factory option smoke detector is not used, this will cause a Smoke Detection Fault.

Appendix A – General Product Data

Model (-)HPDYB Series	090ACF	090ACG	090ACH	090ADF
Cooling Performance^A				
Nominal Cooling Capacity Btu/h [kW]	90,000 [26.37]	90,000 [26.37]	90,000 [26.37]	90,000 [26.37]
EER / IEER ^B	11/14.1	11/14.1	11/14.1	11/14.1
Nominal CFM/AHRI Rated CFM [L/s]	3000/3030 [1416/1430]	3000/3030 [1416/1430]	3000/3030 [1416/1430]	3000/3030 [1416/1430]
AHRI Net Cooling Capacity Btu/h [kW]	86,000 [25.2]	86,000 [25.2]	86,000 [25.2]	86,000 [25.2]
Net Sensible Capacity Btu/h [kW]	64,500 [18.9]	64,500 [18.9]	64,500 [18.9]	64,500 [18.9]
Net Latent Capacity Btu/h [kW]	21,500 [6.3]	21,500 [6.3]	21,500 [6.3]	21,500 [6.3]
Net System Power kW	7.82	7.82	7.82	7.82
Heating Performance (Heat Pumps)				
High Temp. Btu/h [kW] Rating	84,000 [24.62]	84,000 [24.62]	84,000 [24.62]	84,000 [24.62]
System Power kW / COP	7.24/3.4	7.24/3.4	7.24/3.4	7.24/3.4
Low Temp. Btu/h [kW] Rating	48,000 [14.06]	48,000 [14.06]	48,000 [14.06]	48,000 [14.06]
High System Power kW / COP	6.25/2.25	6.25/2.25	6.25/2.25	6.25/2.25
Compressor				
No./Stage/Type	1/2/Scroll	1/2/Scroll	1/2/Scroll	1/2/Scroll
Outdoor Sound Rating (dB)^C				
	87	87	87	87
Outdoor Coil - Fin Type				
Tube Type	Louvered	Louvered	Louvered	Louvered
MicroChannel Depth in. [mm]	1 [25.4]	1 [25.4]	1 [25.4]	1 [25.4]
Face Area sq. ft. [sq. m]	22.8 [2.12]	22.8 [2.12]	22.8 [2.12]	22.8 [2.12]
Rows / FPI [FPCm]	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]
Indoor Coil - Fin Type				
Tube Type	Louvered	Louvered	Louvered	Louvered
MicroChannel Depth in. [mm]	1.26 [32]	1.26 [32]	1.26 [32]	1.26 [32]
Face Area sq. ft. [sq. m]	10.9 [1.01]	10.9 [1.01]	10.9 [1.01]	10.9 [1.01]
Rows / FPI [FPCm]	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]
Outdoor Fan - Type				
Propeller	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	8000 [3775]	8000 [3775]	8000 [3775]	8000 [3775]
No. Motors/HP	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP
Motor RPM	1075	1075	1075	1050
Indoor Fan - Type				
FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Single Speed	Single Speed	Single Speed	Single Speed
No. Motors	1	1	1	1
Motor HP	2	3	3	2
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	56	56
Filter - Type				
Disposable	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(NO.) Size Recommended in. [mm x mm x mm]	(4)2x20x20 [51x508x508]	(4)2x20x20 [51x508x508]	(4)2x20x20 [51x508x508]	(4)2x20x20 [51x508x508]
Refrigerant Charge Oz. [g]				
	172.8 [4898.8]	172.8 [4898.8]	172.8 [4898.8]	172.8 [4898.8]
Weights				
Net Weight lbs. [kg]	780 [354]	790 [358]	791 [359]	780 [354]
Ship Weight lbs. [kg]	819 [371]	829 [376]	830 [377]	819 [371]

P. APPENDICES

Appendix A – General Product Data

Model (-)HPDYB Series	090ADG	090ADH	120ACF	120ACG
Cooling Performance^A				
Nominal Cooling Capacity Btu/h [kW]	90,000 [26.37]	90,000 [26.37]	120,000 [35.16]	120,000 [35.16]
EER / IEER ^B	11/14.1	11/14.1	11/14.1	11/14.1
Nominal CFM/AHRI Rated CFM [L/s]	3000/3030 [1416/1430]	3000/3030 [1416/1430]	4000/3900 [1,888/1841]	4000/3900 [1,888/1841]
AHRI Net Cooling Capacity Btu/h [kW]	86,000 [25.2]	86,000 [25.2]	114,000 [33.4]	114,000 [33.4]
Net Sensible Capacity Btu/h [kW]	64,500 [18.9]	64,500 [18.9]	85,500 [25.1]	85,500 [25.1]
Net Latent Capacity Btu/h [kW]	21,500 [6.3]	21,500 [6.3]	28,500 [8.4]	28,500 [8.4]
Net System Power kW	7.82	7.82	10.36	10.36
Heating Performance (Heat Pumps)				
High Temp. Btu/h [kW] Rating	84,000 [24.62]	84,000 [24.62]	112,000 [32.8]	112,000 [32.8]
High System Power kW / COP	7.24/3.4	7.24/3.4	9.65/3.4	9.65/3.4
Low Temp. Btu/h [kW] Rating	48,000 [14.06]	48,000 [14.06]	68,000 [19.9]	68,000 [19.9]
High System Power kW / COP	6.25/2.25	6.25/2.25	8.86/2.25	8.86/2.25
Compressor				
No./Stage/Type	1/2/Scroll	1/2/Scroll	1/2/Scroll	1/2/Scroll
Outdoor Sound Rating (dB)^C				
	87	87	81	81
Outdoor Coil - Fin Type				
Tube Type	Louvered	Louvered	Louvered	Louvered
MicroChannel Depth in. [mm]	MicroChannel	MicroChannel	MicroChannel	MicroChannel
Face Area sq. ft. [sq. m]	1 [25.4]	1 [25.4]	1.26 [32]	1.26 [32]
Rows / FPI [FPcm]	22.8 [2.12]	22.8 [2.12]	28.8 [2.68]	28.8 [2.68]
	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]
Indoor Coil - Fin Type				
Tube Type	Louvered	Louvered	Louvered	Louvered
MicroChannel Depth in. [mm]	MicroChannel	MicroChannel	MicroChannel	MicroChannel
Face Area sq. ft. [sq. m]	1.26 [32]	1.26 [32]	1.26 [32]	1.26 [32]
Rows / FPI [FPcm]	10.9 [1.01]	10.9 [1.01]	13.2 [1.23]	13.2 [1.23]
Refrigerant Control	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]
Drain Connection No./Size in. [mm]	TX Valves	TX Valves	TX Valves	TX Valves
	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]
Outdoor Fan - Type				
No. Used/Diameter in. [mm]	Propeller	Propeller	Propeller	Propeller
Drive Type/No. Speeds	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]
CFM [L/s]	Direct/1	Direct/1	Direct/1	Direct/1
No. Motors/HP	8000 [3775]	8000 [3775]	8000 [3775]	8000 [3775]
Motor RPM	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP
	1050	1050	1075	1075
Indoor Fan - Type				
No. Used/Diameter in. [mm]	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
Drive Type	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]
No. Speeds	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Motors	Single Speed	Single Speed	Single Speed	Single Speed
Motor HP	1	1	1	1
Motor RPM	3	3	2	3
Motor Frame Size	1725	1725	1725	1725
	56	56	56	56
Filter - Type				
Furnished	Disposable	Disposable	Disposable	Disposable
(NO.) Size Recommended in. [mm x mm x mm]	Yes	Yes	Yes	Yes
	(4)2x20x20 [51x508x508]	(4)2x20x20 [51x508x508]	(4)2x25x20 [51x635x508]	(4)2x25x20 [51x635x508]
Refrigerant Charge Oz. [g]				
	172.8 [4898.8]	172.8 [4898.8]	209.6 [5942.1]	209.6 [5942.1]
Weights				
Net Weight lbs. [kg]	790 [358]	791 [359]	856 [388]	866 [392]
Ship Weight lbs. [kg]	829 [376]	830 [377]	895 [406]	905 [410]

Appendix A – General Product Data

Model (-)HPDYB Series	120ACH	120ADF	120ADG	120ADH
Cooling Performance^A				
Nominal Cooling Capacity Btu/h [kW]	120,000 [35.16]	120,000 [35.16]	120,000 [35.16]	120,000 [35.16]
EER / IEER ^B	11/14.1	11/14.1	11/14.1	11/14.1
Nominal CFM/AHRI Rated CFM [L/s]	4000/3900 [1,888/1841]	4000/3900 [1,888/1841]	4000/3900 [1,888/1841]	4000/3900 [1,888/1841]
AHRI Net Cooling Capacity Btu/h [kW]	114,000 [33.4]	114,000 [33.4]	114,000 [33.4]	114,000 [33.4]
Net Sensible Capacity Btu/h [kW]	85,500 [25.1]	85,500 [25.1]	85,500 [25.1]	85,500 [25.1]
Net Latent Capacity Btu/h [kW]	28,500 [8.4]	28,500 [8.4]	28,500 [8.4]	28,500 [8.4]
Net System Power kW	10.36	10.36	10.36	10.36
Heating Performance (Heat Pumps)				
High Temp. Btu/h [kW] Rating	112,000 [32.8]	112,000 [32.8]	112,000 [32.8]	112,000 [32.8]
High System Power kW / COP	9.65/3.4	9.65/3.4	9.65/3.4	9.65/3.4
Low Temp. Btu/h [kW] Rating	68,000 [19.9]	68,000 [19.9]	68,000 [19.9]	68,000 [19.9]
High System Power kW / COP	8.86/2.25	8.86/2.25	8.86/2.25	8.86/2.25
Compressor				
No./Stage/Type	1/2/Scroll	1/2/Scroll	1/2/Scroll	1/2/Scroll
Outdoor Sound Rating (dB)^C				
	81	81	81	81
Outdoor Coil - Fin Type				
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1.26 [32]	1.26 [32]	1.26 [32]	1.26 [32]
Face Area sq. ft. [sq. m]	28.8 [2.68]	28.8 [2.68]	28.8 [2.68]	28.8 [2.68]
Rows / FPI [FPcm]	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]	1 / 16 [6]
Indoor Coil - Fin Type				
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1.26 [32]	1.26 [32]	1.26 [32]	1.26 [32]
Face Area sq. ft. [sq. m]	13.2 [1.23]	13.2 [1.23]	13.2 [1.23]	13.2 [1.23]
Rows / FPI [FPcm]	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]	1 / 20 [8]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]	1/0.75 [19.05]
Outdoor Fan - Type				
	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]	2/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	8000 [3775]	8000 [3775]	8000 [3775]	8000 [3775]
No. Motors/HP	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP	2 at 1/2 HP
Motor RPM	1075	1050	1050	1050
Indoor Fan - Type				
	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]	1/15 x 15 [381x381]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Single Speed	Single Speed	Single Speed	Single Speed
No. Motors	1	1	1	1
Motor HP	3	2	3	3
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	56	56
Filter - Type				
	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(NO.) Size Recommended in. [mm x mm x mm]	(4)2x25x20 [51x635x508]	(4)2x25x20 [51x635x508]	(4)2x25x20 [51x635x508]	(4)2x25x20 [51x635x508]
Refrigerant Charge Oz. [g]				
	209.6 [5942.1]	209.6 [5942.1]	209.6 [5942.1]	209.6 [5942.1]
Weights				
Net Weight lbs. [kg]	867 [393]	856 [388]	866 [392]	867 [393]
Ship Weight lbs. [kg]	906 [411]	895 [406]	905 [410]	906 [411]

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Appendix A – General Product Data

Notes:

- A. Cooling Performance in rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are able for operation to $\pm 20\%$ of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 340/360.
- B. EER and Integrated Energy Efficiency Ratio (IEER) are rated in accordance with AHRI Standard 340/360 and DOE test standards.
- C. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

Unit Size - Series	Standard Rating (dBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		100	250	500	1000	2000	4000	8000
(-)HPDYB090	87.0	62	74	77	77	74	70	67
(-)HPDYB120	81.0	61	64	69	67	67	66	62

Appendix B – Electrical Data

See Appendix E for Electrical Data and Fuse Sizing specific to the Manufacturer's approved Electric Heater Kits.

ELECTRICAL DATA – (-)HPDYB SERIES									
		090ACF	090ACG 090ACH	090ADF	090ADG 090ADH	120ACF	120ACG 120ACH	120ADF	120ADG 120ADH
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506	187-253	187-253	414-506	414-506
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	3	3	3	3	3	3	3	3
	Hz	60	60	60	60	60	60	60	60
	Minimum Circuit Ampacity	43/43	46/46	20	21	45/45	48/48	24	26
	Minimum Circuit Ampacity- with Power Exhaust	48/48	51/51	22	24	50/50	53/53	27	28
	Minimum Overcurrent Protection Device Size	50/50	60/60	25	25	60/60	60/60	30	30
	Minimum Overcurrent Protection Device Size with Power Exhaust	60/60	60/60	25	30	60/60	60/60	30	35
	Maximum Overcurrent Protection Device Size	60/60	70/70	25	30	70/70	70/70	35	35
	Maximum Overcurrent Protection Device Size with Power Exhaust	70/70	70/70	30	30	70/70	70/70	40	40
Compressor Motor	No.	1	1	1	1	1	1	1	1
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	3	3	3	3	3	3	3	3
	Amps (RLA), Comp. 1	25.2	25.2	10.6	10.6	26.5	26.5	14.0	14.0
	Amps (LRA), Comp. 1	178.5	178.5	79.1	79.1	255.0	255.0	123.0	123.0
Condenser Motor	No.	2	2	2	2	2	2	2	2
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	1	1	1	1	1	1	1	1
	HP	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
	Amps (FLA, each)	2.4	2.4	1.5	1.5	2.4	2.4	1.5	1.5
	Amps (LRA, each)	5.6	5.6	3.1	3.1	5.6	5.6	3.1	3.1
Evaporator Fan	No.	1	1	1	1	1	1	1	1
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	3	3	3	3	3	3	3	3
	HP	2	3	2	3	2	3	2	3
	Amps (FLA, each)	6.2	9.2	3.0	4.6	6.2	9.2	3.0	4.6
	Amps (LRA, each)	47.0	74.5	24.0	38.1	47.0	74.5	24.0	38.1

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Appendix C – Air Flow Performance Data

AIRFLOW PERFORMANCE -- 7.5 TON [26.4 KW] -- 60Hz -- DOWNFLOW

Air Flow		Model (-)HPDZ090 - Downflow										Voltage 208/230, 460, 575 — 3 phase 60 Hz																																	
		External Static Pressure - Inches of Water [kPa]																																											
		0.1 [0.02]		0.2 [0.05]		0.3 [0.07]		0.4 [0.10]		0.5 [0.12]		0.6 [0.15]		0.7 [0.17]		0.8 [0.20]		0.9 [0.22]		1.0 [0.25]		1.1 [0.27]		1.2 [0.30]		1.3 [0.32]		1.4 [0.35]		1.5 [0.37]		1.6 [0.40]		1.7 [0.42]		1.8 [0.45]		1.9 [0.47]		2.0 [0.50]					
RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W				
2400 [1133]	—	—	—	—	—	—	—	567	590	603	833	638	870	672	911	706	955	738	1003	772	1055	803	1111	835	1170	865	1233	885	1300	925	1370	964	1444	982	1522	1009	1604	1036	1688	1063	1779				
2500 [1180]	—	—	—	—	—	—	—	575	827	610	862	645	900	678	942	712	987	744	1036	776	1089	808	1146	838	1207	869	1271	898	1339	927	1411	965	1486	983	1565	1010	1648	1037	1735	1062	1825				
2600 [1227]	—	—	—	—	—	—	—	548	825	583	857	618	892	652	932	685	975	718	1022	750	1072	781	1127	812	1185	843	1246	872	1312	901	1381	930	1454	968	1531	985	1611	1011	1695	1037	1783	1063	1875		
2700 [1274]	—	—	—	—	—	—	—	557	866	591	886	626	906	666	966	692	1011	724	1059	756	1111	787	1166	817	1226	847	1289	876	1355	905	1426	933	1500	960	1578	987	1660	1013	1745	1038	1834	1063	1927		
2800 [1321]	—	—	—	—	—	—	—	566	890	600	924	634	962	667	1004	699	1049	731	1099	762	1152	793	1209	822	1269	852	1333	880	1401	909	1473	936	1549	963	1628	989	1711	1015	1797	1040	1888	1064	1982		
2900 [1368]	—	—	—	—	—	—	—	576	926	609	962	642	1001	675	1044	707	1091	738	1141	769	1196	799	1254	828	1315	857	1381	885	1450	913	1523	940	1600	966	1680	992	1764	1017	1852	1041	1944	1065	2039		
3000 [1416]	—	—	—	—	—	—	—	582	932	596	965	611	1042	683	1087	715	1135	745	1187	776	1242	805	1301	834	1364	862	1431	890	1502	917	1576	944	1654	969	1735	985	1821	1019	1910	1043	2003	1066	2099		
3100 [1463]	—	—	—	—	—	—	—	562	972	586	1007	629	1045	661	1087	692	1132	723	1181	753	1234	783	1291	812	1352	840	1416	868	1484	895	1556	922	1631	948	1710	973	1793	998	1880	1022	1970	1045	2064	1068	2162
3200 [1510]	—	—	—	—	—	—	—	574	1015	605	1051	639	1080	670	1133	701	1180	732	1231	761	1285	791	1343	819	1405	847	1470	874	1540	901	1612	927	1689	962	1770	977	1854	1002	1942	1025	2033	1048	2129	1070	2228
3300 [1557]	552	1028	585	1061	617	1098	649	1139	680	1183	711	1231	741	1283	770	1338	799	1398	827	1461	854	1527	881	1598	907	1672	931	1750	957	1831	982	1917	1005	2006	1029	2099	1051	2195	1073	2296					
3400 [1604]	564	1075	597	1110	629	1148	660	1190	691	1235	721	1284	750	1337	779	1394	807	1455	834	1519	861	1587	888	1659	913	1734	938	1813	963	1896	987	1983	1010	2073	1032	2167	1054	2263	1076	2367					
3500 [1652]	577	1125	609	1161	640	1200	671	1243	701	1290	731	1340	760	1395	788	1453	815	1514	843	1580	869	1649	895	1722	920	1799	944	1879	968	1963	992	2051	1014	2143	1037	2238	1058	2337	1079	2440					
3600 [1699]	580	1178	621	1215	652	1255	683	1299	712	1347	741	1399	770	1455	797	1514	824	1577	851	1644	877	1714	902	1788	927	1866	951	1948	974	2033	997	2122	1019	2215	1041	2312	1062	2412	1082	2516					

NOTE: F- Drive left of the first bold line, G between the bold lines, H-Drive right of second bold line.

Drive Package	F					G					H							
Motor H.P. [W]	2 [1491.4]					3 [2237.1]					3 [2237.1]							
Blower Sheave	AK84H					AK84H					AK84H							
Motor Sheave	1VP40					1VP50					1VP56							
Belt	A49					A50					A51							
Turns Open	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
RPM	766	722	677	634	591	544	990	948	906	864	822	779	1109	1069	1029	988	948	906

NOTES: 1. Factory sheave settings are shown in bold type.

2. Do not set motor sheave below minimum or maximum turns open shown.

3. Re-adjustment of sheave required to achieve rates airflow at AHRI minimum External Static Pressure.

4. Drive data shown is for vertical airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

Airflow	AIRFLOW CORRECTION FACTORS *			COMPONENT AIRFLOW RESISTANCE					Pressure Drop MERV 8	Pressure Drop MERV 13		
	Total MBH	Sensible MBH	Power kW	Wet Coil	Vertical Economizer RA Damper Open	Concentric Diffuser RXRN-AEF2000 & Concentric Adapter RXMC-DD01 (Flush)	Concentric Diffuser RXRN-AED2000 & Concentric Adapter RXMC-DD01 (Drop)					
CFM [L/s]						Resistance — Inches of Water [kPa]						
2400 [1133]	0.97	0.92	0.99	0.06 [0.01]	0.01 [0.00]	0.66 [0.16]	0.53 [0.13]		0.093 [0.02]	0.047 [0.01]		
2500 [1180]	0.98	0.93	0.99	0.06 [0.01]	0.02 [0.00]	0.71 [0.18]	0.57 [0.14]		0.098 [0.02]	0.055 [0.01]		
2600 [1227]	0.99	0.95	0.99	0.06 [0.02]	0.02 [0.01]	0.75 [0.19]	0.60 [0.15]		0.103 [0.02]	0.062 [0.01]		
2700 [1274]	0.99	0.96	0.99	0.07 [0.02]	0.03 [0.01]	0.80 [0.20]	0.65 [0.16]		0.108 [0.03]	0.070 [0.02]		
2800 [1321]	0.99	0.98	1.00	0.07 [0.02]	0.04 [0.01]	0.85 [0.21]	0.69 [0.17]		0.113 [0.03]	0.078 [0.02]		
2900 [1368]	1.00	1.00	1.00	0.08 [0.02]	0.04 [0.01]	0.91 [0.23]	0.74 [0.18]		0.117 [0.03]	0.085 [0.02]		
3000 [1416]	1.01	1.01	1.00	0.08 [0.02]	0.05 [0.01]	0.96 [0.24]	0.79 [0.20]		0.122 [0.03]	0.093 [0.02]		
3100 [1463]	1.01	1.03	1.00	0.09 [0.02]	0.06 [0.02]	1.02 [0.25]	0.86 [0.21]		0.127 [0.03]	0.100 [0.02]		
3200 [1510]	1.02	1.04	1.01	0.10 [0.02]	0.07 [0.02]	1.08 [0.27]	0.92 [0.23]		0.132 [0.03]	0.108 [0.03]		
3300 [1557]	1.02	1.06	1.01	0.10 [0.02]	0.08 [0.02]	1.15 [0.29]	0.99 [0.25]		0.137 [0.03]	0.115 [0.03]		
3400 [1604]	1.03	1.08	1.01	0.11 [0.03]	0.09 [0.02]	1.21 [0.30]	1.05 [0.26]		0.142 [0.03]	0.123 [0.03]		
3500 [1652]	1.04	1.09	1.01	0.11 [0.03]	0.10 [0.02]	1.29 [0.32]	1.09 [0.27]		0.147 [0.04]	0.131 [0.03]		
3600 [1699]	1.04	1.11	1.02	0.12 [0.03]	0.11 [0.03]	1.36 [0.34]	1.13 [0.28]		0.152 [0.04]	0.138 [0.03]		

*Multiply correction factor times gross performance data resulting sensible capacity cannot exceed total capacity.

[] Designates Metric Conversions

[illegible]

NOTE: F - Drive left of the first bold line, G between the bold lines, H-Drive right of second bold line.

	F	G	H
Drive Package			
Motor H.P. [W]	2 [1491.4]	3 [2237.1]	3 [2237.1]
Blower Sheave	AK84H	AK84H	AK84H
Motor Sheave	1VP40	1VP50	1VP56
Belt	A49	A50	A51
Turns Open	0	1	2
RPM	766	989	1067
	720	947	1031
	676	821	821
		863	906
		904	947
		947	989
		1075	1087
		0	1
		5	2
		4	3
		4	4
		5	5

NOTES: 1. Factory sheave settings are shown in bold type.

2. Do not set motor sheave below minimum or maximum turns open shown.
3. Re-adjustment of sheave required to achieve rates airflow at AHRI minimum External Static Pressure.
4. Drive data shown is for vertical airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

Airflow	AIRFLOW CORRECTION FACTORS *				COMPONENT AIRFLOW RESISTANCE				
	Wet Coil	Horizontal Economizer RA Damper Open	Concentric Diffuser RXRN-AEF2000 & Concentric Adapter RXMC-DD01 (Flush)	Concentric Diffuser RXRN-AED2000 & Concentric Adapter RXMC-DD01 (Drop)	Pressure Drop MERV 8	Pressure Drop MERV 13			
CFM [L/s]	Total MBH	Sensible MBH	Power kW	Resistance — Inches of Water [kPa]					
2400 [113]	0.97	0.92	0.99	0.06 [0.01]	0.66 [0.16]	0.53 [0.13]	0.093 [0.02]	0.047 [0.01]	
2500 [1180]	0.97	0.93	0.99	0.06 [0.01]	0.25 [0.06]	0.71 [0.18]	0.098 [0.02]	0.055 [0.01]	
2600 [1227]	0.98	0.95	0.99	0.06 [0.02]	0.28 [0.07]	0.75 [0.19]	0.103 [0.02]	0.062 [0.01]	
2700 [1274]	0.99	0.96	0.99	0.07 [0.02]	0.32 [0.08]	0.80 [0.20]	0.108 [0.03]	0.070 [0.02]	
2800 [1321]	0.99	0.98	1.00	0.07 [0.02]	0.36 [0.09]	0.85 [0.21]	0.113 [0.03]	0.078 [0.02]	
2900 [1368]	1.00	1.00	1.00	0.08 [0.02]	0.39 [0.10]	0.91 [0.23]	0.117 [0.03]	0.085 [0.02]	
3000 [1416]	1.01	1.01	1.00	0.08 [0.02]	0.43 [0.11]	0.96 [0.24]	0.122 [0.03]	0.093 [0.02]	
3100 [1463]	1.01	1.03	1.00	0.09 [0.02]	0.47 [0.12]	1.02 [0.25]	0.127 [0.03]	0.100 [0.02]	
3200 [1510]	1.02	1.04	1.01	0.10 [0.02]	0.51 [0.13]	1.08 [0.27]	0.132 [0.03]	0.108 [0.03]	
3300 [1557]	1.02	1.06	1.01	0.10 [0.03]	0.54 [0.14]	1.15 [0.29]	0.137 [0.03]	0.115 [0.03]	
3400 [1604]	1.03	1.08	1.01	0.11 [0.03]	0.58 [0.14]	1.21 [0.30]	0.142 [0.03]	0.123 [0.03]	
3500 [1652]	1.04	1.09	1.01	0.11 [0.03]	0.62 [0.15]	1.29 [0.32]	0.147 [0.04]	0.131 [0.03]	
3600 [1699]	1.04	1.11	1.02	0.12 [0.03]	0.66 [0.16]	1.36 [0.34]	0.152 [0.04]	0.138 [0.03]	

Multiply correction factor times gross performance data resulting sensible capacity cannot exceed total capacity.

[] Designates Metric Conversions

Appendix C – Air Flow Performance Data (Cont.)

Model (-)HPD2120		Voltage 208/230, 460,575 - 3 phase 60 Hz																																							
Air Flow		External Static Pressure - Inches of Water [Pa]																																							
CFM [L/s]		0.1 [0.2]		0.2 [0.05]		0.3 [0.07]		0.4 [0.10]		0.5 [0.12]		0.6 [0.15]		0.7 [0.17]		0.8 [0.20]		0.9 [0.22]		1.0 [0.25]		1.1 [0.27]		1.2 [0.30]		1.3 [0.32]		1.4 [0.35]		1.5 [0.37]		1.6 [0.40]		1.7 [0.42]		1.8 [0.45]		1.9 [0.47]		2.0 [0.50]	
RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM	RPM	WPM
361	781	589	538	615	567	642	589	669	1023	685	1080	722	1158	748	1230	774	1304	800	1380	825	1459	861	1540	876	1623	902	1705	927	1797	952	1888	977	1981	1001	2077	1026	2175	1050	2275		
3200[1510]	361	589	538	615	567	642	589	669	1023	685	1080	722	1158	748	1230	774	1304	800	1380	825	1459	861	1540	876	1623	902	1705	927	1797	952	1888	977	1981	1001	2077	1026	2175	1050	2275		
3300[1597]	572	836	599	895	625	956	651	1020	678	1086	704	1154	730	1225	755	1298	781	1374	807	1452	832	1533	857	1616	882	1701	907	1789	932	1879	956	1972	981	2067	1005	2164	1029	2264	1053	2366	
3400[1694]	582	894	609	955	635	1018	661	1083	687	1151	712	1222	738	1296	763	1370	788	1446	814	1528	838	1610	863	1695	888	1782	912	1872	937	1964	961	2068	985	2165	1009	2255	1032	2387	1056	2481	
3500[1652]	593	955	619	1018	645	1083	671	1151	696	1221	721	1293	746	1368	771	1445	796	1524	821	1605	845	1691	870	1778	894	1867	918	1958	942	2052	966	2148	989	2248	1013	2349	1036	2453	1059	2559	
3600[1696]	604	1020	630	1085	655	1124	680	1221	705	1293	730	1367	755	1444	779	1523	804	1605	838	1698	862	1775	876	1883	900	1955	924	2048	947	2144	971	2242	994	2343	1017	2446	1040	2550	1063	2660	
3700[1746]	615	1088	640	1155	665	1224	690	1295	715	1369	739	1445	764	1524	788	1605	812	1688	838	1774	860	1862	883	1953	907	2046	930	2141	953	2239	976	2338	999	2442	1022	2547	1046	2652	1067	2765	
3800[1793]	627	1160	651	1228	676	1299	700	1372	725	1448	749	1526	773	1607	797	1690	820	1775	844	1863	867	1953	890	2045	913	2140	936	2238	959	2338	982	2444	1004	2544	1026	2652	1048	2761	1070	2873	
3900[1840]	638	1235	663	1305	687	1378	711	1453	735	1531	758	1611	782	1693	805	1778	829	1885	852	1955	875	2044	898	2141	927	2238	949	2342	965	2439	987	2544	1009	2650	1031	2759	1053	2870	1075	2984	
4000[1893]	652	1395	680	1469	709	1545	732	1625	755	1706	778	1790	801	1875	824	1965	846	2056	869																						

NOTE: F- Drive left of the first bold line, G between the bold lines, H-Drive right of second bold line.

	F	G	H
Drive Package			
Motor H.P. [W]	2 [1491.4]	3 [2237.1]	3 [2237.1]
Blower Sheave	AK79H	AK79H	AK79H
Motor Sheave	1VP50	1VP50	1VP56
Belt	A49	A50	A51
TURNS OPEN	0 1 2	0 1 2 3 4 5	1 2 3 4 5 6
RPM	797 757 715	824 866 908 950 982	1103 1062 1027 991 951 909

NOTES: 1. Factory sheave settings are shown in bold type.

2. Do not set motor sheave below minimum or maximum turns open shown.

3. Re-adjustment of sheave required to achieve rates airflow at AHRU minimum External Static Pressure.

4. Drive data shown is for vertical airflow with drv coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

Airflow	AIRFLOW CORRECTION FACTORS *				COMPONENT AIRFLOW RESISTANCE						Pressure Drop MERV 8	Pressure Drop MERV 13
	CFM [L/s]	Wet Coil			Horizontal Economizer RA Damper Open	Concentric Diffuser RXRN-AEF2000 & Concentric Adapter RXMC-DD01 (Flush)	Concentric Diffuser RXRN-AED2000 & Concentric Adapter RXMC-DD01 (Drop)	Resistance — Inches of Water [kPa]				
		Total MBH	Sensible MBH	Power kW								
3200 [1510]	0.96	0.91	0.98	0.07 [0.02]	0.07 [0.02]	0.74 [0.18]	0.56 [0.14]	0.100 [0.02]	0.058 [0.02]			
3300 [1557]	0.97	0.92	0.99	0.07 [0.02]	0.08 [0.02]	0.79 [0.20]	0.59 [0.15]	0.104 [0.03]	0.065 [0.02]			
3400 [1604]	0.97	0.93	0.99	0.07 [0.02]	0.09 [0.02]	0.84 [0.21]	0.62 [0.15]	0.108 [0.03]	0.071 [0.02]			
3500 [1652]	0.98	0.94	0.99	0.08 [0.02]	0.10 [0.02]	0.90 [0.22]	0.66 [0.16]	0.112 [0.03]	0.077 [0.02]			
3600 [1699]	0.98	0.95	0.99	0.08 [0.02]	0.11 [0.03]	0.95 [0.24]	0.69 [0.17]	0.116 [0.03]	0.083 [0.02]			
3700 [1746]	0.99	0.97	1.00	0.09 [0.02]	0.12 [0.03]	1.00 [0.25]	0.73 [0.18]	0.120 [0.03]	0.089 [0.02]			
3800 [1793]	0.99	0.98	1.00	0.09 [0.02]	0.13 [0.03]	1.04 [0.26]	0.76 [0.19]	0.124 [0.03]	0.095 [0.02]			
3900 [1840]	1.00	0.99	1.00	0.09 [0.02]	0.15 [0.04]	1.09 [0.27]	0.80 [0.20]	0.128 [0.03]	0.102 [0.02]			
4000 [1888]	1.00	1.00	1.01	0.10 [0.02]	0.16 [0.04]	1.13 [0.28]	0.84 [0.21]	0.132 [0.03]	0.108 [0.03]			
4100 [1935]	1.00	1.01	1.01	0.10 [0.03]	0.17 [0.04]	1.19 [0.30]	0.88 [0.22]	0.136 [0.03]	0.114 [0.03]			
4200 [1982]	1.01	1.02	1.01	0.11 [0.03]	0.19 [0.05]	1.24 [0.31]	0.92 [0.23]	0.140 [0.03]	0.120 [0.03]			
4300 [2029]	1.01	1.03	1.01	0.11 [0.03]	0.20 [0.05]	1.31 [0.33]	0.97 [0.24]	0.144 [0.03]	0.126 [0.03]			
4400 [2076]	1.02	1.05	1.02	0.12 [0.03]	0.21 [0.05]	1.37 [0.34]	1.02 [0.25]	0.148 [0.04]	0.132 [0.03]			
4500 [2123]	1.02	1.06	1.02	0.13 [0.03]	0.23 [0.06]	1.43 [0.35]	1.07 [0.27]	0.152 [0.04]	0.138 [0.03]			
4600 [2171]	1.03	1.07	1.02	0.13 [0.03]	0.24 [0.06]	1.48 [0.37]	1.11 [0.28]	0.156 [0.04]	0.145 [0.04]			
4700 [2218]	1.03	1.08	1.03	0.14 [0.03]	0.26 [0.06]	1.54 [0.38]	1.15 [0.29]	0.160 [0.04]	0.151 [0.04]			
4800 [2265]	1.04	1.09	1.03	0.14 [0.03]	0.28 [0.07]	1.59 [0.40]	1.19 [0.30]	0.164 [0.04]	0.157 [0.04]			

*Multiply correction factor times gross performance data resulting sensible capacity cannot exceed total capacity.

T 1 Designates Metric Conversions

Appendix C – Air Flow Performance Data (Cont.)

AIRFLOW PERFORMANCE -- 10 TON [35.1 KW] -- 60Hz -- SIDEFLOW

Model (-)HPD2120		Voltage 208/230, 460,575 - 3 phase 60 Hz																																									
Air Flow CFM [L/s]		External Static Pressure - Inches of Water [kPa]																																									
		0.1 [0.02]		0.2 [0.05]		0.3 [0.07]		0.4 [0.10]		0.5 [0.12]		0.6 [0.15]		0.7 [0.17]		0.8 [0.20]		0.9 [0.22]		1.0 [0.25]		1.1 [0.27]		1.2 [0.30]		1.3 [0.32]		1.4 [0.35]		1.5 [0.37]		1.6 [0.40]		1.7 [0.42]		1.8 [0.45]		1.9 [0.47]		2.0 [0.50]			
RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
3200 [1510]	539	711	568	774	397	838	625	904	653	973	681	1043	709	1115	736	1189	763	1265	790	1343	816	1422	842	1504	868	1587	893	1673	918	1760	943	1849	968	1941	992	2034	1016	2129	1040	2226			
3300 [1557]	549	761	578	826	406	882	634	960	662	1031	689	1103	717	1177	745	1253	770	1331	798	1410	822	1492	848	1576	873	1661	898	1748	923	1838	947	1939	972	2022	995	2117	1019	2214	1042	2313			
3400 [1604]	560	785	588	882	416	904	644	1020	671	1092	698	1166	725	1242	751	1320	777	1400	803	1482	829	1565	854	1651	879	1738	904	1828	928	1919	952	2012	976	2107	999	2204	1022	2303	1045	2404			
3500 [1652]	571	823	598	941	426	1011	653	1084	680	1158	707	1234	733	1312	759	1392	785	1473	810	1557	836	1643	860	1730	885	1819	909	1911	933	2004	957	2099	980	2196	1003	2295	1026	2386	1048	2499			
3600 [1699]	582	934	609	1004	436	1076	663	1151	690	1227	716	1305	742	1385	767	1465	793	1550	818	1636	842	1723	867	1813	891	1904	915	1987	938	2093	962	2190	984	2289	1007	2390	1029	2492	1051	2597			
3700 [1748]	593	999	620	1071	447	1145	673	1221	699	1299	725	1379	751	1461	781	1545	801	1631	825	1718	850	1806	874	1899	897	1992	921	2088	944	2165	967	2284	989	2385	1011	2468	1033	2592	1055	2699			
3800 [1793]	604	1067	631	1141	457	1218	685	1286	709	1376	734	1458	760	1541	784	1627	806	1715	833	1804	857	1896	881	1989	904	2084	927	2182	950	2261	972	2382	994	2485	1016	2589	1037	2686	1058	2805			
3900 [1840]	616	1139	642	1216	468	1294	694	1374	719	1456	744	1540	769	1625	788	1713	817	1803	841	1894	865	1988	888	2093	911	2180	933	2279	955	2380	977	2483	999	2588	1020	2695	1041	2804	1062	2914			
4000 [1888]	628	1215	654	1293	479	1373	704	1455	729	1539	754	1625	778	1713	802	1803	826	1894	849	1988	872	2093	895	2180	917	2279	940	2381	962	2484	983	2588	1004	2695	1025	2804	1046	2915	1066	3027			
4100 [1933]	640	1295	665	1375	490	1457	715	1541	740	1627	764	1714	788	1804	811	1896	835	1989	858	2085	880	2182	903	2281	925	2382	946	2496	968	2590	989	2697	1010	2806	1030	2917	1051	3029	1070	3144			
4200 [1982]	652	1379	677	1460	502	1544	726	1630	750	1718	774	1807	798	1899	821	1993	844	2098	866	2186	888	2285	910	2386	932	2488	953	2604	974	2701	995	2810	1015	2921	1036	3033	1055	3148	1075	3264			
4300 [2028]	665	1465	689	1549	513	1635	737	1723	761	1812	784	1904	807	1998	830	2093	853	2191	875	2290	897	2391	918	2494	939	2599	960	2706	981	2815	1001	2926	1021	3039	1041	3153	1060	3270	1080	3388			
4400 [2076]	677	1555	701	1641	525	1729	748	1819	772	1911	795	2004	818	2108	840	2197	862	2297	884	2398	905	2501	926	2606	947	2713	968	2822	988	2933	1008	3046	1027	3161	1047	3277	1066	3396	1084	3516			
4500 [2123]	690	1649	714	1737	537	1827	760	1919	783	2013	806	2108	828	2206	850	2305	872	2407	893	2510	914	2615	935	2722	955	2831	975	2942	995	3055	1014	3170	1034	3286	1053	3405	1071	3525	1089	3647			
4600 [2171]	703	1747	727	1837	550	1929	772	2023	795	2118	817	2216	839	2315	860	2417	881	2520	902	2625	923	2732	943	2841	963	2952	983	3065	1002	3180	1021	3297	1040	3415	1059	3536	1077	3658	—	—			
4700 [2218]	716	1849	739	1940	562	2034	784	2130	806	2228	828	2327	849	2429	871	2532	891	2637	912	2744	932	2853	952	2964	971	3077	991	3192	1010	3309	1028	3428	1047	3548	1065	3671	1083	3795	—	—			
4800 [2265]	730	1964	752	2048	575	2143	796	2241	818	2341	839	2442	860	2545	881	2651	901	2758	922	2867	941	2978	961	3091	980	3206	999	3323	1017	3441	1036	3562	1054	3685	1071	3809	1089	3935	—	—			

NOTE: F- Drive left of the first bold line, G between the bold lines, H- Drive right of second bold line.

F

G

H

Drive Package	2 [1491.4]				3 [2237.1]				3 [2237.1]			
Motor H.P. [W]	AK79H				AK79H				AK79H			
Blower Sleeve	1VP50				1VP50				1VP50			
Motor Shave	A49				A50				A51			
Ball	0				1				2			
Turns Open	798				757				716			
RPM	798				757				716			
	0				1				2			
	3				4				5			
	676				633				590			
	716				633				590			
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NOTE: F - Drive left of the first bold line, G between the bold lines, H-Drive right of second bold line.

Drive Package		F					G					H						
Motor H.P. [W]		2 [1491.4]					3 [2237.1]					3 [2237.1]						
Blower Sheave		AK79H					AK79H					AK79H						
Motor Sheave		1VP40					1VP50					1VP56						
Belt		A49					A50					A51						
Turns Open	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
RPM	798	757	716	676	633	590	1026	988	948	907	866	824	1093	1062	1026	988	950	908

NOTES: 1. Factory sheave settings are shown in bold type.

2. Do not set motor sheave below minimum or maximum turns open shown.

3. Re-adjustment of sheave required to achieve rates airflow at AHRI minimum External Static Pressure.

4. Drive data shown is for vertical airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

Airflow	AIRFLOW CORRECTION FACTORS *				COMPONENT AIRFLOW RESISTANCE					Pressure Drop MERV 8	Pressure Drop MERV 13
	CFM [L/s]	Total MBH	Sensible MBH	Power kW	Wet Coil	Horizontal Economizer RA Damper Open	Concentric Diffuser RXRN-AEF2000 & Concentric Adapter RXMC-DD01 (Flush)	Concentric Diffuser RXRN-AED2000 & Concentric Adapter RXMC-DD01 (Drop)			
					Resistance — Inches of Water [kPa]						
	3200 [1510]	0.96	0.91	0.98	0.07 [0.02]	0.31 [0.08]	0.74 [0.18]	0.56 [0.14]		0.100 [0.02]	0.058 [0.02]
	3300 [1557]	0.97	0.92	0.99	0.07 [0.02]	0.36 [0.09]	0.79 [0.20]	0.59 [0.15]		0.104 [0.03]	0.065 [0.02]
	3400 [1604]	0.97	0.93	0.99	0.07 [0.02]	0.42 [0.10]	0.84 [0.21]	0.62 [0.15]		0.108 [0.03]	0.071 [0.02]
	3500 [1652]	0.98	0.94	0.99	0.08 [0.02]	0.47 [0.12]	0.90 [0.22]	0.66 [0.16]		0.112 [0.03]	0.077 [0.02]
	3600 [1699]	0.98	0.95	0.99	0.08 [0.02]	0.52 [0.13]	0.95 [0.24]	0.69 [0.17]		0.116 [0.03]	0.083 [0.02]
	3700 [1746]	0.99	0.97	1.00	0.09 [0.02]	0.58 [0.14]	1.00 [0.25]	0.73 [0.18]		0.120 [0.03]	0.089 [0.02]
	3800 [1793]	0.99	0.98	1.00	0.09 [0.02]	0.63 [0.16]	1.04 [0.26]	0.76 [0.19]		0.124 [0.03]	0.095 [0.02]
	3900 [1840]	1.00	0.99	1.00	0.09 [0.02]	0.68 [0.17]	1.09 [0.27]	0.80 [0.20]		0.128 [0.03]	0.102 [0.02]
	4000 [1888]	1.00	1.00	1.01	0.10 [0.02]	0.73 [0.18]	1.13 [0.28]	0.84 [0.21]		0.132 [0.03]	0.108 [0.03]
	4100 [1935]	1.00	1.01	1.01	0.10 [0.03]	0.78 [0.19]	1.19 [0.30]	0.88 [0.22]		0.136 [0.03]	0.114 [0.03]
	4200 [1982]	1.01	1.02	1.01	0.11 [0.03]	0.83 [0.21]	1.24 [0.31]	0.92 [0.23]		0.140 [0.03]	0.120 [0.03]
	4300 [2029]	1.01	1.03	1.01	0.11 [0.03]	0.88 [0.22]	1.31 [0.33]	0.97 [0.24]		0.144 [0.03]	0.126 [0.03]
	4400 [2076]	1.02	1.05	1.02	0.12 [0.03]	0.93 [0.23]	1.37 [0.34]	1.02 [0.25]		0.148 [0.04]	0.132 [0.03]
	4500 [2123]	1.02	1.06	1.02	0.13 [0.03]	0.98 [0.24]	1.43 [0.35]	1.07 [0.27]		0.152 [0.04]	0.138 [0.03]
	4600 [2171]	1.03	1.07	1.02	0.13 [0.03]	1.03 [0.26]	1.48 [0.37]	1.11 [0.28]		0.156 [0.04]	0.145 [0.04]
	4700 [2218]	1.03	1.08	1.03	0.14 [0.03]	1.07 [0.27]	1.54 [0.38]	1.15 [0.29]		0.160 [0.04]	0.151 [0.04]
	4800 [2265]	1.04	1.09	1.03	0.14 [0.04]	1.12 [0.28]	1.59 [0.40]	1.19 [0.30]		0.164 [0.04]	0.157 [0.04]

P. APPENDICES

Appendix D – Performance Data for (-)HPDYB 7.5 Ton

COOLING PERFORMANCE DATA -- (-)HPDYB090A

ENTERING INDOOR AIR @80°F [26.7°C] dbE (1)											
wB/E		71°F [21.7°C]		67°F [19.4°C]		63°F [17.2°C]					
CFM [L/s]		3600 [1699]	3300 [1557]	2400 [1133]	3600 [1699]	3300 [1557]	2400 [1430]	3600 [1699]	3300 [1557]	2400 [1133]	
DR		.05	.09	.12	.05	.09	.12	.05	.09	.12	
75°F [23.9°C]	Total kBtu/h [kW]	103.7 [30.4]	102 [29.9]	96.9 [28.4]	99.9 [29.3]	98.3 [28.8]	93.4 [27.4]	95.1 [27.9]	93.6 [27.4]	88.9 [26.1]	
	Sens kBtu/h [kW]	61.1 [17.9]	58.6 [17.2]	51.2 [15]	74.9 [22]	71.9 [21.1]	62.7 [18.4]	82.1 [24.1]	78.7 [23.1]	68.7 [20.1]	
	Power	6.9	6.8	6.7	6.7	6.7	6.5	6.6	6.5	6.4	
80°F [26.7°C]	Total kBtu/h [kW]	102 [29.9]	100.3 [29.4]	95.4 [28]	98.2 [28.8]	96.6 [28.3]	91.8 [26.9]	93.4 [27.4]	91.9 [26.9]	87.4 [25.6]	
	Sens kBtu/h [kW]	61.1 [17.9]	58.6 [17.2]	51.1 [15]	74.9 [22]	71.8 [21]	62.7 [18.4]	82 [24]	78.7 [23.1]	68.7 [20.1]	
	Power	7.2	7.1	7	7	7	6.8	6.9	6.8	6.7	
85°F [29.4°C]	Total kBtu/h [kW]	100 [29.3]	98.4 [28.8]	93.5 [27.4]	96.3 [28.2]	94.7 [27.8]	90 [26.4]	91.5 [26.8]	90 [26.4]	85.6 [25.1]	
	Sens kBtu/h [kW]	60.7 [17.8]	58.2 [17.1]	50.8 [14.9]	74.5 [21.8]	71.5 [21]	62.4 [18.3]	81.6 [23.9]	78.3 [22.9]	68.3 [20]	
	Power	7.5	7.4	7.3	7.3	7.3	7.1	7.2	7.2	7	
90°F [32.2°C]	Total kBtu/h [kW]	97.8 [28.7]	96.3 [28.2]	91.5 [26.8]	94.1 [27.6]	92.6 [27.1]	88 [25.8]	89.3 [26.2]	87.9 [25.8]	83.5 [24.5]	
	Sens kBtu/h [kW]	60 [17.6]	57.5 [16.9]	50.2 [14.7]	73.8 [21.6]	70.8 [20.8]	61.8 [18.1]	80.9 [23.7]	77.6 [22.7]	67.7 [19.8]	
	Power	7.8	7.8	7.6	7.6	7.6	7.4	7.5	7.5	7.3	
95°F [35.0°C]	Total kBtu/h [kW]	95.4 [28]	93.8 [27.5]	89.2 [26.1]	91.6 [26.8]	90.1 [26.4]	85.7 [25.1]	86.8 [25.4]	85.4 [25]	81.2 [23.8]	
	Sens kBtu/h [kW]	58.9 [17.3]	56.5 [16.6]	49.3 [14.4]	72.7 [21.3]	69.8 [20.5]	60.9 [17.8]	79.9 [23.4]	76.6 [22.5]	66.9 [19.6]	
	Power	8.1	8.1	7.9	8	7.9	7.7	7.8	7.8	7.6	
100°F [37.8°C]	Total kBtu/h [kW]	92.7 [27.2]	91.1 [26.7]	86.6 [25.4]	88.9 [26.1]	87.4 [25.6]	83.1 [24.4]	84.1 [24.6]	82.7 [24.2]	78.6 [23]	
	Sens kBtu/h [kW]	57.6 [16.9]	55.2 [16.2]	48.2 [14.1]	71.4 [20.9]	68.5 [20.1]	59.8 [17.5]	78.5 [23]	75.3 [22.1]	65.7 [19.3]	
	Power	8.4	8.4	8.2	8.3	8.2	8	8.1	8.1	7.9	
105°F [40.6°C]	Total kBtu/h [kW]	89.7 [26.3]	88.2 [25.8]	83.8 [24.6]	85.9 [25.2]	84.5 [24.8]	80.3 [23.5]	81.1 [23.8]	79.8 [23.4]	75.8 [22.2]	
	Sens kBtu/h [kW]	55.9 [16.4]	53.6 [15.7]	46.8 [13.7]	69.7 [20.4]	66.8 [19.6]	58.3 [17.1]	76.8 [22.5]	73.7 [21.6]	64.3 [18.8]	
	Power	8.7	8.7	8.5	8.6	8.5	8.3	8.5	8.4	8.2	
110°F [43.3°C]	Total kBtu/h [kW]	86.4 [25.3]	85 [24.9]	80.8 [23.7]	82.6 [24.2]	81.3 [23.8]	77.3 [22.7]	77.9 [22.8]	76.6 [22.5]	72.8 [21.3]	
	Sens kBtu/h [kW]	53.9 [15.8]	51.7 [15.2]	45.1 [13.2]	67.7 [19.8]	64.9 [19]	56.6 [16.6]	74.8 [21.9]	71.8 [21]	62.6 [18.3]	
	Power	9.1	9	8.8	8.9	8.8	8.6	8.8	8.7	8.5	
115°F [46.1°C]	Total kBtu/h [kW]	82.9 [24.3]	81.5 [23.9]	77.5 [22.7]	79.1 [23.2]	77.8 [22.8]	74 [21.7]	74.3 [21.8]	73.1 [21.4]	69.5 [20.4]	
	Sens kBtu/h [kW]	51.5 [15.1]	49.4 [14.5]	43.1 [12.6]	65.3 [19.1]	62.7 [18.4]	54.7 [16]	72.5 [21.2]	69.5 [20.4]	60.7 [17.8]	
	Power	9.4	9.3	9.1	9.2	9.1	8.9	9.1	9	8.8	
120°F [48.9°C]	Total kBtu/h [kW]	79.1 [23.2]	77.8 [22.8]	74 [21.7]	75.3 [22.1]	74.1 [21.7]	70.4 [20.6]	70.6 [20.7]	69.4 [20.3]	66 [19.3]	
	Sens kBtu/h [kW]	48.8 [14.3]	46.9 [13.7]	40.9 [12]	62.6 [18.3]	60.1 [17.6]	52.4 [15.4]	69.8 [20.5]	66.9 [19.6]	58.4 [17.1]	
	Power	9.7	9.6	9.4	9.5	9.4	9.2	9.4	9.3	9.1	
125°F [51.7°C]	Total kBtu/h [kW]	75 [22]	73.8 [21.6]	70.2 [20.6]	71.3 [20.9]	70.1 [20.5]	66.6 [19.5]	66.5 [19.5]	65.4 [19.2]	62.2 [18.2]	
	Sens kBtu/h [kW]	45.8 [13.4]	44 [12.9]	38.4 [11.3]	59.6 [17.5]	57.2 [16.8]	49.9 [14.6]	66.5 [19.5]	64.1 [18.8]	55.9 [16.4]	
	Power	9	9.9	9.7	9.8	9.7	9.5	9.7	9.6	9.4	

Outdoor Dry Bulb Temperature °F [°C]

DR —Depression ratio Total —Total capacity x 1000 Btu/h NOTES:

dbE —Entering air dry bulb Sens —Sensible capacity x 1000 Btu/h. When the entering air dry bulb is other than 80°F [27°C], adjust the sensible wB/E—Entering air wet bulb Power—kW input capacity from the table by adding [1.10 x CFM x (1 – DR) x (dbE – 80)].

Appendix D – Performance Data for (-)HPDYB 7.5 Ton

HEATING PERFORMANCE DATA -- (-)HPDYB090A

wBtE		60°F [15.5 °C]			70°F [21.1 °C]			80°F [26.7 °C]		
CFM [L/s]		3600 [1699]	3300 [1557]	2400 [1133]	3600 [1699]	3300 [1557]	2400 [1133]	3600 [1699]	3300 [1557]	2400 [1133]
0°F [-17.8 °C]	Total kBtu/h [kW] Power	32.1 [9.4] 6	31.9 [9.3] 6.1	31.2 [9.1] 6.3	30.6 [9] 6.3	30.4 [8.9] 6.4	29.8 [8.7] 6.6	29.2 [8.6] 7.2	29 [8.5] 7.3	28.4 [8.3] 7.6
5°F [-15.0 °C]	Total kBtu/h [kW] Power	37.9 [11.1] 6	37.6 [11] 6.1	36.9 [10.8] 6.3	36.4 [10.7] 6.4	36.2 [10.6] 6.4	35.5 [10.4] 6.7	35 [10.3] 7.3	34.8 [10.2] 7.4	34.8 [10.2] 7.4
10°F [-12.2 °C]	Total kBtu/h [kW] Power	43.7 [12.8] 6.1	43.4 [12.7] 6.2	42.5 [12.5] 6.4	42.2 [12.4] 6.4	42 [12.3] 6.5	41.1 [12] 6.7	40.8 [12] 7.3	40.5 [11.9] 7.4	39.7 [11.6] 7.7
15°F [-9.4 °C]	Total kBtu/h [kW] Power	49.5 [14.5] 6.1	49.2 [14.4] 6.2	48.2 [14.1] 6.4	48 [14.1] 6.5	47.7 [14] 6.5	46.8 [13.7] 6.8	46.6 [13.7] 7.4	46.3 [13.6] 7.5	45.4 [13.3] 7.7
20°F [-6.7 °C]	Total kBtu/h [kW] Power	55.3 [16.2] 6.2	54.9 [16.1] 6.3	53.8 [15.8] 6.5	53.8 [15.8] 6.5	53.5 [15.7] 6.6	52.4 [15.4] 6.8	52.4 [15.4] 7.4	52 [15.2] 7.5	51 [14.9] 7.8
25°F [-3.9 °C]	Total kBtu/h [kW] Power	61.1 [17.9] 6.2	60.7 [17.8] 6.3	59.5 [17.4] 6.5	59.6 [17.5] 6.6	59.2 [17.4] 6.6	58.1 [17] 6.9	58.2 [17.1] 7.5	57.8 [16.9] 7.6	56.7 [16.6] 7.8
30°F [-1.1 °C]	Total kBtu/h [kW] Power	66.9 [19.6] 6.3	66.4 [19.5] 6.4	65.1 [19.1] 6.6	65.4 [19.2] 6.6	65 [19.1] 6.7	63.7 [18.7] 6.9	64 [18.8] 7.5	63.6 [18.6] 7.6	62.3 [18.3] 7.9
35°F [1.7 °C]	Total kBtu/h [kW] Power	72.7 [21.3] 6.3	72.2 [21.2] 6.4	70.8 [20.8] 6.6	71.2 [20.9] 6.7	70.8 [20.8] 6.7	69.4 [20.3] 7	69.8 [20.5] 7.6	69.3 [20.3] 7.7	68 [19.9] 7.9
40°F [4.4 °C]	Total kBtu/h [kW] Power	78.5 [23] 6.4	78 [22.9] 6.5	76.4 [22.4] 6.7	77 [22.6] 6.7	76.5 [22.4] 6.8	75 [22] 7	75.6 [22.2] 7.6	75.1 [22] 7.7	73.6 [21.6] 8
45°F [7.2 °C]	Total kBtu/h [kW] Power	84.3 [24.7] 6.4	83.7 [24.5] 6.5	82.1 [24.1] 6.7	82.8 [24.3] 6.8	82.3 [24.1] 6.8	80.7 [23.7] 7.1	81.4 [23.9] 7.7	80.9 [23.7] 7.8	79.3 [23.2] 8
50°F [10.0 °C]	Total kBtu/h [kW] Power	90.1 [26.4] 6.5	89.5 [26.2] 6.6	87.7 [25.7] 6.8	88.6 [26] 6.8	88.1 [25.8] 6.9	86.3 [25.3] 7.1	87.2 [25.6] 7.7	86.6 [25.4] 7.8	84.9 [24.9] 8.1

Outdoor Dry Bulb Temperature

IDB- Indoor Air Dry Bulb

[] Designates Metric Conversions

P. APPENDICES

Appendix D – Performance Data for (-)HPDYB 10 Ton

COOLING PERFORMANCE DATA -- (-)HPDYB120A

ENTERING INDOOR AIR @80°F [26.7°C] dbE (1)											
wbE		71°F [21.7 °C]			67°F [19.4 °C]			63°F [17.2°C]			
CFM [L/s]		4800 [2265]	3950 [1864]	3200 [1510]	4800 [2265]	3950 [1864]	3200 [1510]	4800 [2265]	3950 [1864]	3200 [1510]	
DR		.05	.09	.12	.05	.09	.12	.05	.09	.12	
75°F [23.9°C]	Total kBTu/h [kW]	145.2 [42.6]	139.7 [40.9]	134.9 [39.5]	136.5 [40]	131.4 [38.5]	126.8 [37.2]	127.9 [37.5]	123.1 [36.1]	118.8 [34.8]	
	Sens kBTu/h [kW] Power	90.5 [26.5] 9.1	82.3 [24.1] 8.9	75 [22] 8.8	98 [28.7] 9.1	89.1 [26.1] 8.9	81.2 [23.8] 8.8	105.6 [30.9] 9	95.9 [28.1] 8.8	87.4 [25.6] 8.7	
80°F [26.7°C]	Total kBTu/h [kW]	142.6 [41.8]	137.2 [40.2]	132.5 [38.8]	133.9 [39.2]	128.9 [37.8]	124.4 [36.5]	125.3 [36.7]	120.6 [35.3]	116.4 [34.1]	
	Sens kBTu/h [kW] Power	90.5 [26.5] 9.6	82.2 [24.1] 9.4	74.9 [22] 9.2	97.9 [28.7] 9.6	89 [26.1] 9.4	81.1 [23.8] 9.2	105.5 [30.9] 9.5	95.9 [28.1] 9.3	87.4 [25.6] 9.2	
85°F [29.4°C]	Total kBTu/h [kW]	139.7 [40.9]	134.4 [39.4]	129.8 [38]	130.9 [38.4]	126 [36.9]	121.7 [35.7]	122.3 [35.8]	117.7 [34.5]	113.7 [33.3]	
	Sens kBTu/h [kW] Power	90 [26.4] 10.1	81.8 [24] 9.9	74.6 [21.9] 9.7	97.5 [28.6] 10	88.6 [26] 9.9	80.8 [23.7] 9.7	105.1 [30.8] 10	95.5 [28] 9.8	87 [25.5] 9.6	
90°F [32.2°C]	Total kBTu/h [kW]	136.3 [39.9]	131.2 [38.5]	126.7 [37.1]	127.6 [37.4]	122.8 [36]	118.6 [34.8]	119 [34.9]	114.5 [33.6]	110.6 [32.4]	
	Sens kBTu/h [kW] Power	89.2 [26.1] 10.6	81.1 [23.8] 10.4	73.9 [21.7] 10.2	96.7 [28.3] 10.5	87.9 [25.8] 10.3	80.1 [23.5] 10.2	104.3 [30.6] 10.5	94.7 [27.8] 10.3	86.3 [25.3] 10.1	
95°F [35.0°C]	Total kBTu/h [kW]	132.6 [38.9]	127.6 [37.4]	123.2 [36.1]	123.9 [36.3]	119.3 [35]	115.1 [33.7]	115.3 [33.8]	111 [32.5]	107.1 [31.4]	
	Sens kBTu/h [kW] Power	88 [25.8] 11	80 [23.4] 10.8	72.9 [21.4] 10.7	95.5 [28] 11	86.8 [25.4] 10.8	79.1 [23.2] 10.6	103.1 [30.2] 11	93.6 [27.4] 10.8	85.3 [25] 10.6	
100°F [37.8°C]	Total kBTu/h [kW]	128.6 [37.7]	123.7 [36.3]	119.5 [35]	119.9 [35.1]	115.4 [33.8]	111.4 [32.6]	111.3 [32.6]	107.1 [31.4]	103.4 [30.3]	
	Sens kBTu/h [kW] Power	86.4 [25.3] 11.5	78.5 [23] 11.3	71.6 [21] 11.1	93.9 [27.5] 11.5	85.3 [25] 11.3	77.8 [22.8] 11.1	101.5 [29.7] 11.4	92.2 [27] 11.2	84 [24.6] 11	
105°F [40.6°C]	Total kBTu/h [kW]	124.2 [36.4]	119.5 [35]	115.4 [33.8]	115.5 [33.9]	111.1 [32.6]	107.3 [31.4]	106.9 [31.3]	102.8 [30.1]	99.3 [29.1]	
	Sens kBTu/h [kW] Power	84.4 [24.7] 12	76.7 [22.5] 11.8	69.9 [20.5] 11.6	91.9 [26.9] 12	83.5 [24.5] 11.8	76.1 [22.3] 11.6	99.5 [29.2] 11.9	90.4 [26.5] 11.7	82.4 [24.2] 11.5	
110°F [43.3°C]	Total kBTu/h [kW]	119.4 [35]	114.9 [33.7]	110.9 [32.5]	110.7 [32.4]	106.5 [31.2]	102.8 [30.1]	102.1 [29.9]	98.2 [28.8]	94.8 [27.8]	
	Sens kBTu/h [kW] Power	82.1 [24.1] 12.5	74.6 [21.9] 12.3	68 [19.9] 12.1	89.5 [26.2] 12.5	81.4 [23.9] 12.3	74.2 [21.7] 12.1	97.1 [28.5] 12.4	88.3 [25.9] 12.2	80.4 [23.6] 12	
115°F [46.1°C]	Total kBTu/h [kW]	114.3 [33.5]	110 [32.2]	106.2 [31.1]	105.5 [30.9]	101.6 [29.8]	98.1 [28.8]	96.9 [28.4]	93.3 [27.3]	90.1 [26.4]	
	Sens kBTu/h [kW] Power	79.3 [23.2] 13	72.1 [21.1] 12.8	65.7 [19.3] 12.5	86.8 [25.4] 13	78.9 [23.1] 12.7	71.9 [21.1] 12.5	94.4 [27.7] 12.9	85.8 [25.1] 12.7	78.2 [22.9] 12.5	
120°F [48.9°C]	Total kBTu/h [kW]	108.8 [31.9]	104.7 [30.7]	101.1 [29.6]	100 [29.3]	96.3 [28.2]	93 [27.3]	91.4 [26.8]	88 [25.8]	85 [24.9]	
	Sens kBTu/h [kW] Power	76.2 [22.3] 13.5	69.3 [20.3] 13.2	63.1 [18.5] 13	83.7 [24.5] 13.5	76 [22.3] 13.2	69.3 [20.3] 13	91.3 [26.8] 13.4	82.9 [24.3] 13.1	75.6 [22.2] 12.9	
125°F [51.7°C]	Total kBTu/h [kW]	102.9 [30.2]	99 [29]	95.6 [28]	94.2 [27.6]	90.6 [26.6]	87.5 [25.6]	85.6 [25.1]	82.4 [24.2]	79.5 [23.3]	
	Sens kBTu/h [kW] Power	72.7 [21.3] 14	66.1 [19.4] 13.7	60.2 [17.6] 13.5	80.2 [23.5] 14	72.8 [21.3] 13.7	66.4 [19.5] 13.5	85.6 [25.1] 13.9	79.7 [23.4] 13.6	72.7 [21.3] 13.4	
Outdoor Dry Bulb Temperature °F [°C]											

Outdoor Dry Bulb Temperature °F [°C]

DR —Depression ratio Total —Total capacity x 1000 Btu/h NOTES:
dbE —Entering air dry bulb Sens —Sensible capacity x 1000 Btu/h. When the entering air dry bulb is other than 80°F [27°C], adjust the sensible
wbE—Entering air wet bulb Power—kW input capacity from the table by adding [1.10 x CFM x (1 – DR) x (dbE – 80)].

Appendix D – Performance Data for (-)HPDYB 10 Ton

HEATING PERFORMANCE DATA -- (-)HPDYB120A

wBE CFM [L/s]		60°F [15.5 °C]			70°F [21.1 °C]			80°F [26.7 °C]		
		4800 [2265]	3950 [1864]	3200 [1510]	4800 [2265]	3950 [1864]	3200 [1510]	4800 [2265]	3950 [1864]	3200 [1510]
0°F [-17.8 °C]	Total kBtu/h [kW] Power	43.9 [12.9] 6.3	43.3 [12.7] 6.5	42.7 [12.5] 6.7	41.8 [12.3] 7.1	41.2 [12.1] 7.3	40.6 [11.9] 7.5	39.7 [11.6] 7.8	39.1 [11.5] 8	38.6 [11.3] 8.2
5°F [-15.0 °C]	Total kBtu/h [kW] Power	51.9 [15.2] 6.5	51.1 [15] 6.7	50.4 [14.8] 6.9	49.7 [14.6] 7.3	49 [14.4] 7.5	48.3 [14.2] 7.7	47.6 [14] 8	46.9 [13.7] 8.2	46.3 [13.6] 8.4
10°F [-12.2 °C]	Total kBtu/h [kW] Power	59.8 [17.5] 6.7	58.9 [17.3] 6.9	58.1 [17] 7.1	57.7 [16.9] 7.5	56.8 [16.6] 7.7	56 [16.4] 7.9	55.6 [16.3] 8.2	54.7 [16] 8.4	54 [15.8] 8.6
15°F [-9.4 °C]	Total kBtu/h [kW] Power	67.7 [19.8] 6.9	66.7 [19.5] 7.1	65.8 [19.3] 7.3	65.6 [19.2] 7.7	64.6 [18.9] 7.9	63.7 [18.7] 8.1	63.5 [18.6] 8.3	62.5 [18.3] 8.6	61.7 [18.1] 8.8
20°F [-6.7 °C]	Total kBtu/h [kW] Power	75.7 [22.2] 7.1	74.5 [21.8] 7.3	73.5 [21.5] 7.5	73.5 [21.5] 7.8	72.4 [21.2] 8.1	71.4 [20.9] 8.2	71.4 [20.9] 8.5	70.3 [20.6] 8.8	69.4 [20.3] 9
25°F [-3.9 °C]	Total kBtu/h [kW] Power	83.6 [24.5] 7.3	82.3 [24.1] 7.5	81.2 [23.8] 7.7	81.5 [23.9] 8	80.2 [23.5] 8.2	79.2 [23.2] 8.4	79.4 [23.3] 8.7	78.2 [22.9] 9	77.1 [22.6] 9.2
30°F [-1.1 °C]	Total kBtu/h [kW] Power	91.5 [26.8] 7.5	90.1 [26.4] 7.7	88.9 [26.1] 7.9	89.4 [26.2] 8.2	88.1 [25.8] 8.4	86.9 [25.5] 8.6	87.3 [25.6] 8.9	86 [25.2] 9.2	84.8 [24.9] 9.4
35°F [1.7 °C]	Total kBtu/h [kW] Power	99.5 [29.2] 7.6	98 [28.7] 7.9	96.8 [28.3] 8	97.3 [28.5] 8.4	95.9 [28.1] 8.6	94.6 [27.7] 8.8	95.2 [27.9] 9.1	93.8 [27.5] 9.3	92.5 [27.1] 9.6
40°F [4.4 °C]	Total kBtu/h [kW] Power	107.4 [31.5] 7.8	105.8 [31] 8.1	104.3 [30.6] 8.2	105.3 [30.9] 8.6	103.7 [30.4] 8.8	102.3 [30] 9	103.2 [30.2] 9.3	101.6 [29.8] 9.5	100.2 [29.4] 9.8
45°F [7.2 °C]	Total kBtu/h [kW] Power	115.3 [33.8] 8	113.6 [33.3] 8.2	112 [32.8] 8.4	113.2 [33.2] 8.8	111.5 [32.7] 9	110 [32.2] 9.2	111.1 [32.6] 9.5	109.4 [32.1] 9.7	107.9 [31.6] 10
50°F [10.0 °C]	Total kBtu/h [kW] Power	123.3 [36.1] 8.2	121.4 [35.6] 8.4	119.7 [35.1] 8.6	121.1 [35.5] 9	119.3 [35] 9.2	117.7 [34.5] 9.4	119 [34.9] 9.7	117.2 [34.3] 9.9	115.6 [33.9] 10.2

Outdoor Dry Bulb Temperature

P. APPENDICES

Appendix E – Heater Kit Characteristics

208/230V, THREE PHASE, 60 Hz, AUXILIARY ELECTRIC HEATER KIT CHARACTERISTICS AND APPLICATION													
Single Power Supply for Both Unit and Heater Kit								Separate Power Supply for Both Unit and Heater Kit					
UNIT MODEL NUMBER	Heater Kit			Heat Pump				Heater Kit		Heat Pump			
	MODEL NO. RXJJ-	Rated Heater kW @208/230V	Heater Kit FLA	UNIT MIN. CKT. AMPACITY @208/230V	UNIT MIN. CKT. AMPACITY @208/230V W/ POWERED EXHAUST	MAX FUSE OR CKT. BKR. SIZE	MAX FUSE OR CKT. BKR. SIZE W/ POWERED EXHAUST	HEATER KIT MIN. CKT. AMPACITY	MAX FUSE SIZE OR CKT. BKR. SIZE	MIN. CIRCUIT AMPACITY	MIN. CIRCUIT AMPACITY W/ POWERED EXHAUST	AIR COND. MAX. FUSE OR CKT. BKR. SIZE	AIR COND. MAX. FUSE OR CKT. BKR. SIZE W/ POWERED EXHAUST
(-)HPDYB090ACF	NONE	—	—	43/43	48/48	60/60	70/70	—	—	43/43	48/48	60/60	70/70
	DD10CP	7.4/9.9	20.6/23.8	69/73	74/78	80/90	90/90	26/30	30/30	43/43	48/48	60/60	70/70
	DD15CP	10.8/14.4	30.0/34.6	80/86	86/92	90/100	100/100	38/44	40/45	43/43	48/48	60/60	70/70
	DD20CP	14.8/19.8	41.2/47.6	94/102	100/108	100/110	110/110	52/60	60/60	43/43	48/48	60/60	70/70
	DD30CP	21.6/28.8	60.0/69.3	118/130	123/135	125/150	125/150	75/87	80/90	43/43	48/48	60/60	70/70
	DD40CP	29.7/39.6	82.4/95.2	146/162	151/167	150/175	175/175	103/119	110/125	43/43	48/48	60/60	70/70
(-)HPDYB090ACG	NONE	—	—	46/46	51/51	70/70	70/70	—	—	46/46	51/51	70/70	70/70
	DD10CP	7.4/9.9	20.6/23.8	72/76	77/81	90/90	90/90	26/30	30/30	46/46	51/51	70/70	70/70
	DD15CP	10.8/14.4	30.0/34.6	83/89	89/95	100/100	100/110	38/44	40/45	46/46	51/51	70/70	70/70
	DD20CP	14.8/19.8	41.2/47.6	97/105	103/111	110/110	110/125	52/60	60/60	46/46	51/51	70/70	70/70
	DD30CP	21.6/28.8	60.0/69.3	121/133	126/138	125/150	150/150	75/87	80/90	46/46	51/51	70/70	70/70
	DD40CP	29.7/39.6	82.4/95.2	149/165	154/170	150/175	175/175	103/119	110/125	46/46	51/51	70/70	70/70
(-)HPDYB090ACH	NONE	—	—	46/46	51/51	70/70	70/70	—	—	46/46	51/51	70/70	70/70
	DD10CP	7.4/9.9	20.6/23.8	72/76	77/81	90/90	90/90	26/30	30/30	46/46	51/51	70/70	70/70
	DD15CP	10.8/14.4	30.0/34.6	83/89	89/95	100/100	100/110	38/44	40/45	46/46	51/51	70/70	70/70
	DD20CP	14.8/19.8	41.2/47.6	97/105	103/111	110/110	110/125	52/60	60/60	46/46	51/51	70/70	70/70
	DD30CP	21.6/28.8	60.0/69.3	121/133	126/138	125/150	150/150	75/87	80/90	46/46	51/51	70/70	70/70
	DD40CP	29.7/39.6	82.4/95.2	149/165	154/170	150/175	175/175	103/119	110/125	46/46	51/51	70/70	70/70
(-)HPDYB120ACF	NONE	—	—	45/45	50/50	70/70	70/70	—	—	45/45	50/50	70/70	70/70
	DD10CP	7.4/9.9	20.6/23.8	70/74	76/80	90/90	90/90	26/30	30/30	45/45	50/50	70/70	70/70
	DD15CP	10.8/14.4	30.0/34.6	82/88	88/93	100/100	100/110	38/44	40/45	45/45	50/50	70/70	70/70
	DD20CP	14.8/19.8	41.2/47.6	96/104	102/110	110/110	110/110	52/60	60/60	45/45	50/50	70/70	70/70
	DD30CP	21.6/28.8	60.0/69.3	120/131	125/137	125/150	125/150	75/87	80/90	45/45	50/50	70/70	70/70
	DD40CP	29.7/39.6	82.4/95.2	148/164	153/169	150/175	175/175	103/119	110/125	45/45	50/50	70/70	70/70
(-)HPDYB120ACG	NONE	—	—	48/48	53/53	70/70	70/70	—	—	48/48	53/53	70/70	70/70
	DD10CP	7.4/9.9	20.6/23.8	73/77	79/83	90/90	90/100	26/30	30/30	48/48	53/53	70/70	70/70
	DD15CP	10.8/14.4	30.0/34.6	85/91	91/96	100/100	100/110	38/44	40/45	48/48	53/53	70/70	70/70
	DD20CP	14.8/19.8	41.2/47.6	99/107	105/113	110/110	110/125	52/60	60/60	48/48	53/53	70/70	70/70
	DD30CP	21.6/28.8	60.0/69.3	123/134	128/140	125/150	150/150	75/87	80/90	48/48	53/53	70/70	70/70
	DD40CP	29.7/39.6	82.4/95.2	151/167	156/172	175/175	175/175	103/119	110/125	48/48	53/53	70/70	70/70
(-)HPDYB120ACH	NONE	—	—	48/48	53/53	70/70	70/70	—	—	48/48	53/53	70/70	70/70
	DD10CP	7.4/9.9	20.6/23.8	73/77	79/83	90/90	90/100	26/30	30/30	48/48	53/53	70/70	70/70
	DD15CP	10.8/14.4	30.0/34.6	85/91	91/96	100/100	100/110	38/44	40/45	48/48	53/53	70/70	70/70
	DD20CP	14.8/19.8	41.2/47.6	99/107	105/113	110/110	110/125	52/60	60/60	48/48	53/53	70/70	70/70
	DD30CP	21.6/28.8	60.0/69.3	123/134	128/140	125/150	150/150	75/87	80/90	48/48	53/53	70/70	70/70
	DD40CP	29.7/39.6	82.4/95.2	151/167	156/172	175/175	175/175	103/119	110/125	48/48	53/53	70/70	70/70

Appendix E – Heater Kit Characteristics

460V, THREE PHASE, 60 Hz, AUXILIARY ELECTRIC HEATER KIT CHARACTERISTICS AND APPLICATION													
Single Power Supply for Both Unit and Heater Kit								Separate Power Supply for Both Unit and Heater Kit					
UNIT MODEL NUMBER	Heater Kit			Heat Pump				Heater Kit		Heat Pump			
	MODEL NO. RXJJ-	Rated Heater kW @460V	Heater Kit FLA	UNIT MIN. CKT. AMPACITY @460V	UNIT MIN. CKT. AMPACITY @460V W/ POWERED EXHAUST	MAX FUSE OR CKT. BKR. SIZE	MAX FUSE OR CKT. BKR. SIZE W/ POWERED EXHAUST	HEATER KIT MIN. CKT. AMPACITY	MAX FUSE SIZE OR CKT. BKR. SIZE	MIN. CIRCUIT AMPACITY	MIN. CIRCUIT AMPACITY W/ POWERED EXHAUST	AIR COND. MAX. FUSE OR CKT. BKR. SIZE	AIR COND. MAX. FUSE OR CKT. BKR. SIZE W/ POWERED EXHAUST
(-)HPDYB090ADF	NONE	—	—	20	22	25	30	—	—	20	22	25	30
	DD10DNV	9.9	11.9	35	37	40	40	15	15	20	22	25	30
	DD15DNV	14.4	17.3	41	44	45	45	22	25	20	22	25	30
	DD20DNV	19.8	23.8	49	52	50	60	30	30	20	22	25	30
	DD30DNV	28.8	34.6	63	66	70	70	44	45	20	22	25	30
	DD40DNV	39.6	47.6	79	82	80	90	60	60	20	22	25	30
(-)HPDYB090ADG	NONE	—	—	21	24	30	30	—	—	21	24	30	30
	DD10DNV	9.9	11.9	36	39	40	45	15	15	21	24	30	30
	DD15DNV	14.4	17.3	43	46	45	50	22	25	21	24	30	30
	DD20DNV	19.8	23.8	51	54	60	60	30	30	21	24	30	30
	DD30DNV	28.8	34.6	65	67	70	70	44	45	21	24	30	30
	DD40DNV	39.6	47.6	81	84	90	90	60	60	21	24	30	30
(-)HPDYB090ADH	NONE	—	—	21	24	30	30	—	—	21	24	30	30
	DD10DNV	9.9	11.9	36	39	40	45	15	15	21	24	30	30
	DD15DNV	14.4	17.3	43	46	45	50	22	25	21	24	30	30
	DD20DNV	19.8	23.8	51	54	60	60	30	30	21	24	30	30
	DD30DNV	28.8	34.6	65	67	70	70	44	45	21	24	30	30
	DD40DNV	39.6	47.6	81	84	90	90	60	60	21	24	30	30
(-)HPDYB120ADF	NONE	—	—	24	27	35	40	—	—	24	27	35	40
	DD10DNV	9.9	11.9	39	42	45	50	15	15	24	27	35	40
	DD15DNV	14.4	17.3	46	48	50	50	22	25	24	27	35	40
	DD20DNV	19.8	23.8	54	56	60	60	30	30	24	27	35	40
	DD30DNV	28.8	34.6	67	70	70	70	44	45	24	27	35	40
	DD40DNV	39.6	47.6	83	86	90	90	60	60	24	27	35	40
(-)HPDYB120ADG	NONE	—	—	26	28	35	40	—	—	26	28	35	40
	DD10DNV	9.9	11.9	40	43	50	50	15	15	26	28	35	40
	DD15DNV	14.4	17.3	47	50	50	50	22	25	26	28	35	40
	DD20DNV	19.8	23.8	55	58	60	60	30	30	26	28	35	40
	DD30DNV	28.8	34.6	69	72	70	80	44	45	26	28	35	40
	DD40DNV	39.6	47.6	85	88	90	90	60	60	26	28	35	40
(-)HPDYB120ADH	NONE	—	—	26	28	35	40	—	—	26	28	35	40
	DD10DNV	9.9	11.9	40	43	50	50	15	15	26	28	35	40
	DD15DNV	14.4	17.3	47	50	50	50	22	25	26	28	35	40
	DD20DNV	19.8	23.8	55	58	60	60	30	30	26	28	35	40
	DD30DNV	28.8	34.6	69	72	70	80	44	45	26	28	35	40
	DD40DNV	39.6	47.6	85	88	90	90	60	60	26	28	35	40

P. APPENDICES

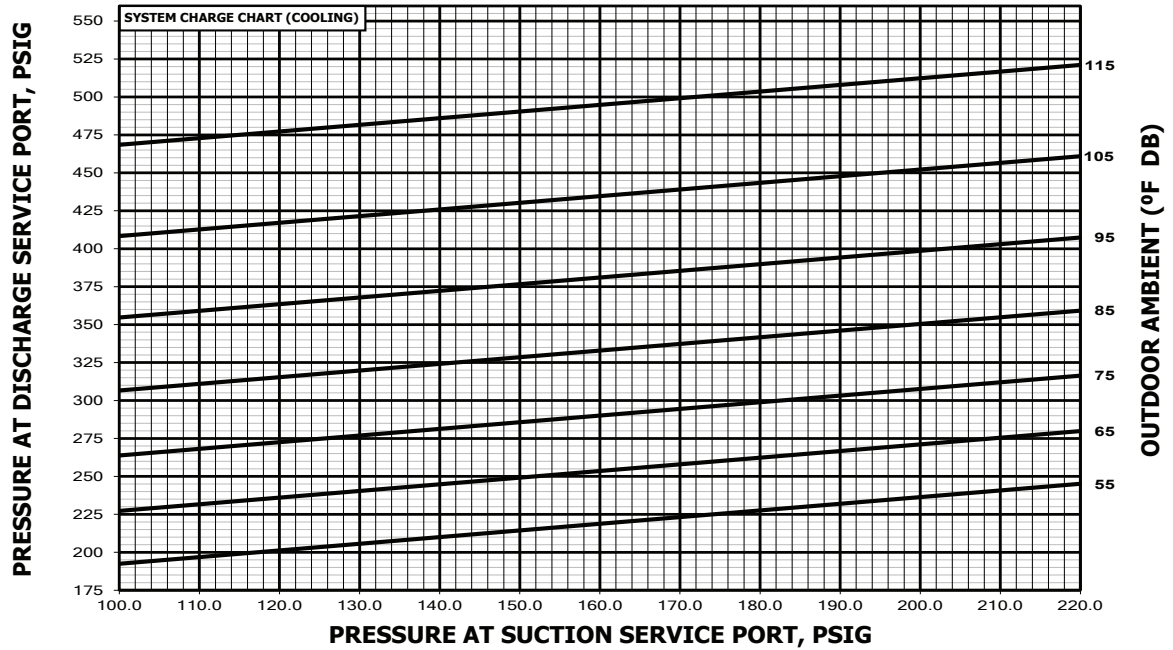
Appendix F. A2L Refrigerant Installation Safety Data

Model		(-)HPDYB090	(-)HPDYB120
Refrigerant Charge Weight (oz)		172.8	209.6
Minimum Circulation Airflow, Qmin (cfm)		292	354
Installed Altitude (ft above sea level)	Altitude Adjustment Factor	Minimum Total Conditioned Room Area, TAmin (sq ft)	
0	1.000	162	196
1000	1.025	166	201
2000	1.051	170	206
3000	1.078	175	212
4000	1.107	179	217
5000	1.138	184	224
6000	1.170	189	230
6500	1.187	192	233

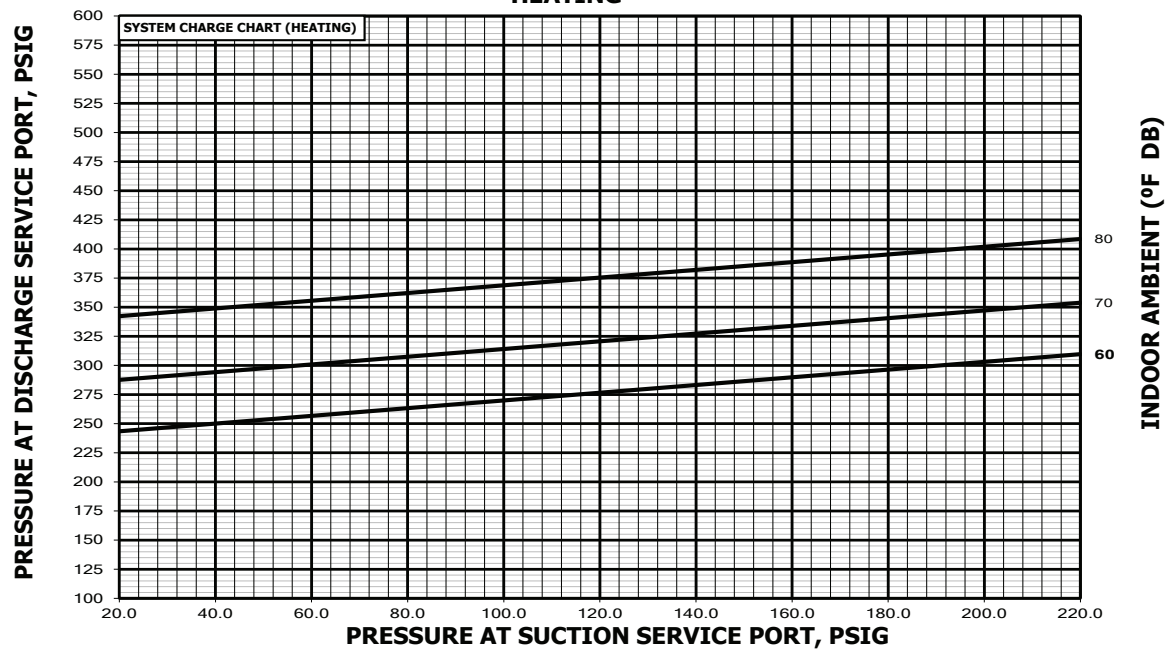
Appendix G – Refrigerant Charging Charts

7.5 - TON 2-STAGE CHARGE CHARTS

COOLING



HEATING



CAUTION: DESIGN TARGET SUBCOOLING AT 95°F: 15.08 ± 0.5°F.

NOTE: FACTORY CHARGE CHART AND/OR DESIGN TARGET SUBCOOLING ARE FOR GROSS CHARGE VERIFICATION. ANY ADJUSTMENT SHALL NOT EXCEED 2% OF THE TOTAL REFRIGERANT WEIGHT LISTED ON THE RATING PLATE OF THE UNIT AND SHOULD NOT SUPERSEDE CORRECTLY WEIGHED-IN REFRIGERANT.

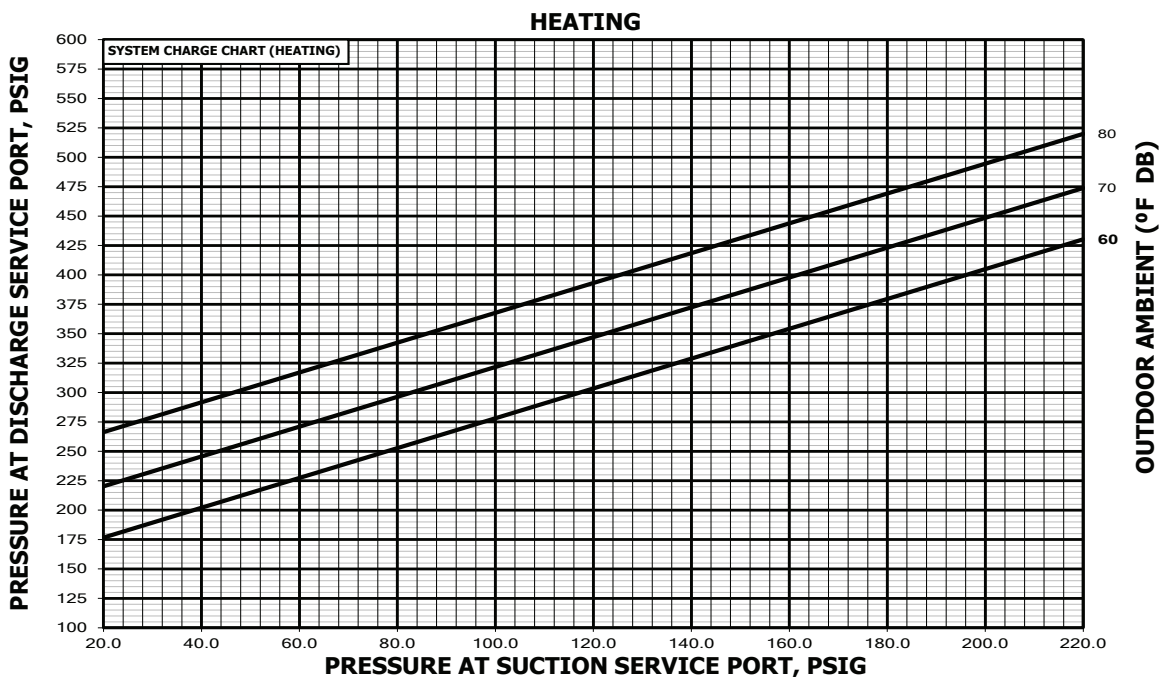
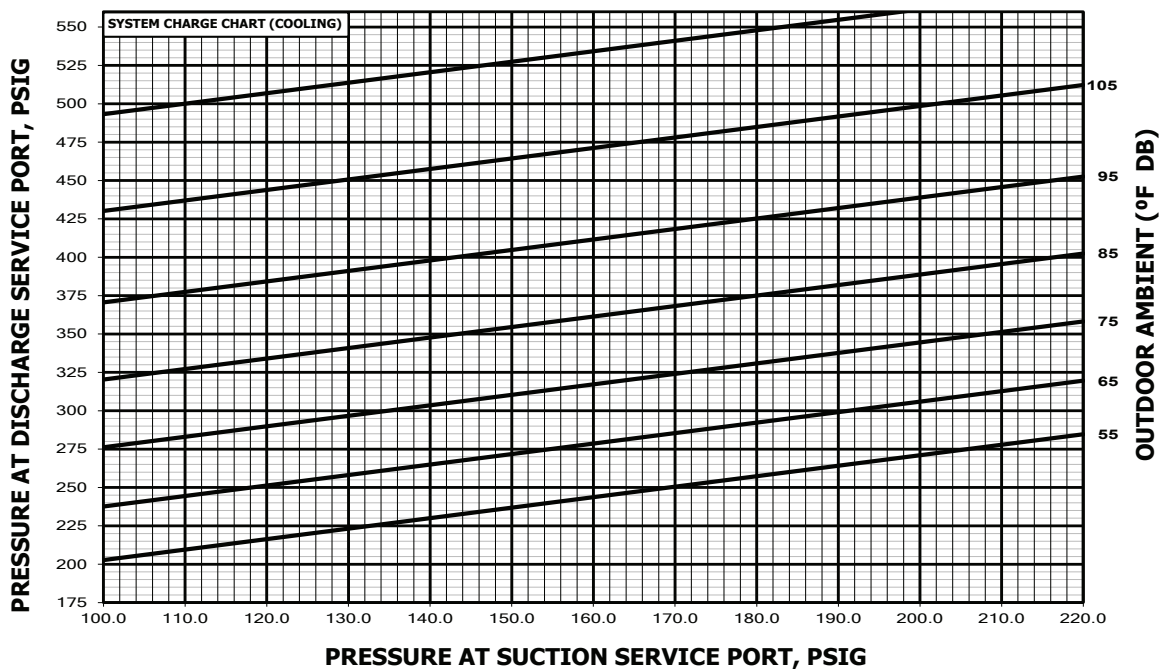
REFER TO THE REFRIGERANT CHARGE VERIFICATION AND ADJUSTMENT SECTION IN THE I&O MANUAL FOR INSTRUCTIONS ON USING THIS CHARGE CHART.

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P. APPENDICES

Appendix G – Refrigerant Charging Charts (Cont.)

10 - TON 2-STAGE CHARGE CHARTS



CAUTION: DESIGN TARGET SUBCOOLING AT 95°F: 17.18 ± 0.5°F.

NOTE: FACTORY CHARGE CHART AND/OR DESIGN TARGET SUBCOOLING ARE FOR GROSS CHARGE VERIFICATION. ANY ADJUSTMENT SHALL NOT EXCEED 2% OF THE TOTAL REFRIGERANT WEIGHT LISTED ON THE RATING PLATE OF THE UNIT AND SHOULD NOT SUPERSEDE CORRECTLY WEIGHED-IN REFRIGERANT.

REFER TO THE REFRIGERANT CHARGE VERIFICATION AND ADJUSTMENT SECTION IN THE I&O MANUAL FOR INSTRUCTIONS ON USING THIS CHARGE CHART.



92-110039-11-00

Appendix G – Refrigerant Charging Charts (Cont.)

SYSTEM CHARGE CHART – REFRIGERANT R-454B

PRESSURE REQUIREMENTS – GROSS CHARGE CHECK (REFER CHARGE CHART)

OUTDOOR DRY BULB (°F)	7.5 - TON	10 - TON
	LIQUID /VAPOR PRESSURE (PSIG)	
115	469.44/140.95	482.15/132.73
105	408.28/138.34	417.66/130.18
95	353.91/136.44	356.75/127.56
85	305.02/134.25	305.5/125.46
75	267.17/131.53	260.46/123.11
65	230.35/127.74	221.34/119.7
55	194.3/123.09	192.05/113.66

SUB COOLING REQUIREMENTS – FINAL CHARGE VERIFI- CATION

OUTDOOR DRY BULB (°F)	7.5 - TON	10 - TON
	SUBCOOLING (°F)	
115	18.01	20.03
105	16.74	18.47
95	15.47	16.81
85	14.09	15.31
75	14.36	14.04
65	13.72	13.44
55	12.9	14.83

Note: Factory charge chart and/or design target subcooling are for gross charge verification.

Charge verification instructions:

1. Allow the unit to operate for 15 minutes before checking or adjusting the charge.
2. Ensure that the contamination of different refrigerants does not occur when using charging equipment. Hoses or lines must be as short as possible to minimize the amount of refrigerant contained in them.
3. Ensure that the unit is properly grounded.
4. Return air temperature must be within comfort conditions (72°F - 82°F).
5. Remove caps from the high-side and low-side pressure service fittings.
6. Cylinders must be kept in an upright position for the entirety of the testing and charging procedure.
7. Record the following measurements:
 - a. High-side pressure at service fitting
 - b. Liquid line temperature
8. Using R-454B refrigerant saturation T-P tables, find the corresponding refrigerant saturation temperature relative to the measured high-side pressure.

9. To determine subcooling, subtract the liquid line temperature measured in Step 7 from the saturation temperature found in Step 8.
10. Compare the subcooling result from Step 9 to the subcooling table located on the unit or in the I&O manual.
11. If the subcooling value from Step 9 is more than 1°F above the value listed in the subcooling table, remove charge to match the value listed in the table, $\pm 0.5^\circ\text{F}$.
 - a. Take extreme care not to overfill the refrigerating system.
12. If the subcooling value from Step 9 is more than 1°F below the value listed in the subcooling table, add charge to match the value listed in the table, $\pm 0.5^\circ\text{F}$.
 - a. Take extreme care not to overfill the refrigerating system.

After charging is complete, a leak test must be done. Before leaving the site an additional leak test must also be done at the end of the installation. Refer to **J.1.1.3. Removal and Evacuation of Refrigerant.**

Appendix H. Wiring Diagrams & Schematics



Appendix H. Wiring Diagrams & Schematics (Cont.)



Appendix H. Wiring Diagrams & Schematics (Cont.)



Appendix H. Wiring Diagrams & Schematics (Cont.)



P. APPENDICES

Appendix H. Wiring Diagrams & Schematics (Cont.)

MITSUBISHI E800-HVC

PL46

1> 151 — PR

2> 152 — W

3> 153 — BR

4>

PL47

1> 068 — BL

2> 607 — O

3> 604 — Y

4> 602 — BK

5> 067 — Y

6> 603 — W/BL

VFD

12 13 14 15 16 17 18 19 20 21 22

1 2 3 4 5 6 7 8 9 10 11

GND

R/L1

S/L2

T/L3

U/T1

V/T2

W/T3

GND

YASKAWA V1000

PL46

1> 151 — PR

2> 152 — W

3> 152 — W

4> 153 — BR

PL47

1> 068 — BL

2>

3>

4>

5> 067 — O

6> 068 — BL

VFD

S+ R+ S- R- IG

S1 S2 S3 S4 S5 S6 S7 SC*

GND

R/L1

S/L2

T/L3

U/T1

V/T2

W/T3

GND

WIRE COLOR CODE

BK.....BLACK

O.....ORANGE

BR.....BROWN

PR.....PURPLE

BL.....BLUE

R.....RED

G.....GREEN

W.....WHITE

GY.....GRAY

Y.....YELLOW

COMPONENT CODES

PL PLUG

VFD VARIABLE FREQUENCY DRIVE

MDBA MODBUS ADAPTER

GND GROUND

NOTES

1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.

2. THIS DIAGRAM IS TO BE USED IN CONJUNCTION WITH THE PRIMARY WIRING DIAGRAM FOUND IN THE CONTROL ACCESS PANEL.

3. THE FACTORY INSTALLED OPTIONAL WIRING IS NOT USED ON ALL MITSUBISHI VFDS.

DELTA MS300

PL46

1> 151 — PR

2> 152 — W

3> 153 — BR

4>

PL47

1>

2>

3>

4>

5> 067 — BL

6> 068 — BL

VFD

SG+ SG- SGND

MI1 MI2 MI3 MI4 MI5 MI6 DCM

GND

R/L1

S/L2

T/L3

U/T1

V/T2

W/T3

GND

CONTROL TECHNIQUES C200

PL46

1> 151 — PR

2> 152 — W

3> 153 — BR

4>

PL47

1>

2>

3>

4>

5> 067 — BL

6> 068 — BL

MDBA

1 2 3 4 5 6

1 2 4 5 7 9 10 11 12 13 14 41 42

VFD

GND

R/L1

S/L2

T/L3

U/T1

V/T2

W/T3

GND

WIRING INFORMATION

LINE VOLTAGE

-FACTORY STANDARD

-FACTORY OPTION

-FIELD INSTALLED

LOW VOLTAGE

-FACTORY STANDARD

-FACTORY OPTION

-FIELD INSTALLED

REPLACEMENT WIRE

-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING

-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODES AS APPLICABLE.

ORIGINAL RELEASE NO.:

116859

APPROVED:

CHECKED:

ELECTRICAL WIRING DIAGRAM

VARIABLE FREQUENCY DRIVES (DDC)

MODELED BY:

J. VELA

PART NO.:

90-109493-02

DATE:

4/8/2024

REV:

00

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Appendix H. Wiring Diagrams & Schematics (Cont.)

MITSUBISHI E800-HVC		YASKAWA V1000		WIRE COLOR CODE BK.....BLACK O.....ORANGE BR.....BROWN PR.....PURPLE BL.....BLUE R.....RED G.....GREEN W.....WHITE GY.....GRAY Y.....YELLOW			
PL46 1 > 151 — PR 2 > 152 — W 3 > 153 — BR 4 > PL47 1 > 068 — BL 2 > 607 — O 3 > 604 — Y 4 > 602 — BK 5 > 607 — Y 6 > 603 — W/BL		VFD 12 13 14 15 16 17 18 19 20 21 22 1 2 3 4 5 6 7 8 9 10 11 GND GND R/L1 S/L2 T/L3 U/T1 V/T2 W/T3 GND O O O O O O O O		VFD S1 S2 S3 S4 S5 S6 S7 SC* 607 — O 602 — BK 604 — Y 604 — Y 603 — W/BL GND R/L1 S/L2 T/L3 U/T1 V/T2 W/T3 GND O O O O O O O O		COMPONENT CODES PL PLUG VFD VARIABLE FREQUENCY DRIVE MDBA MODBUS ADAPTER GND GROUND	
		*575V MODELS CONNECT TO "SN" INSTEAD OF "SC"					
DELTA MS300		CONTROL TECHNIQUES C200		NOTES 1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY. 2. PL46 IS NOT USED ON NON-DDC MODELS WITH A MITSUBISHI VFD. 3. THIS DIAGRAM IS TO BE USED IN CONJUNCTION WITH THE PRIMARY WIRING DIAGRAM FOUND IN THE CONTROL ACCESS PANEL. 4. THE FACTORY INSTALLED OPTIONAL WIRING IS NOT USED ON ALL MITSUBISHI VFDs.			
PL47 1 > 2 > 607 — O 3 > 4 > 602 — BK 5 > 604 — Y 6 > 603 — W/BL		VFD MI1 MI2 MI3 MI4 MI5 MI6 DCM GND R/L1 S/L2 T/L3 U/T1 V/T2 W/T3 GND O O O O O O O O		VFD 1 2 4 5 7 9 10 11 12 13 14 41 42 607 — O 602 — BK 604 — Y 604 — Y 603 — W/BL GND R/L1 S/L2 T/L3 U/T1 V/T2 W/T3 GND O O O O O O O O			
SCHNEIDER ATV320				WIRING INFORMATION LINE VOLTAGE -FACTORY STANDARD _____ -FACTORY OPTION - - - - - -FIELD INSTALLED - - - - - LOW VOLTAGE -FACTORY STANDARD _____ -FACTORY OPTION - - - - - -FIELD INSTALLED - - - - - REPLACEMENT WIRE -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.) WARNING -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODES AS APPLICABLE.			
PL47 1 > 2 > 607 — O 3 > 4 > 602 — BK 5 > 604 — Y 6 > 603 — W/BL		VFD +24 DI1 DI2 DI3 DI4 DI5 DI6 GND R/L1 S/L2 T/L3 GND V/T2 W/T3 U/T1 O O O O O O O O					
ORIGINAL RELEASE NO.: 116859		ELECTRICAL WIRING DIAGRAM		MODELED BY: J. VELA			
APPROVED: _____		VARIABLE FREQUENCY DRIVES (NON-DDC)		DATE: 4/8/2024			
CHECKED: _____				PART NO.: 90-109493-03			
				REV: 00			

P. APPENDICES

J. Unit Tie-Down



160 SW 12TH AVE SUITE 106, DEERFIELD BEACH, FL 33442
(954) 354-0660 | ENGINEERINGEXPRESS.COM

Technical Evaluation Report

DIVISION: 23 08 00—COMMISSIONING OF HVAC

FL 26981.1
THIS DOCUMENT CONTAINS (4) PAGES

EVALUATION SUBJECT: RHEEM PACKAGED UNITS

TER-20-28788

REPORT HOLDER:

RHEEM MANUFACTURING COMPANY, INC.
1100 ABERNATHY ROAD SUITE 1400
ATLANTA, GA, USA
770-351-3000 | RHEEM.COM



SCOPE OF EVALUATION (compliance with the following codes):

THIS IS A STRUCTURAL (WIND) PERFORMANCE EVALUATION ONLY. NO ELECTRICAL OR COOLING PERFORMANCE RATINGS OR CERTIFICATIONS ARE OFFERED OR IMPLIED HEREIN.

This Product Evaluation Report is being issued in accordance with the requirements of the 7th Edition Florida Building Code (2020) per FBC Section 104.11, FMC 301.15, FBC Building Ch. 16, ASCE-7-16, FBC Building 1522.2, FBC Residential M1202.1, M1301.1, & FS 471.025. The product noted on this report has been tested and evaluated as summarized herein.

SUBSTANTIATING DATA:

• Product Evaluation Documents Test Reports

Substantiating documentation has been submitted to provide this TER and is summarized in the sections below.

Test Report: 0320.01-18 (American Test Lab of South FL)

• Structural Engineering Calculations

Structural engineering calculations have been prepared which evaluate the product based on comparative and/or rational analysis to qualify the following design criteria:

Maximum allowable uplift, sliding, & overturning moment for ground and roof applications

Maximum unit anchorage to steel curb

NOTE: No 33% increase in allowable stress has been used in the design of this product.

INSTALLATION:

The product(s) listed above shall be installed in strict compliance with this product evaluation & manufacturer-provided model specifications.

The product components shall be of the material specified in the manufacturer-provided product specifications. All screws must be installed in accordance with the applicable provisions & anchor manufacturer's published installation instructions.

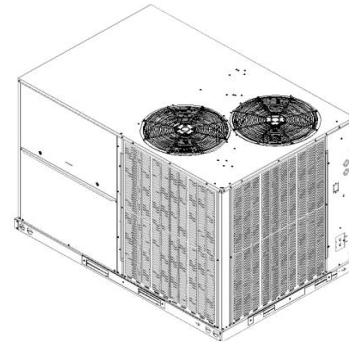
LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with this product evaluation as noted herein. The supporting host structure shall be designed to resist all superimposed loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. Host structure conditions which are not accounted for in this product's respective anchor schedule shall be designed for on a site-specific basis by a registered professional engineer. No evaluation is offered for the host supporting structure by use of this document; Adjustment factors noted herein and the applicable codes must be considered, where applicable.

All supporting components which are permanently installed shall be protected against corrosion, contamination, and other such damage at all times.

Fasteners must penetrate the supporting members such that the full length of the threaded portion is embedded within the main member.

This evaluation does not offer any evaluation to meet large missile impact debris requirements which typically are not required for this type of product.



NOTE: GRAPHICAL DEPICTIONS IN THIS REPORT ARE FOR ILLUSTRATIVE PURPOSES ONLY AND MAY DIFFER IN APPEARANCE

UNIT CASING MATERIAL:

20ga galv. sheet steel ASTM A653 Type B.

Removable Top & side covers secured with #10 Sheet metal Hex Head Screws

Knockouts provided for utility & control connections.

FINISH:

Baked Enamel

INSTALLATION:

Shall follow manufacturer specifications as well as information provided herein

OPTIONS:

This evaluation is valid for models shown in the last page

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:

Maximum Rated Wind Pressure:

200psf Lateral 133psf Uplift

VISIT ECALC.IO/28788

FOR SITE SPECIFIC DEVIATIONS
& MORE INFORMATION ABOUT THIS DOCUMENT
OR SCAN THIS QR CODE

VISIT ENGINEERINGEXPRESS.COM/STORE FOR
ADDITIONAL PLANS, REPORTS & RESOURCES



ENGINEER SIGNATURE AND SEAL :

Frank Bennardo, P.E.

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J. Unit Tie-Down RHEEM PACKAGED UNITS

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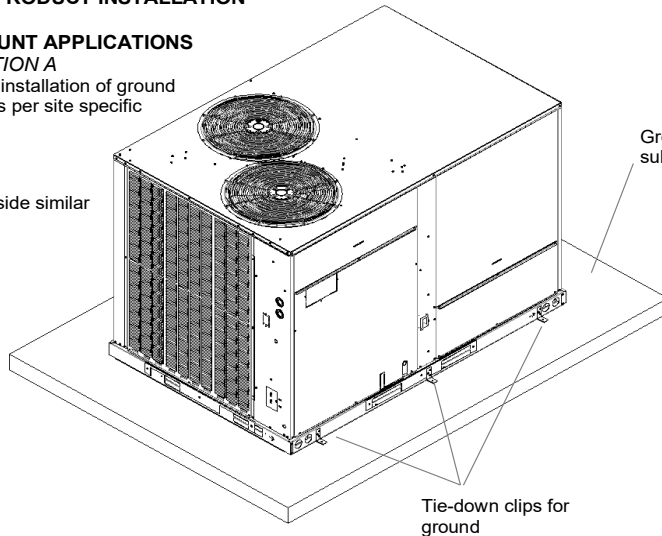
SECTION 2 PRODUCT INSTALLATION

GROUND MOUNT APPLICATIONS

CONFIGURATION A

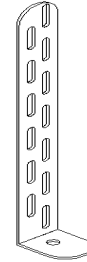
Note: Design & installation of ground host is by others per site specific conditions

Opposite side similar



Ground structure /
substrate (concrete)

Tie-down clips for
ground



TIE-DOWN CLIP (GROUND APPLICATION)

Miami Tech CUTD 1" wide ASTM A653 galvanized steel 0.07" thick of varying length (FL19731.2) or equivalent for all cabinets tied down to a ground structure; fasten clip to structure using anchor from Anchor Schedule A to Host Structure Table and (3) #12 SAE Gr 2 self-drilling screw to fasten clip to unit base rail. Install in unit with quantities shown ((3) per side). Locate clips at 8.5" min away from the appropriate corner using three clips per side and three clips opposite side in the same configuration.

ANCHOR SCHEDULE TO HOST STRUCTURE

Pressure Lateral (Uplift) (psf)	Concrete	Steel Curb With Clip	Steel Curb Screw
Ground	A	-	-
Up to 81 (64)	-	-	C
Up to 200 (133)	-	B	-

A. – 5/16" DEWALT ULTRACON Anchor embedded 2" in 3,515 psi concrete. 3 1/8" from edge minimum & 5" spacing minimum. NOA No. 17-1227.22

B. – #12 TEK Screws, (14) screws per clip, (5) top front side, (4) top back side and (5) bottom front side.

C. – 3/8" SAE Grade 5 Self-Drilling Screw at 6" O.C., (15) per long side and (10) per short side.

STEEL CURB (ROOF APPLICATION)

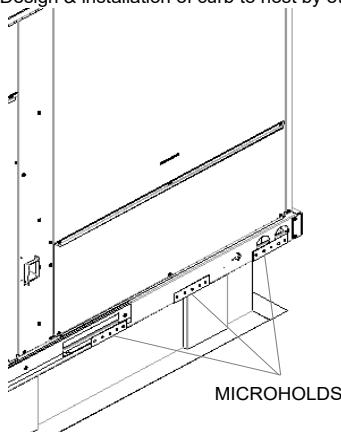
Steel curb to be a minimum of 16ga ASTM A653 steel

Curb Clip to be 14ga ASTM A653 steel min (Microhold)

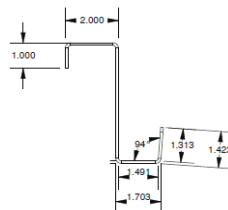
CURB MOUNT APPLICATIONS

CONFIGURATION B

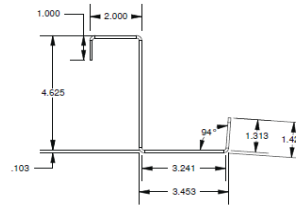
Note: Design & installation of curb to host by others per site specific conditions



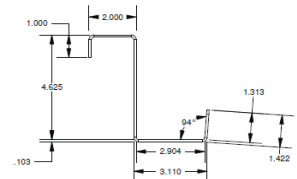
MICROHOLDS



Curb Clip A



Curb Clip C



Curb Clip B

1/4" diameter holes

11" long

MICROHOLDS

IN ALL CONDITIONS IT IS THE RESPONSIBILITY OF THE PERMIT HOLDER TO ENSURE THE HOST STRUCTURE IS CAPABLE OF WITHSTANDING FORCES BY SITE-SPECIFIC DESIGN. NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, IS OFFERED BY RHEEM MANUFACTURING COMPANY, OR ENGINEERING EXPRESS AS TO THE INTEGRITY OF THE HOST STRUCTURE TO CARRY LOADS INCURRED BY THIS UNIT.

P. APPENDICES

J. Unit Tie-Down RHEEM PACKAGED UNITS

CURB CLIP LOCATION

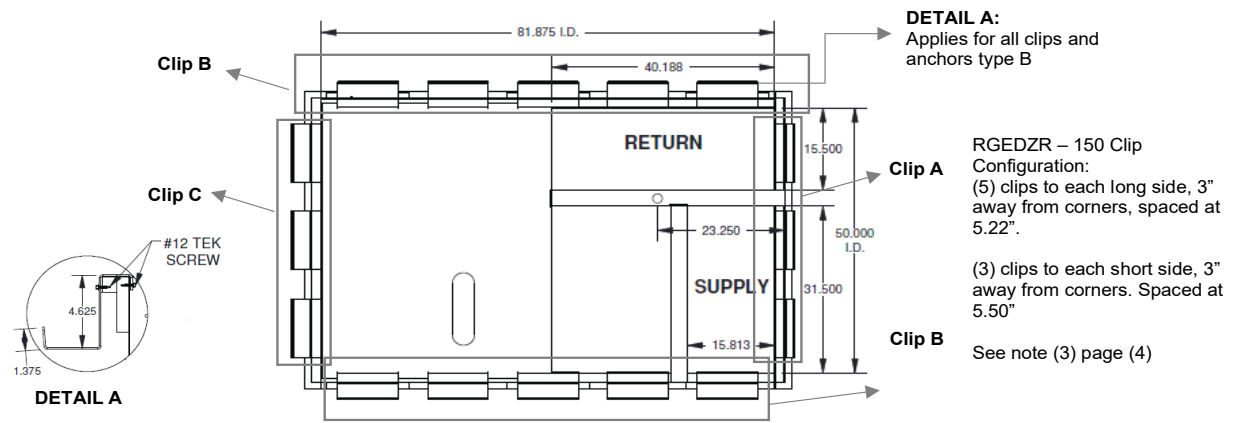


Table 1: Clip Curb Schedule			
Unit Model			Number of Clips (Pcs)
(-)GEC - 036	(-)ACC - 036	(-)HPC - 036	4 LS - 2 SS
(-)GEC - 048	(-)ACC - 048	(-)HPC - 048	4 LS - 2 SS
(-)GEC - 060	(-)ACC - 060	(-)HPC - 060	4 LS - 2 SS
(-)GEC - 072	(-)ACC - 072	(-)HPC - 072	4 LS - 2 SS
(-)GED - 090	(-)ACD - 090	(-)HPD - 090	5 LS - 3 SS
(-)GED - 102	(-)ACD - 102	(-)HPD - 102	5 LS - 3 SS
(-)GED - 120	(-)ACD - 120	(-)HPD - 120	5 LS - 3 SS
(-)GED - 150	(-)ACD - 150		5 LS - 3 SS

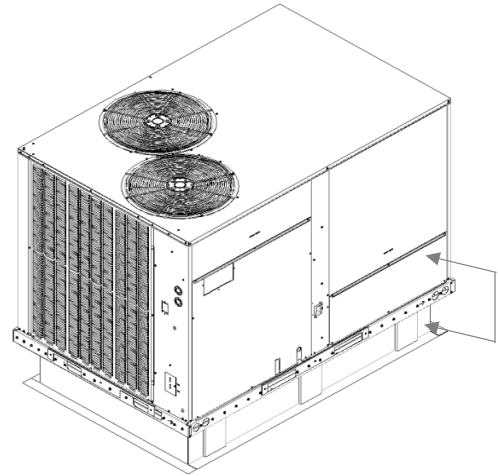
#Clip Designation (5 LS= 5 clips each Long Side;
3 SS= 3 clips each Short Side) equally spaced

Unit Model Note: '(-)' designates equivalent trade brands with similar cabinetry and may vary depending on brand

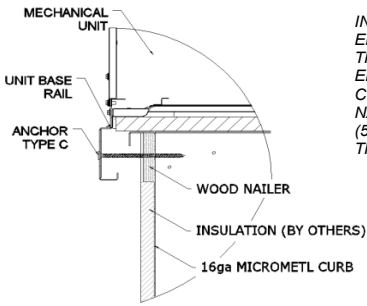
See pressures on page (2) for alternative anchor limitations

ALTERNATIVE ANCHORAGE TO CURB

STEEL CURB WITH SCREW
CONFIGURATION C



DETAIL B



DETAIL B

Mechanical Unit Curb Mounted

J. Unit Tie-Down

RHEEM PACKAGED UNITS

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SECTION 3 MODELS SUMMARY, DIMENSION & NOTES

TABLE 2: Qualified Tested Unit Construction Metal Cabinetry				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
RGEDZR - 150	59 1/2	90 1/10	59 7/10	1070

TESTED UNIT LIMITATIONS

1. The unit model listed above was tested and designed as worst-case configurations of model units listed in *Evaluation Model Series Matrix*, remaining unit models are certified by this approval as long as they have identical construction as those listed above and are of equal or lesser dimensions (length, width, height).
2. Dimensions shown are measured from outermost points of unit, including screw heads.
3. Curb clips shall be as close as possible from the shown locations; installers shall verify any interference between clip attachment and internal components of the unit and move clip within the tolerance allowed.

REQUIRED WIND PRESSURES

Design pressures calculated for use with these units shall be determined by others on a job-specific basis in accordance with the governing code. Site specific load requirements for wind load shall be determined in accordance with ASCE 7 and the codes referenced herein by separate engineering certification and shall be less or equal to design pressures capacity values listed herein for any assembly as shown.

TEST REPORTS UTILIZED

Design and certification of the unit cabinetry is approved through American Test Lab of South Florida Report #: 0320.01-18
Tested according ASTM E330-05 and TAS 202-94.

TABLE 3: Evaluation Model Series Matrix (Unit Construction Metal Cabinetry)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
(-)ACC - 036	46 3/4	78 3/8	41 3/8	453
(-)ACC - 048	46 3/4	78 3/8	41 3/8	477
(-)ACC - 060	46 3/4	78 3/8	41 3/8	482
(-)ACC - 072	46 3/4	78 3/8	41 3/8	689
(-)ACD - 090	59 15/32	89 5/16	49 1/4	722
(-)ACD - 102	59 15/32	89 5/16	49 1/4	748
(-)ACD - 120	59 15/32	89 5/16	49 1/4	777
(-)ACD - 150	59 1/2	90 1/10	59 7/10	946

TABLE 3.1: Evaluation Model Series Matrix (Unit Construction Metal Cabinetry)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
(-)GEC - 036	46 3/4	78 3/8	41 3/8	453
(-)GEC - 048	46 3/4	78 3/8	41 3/8	477
(-)GEC - 060	46 3/4	78 3/8	41 3/8	482
(-)GEC - 072	46 3/4	78 3/8	41 3/8	689
(-)GED - 090	59 15/32	89 5/16	49 1/4	846
(-)GED - 102	59 15/32	89 5/16	49 1/4	872
(-)GED - 120	59 15/32	89 5/16	49 1/4	901

TABLE 3.2: Evaluation Model Series Matrix (Unit Construction Metal Cabinetry)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
(-)HPC - 036	78 3/8	46 3/4	41 3/8	528
(-)HPC - 048	78 3/8	46 3/4	41 3/8	551
(-)HPC - 060	78 3/8	46 3/4	41 3/8	553
(-)HPC - 072	78 3/8	46 3/4	41 3/8	553
(-)HPD - 090	89 5/16	59 1/2	49 1/4	786
(-)HPD - 102	89 5/16	59 1/2	49 1/4	822
(-)HPD - 120	89 5/16	59 1/2	59 7/10	874

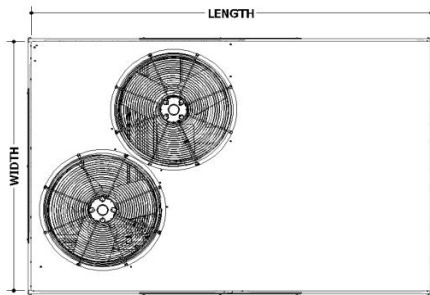
Unit Model Note: '(-)' designates equivalent trade brands with similar cabinetry and may vary depending on brand

P. APPENDICES

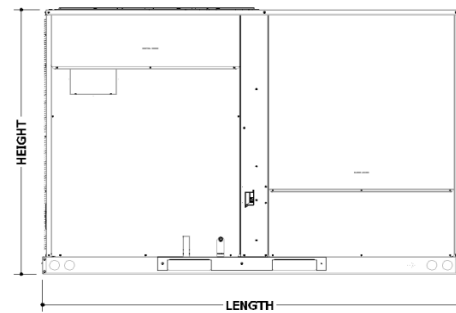
J. Unit Tie-Down RHEEM PACKAGED UNITS

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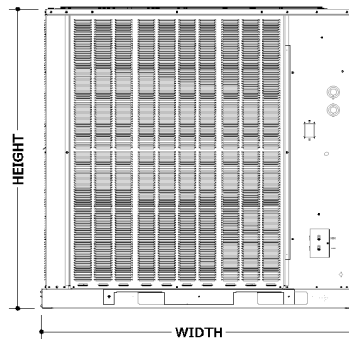
UNIT VIEWS & ELEVATIONS



TOP VIEW



ELEVATION VIEW



SIDE VIEW

Note: RGEDZR-150 illustration selected for dimensional purposes

Q. DECOMMISSIONING

Q.1. Before Beginning Decommissioning

Before carrying out decommissioning, the technician performing decommissioning must be familiar with the equipment and its safety procedures, and ensure electrical power is available to the unit. See **Section A.3.1. Working Personnel Qualifications** for more information.

Before recovering the refrigerant, an oil and refrigerant sample must be taken if the technician intends to reuse the recovered refrigerant to have a record.

Before beginning any work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. See **C.2.6. No Ignition Sources**.

Before beginning any work on the system or conducting any hot work, ensure that the area is in the open or that it is adequately ventilated. Ventilation must continue while the unit is being worked on. Ventilation is required to safely disperse any released refrigerant into the atmosphere.

Work shall be undertaken under a controlled procedure so as to minimize the risk of flammable gas or vapor being present while work is being performed. See **A.3. Importance of a Quality Installation**.

All maintenance staff and others working in the local area shall be instructed on the nature of the work being performed. Work in confined spaces shall be avoided.

The area shall be checked with an appropriate refrigerant detector before and during work to ensure the technician is aware of potentially toxic or flammable atmospheres.

Q.2. Decommissioning Procedure

Follow the decommissioning procedure outlined below:

READ ALL STEPS BEFORE BEGINNING.

1. Become familiar with the equipment, its operation, and its safety procedures.
2. Isolate the system electrically.
3. Ensure that mechanical handling equipment for the refrigerant cylinders is at hand, if required.
4. Ensure personal, protective equipment is being used correctly.
5. A competent supervisor must be present during the refrigerant recovery process. Ensure such a person is available on site.

6. Confirm that the recovery equipment and cylinders are correct for the equipment and its refrigerant.
7. Follow the steps outlines in **Section J.1.1. Check for Refrigerant Leaks** and **Section J.1.1.3. Removal and Evacuation of Refrigerant**.
8. If possible, pump down the refrigerant system.
9. If a vacuum is not possible, make a manifold so that the refrigerant can be removed from various parts of the system.
10. Make sure that the recovery cylinder is situated on the scale before recovery begins.
11. Start the recovery machine and operate it in accordance with its instructions.
12. Do not overflow the cylinders. No more than 80% volume liquid charge is allowed.
13. Do not exceed the maximum working pressure of the cylinder, even temporarily.
14. When the cylinders have been filled correctly and the process is complete, make sure that the cylinders and the recovery equipment are removed from the site promptly.
15. Verify all isolation valves on the unit are closed (off).
16. Recovered refrigerant shall not be charged into another unit unless a sample was taken prior to recovering the refrigerant and its been cleaned and checked.

Q.3. Labeling

When performing any maintenance or troubleshooting on the refrigerating equipment or associated parts, a dry powder or CO2 fire extinguisher shall be nearby for emergency use.

Equipment must be labeled stating that is has been decommissioned and emptied of refrigerant. The label must be dated and signed. Ensure that there are label(s) on the unit stating that this equipment contains **flammable refrigerant**.

R. INFORMATION FOR THE OWNER

R.1. Product Model and Serial Number

The product model and serial number are both located on the rating plate found on the supply/return panel of the unit.

R.2. Information for the Owner: Maintenance and service

For routine maintenance, general diagnostics for cooling and heating, and other generalized information regarding filter changing, cleaning the condensate pan, cleaning the coils, and general inspections, refer to the User's Information Manual which can be found on the manufacturer's website.

At least once a year, scheduled service checks must be made to verify the safety systems in this unit are working as intended.

R.2.1. Filter Changing

WARNING: DISCONNECT THE MAIN POWER TO THE OUTDOOR UNIT BEFORE ATTEMPTING ANY MAINTENANCE OPERATION. FAILURE TO DO SO CAN RESULT IN SEVERE ELECTRICAL SHOCK OR DEATH.

1. Keep air filters clean. There are several types of material used in air filters and there are many possible locations for air filters. Consult with your contractor as to the locations of the filters and type of material in use.

2. How To Clean:

Glass Fiber (Throwaway) — This is a disposable type of filter. Inspect monthly and replace when necessary. A new building will normally require more frequent attention to the filters.

Aluminum Mesh — Wash with detergent and water. Air dry thoroughly and renew the coating in compliance with the manufacturer's instructions.

Pleated or MERV Filters (Throwaway) — There are various types and levels of filtration available. These may require more frequent inspection or replacement. Consult with the filter manufacturer.

IMPORTANT: Do not operate your system for extended periods without filters, as the dust contained in the air may pack into the fin area of the evaporator coil creating a condition which could require extensive repairs.

WARNING: A PORTION OF THE DUST CONTAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. ANY RECIRCULATED DUST PARTICLES WILL BE HEATED AND CHARRED BY CONTACT WITH THE ELECTRIC HEATING ELEMENTS. THIS RESIDUE WILL SOIL CEILINGS, WALLS, FLOORING, AND OTHER BUILDING ARTICLES.

R.2.2. Cleaning Condensate Pan

Check annually and, if necessary, clean drain pan and drain line. In winter, keep drain and trap dry or protect against freezeup. If this unit is installed with proper clearances, then the drain pan on most units is removable (check unit Specification Sheet to determine whether or not your unit is equipped with a slide-out drain pan). Refer to the unit Installation and Operation Manual for specific instruction on clearances and how to clean the drain pan.

R.2.3. Cleaning Coils

NOTE: Clean the Microchannel using only water. Due to the aluminum construction, do not use cleaners or detergents because they may cause corrosion to the Microchannel, leading to refrigerant leaks.

Directions to clean the Microchannel coils are as follows:

1. Disconnect power to the unit.
2. Wear proper personal protection equipment such as a face shield, gloves, and waterproof clothing.
3. Remove panels from the unit to gain safe access to the microchannel coils.

NOTE: Clean the coil from the inside out, in the opposite direction of normal airflow, allowing the debris to be pushed out rather than further in.

4. Use a soft brush or vacuum to remove base debris or surface-loaded fibers from both sides of the coil.

R. INFORMATION FOR THE OWNER

R.2.3. Cleaning Coils (Cont.)

5. Using a sprayer and water ONLY, clean the coil following the guidelines below:

- a. Use a 90° sprayer nozzle attachment to aid in cleaning the closely spaced coils. Sprayer nozzle pressure should not exceed 600 psi. Use a flat fan spray nozzle with an angle of at least 15 degrees.
- b. Spray perpendicular to the face of the coil. The maximum source angle should not exceed 25 degrees to the face of the coil.
- c. Spray approximately 1"-3" from the coil surface.

6. Do not allow the sprayer to come in contact with the tube and fin as it may damage the coil.

R.2.4. Checking Electrical Components

Repair and maintenance of electrical components must include safety checks and component inspections.

If a fault exists that could compromise safety, then no electrical supply can be connected to the unit until the error causing the fault is repaired. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution must be used. The temporary solution must be communicated to the owner.

Initial safety checks include:

- Confirming that the capacitors are discharged. This must be done safely to avoid the possibility of sparking.
- Ensure that no live electrical components or wiring are exposed while charging, recovering, or purging the system.
- Confirm that the unit grounding is constant and secure.

R.3. Refrigerant Recovery

When removing refrigerant from a unit, either for service or decommissioning, the following practices are required to safely remove the refrigerant.

When transferring the refrigerant into cylinders, ensure that only the appropriate recovery cylinders are employed.

- Ensure that the correct number of recovery cylinders are available to hold the total system charge.
- All cylinders used must be designed for recovering R-454B refrigerant.

- Cylinders shall be complete with a pressure-relief valve and shut-off valves, all in working order.

- Empty recovery cylinders must be evacuated and cooled before refrigerant recovery occurs.

The following equipment is required to be on site and in good working condition prior to and during refrigerant recovery:

- The technician's recovery equipment
- The recovery equipment's instructions that details the proper recovery of flammable refrigerant.
- A set of calibrated weighing scales
- Hoses, which must be complete with leak-free disconnect couplings.

If in doubt, contact the manufacturer about recovering flammable refrigerant.

The recovered refrigerant must be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. **DO NOT MIX REFRIGERANTS IN RECOVERY UNITS OR RECOVERY CYLINDERS.**

If compressors or compressor oils are to be removed, ensure that they have been evacuated to make certain that the flammable refrigerant, R-454B, does not remain within the lubricant. The compressor body must not be heated by an open flame or other ignition sourced to accelerate this process. When oil is drained from a system, it shall be carried out safely.

R.4. Warranty Information

For more information on this unit's factory warranty, see the warranty card shipped with the unit. The warranty card is also provided on the manufacturer's website.

S. INSTALLATION CHECK LIST AND JOB SITE SHEET

Commercial Job Site Information

Site Information and Application Details:

Business Name :	_____	Model Number :	_____
Address :	_____	(Please include all letters and digits of the model number)	
City :	_____	State :	_____
Zip :	_____	Serial Number :	_____
Site Contact :	_____	(Please include all letters and digits of the serial number)	
Phone :	_____	Mobile :	_____
Email :	_____	Date of Install :	_____
		(When was the unit installed, month, day, and year)	

Dealer/Contractor Information:

Business Name :	_____	Technician Name :	_____
Address :	_____	Visit Date:	_____
City :	_____	State :	_____
Zip :	_____	Technician Name :	_____
Site Contact :	_____	Visit Date:	_____
Phone :	_____	Mobile :	_____
Email :	_____	Technician Name :	_____
		Visit Date:	_____

Distributor and Support Details:

Distributor Name :	_____	Rep Name :	_____
City :	_____	State :	_____
		Visit Date:	_____

Unit Setup and Operational Information

Voltage and Amperage Information :

Line Voltage Measurements :

Base Voltage :	208	240	460	Phase :	1	3
	(Circle one)				(Circle one)	
Measured Line Voltage :	_____					
Phase A to B :	_____	Phase A to Ground :	_____			
Phase B to C :	_____	Phase B to Ground :	_____			
Phase C to A :	_____	Phase C to Ground :	_____			
Breaker Size :	_____	Conductor Size:	_____			

24VAC Low Voltage Measurements :

Transformer Tap :	208	240	460
	(Circle one)		
24VAC Measured Voltage :	R to C :	_____	
24VAC Measured Amp Load :	Transformer Load:	_____	
	T-stat Load:	_____	

Amperage and Power Measurements :

Full Running Load	Blower	Compressor 1	Compressor 2	Outdoor Fans
Phase A :	_____	_____	_____	_____
Phase B :	_____	_____	_____	_____
Phase C :	_____	_____	_____	_____

Refrigerant Circuit Information :

Circuit 1 :		Circuit 2 :	
Suction Line	Liquid Line	Suction Line	Liquid Line
Pressure (PSI) :	_____	Pressure (PSI) :	_____
Temperature (°F) :	_____	Temperature (°F) :	_____
Superheat (°F) :	_____	Sub-cooling (°F) :	_____
Outdoor Air Temperature (°F) :	_____	Return Air Temperature (°F) :	_____
Outdoor Air Wet Bulb (°F) :	_____	Return Air Wet Bulb (°F) :	_____
		Supply Air Temperature (°F) :	_____
		Supply Air Wet Bulb (°F) :	_____

S. INSTALLATION CHECK LIST AND JOB SITE SHEET

Commercial Job Site Information

Air Flow CFM :

Building Design CFM : _____

Operating System CFM : _____

Blower Speed :

Motor RPM : _____

Blower RPM : _____

Blower Sheave Turns : _____

(Turns are measured from a fully closed position)

Static Pressure :

Return Static Pressure : _____

Supply Static Pressure : _____

Total Static Pressure : _____

Variable Frequency Drive (VFD) : (low fan speed settings are located in DDC Control)

Factory Equiped: Yes No
(Circle one)

Active VFD Display (Hz) : _____

LOC/REM Light On?: Yes No
(Circle one)

Power Setting (uLu) : _____

Runs to 45hz on Start?: Yes No
(Circle one)

Runs to 60hz 2nd Stage?: Yes No
(Circle one)

Low Fan Speed % : _____

1stg Cooling Speed % : _____

Low Economizer % : _____

Economizer Setup and Information :

Outdoor Air:

Design CFM : _____

Design % : _____

Measured CFM : _____

Measured % : _____

Blade Position and Settings:

Minimum Position - Low : _____

Minimum Position - High : _____

Min Position Shaft Angle : _____

Measured % : _____

Program Settings:

Enthalpy Zone Setting : A B C D E
(Circle one)

Mixed Air Temperature : _____

Min Position Shaft Angle : _____

Measured % : _____

Heat or Furnace Information :

Gas Heat :

Fuel Type : Natural LP
(Circle one)

Input BTU : _____

Measured BTU : _____

Line Gas Pressure : _____

Manifold Pressure - Low : _____

Manifold Pressure - High : _____

Number of Orifices : _____

Orifice Size : _____

Flame Signal - microamp (s) : _____

Voltage: Amperage:

Line 1 Line 2 Line 1 Line 2 RPM

Pressure Switches
(measured in inches w.c.)

Low High Close Open

Inducer 1: _____

Inducer 2: _____

Inducer 3: _____

Inducer 4: _____

Main Limit Closed: Yes No
(Circle one)

Over Temp Limit Closed: Yes No
(Circle one)

Spark Visible at Igniter : Yes No
(Circle one)

Burner Flames Blue : Yes No
(Circle one)

Electric Heat :

System Voltage : 208 240 460
(Circle one)

Total Kw input Rating : _____

Stage 1 Amps:

Stage 2 Amps:

Stage 1 Watts:

Stage 2 Watts:

Phase A : _____

Phase B : _____

Phase C : _____

Notes and Comments :

