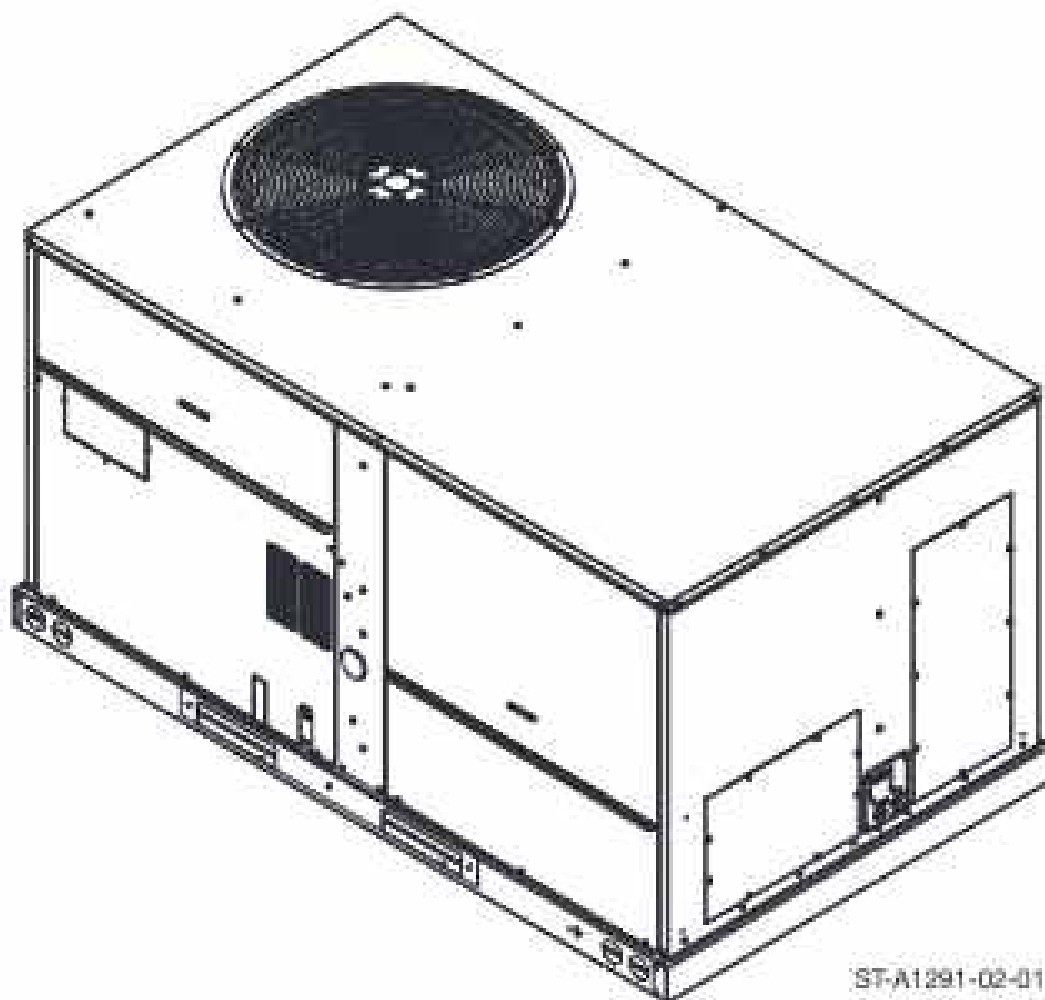


INSTALLATION INSTRUCTIONS

FOR RENAISSANCE™ PACKAGED HEAT PUMP UNITS

(-)HPC SERIES 3.0, 4.0, 5.0 & 6.0 TON [10.6, 14.1, 17.6 & 21.1 KW]
60 HZ MODELS
WITH R-454B REFRIGERANT



ST-A1291-02-01

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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.

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A. IMPORTANT SAFETY AND GENERAL INFORMATION

A.1 Introduction

This booklet contains the installation and operating instructions for your 3 ton, 4 ton, 5 ton, or 6 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. All dimensions contained in this document are approximations. 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 16 hours at 115°F outdoor ambient temperature and 80° dry bulb / 75° wet bulb indoor ambient temperature.

NOTICE: EFFICIENCY TESTING NOTICE

For purposes of verifying or testing efficiency ratings, the test procedure in Title 10 Appendix M1 to Subpart B of Part 430 (Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps), and the clarifying provisions provided in the standards listed below 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
- ANSI/ASHRAE 103 (2022)
- Standards for Unitary Small AC Equipment AHRI 210/240 (2023) for 3-5T
- Standards for Unitary Large AC Equipment AHRI 340/360 (2022) for 6T

SAFETY

- UL 90335-2-40 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 power CO2 fire extinguisher must be near the charging area at all times during installation, commissioning, service, and decommissioning.

IMPORTANT: Check the unit model number, heating size, electrical characteristics, and accessories to determine if they are correct.

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 a 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

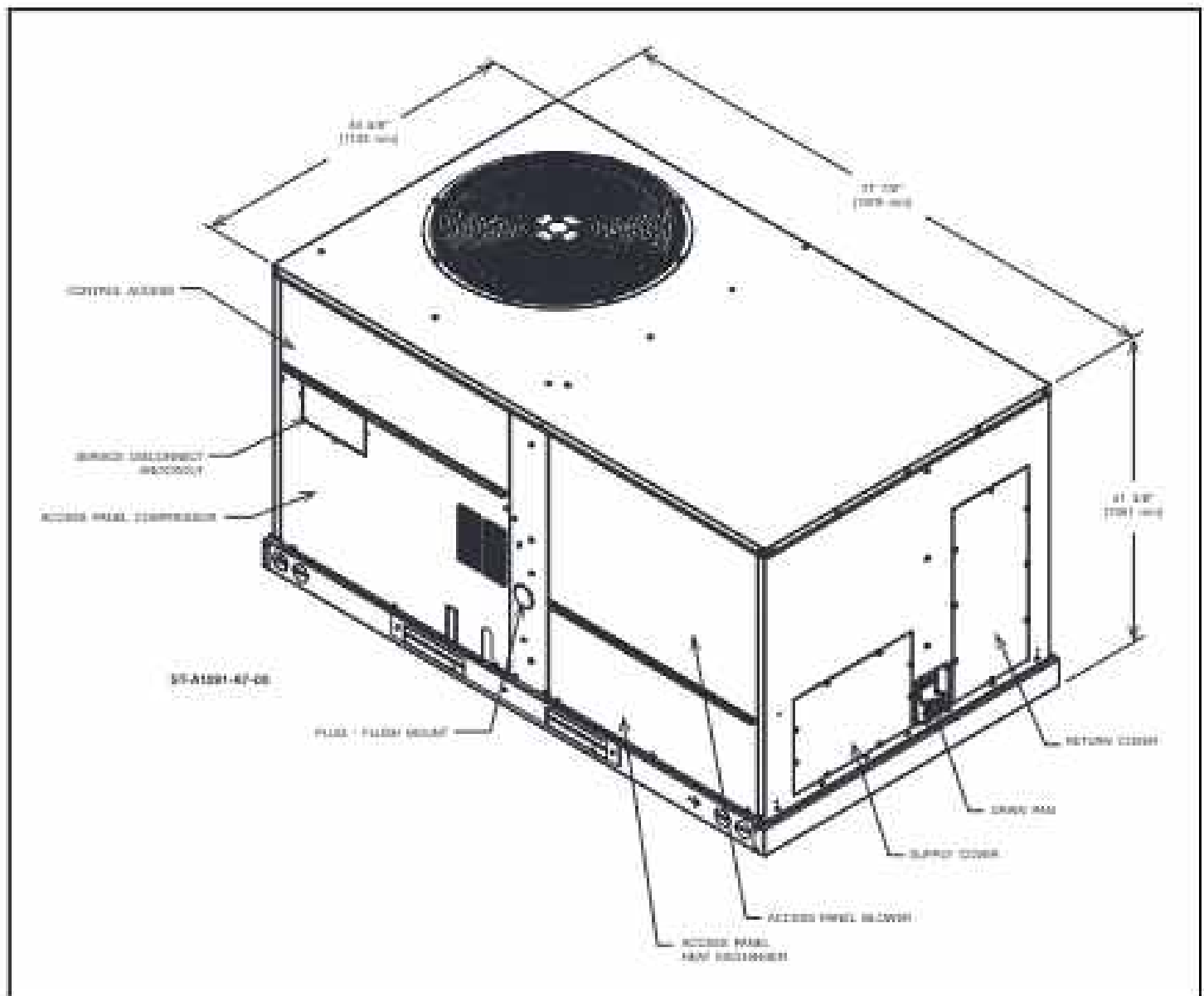
B.2. Major Components

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.

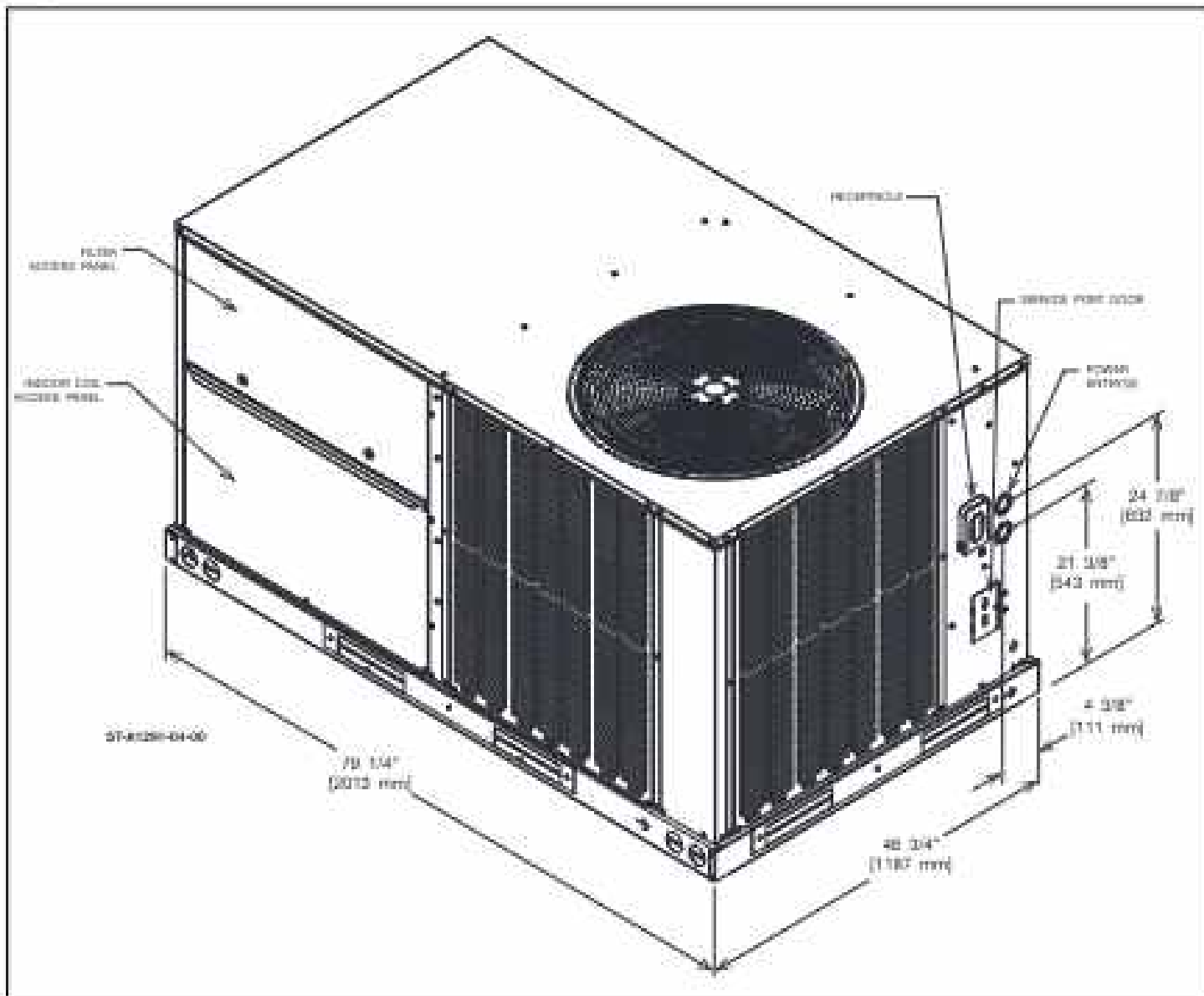


B. GENERAL SPECIFICATIONS

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 both without auxiliary heat or with 10, 15, 20, or 24 KW electric heat input (either factory installed or field installed). Cooling capacity is 3.0, 4.0, 5.0, and 6.0 nominal tons. Units are convertible from downflow supply/return to sidewall supply/return by relocation of supply/return cover panels. See section **C.3.5. Downflow to Horizontal Conversion** for more details.

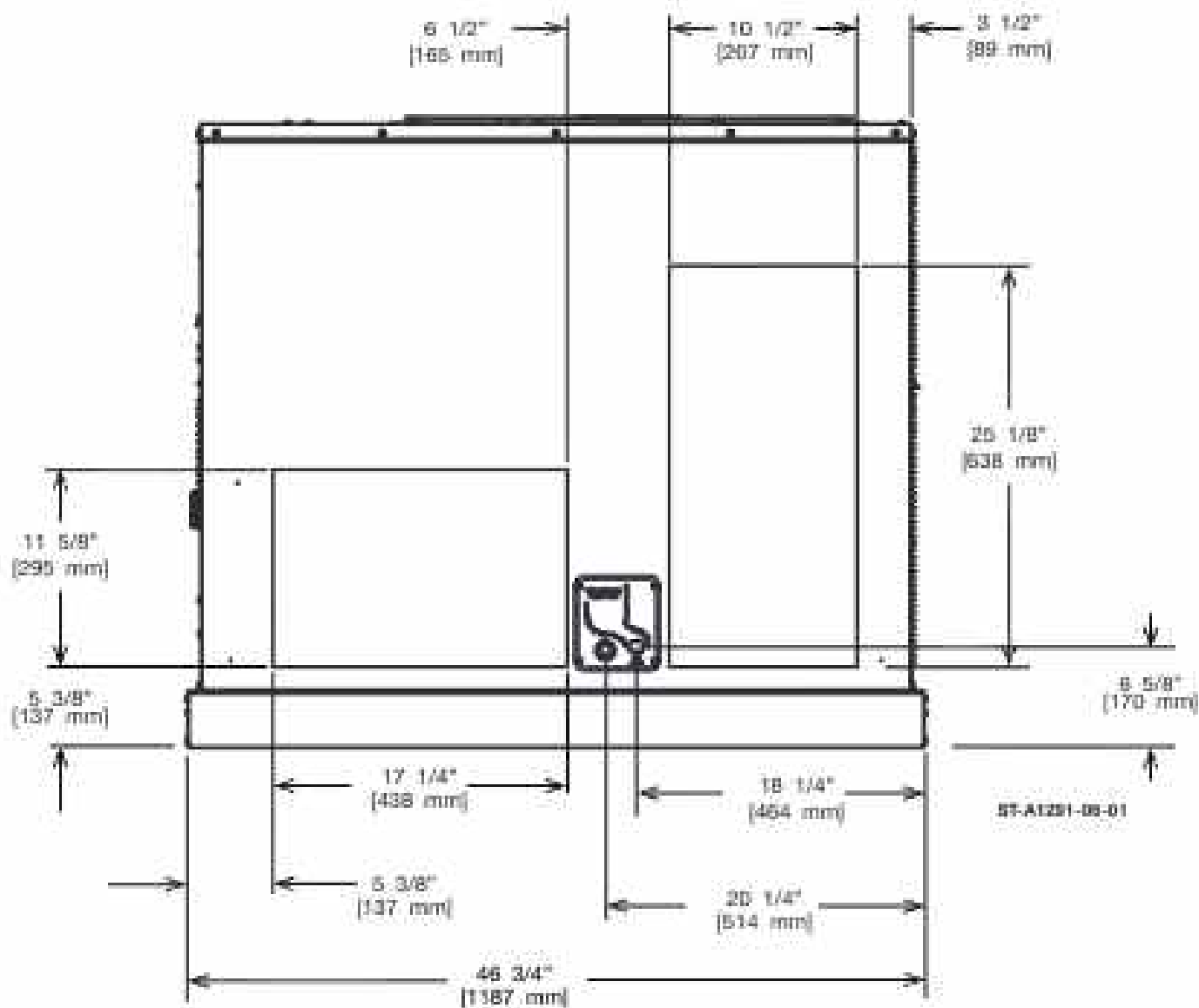
The units are weatherized for mounting outside of the building.

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

B. GENERAL SPECIFICATIONS

B.3.6. Supply and Return Duct Dimensions

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



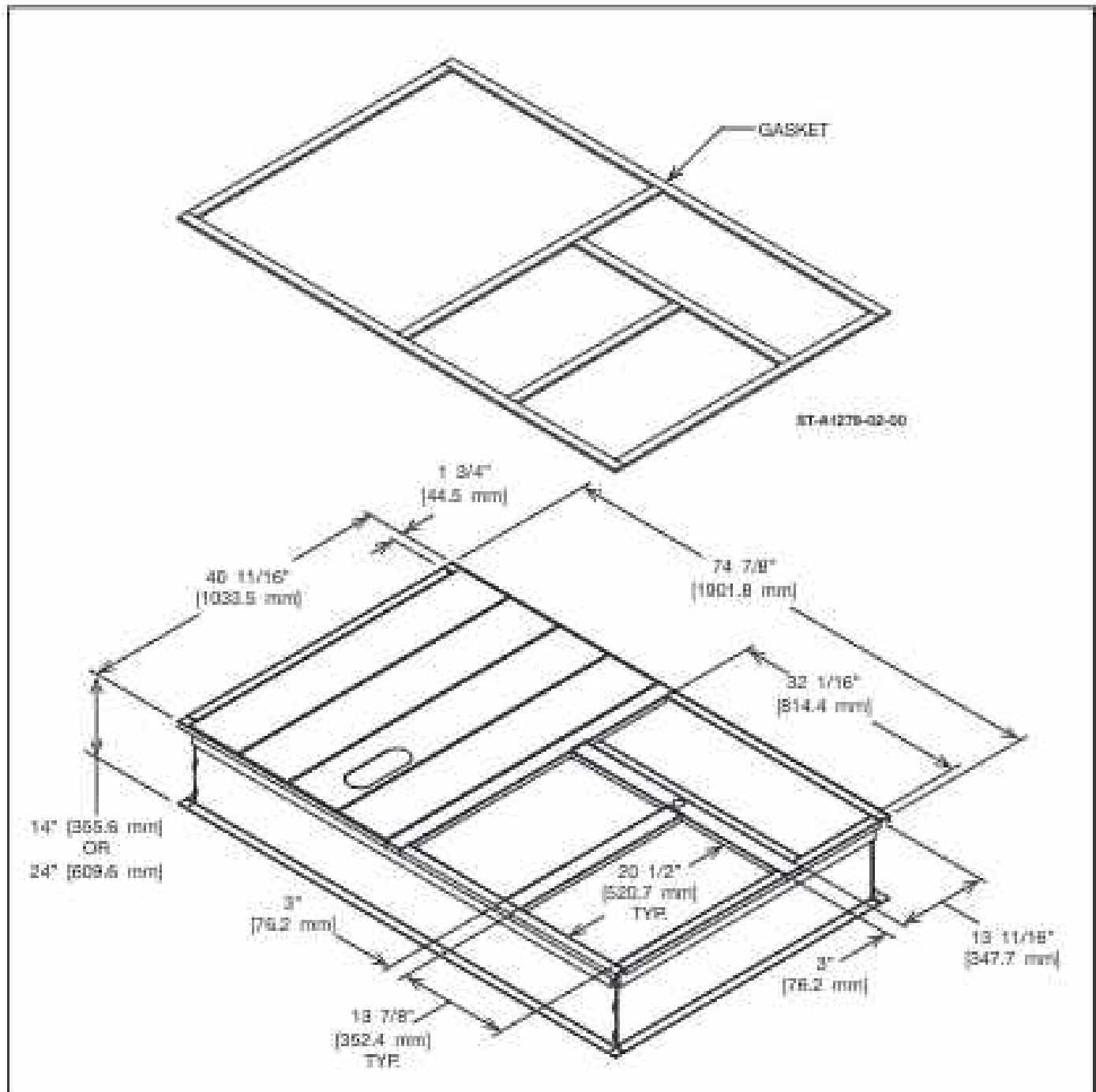
B. GENERAL SPECIFICATIONS

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. – Ac Roofcure 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 - away from bedroom windows

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 flammability class indicated flammability.

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

C.2.3. Quick Reference Guide for R-454B

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

- Refrigerant R-454B operates at pressure 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. If required, the existing TXV and/or evaporator coil must be replaced with the factory specified components specifically designed for R-454B.

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

C.2.5. Minimum Room Area

Because this unit uses refrigerant R-454B, 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 F - A2L Refrigerant Installation Safety Data](#).

C.2.6. No Ignition Sources

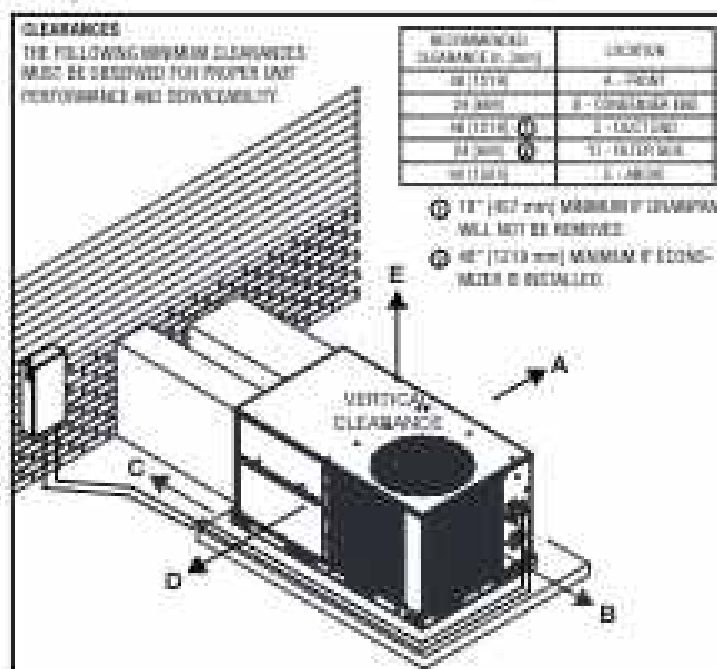
When performing work that involves exposing any pipework, no person working on or near the refrigerant system may use any ignition sources that could lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept far away from the site during installation, repair, removal, or disposal, during which refrigerant can possibly be released into 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.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. INSTALLATION OF THE UNIT

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 roof curb 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.

Regular service will reduce the buildup of contaminants and help to protect the unit's finish.

⚠ 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.

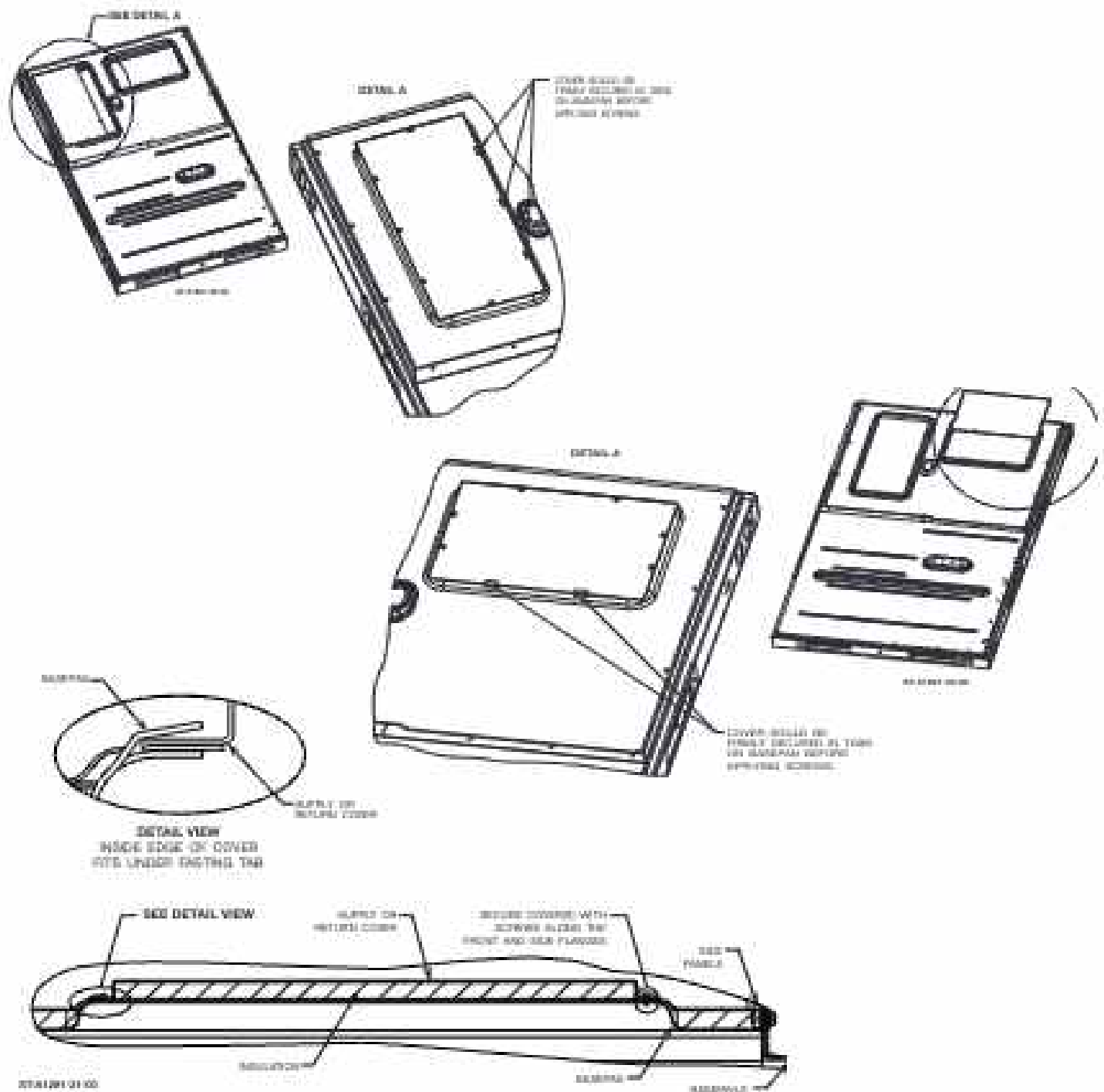
C. INSTALLATION OF THE UNIT

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.3.5. – 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.

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



C. INSTALLATION OF THE UNIT

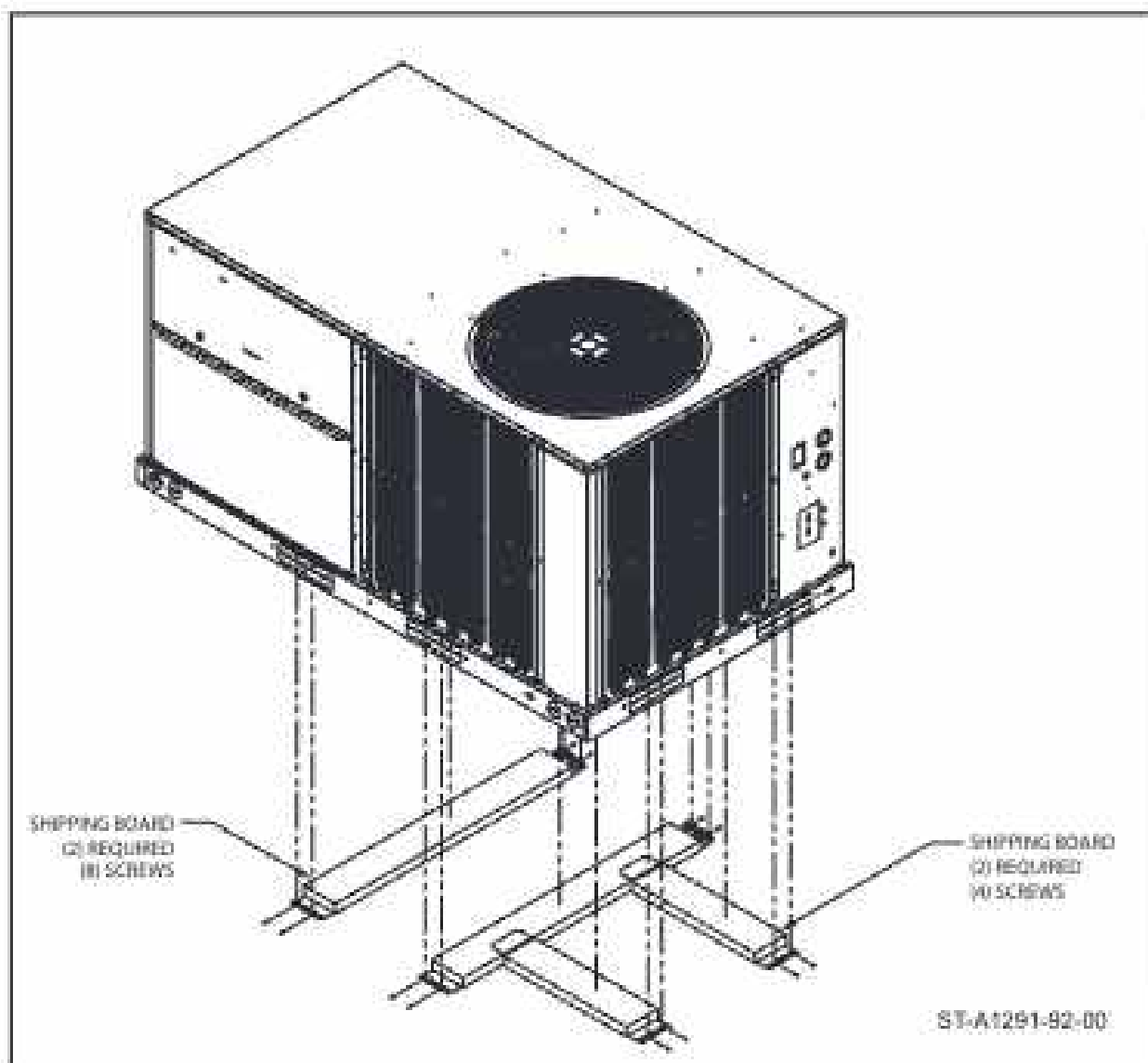
C.4. Setting the Unit

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 the top, and the condenser coil protection (on non-louver panel units).

- **Wooden Board 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.

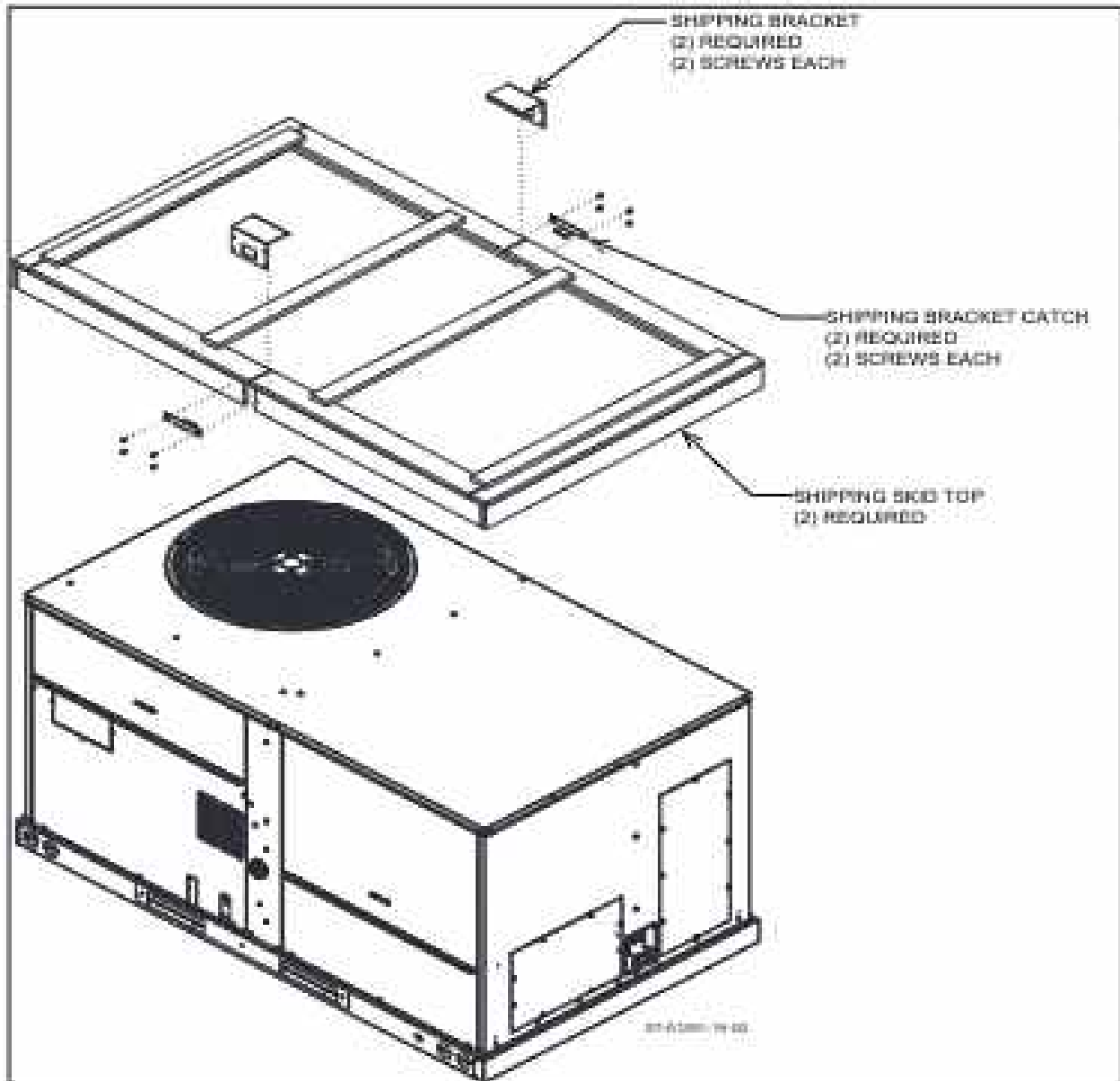
Figure C.4.1. – A: Basepan Protection Assembly



C. INSTALLATION OF THE UNIT

- **Shipping Screws** – Shipping screws are type #2 square head screws.
- **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.

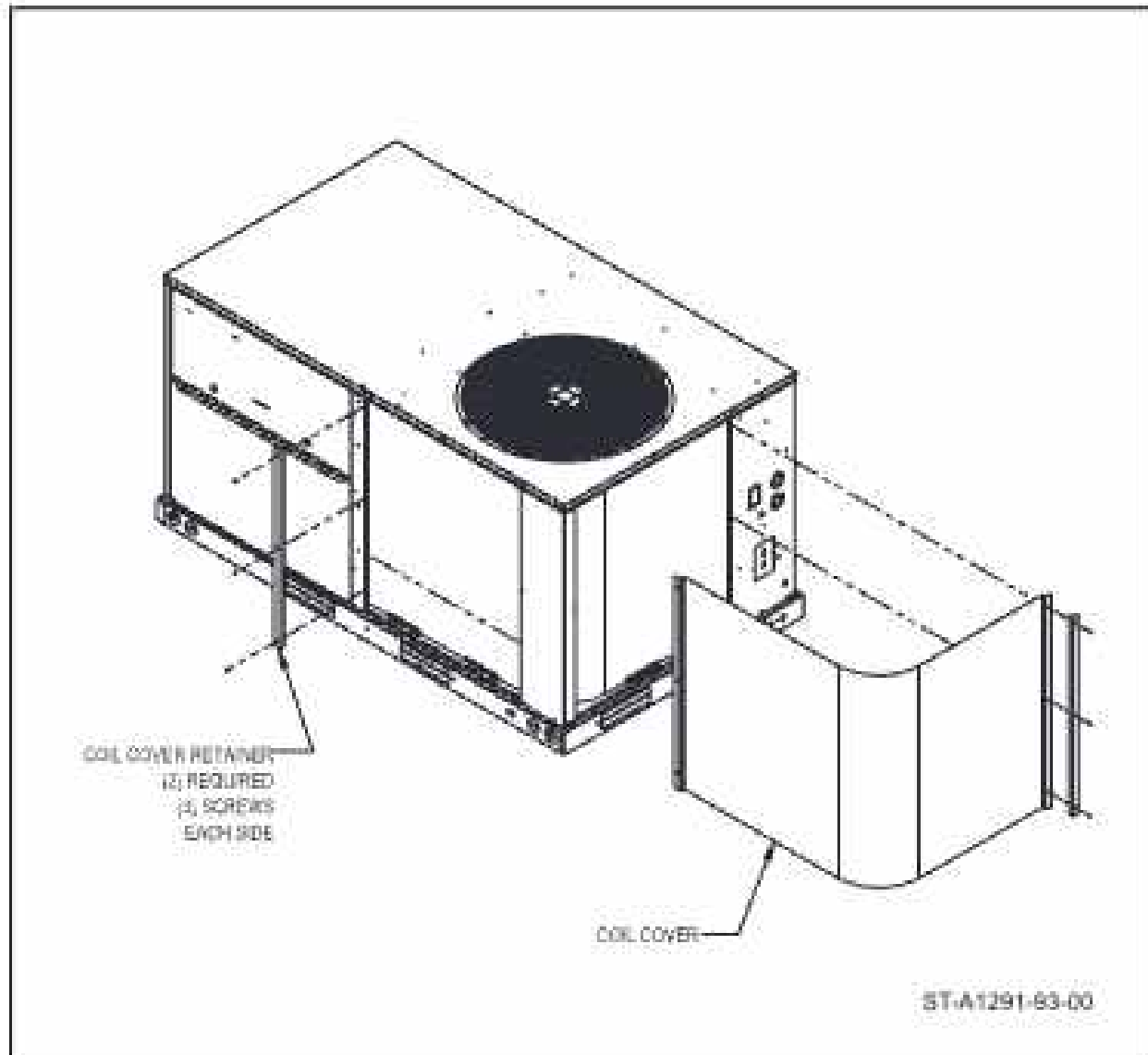
Figure C.4.1. – B: Wooden Skid Assembly



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.

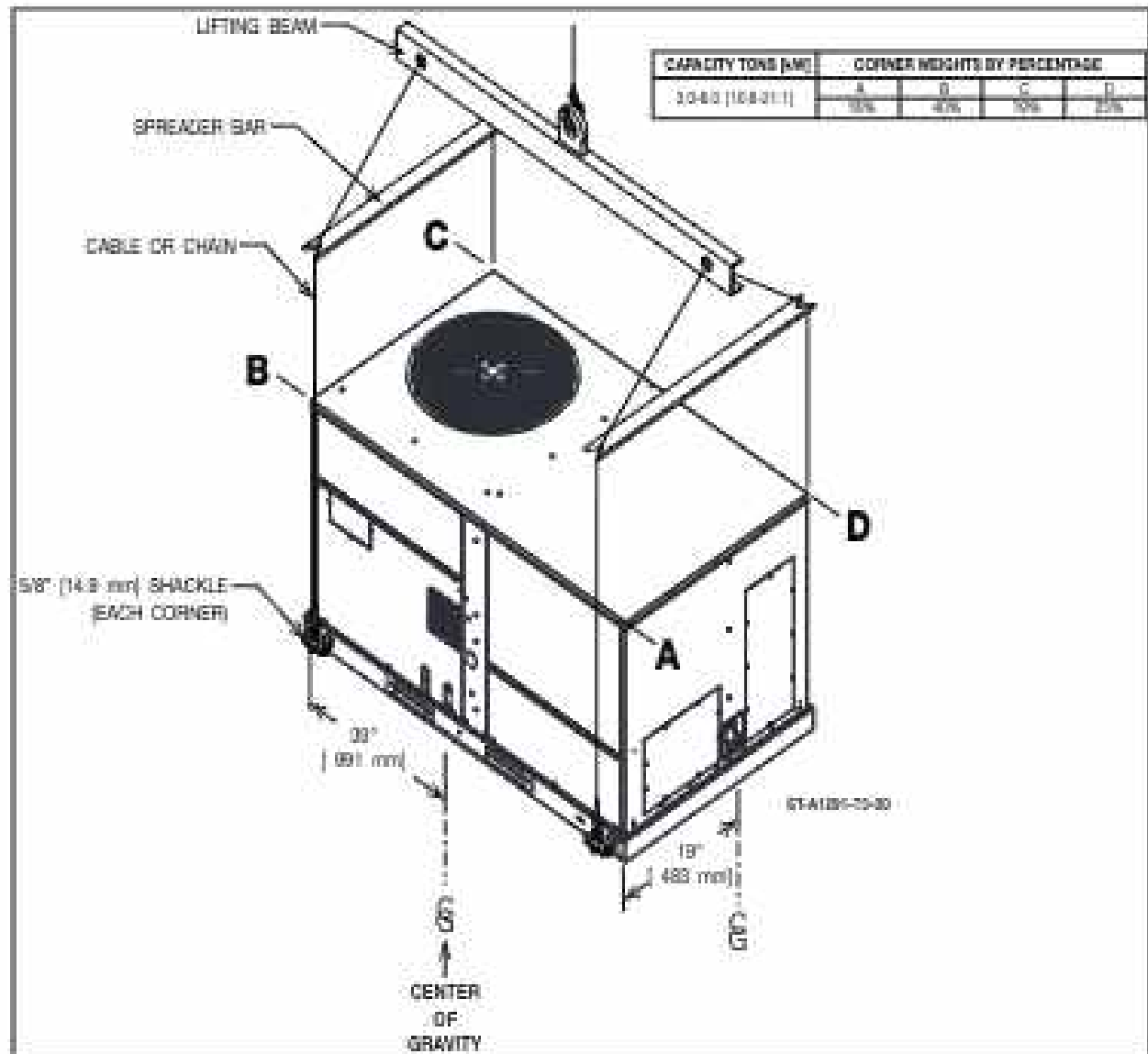
Figure C.4.1. – C: Condenser Coil Protection Assembly



C. INSTALLATION OF THE UNIT

C.4.2. Lifting the Unit

Figure C.4.2 - A : Lifting Detail



C. INSTALLATION OF THE UNIT

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.

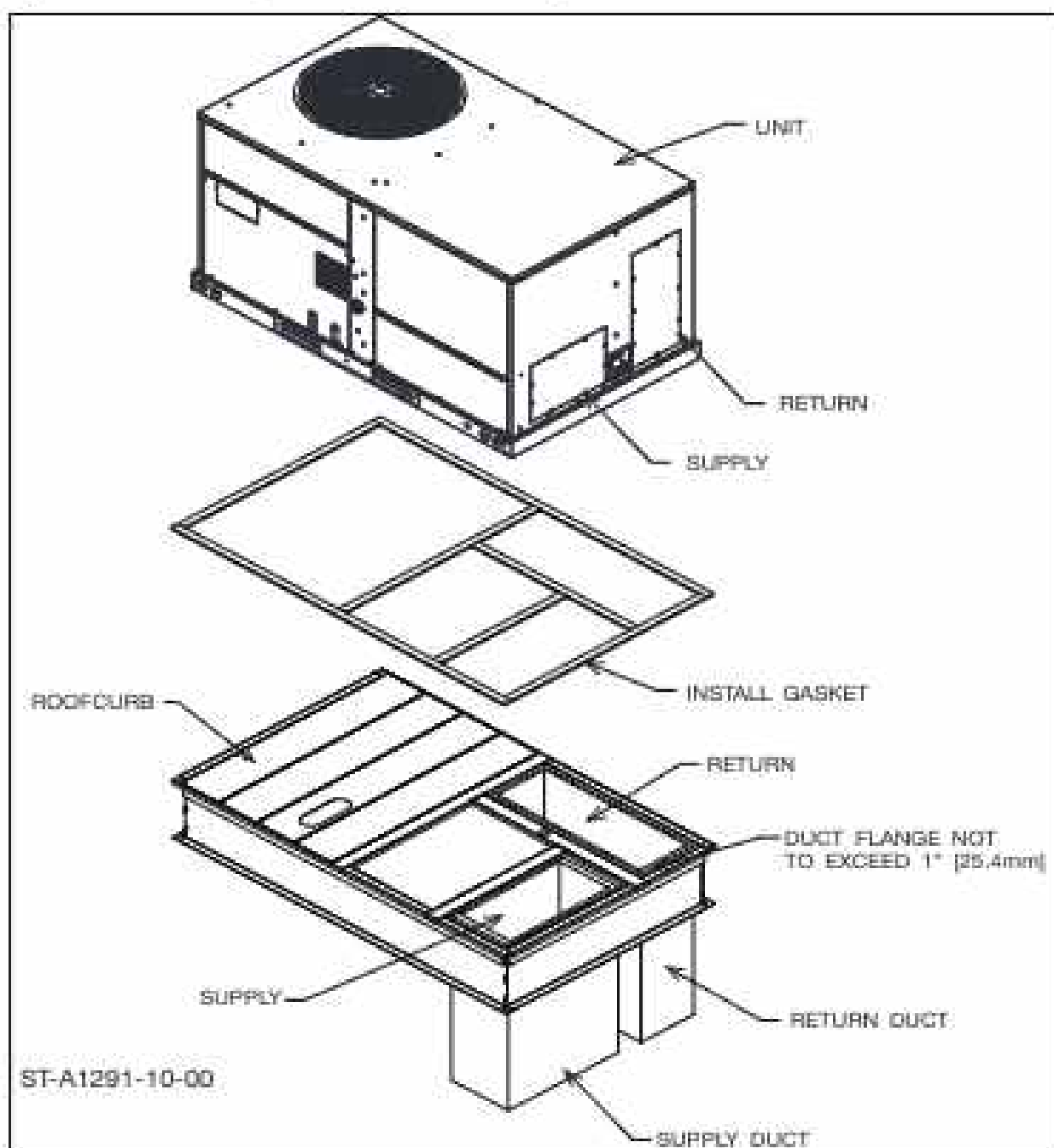
C.4.3.1. Installing the Roof Curb

Refer to the separate Installation Instructions for installing a roof curb. The accessory part numbers for the following accessories can be found in the product specification sheet.

- 14" and 21" Roofcurb
- Roofcurb Adapter

C.4.3.2. Setting the Unit

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



C. INSTALLATION OF THE UNIT

Figure C.5.1 – A: Condensate Drain Tap

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

The units must be secured in compliance with ASCE 7-10 and the latest Florida Building Code, where applicable. 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 latest Florida Building Code. Please refer to [Appendix J: Unit Tie-Down Methods](#).

C.5. Installing Condensate Drain

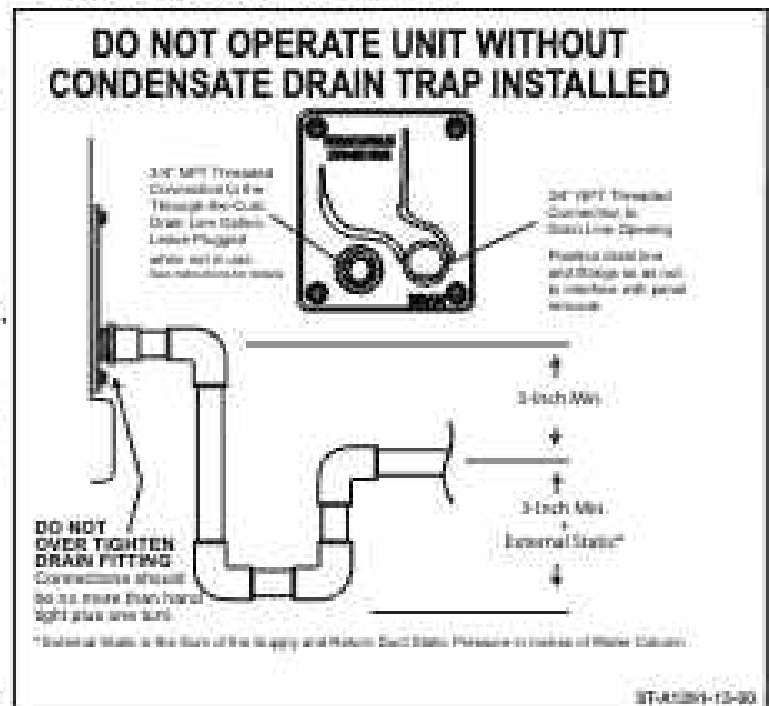
IMPORTANT: Install a condensate trap to ensure proper condensate drainage. See [Figure C.5.1 - A](#) for reference.

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.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.5.3.1. 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 1/4" 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. INSTALLATION OF THE UNIT

C.5.4. 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/roof/curb, 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 **4.3**, *"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 at www.acca.org

⚠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 must be informed against future changes in construction which might change this to a "confined space." Also, caution the user 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 17 3/4" x 16 3/8", the supply duct opening for horizontal ducted installations is 18 5/8" x 13 1/8". See Figure B.3.6. – A and – B for reference.

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.

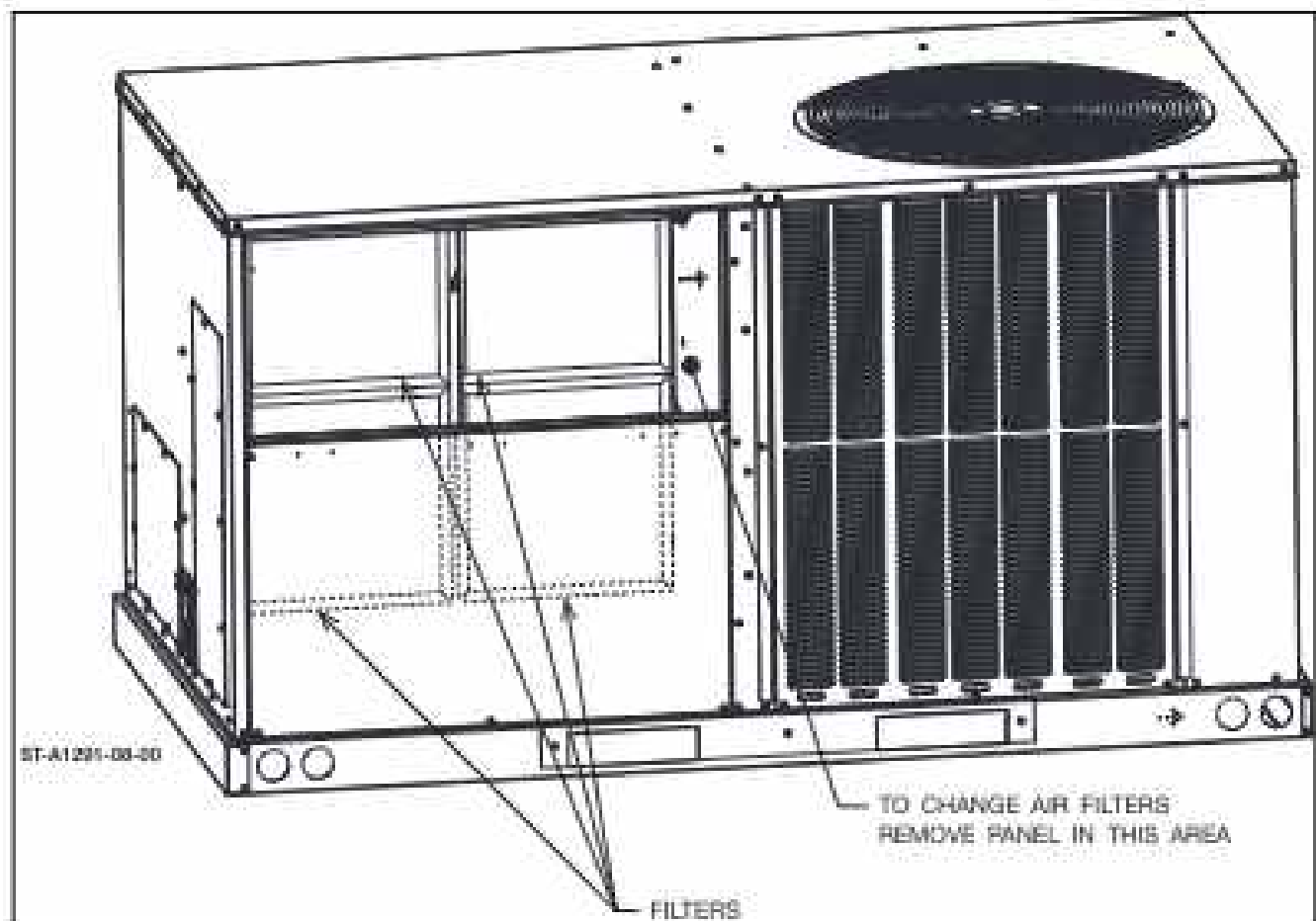
The return duct opening for roof curb installations is 25 5/8" x 12 1/8", the return duct opening for horizontal ducted installations is 26 5/8" x 12". See Figure B.3.6. – A and – B for reference.

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

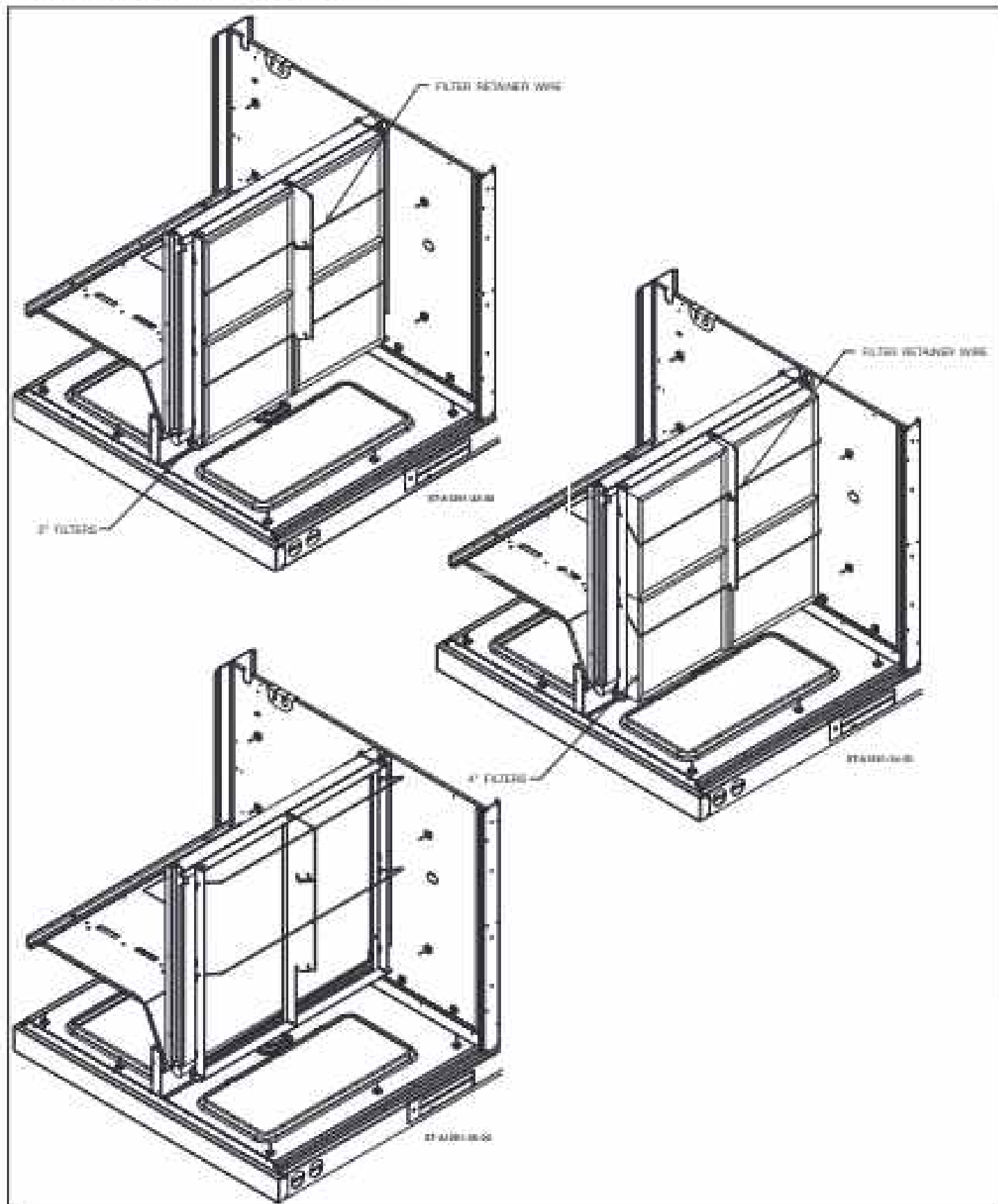
D.3.1. Installing Filters



D. DUCT AND VENTING

D.3. Filters

D.3.1. Installing Filters (Cont.)



D. DUCT AND VENTING

This product will accept both 2" and 4" filters. A new unit ships with four 2" x 16" x 16" 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.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.

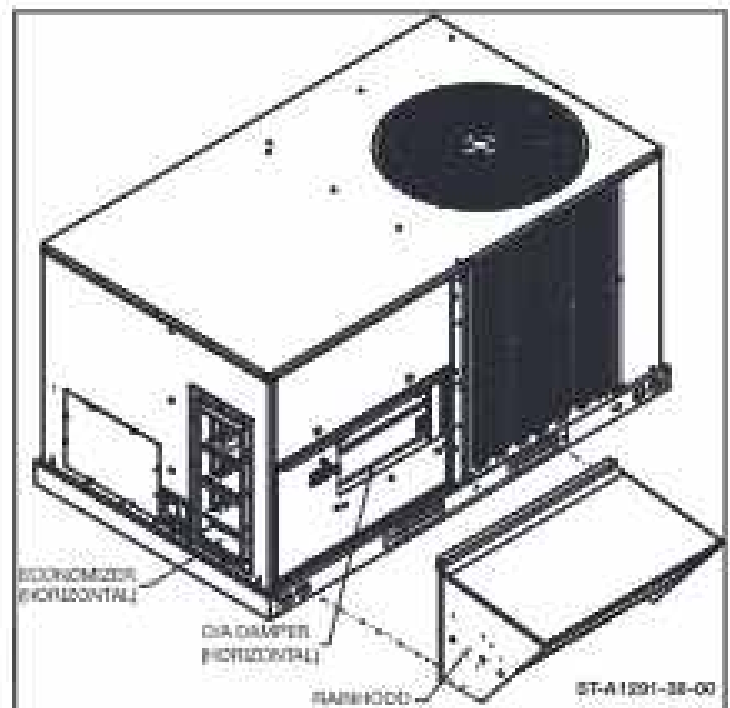
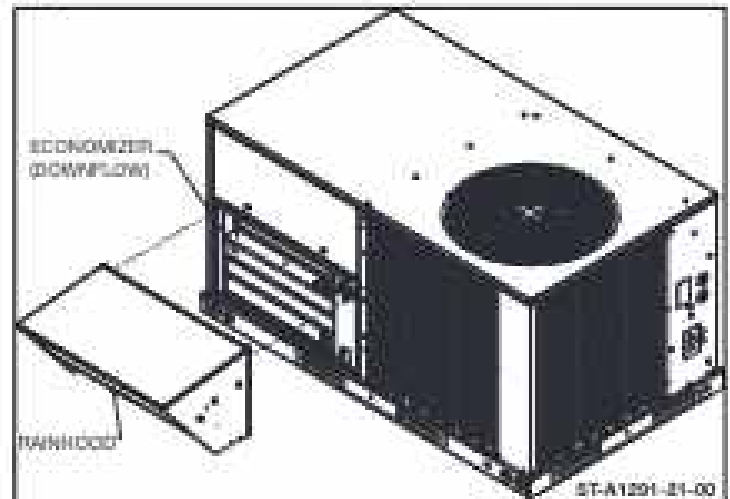
The Downflow Economizer is designed specifically for units setup in a downflow configuration. The downflow economizer fits inside the package unit and sits over the return-air opening along the bottom of the unit. All economizers are equipped with horizontal gear driven blades and a gravity relief damper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

The Horizontal Economizer is designed specifically for units setup 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) gravity 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 economizers, or on the manufacturer's website.

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



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 idea is to manually set the blade located inside the hood 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 they introduce 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.

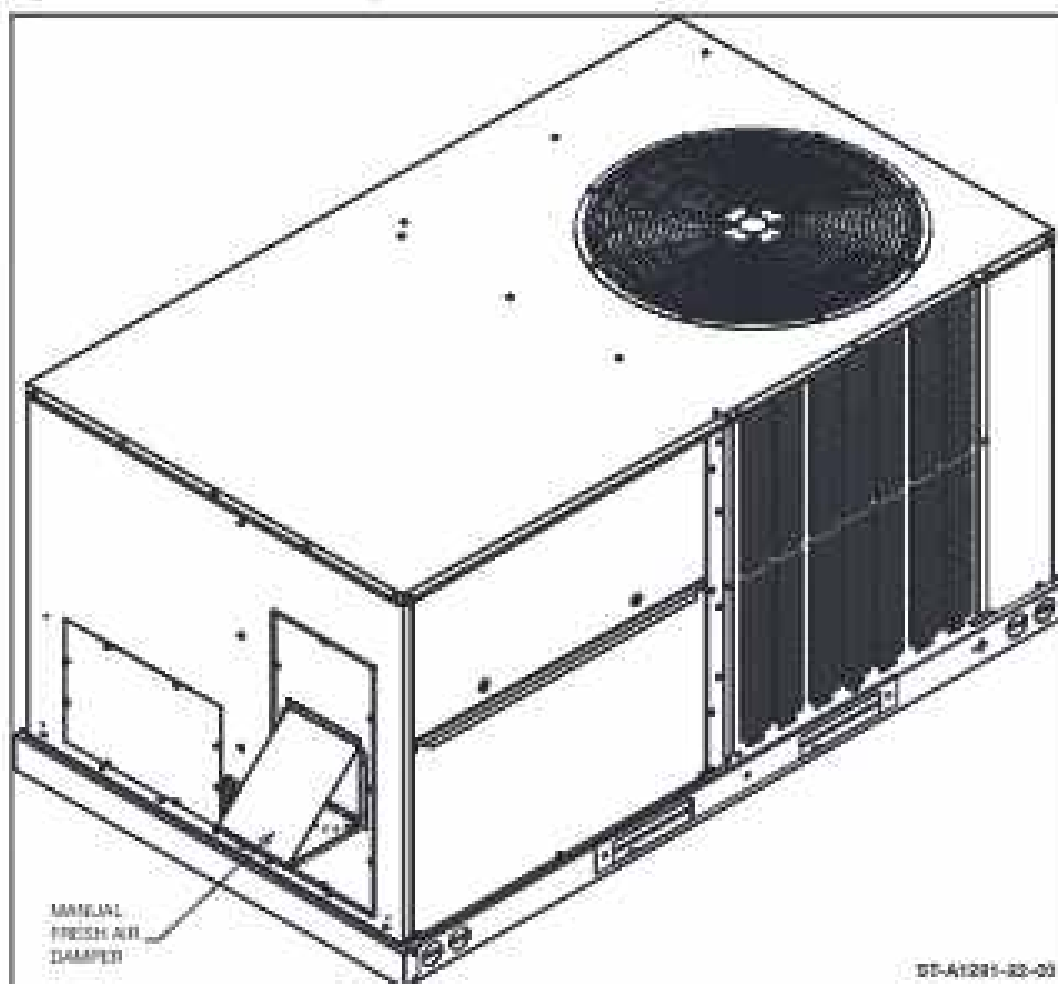
The motorized damper is coupled to an actuator, and designed to open when the RTU fan is running, and close when the fan is off. The advantage of the motorized damper is that the outside air is no longer a factor once the RTU fan is cycled off.

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 dampers, in the box for field installed dampers, or on the manufacturer's website.

Figure D.4.2. – A: Fresh Air Damper

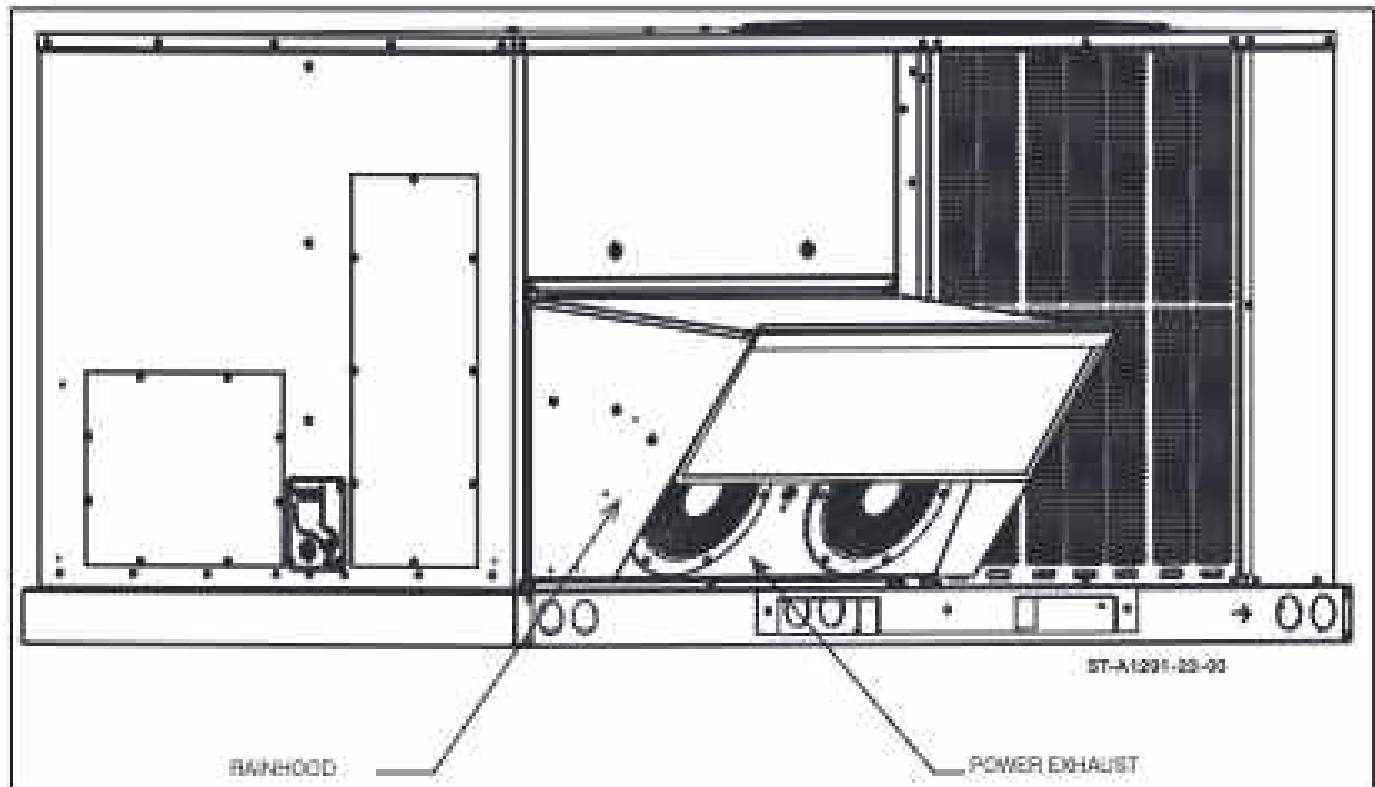


D. DUCT AND VENTING

D.4.3. Powered Exhaust

POWER EXHAUST - This 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.

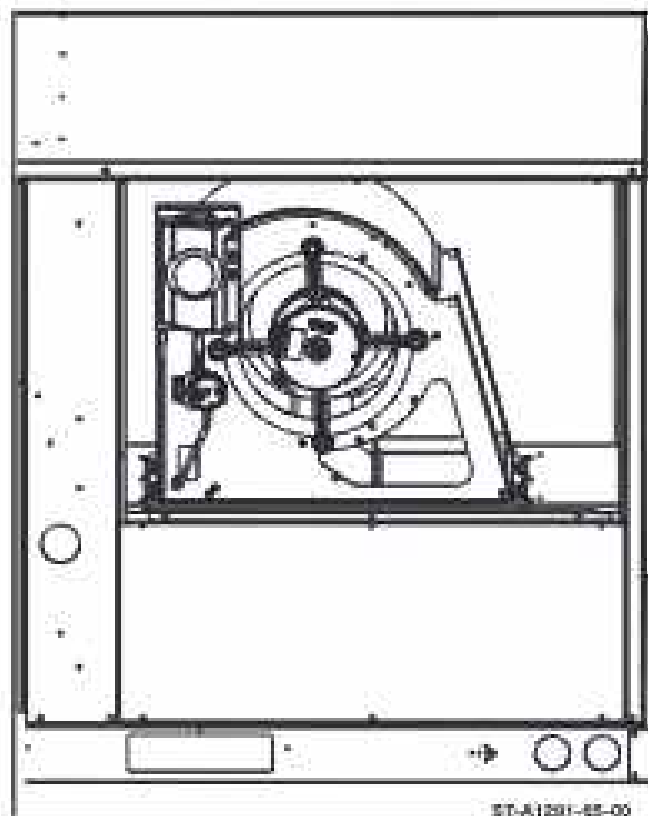
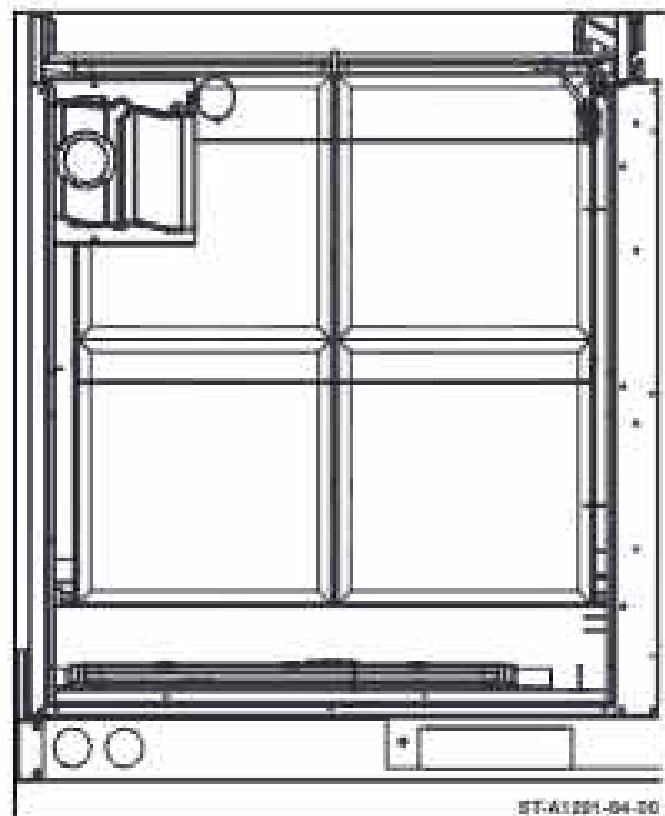
Figure D.4.3. - A: Powered Exhaust



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 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.

Note: Accessory appearance may vary.

D.5.2. Remote Smoke Detectors Reference

Refer to [Section F.1.2-A 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. ELECTRICAL

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 E. – A** from the unit disconnect to unit.

4. For through the base wiring entry reference **Figure F.3. – A: Electrical and Piping 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.2.1. – 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

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 elec heat / single point. See

Appendix E - Heater Kit Characteristics for additional info.

Select the equivalent aluminum wire size from the tabulation below:

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. 208/240 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

Setup for 460V units will not require any additional setup.

E.1.4. 575 Volt Operation

575V operation is not available in this model.

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 contractors, 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.

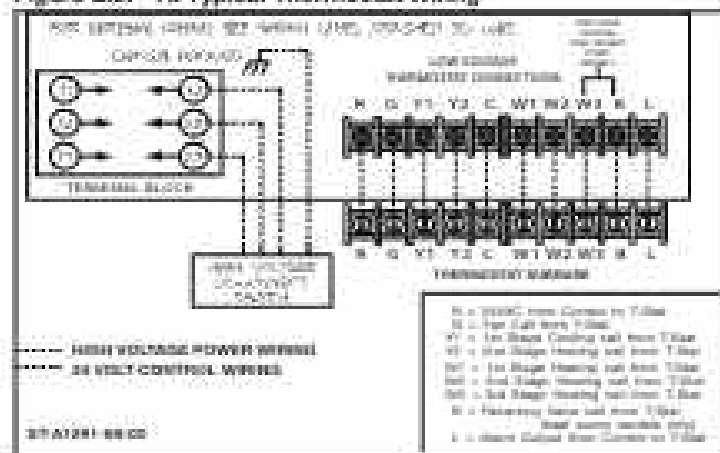
E. ELECTRICAL

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



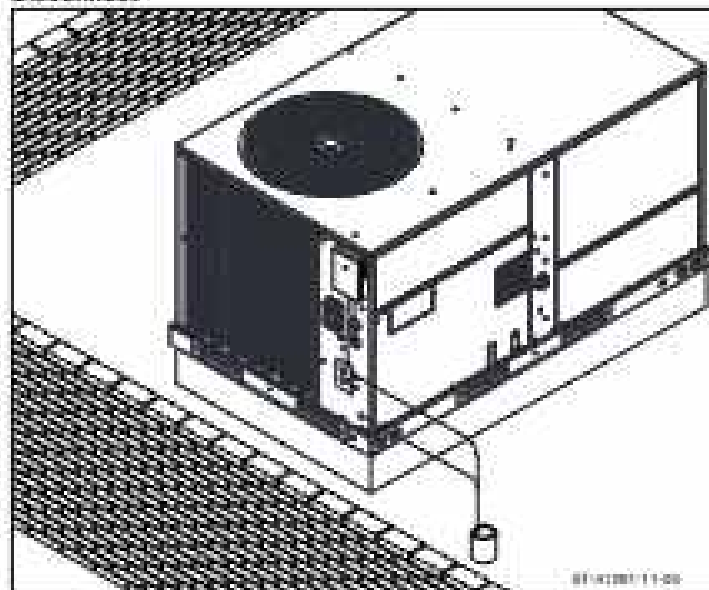
Use to **Appendix B** "Electrical Data" and National Electrical Code for circuit ampacity to determine proper wire sizing.

Refer to *Figure E.3 – A: Power and Control Routing* for location of wiring entrances, and *Figure E.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.

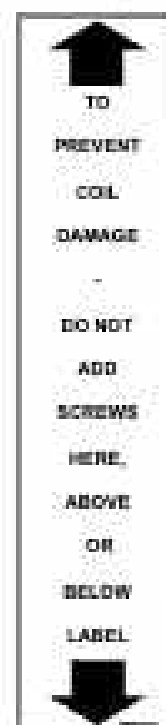
Figure E.3.1.1. – A: Standard Location for Mounting Disconnect



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 E.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 E.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.3.3.2. Powered

The powered convenience outlet, if purchased as an option for the unit, will come shipped pre-installed into the unit. No additional hook-up will be needed, but ensure the connections remained secure from shipping before powering the unit.

For connecting the 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 models equipped with an ECM Direct Drive Blower Motor or 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.

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 E. - A: Field Wire Size for 24v Thermostat Circuits.

F. CONTROL / THERMOSTAT WIRING

F.1. Non-DDC Control Inputs

Figure F.1. – A

		SOLID COPPER WIRE - AWG					
		18	14	12	10	10	10
THERMOSTAT LOAD - AMPS	3.0	18	14	12	10	10	10
	2.5	18	14	12	12	12	10
	2.0	18	16	14	12	12	10
		50	100	150	200	250	300
		LENGTH OF RUN - FEET (F)					

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

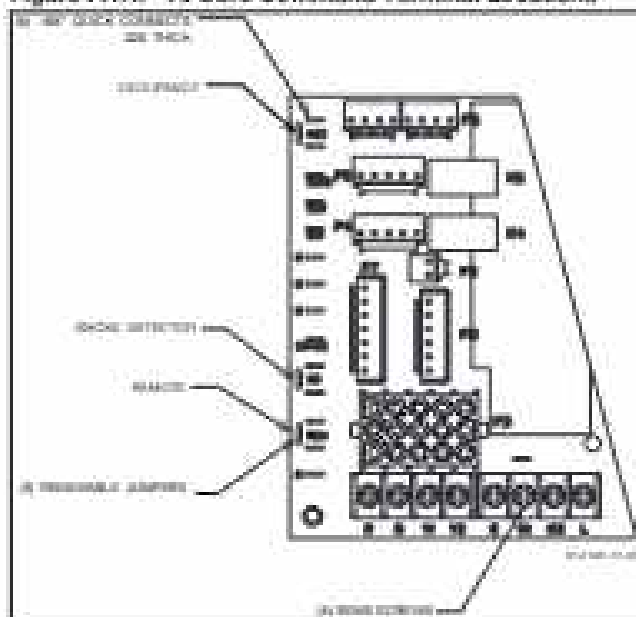
NOTE: DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.

F.1.1. T-Stat field connections

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

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.1.1**, 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.

Figure E.1.1 - A: Core Command Terminal Locations



F.1.2. Occupancy and Remote Smoke Detector Connections

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

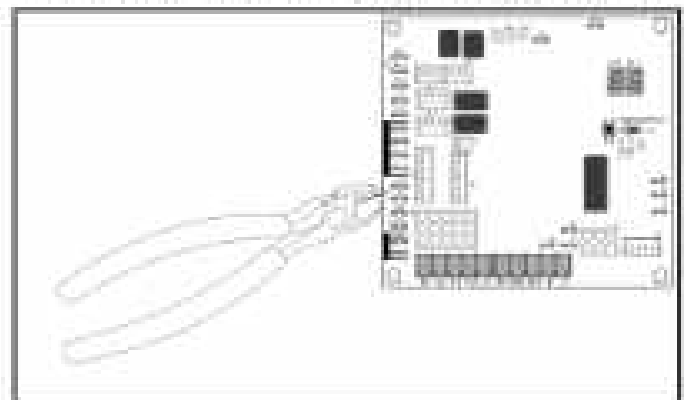


Figure F.1.2 - D: Non-DDC Board

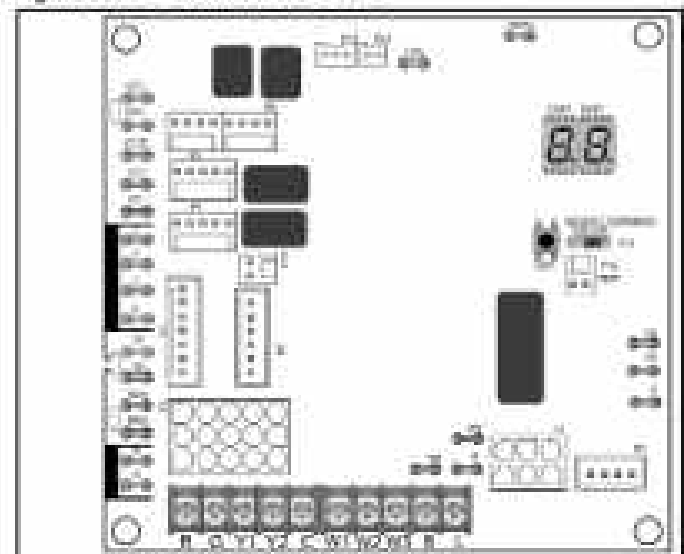
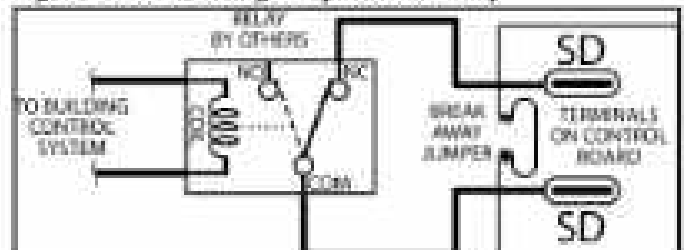


Figure E.1.2 - C: Using a Dry-Contact Relay



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.

F. CONTROL / THERMOSTAT WIRING

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 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 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.

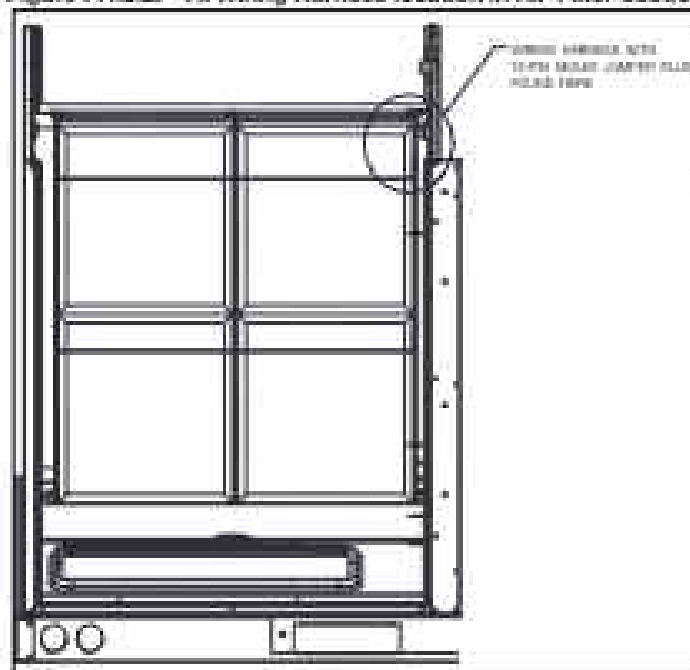
REM – Remote Shutdown Control. This feature allows the unit to be turned off remotely ignoring the thermostat calls for cooling or heat. Locate the terminals at the left side of the board mark “REM”. See [Figure F.1.2 – A: Occupancy and Remote Connections](#) for reference.

Using cutters or a small screw driver, break the edge of the board between the 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.1.3.2. 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.1.3.2 – 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.

Figure F.1.3.2 – A: Wiring Harness location in Air-Filter Section



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 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 Switch. Do not connect multiple control boards to the same dry contact relay or switch.

F.1.4. 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. CONTROL / THERMOSTAT WIRING

F.2. DDC Control Inputs

Figure F.2.1. - A 24VAC Thermostat Circuits

FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS						
THERMOSTAT LOAD - AMPS	BULB COPPER WIRE - AWG					
	90	14	12	10	10	10
	90	14	12	12	12	10
	90	14	14	12	12	10
THERMOSTAT LOAD - AMPS	90	14	14	12	12	10
	90	14	14	12	12	10
LENGTH OF WIRE - FEET (M)						
	50	100	150	200	250	300

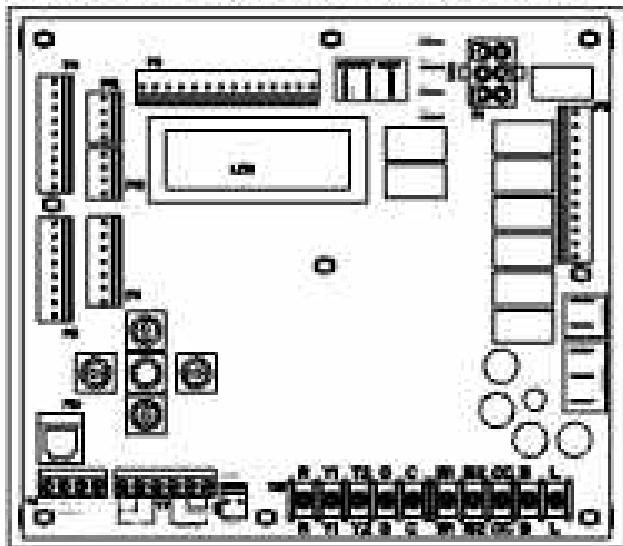
10 THE TOTAL LENGTH OF THE WIRE FROM THE THERMOSTAT TO THE THERMOSTAT AND BACK TO THE THERMOSTAT

NOTE: DO NOT USE CONTROL WIRE SMALLER THAN NO. 14 AWG.

F.2.1. 24VAC Thermostat Control/Operation

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.

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



F.2.2. DDC Automated Stand-Alone Operation.

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 - will only run 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. Indoor Fan Mode**.

F. CONTROL / THERMOSTAT WIRING

- 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 continuously 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

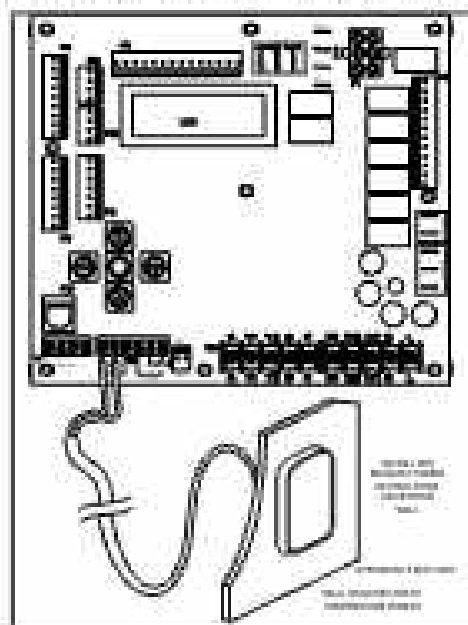
There are two temperature setpoints for occupied and unoccupied modes, heating and cooling. Using the control board’s navigation buttons, proceed to the Setpoints Menu and use the down arrow key to select “occupied or unoccupied cool and heat setpoints.” Press the middle button to select the first setpoint and use the up and down arrow 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.2.3. External Sensor Connections

F.2.3.1. Space Temperature Sensor

Figure F.2.3.1. - A: Space Temperature Sensor



F. CONTROL / THERMOSTAT WIRING

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, 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.

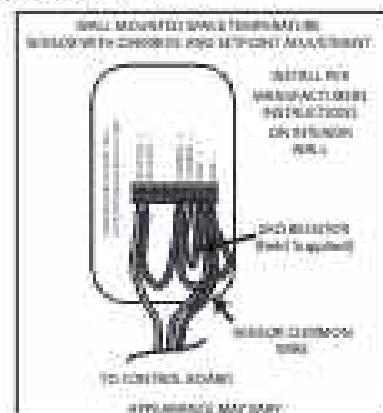
9. If the Clear Control is in the control by Thermostat Mode, the Space Temperature sensor will not be used for the operation of the unit.

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.

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



F. CONTROL / THERMOSTAT WIRING

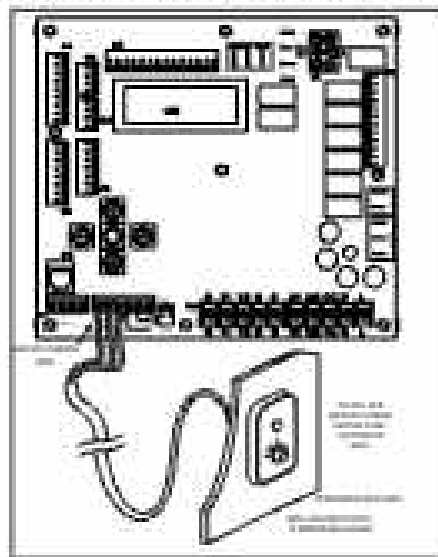
F.2.3.3. Set-Point Adjustment

In an Automatic Operation Mode or controlled by a BMS, a zone sensor with a setpoint adjustment is can be 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 or 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.
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. CONTROL / THERMOSTAT WIRING

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 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 to select Smoke Options. These options will change the operation as follows:

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

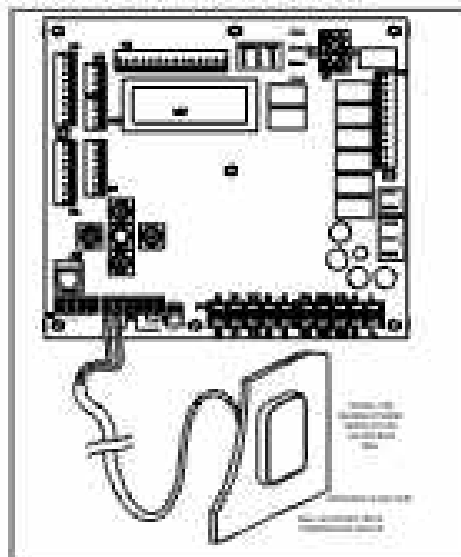
Pressurize - Ramps the VFD to full speed, opens the economizer up 100%, stops all heating and cooling functions.

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.

Figure F.2.3.5. - A: Remote Duct Sensor



F. CONTROL / THERMOSTAT WIRING

F.2.5.1. Factory Smoke Detector Kit

If a field or factory installed factory 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.2.5.2. - A: Wiring Harness location in Air-Filter Section

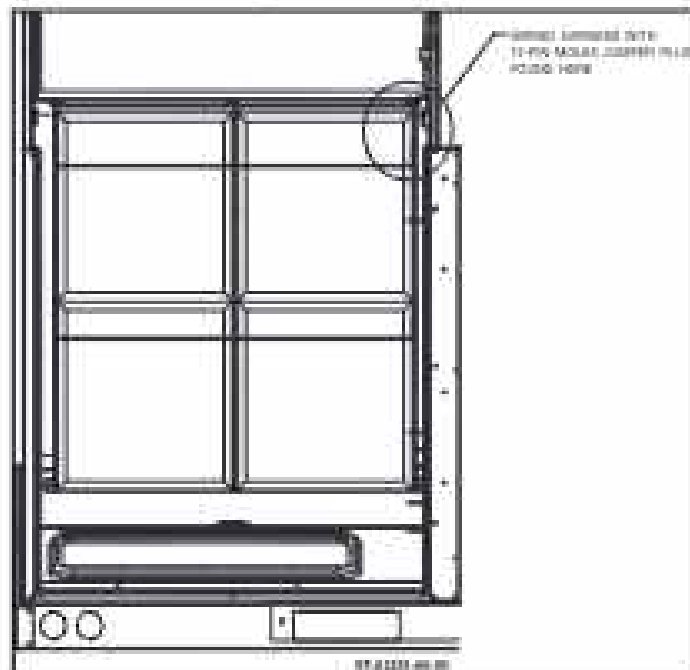
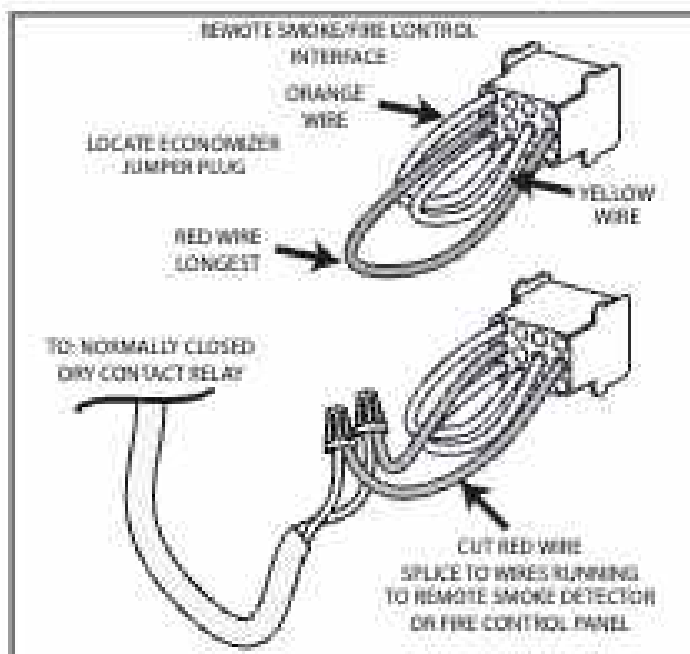


Figure F.2.5.2. - B: Smoke Detector Connection (DDC)



F. CONTROL / THERMOSTAT WIRING

F.3. Routing Control wiring

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

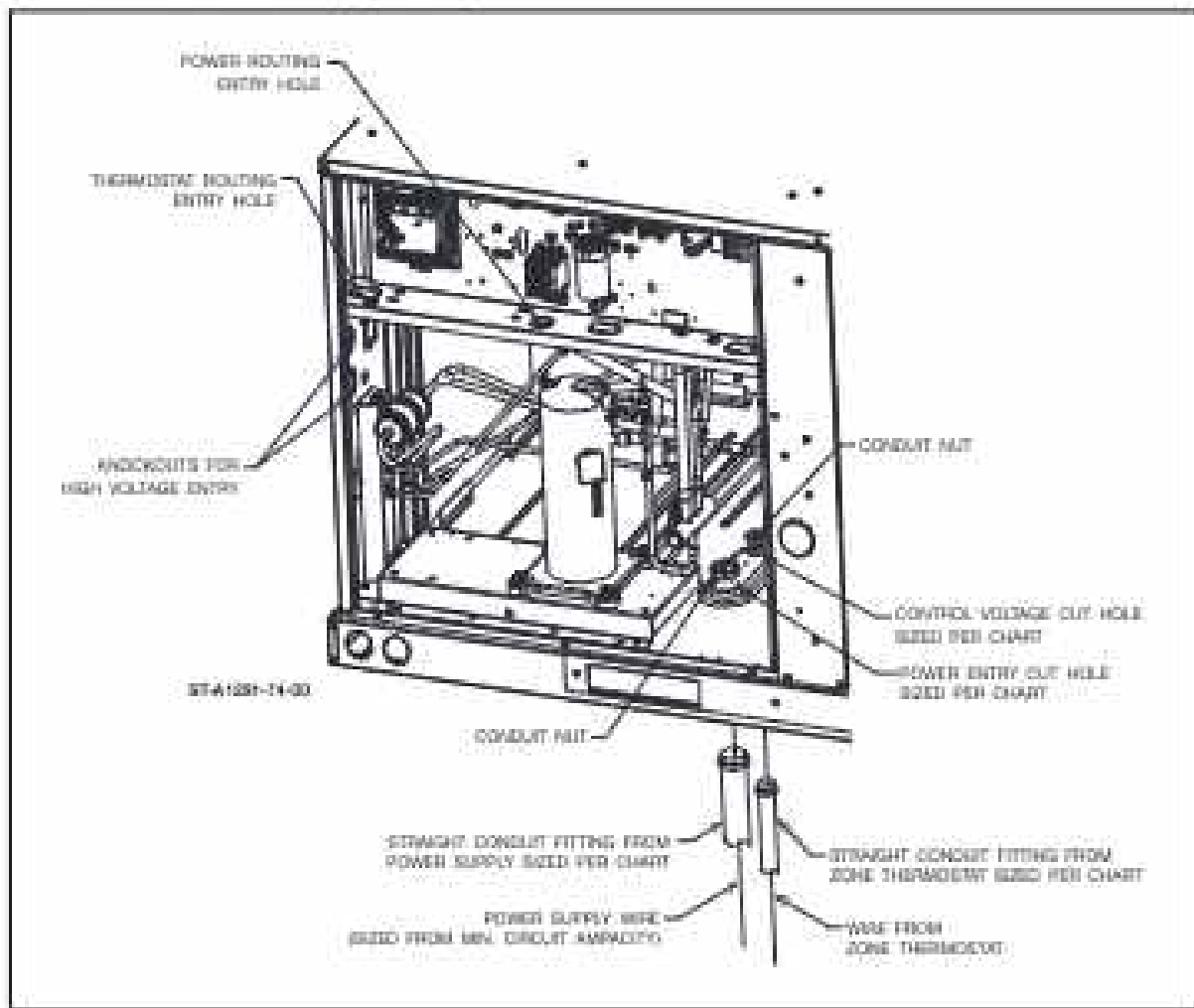


Figure F.3. – B: Hole Sizing for Conduit

	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"	1"	1 1/8"	1-3/16"	1-23/64"	1-23/64"	1-21/32"	1-25/32"	1-31/32"	1-31/32"	2-15/16"	2-15/16"

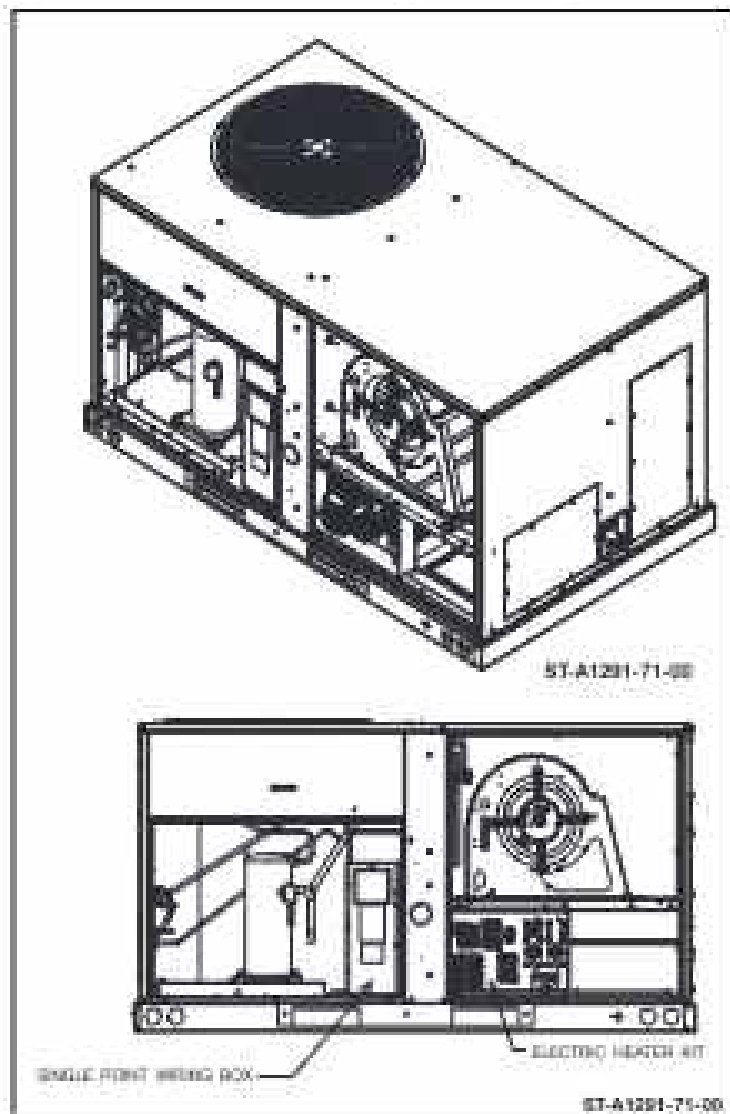
NOTES: 1. DETERMINE REQUIRED WIRE SIZE FROM MINIMUM CIRCUIT AMPLACITY SHOWN IN INSTALLATION & OPERATING INSTRUCTION.
 2. BOTTOM POWER ENTRY WILL NOT ACCOMMODATE WIRE LARGER THAN 10 AWG (SHADED AREA).

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.

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 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 R454-B. Before use, ensure that the detector is not 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

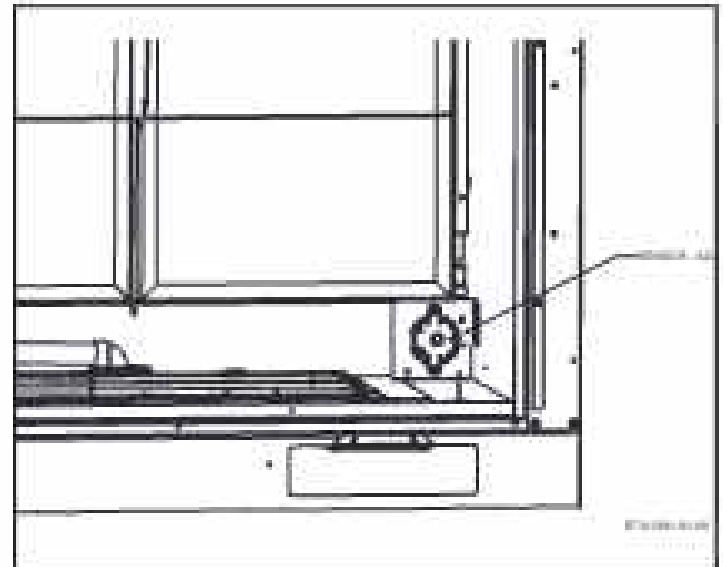
The refrigerant leak detection system will continuously monitor the air for a refrigerant leak. If the leak detection system detects a leak, the system will begin mitigation procedures: the blower will turn on and the compressors will shut down. Note: Gas or electric heat functions may continue during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

Figure J.1.1.1. - A: A2L Sensor Location shows the location of the sensor on the bracket in the filter compartment.

Please note that the sensor is mounted on the backside of the bracket, facing the filters.

Figure J.1.1.1. - A: 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:

- Energize the fan(s) of the appliance to deliver indoor airflow at or above the minimum airflow. See [Appendix F—A2L Refrigerant Installation Safety Data](#).
 - The fans will be energized following the input signal to turn on the fan(s).
- The system de-energizes compressor operation.
- 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 DDC units, user-selectable Fan Off Delay will remain in effect after the A2L sensor triggers the mitigation procedure.

J. STARTUP AND OPERATION

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, 1/2 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 pumps 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 any 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.
 - b. 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.

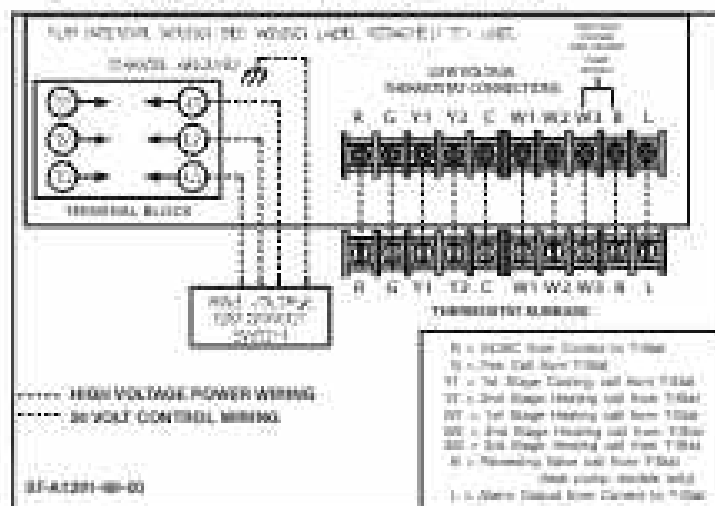
J.1.3. Check Electrical Connections For Proper Torque

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

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. STARTUP AND OPERATION

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 misc 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 all the internal and field wiring will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects, 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

As a reminder, all units with an ECM-drive blower motor will have the correct rotation even if the phase to the unit is wired incorrectly. 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 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

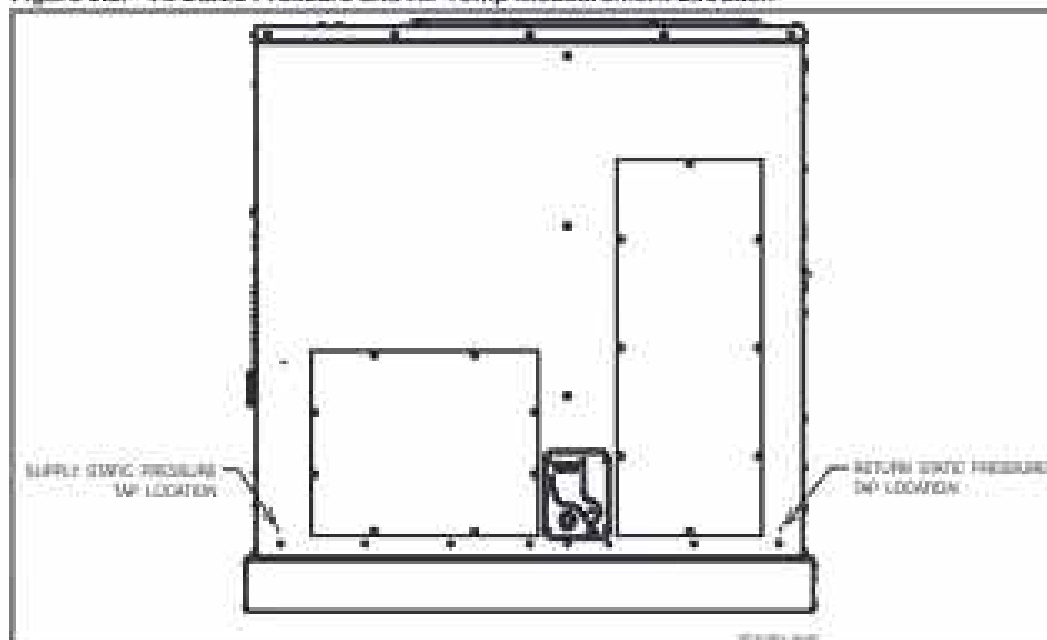
Use a voltmeter to measure the low voltage and low voltage amp draws during operation. Accessories such as remote smoke detectors and excessive wire length can increase the amp draw on the low voltage wiring. Verify that the total amp draw on the 24VAC side is less than 0.3A in full operation. Refer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

J. STARTUP AND OPERATION

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](#).

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



J.3.1. Static Pressures and Measurements

- To measure the static pressure of the system, locate 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 water 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.

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. - 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 airflow, against the measured static pressures and number of turns on the adjustable blower sheave. Verify the measured air flow against the charts.

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

J. STARTUP AND OPERATION

Figure J.3.2 - A: How to Increase Airflow for All Single-Stage Units

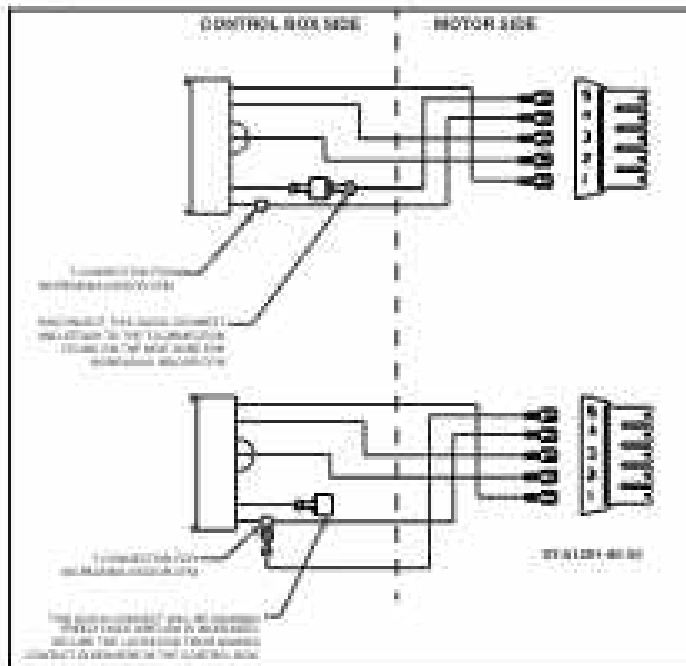
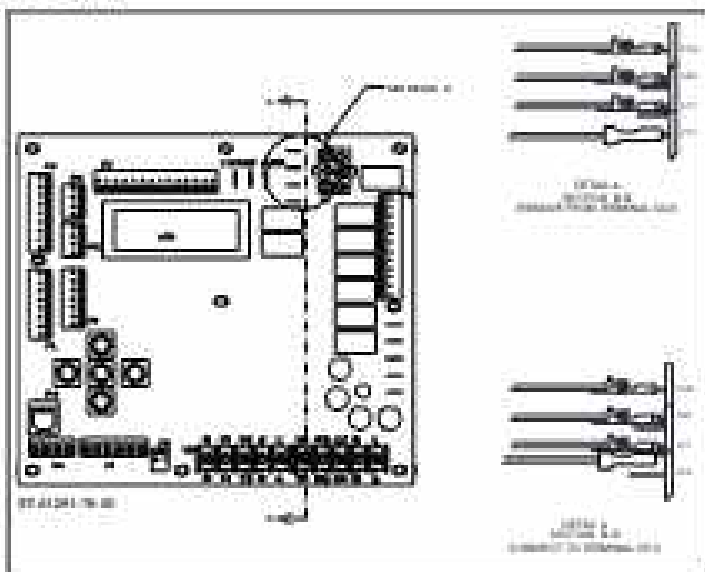


Figure J.3.2 - B: How to Increase Airflow for 3 to 5 ton DDC Units



J.3.2.2. 6 ton Models - High or Low Static Drive

This adjustment only affects the fan speed during second stage cooling operation, and does not change the airflow for fan only, any heating stage, or the first stage cooling call.

For non-DDC units, the unit ships standard with the purple wire with a quick-connect toward the control board-end of the harness, disconnected.

If more airflow is needed, attach the purple wire to the T-connection on the orange wire (wire 607). Refer to [Figure J.3.2-C](#).

For DDC units, the unit ships standard with the purple wire with a quick connect toward the control board-end of the harness, disconnected.

If more airflow is needed, connect the purple wire to the piggyback connection of the orange wire on CC2. Refer to [Figure J.3.2-D](#).

Figure J.3.2 - C: How to Increase Airflow for All Two-Stage Units

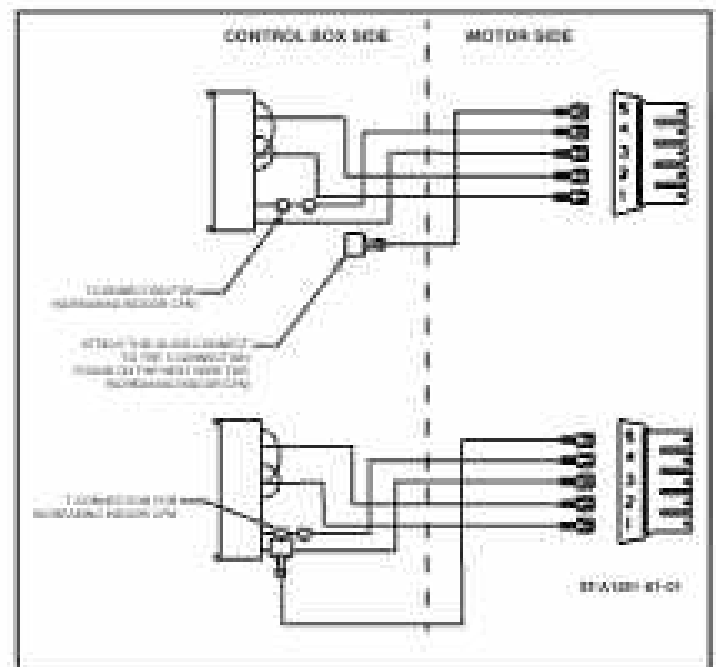
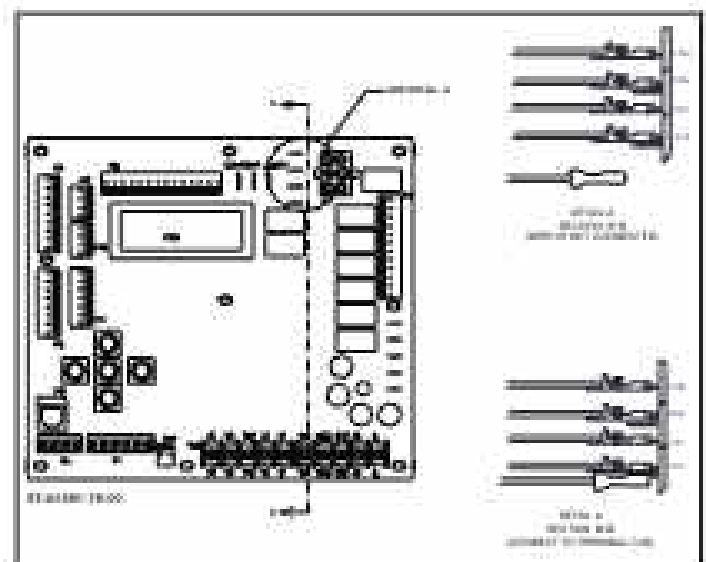


Figure J.3.2 - D: How to Increase Airflow for 6 ton DDC Units



J. STARTUP AND OPERATION

J.3.2.3. Adjusting Fresh Air Flow with Economizer

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

J.3.2.4. 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 damper for more information on adjusting airflow. Refer to local building codes for any fresh air requirements.

J.4. Checking Cooling Operation

Note: In the below section, first and second stage cooling applies to ONLY the 6 ton units. For 3-5T units, only first stage applies.

COOLING SEQUENCE OF OPERATION

A. Call for cooling

1. The zone thermostat contacts close, and a call for cooling is initiated.
2. Inputs 'Y1' and 'G' to the control are energized.
3. The control senses input to 'Y1' and 'G'. After a 1sec delay, the control energizes both the indoor blower and first stage compressor.
4. The control enters 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 "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 1sec 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 "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 compressor anti-short cycle delay timer. To bypass the time delay, press the SW1 button with an insulated probe for 1sec and then release.

FAULT RECALL OPERATION for non-DDC units

To enter FAULT RECALL mode, press the SW1 button with an insulated probe for 2sec 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 5sec and release. The top and bottom segments of the 7-segment display will be activated and flash to indicate the history has been cleared.

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 information.

J. STARTUP AND OPERATION

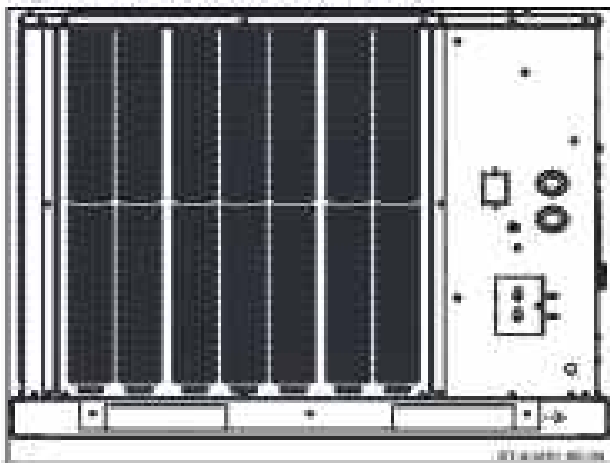
J.4.1. Checking Refrigerant Pressures

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.

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

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

Figure J.4.1. -A: Service Port Location



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.

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 the 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. STARTUP AND OPERATION

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.

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.

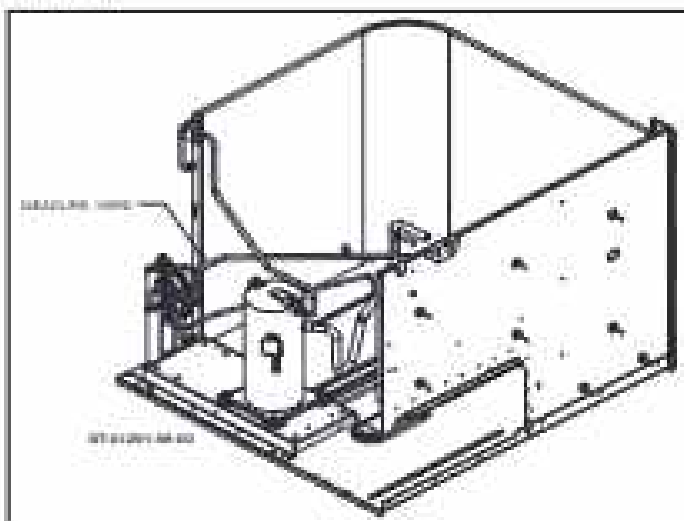
Measuring line temperature:

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.

J.4.3. Measuring Compressor Electrical Loads

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

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



J. STARTUP AND OPERATION

J.5. 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.5.1. Heating Mode

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.5.2. 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.

J. STARTUP AND OPERATION

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.

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 low pressure control opens and will start again when the low side pressure rises to approximately 40 psig when the low pressure control automatically resets. 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 compressor and outdoor fan operation. If the lock-out due to low pressure occurs at an outdoor ambient temperature below 5°F, the defrost control will automatically exit the lock-out mode when 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.

Exiting Lock-Out Mode: To exit the lock-out mode, remove 24 volts to the defrost control by removing power to the unit or by shorting the two defrost control pins together.

J. STARTUP AND OPERATION

DIAGNOSTIC CODES

SENSOR TEMPERATURE VS. RESISTANCE

LED 1	LED 2	Control Board Status
OFF	OFF	No Power
ON	ON	Coil Sensor Failure
OFF	ON	Ambient Sensor Failure
FLASH	FLASH	Normal
OFF	FLASH	Low Pressure Lockout (short test pins to reset)
FLASH	OFF	High Pressure Lockout (short test pins to reset)
ON	FLASH	Low Pressure Control Open
FLASH	ON	High Pressure Control Open
Alternate Flashing		5 Minute Time Delay

TABLE REPLACEMENT PARTS

Degrees C	Degrees F	Ohms
-20	-4	98,974
-10	14	55,298
0	32	32,650
10	50	19,803
20	68	12,493
25	77	10,000
30	86	8,058
40	104	5,324

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:

1. Ensure all electrical components in this system are approved by the manufacturer.
2. Confirm the actual refrigerant charge complies with the minimum room size requirements outlined in Appendix H. A2L Refrigerant Installation Safety Data
3. Ensure that the ventilation machinery and outlets are operating correctly and are not obstructed.
4. If an indirect refrigerant circuit is being used, the secondary circuit must be checked for the presence of refrigerant.
5. Ensure that all the equipment labels and markings are visible and legible. Markings, labels, and signs that are illegible must be corrected.
6. 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.

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 3-5 Ton Units

See Section J.3.2. Air Flow Measurements and Adjustments on how to increase the blower speed and increase airflow for the 3-5T units.

K.2.2. Blower Motor Controller for 5 ton High Static 460V and all 6 ton units.

See Section J.3.2. Air Flow Measurements and Adjustments on how to increase the blower speed and increase airflow on the 5 Ton High Static 460V and 6 Ton units that use a Blower Motor Controller.

K.2.3. 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. The part numbers for these instructions are listed in section D.4.1. Economizer Information.

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 - Failed contactor - Blown fuse - 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 fuse - Check wiring-replace transformer - Reset-size low high head pressure correctly. The high pressure control opens at 450 PSIG - Replace thermostat wiring
Condenser fan runs, compressor doesn't	- Loose connection - Compressor stuck, grounded or open motor winding open internal overload - Low voltage condition - Low voltage condition	- 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 volts when unit is operating - Add start kit components
Insufficient cooling	- Improperly sized unit - Improper setpoint - Incorrect refrigerant charge - Air not condensable or moisture in system - Incorrect voltage	- Recalculate load - Check - should be approximately 450 CFM 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 volts when unit is operating
Compressor short cycles	- Incorrect voltage - Defective overload protector - Refrigerant undercharge	- At compressor terminals, voltage must be a 10% of nameplate rating when unit is operating - Replace - check for correct voltage - Add refrigerant
Refrigerant sweet	Low evaporator airflow	Increase speed of blower or reduce restriction - replace air filter
High head-low vapor pressure	- Restriction in liquid line, expansion device or filter drier - Flare check patch size too small - Incorrect capillary tubes - TXV does not open	- Remove or replace defective component - Change to correct size patch - Change coil assembly - Replace TXV
High head-high or normal vapor pressure - Cooling mode	- Dirty condenser coil - Refrigerant overcharge - Condenser fan not running - Air not condensable in system	- Clean coil - Correct system charge - Repair or replace - Recover refrigerant, evacuate & recharge
Low head-high vapor pressure	- Defective Compressor valves - Incorrect capillary tubes	- Replace compressor - Replace coil assembly
Low vapor - cool compressor - coil evaporator coil	- Low evaporator airflow - Operating below 60°F outdoor - Moisture in system	- Increase speed of blower or reduce restriction - replace air filter - Add Low Ambient Kit - Recover refrigerant - evacuate & recharge - add filter drier
High vapor pressure	- Excessive load - Defective compressor	- Recheck load calculation - Replace
Fluctuating head & vapor pressure	- TXV hunting - Air not condensable in system	- Check TXV bulb clamp - check air distribution in coil - replace TXV - Recover refrigerant, evacuate & recharge
Gurgling or pulsing noises at expansion device or liquid line	Air not condensable 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 Coding - 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-Occ	Problem
84	Outdoor Air Temperature Sensor Fail-Occ	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	
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	
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	

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	
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.	
83	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	MRLO (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.3. Common Mistakes

- These are 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 5-HPCTO Series	0060CT 0060ST 0060JT	0060MT	0060OT
Cooling Performance¹			
Rated Cooling Capacity (Btu (kW))	36,000 (10.50)	36,000 (10.50)	36,000 (10.50)
SEER ²	10.5	10.5	10.5
CEEF ³	13.4	13.4	13.4
Nominal CFM (L/s)	1000 (290)	1000 (290)	1000 (290)
AWS Rated CFM (L/s)	1175 (330)	1175 (330)	1175 (330)
AWS Net Cooling Capacity (Btu (kW))	34000 (10.00)	34000 (10.00)	34000 (10.00)
Net Sensible Capacity (Btu (kW))	25000 (7.3)	25000 (7.3)	25000 (7.3)
Net Latent Capacity (Btu (kW))	8000 (2.32)	8000 (2.32)	8000 (2.32)
Net System Power (kW)	3.2	3.2	3.2
Heating Performance (Heat Pumps)			
High Temp. Heat (kW) Rating	34000 (10.00)	34000 (10.00)	34000 (10.00)
System Power (kW) / COP	2.58/3.8	2.58/3.8	2.58/3.8
Low Temp. Heat (kW) Rating	21000 (6.13)	21000 (6.13)	21000 (6.13)
System Power (kW) / COP	2.58/2.5	2.58/2.5	2.58/2.5
HPF ⁴ (Btu/kWh) (kJ)	6.7	6.7	6.7
Compressor			
No. Type	1/Scroll	1/Scroll	1/Scroll
No. Stages	1	1	1
Outdoor Cond. Rating (BTU)⁵			
Outdoor Coil – Fin Type			
Coil Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth (in) (mm)	0.03 (1.0)	0.03 (1.0)	0.03 (1.0)
Fins Per Inch (FPI) (F/In)	15.75 (1.40)	15.75 (1.40)	15.75 (1.40)
Flow / FPI (F/In)	1 / 15.75	1 / 15.75	1 / 15.75
Refrigerant Control	TX Values	TX Values	TX Values
Indoor Coil – Fin Type			
Coil Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth (in) (mm)	1.00 (25.4)	1.00 (25.4)	1.00 (25.4)
Fins Per Inch (FPI) (F/In)	7.48 (3.7)	7.48 (3.7)	7.48 (3.7)
Flow / FPI (F/In)	1 / 7.48	1 / 7.48	1 / 7.48
Refrigerant Control	TX Values	TX Values	TX Values
Coil Connection (in) (mm)	1/2 (12.7) (19.05)	1/2 (12.7) (19.05)	1/2 (12.7) (19.05)
Outdoor Fan – Type			
No. Speed/Revolutions (in) (mm)	1/20 (508.4)	1/20 (508.4)	1/20 (508.4)
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1
CFM (L/s)	5100 (240.7)	5100 (240.7)	5100 (240.7)
No. Motors/HP	1 at 1/2 HP	1 at 1/2 HP	1 at 1/2 HP
Motor RPM	800	800	800
Indoor Fan – Type			
No. Speed/Revolutions (in) (mm)	1/11 (274.32)	1/11 (274.32)	1/11 (274.32)
Drive Type	Direct	Direct	Direct
No. Speeds	Multiple	Multiple	Multiple
No. Motors	1	1	1
Motor HP	3/4	1 1/2	1
Motor RPM	1000	1000	1000
Motor Frame Size	40	40	40
Filter – Type			
Function	Disposable	Disposable	Disposable
Function	No	No	No
CFM (L/s) Recommended (in) (mm)	400/100 (11.31) (284.48)	400/100 (11.31) (284.48)	400/100 (11.31) (284.48)
Refrigerant Charge (lb. (kg))			
R410A (R32)			
Weights			
Net Weight (lb. (kg))	500 (220)	500 (220)	500 (220)
Gross Weight (lb. (kg))	570 (240)	570 (240)	570 (240)

P. APPENDICES

Appendix A – General Product Data

Model (–)HPONE Series	00AA01 00AA01 00AA01	00AA02	00AA03
Cooling Performance			
Quick Cooling Capacity (kW)	48000 (14.07)	48000 (14.07)	48000 (14.07)
SEER	13.5	13.5	13.5
SEER2	13.4	13.4	13.4
Rated COP (LHV)	10.80 (7.00)	10.80 (7.00)	10.80 (7.00)
A/E Ratio (kW / LHV)	1400 (800)	1400 (800)	1400 (800)
A/E Ratio Cooling Capacity (kW / kW)	40000 (13.34)	40000 (13.34)	40000 (13.34)
Net Sensible Capacity (kW)	34000 (10.00)	34000 (10.00)	34000 (10.00)
Net Latent Capacity (kW)	11000 (3.21)	11000 (3.21)	11000 (3.21)
Net System Power (kW)	4.2	4.2	4.2
Heating Performance (Heat Pumps)			
High Temp. Heat (kW) Heating	48000 (13.34)	48000 (13.34)	48000 (13.34)
System Power (kW) / COP	3.00 (3.4)	3.00 (3.4)	3.00 (3.4)
Low Temp. Heat (kW) Heating	38000 (10.8)	38000 (10.8)	38000 (10.8)
System Power (kW) / COP	3.04 (3.2)	3.04 (3.2)	3.04 (3.2)
COP2 (kW/kWh in)	6.7	6.7	6.7
Compressor			
No. Type	1 (Scroll)	1 (Scroll)	1 (Scroll)
No. Stages	1	1	1
Outdoor Sound Rating (dB)			
	85	85	85
Outdoor Coil - Pin Type			
Tube Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth (in.) (mm)	1.20 (32)	1.20 (32)	1.20 (32)
Pads/Rows (in.) (mm)	15.50 (395)	15.50 (395)	15.50 (395)
Rows / FT (Rows)	1 / 10 (30)	1 / 10 (30)	1 / 10 (30)
Refrigerant Control	TX Valves	TX Valves	TX Valves
Indoor Coil - Pin Type			
Tube Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth (in.) (mm)	1.20 (32)	1.20 (32)	1.20 (32)
Pads/Rows (in.) (mm)	7.75 (200)	7.75 (200)	7.75 (200)
Rows / FT (Rows)	1 / 30 (30)	1 / 30 (30)	1 / 30 (30)
Refrigerant Control	TX Valves	TX Valves	TX Valves
Drain Connection (in.) (mm)	1/2 (12.7) (12.7)	1/2 (12.7) (12.7)	1/2 (12.7) (12.7)
Outdoor Fan - Type			
No. Size/Diameter (in.) (mm)	1.00 (254.0)	1.00 (254.0)	1.00 (254.0)
Drive Type/Rev. Speed	Direct/1	Direct/1	Direct/1
CFM (L/s)	3000 (2794)	3000 (2794)	3000 (2794)
No. Motor/HP	1 at 1.0 HP	1 at 1.0 HP	1 at 1.0 HP
Motor RPM	1075	1075	1075
Indoor Fan - Type			
No. Size/Diameter (in.) (mm)	1.1 (1.1) (279.4mm)	1.1 (1.1) (279.4mm)	1.1 (1.1) (279.4mm)
Drive Type	Direct	Direct	Direct
No. Motors	Multiple	Multiple	Multiple
No. Motors	1	1	1
Motor HP	3/4	1 (1.0)	1
Motor RPM	1000	1000	1000
Motor Power (kW)	40	40	40
Filter - Type			
Filter Type	Disposable	Disposable	Disposable
Particulate	Yes	Yes	Yes
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Appendix A – General Product Data

Model E-40F10 Series	000A07 000A07 000A17	000A03	000A00
Cooling Performance¹			
Gross Cooling Capacity Btu (kW)	30000 (17.34)	30000 (17.34)	30000 (17.34)
SEER ²	13.0	13.0	13.0
SEER2	13.4	13.4	13.4
Normal CFM (L/s)	2000 (944)	2000 (944)	2000 (944)
AHRI Gross CFM (L/s)	1500 (708)	1500 (708)	1500 (708)
AHRI Net Cooling Capacity Btu (kW)	30000 (17.37)	30000 (17.37)	30000 (17.37)
Net Sensible Capacity Btu (kW)	40000 (12.3)	40000 (12.3)	40000 (12.3)
Net Latent Capacity Btu (kW)	14000 (4.1)	14000 (4.1)	14000 (4.1)
Net Suction Power kW	5.4	5.4	5.4
Heating Performance (Heat Pumps)			
High Temp. (Btu (kW) Heating)	30000 (18.77)	30000 (18.77)	30000 (18.77)
System Power kW (EER)	4.402.3	4.402.3	4.402.3
Low Temp. (Btu (kW) Heating)	30000 (7.08)	30000 (7.08)	30000 (7.08)
System Power kW (EER)	3.3402.3	3.3402.3	3.3402.3
HEATING (Btu (kW) Heating)	8.7	8.7	8.7
Compressor			
No./Type	1 (Scroll)	1 (Scroll)	1 (Scroll)
No. Stages	1	1	1
Outdoor Sound Rating (dB)³			
Outdoor Coil – Fin Type	Lowest dB	Lowest dB	Lowest dB
Tube Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. (mm)	1.26 (32)	1.26 (32)	1.26 (32)
Face Area sq. ft. (sq. m)	18.52 (1.44)	18.52 (1.44)	18.52 (1.44)
Head / FPM (F/min)	1 / 10 (3)	1 / 10 (3)	1 / 10 (3)
Refrigerant Control	TX Valve	TX Valve	TX Valve
Indoor Coil – Fin Type	Lowest dB	Lowest dB	Lowest dB
Tube Type	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. (mm)	1.26 (32)	1.26 (32)	1.26 (32)
Face Area sq. ft. (sq. m)	7.13 (0.7)	7.13 (0.7)	7.13 (0.7)
Head / FPM (F/min)	1 / 20 (3)	1 / 20 (3)	1 / 20 (3)
Refrigerant Control	TX Valve	TX Valve	TX Valve
Grade Connection No. (Line in. (mm))	1/8 (3.18) (3/8) (9.52)	1/8 (3.18) (3/8) (9.52)	1/8 (3.18) (3/8) (9.52)
Outdoor Fan – Type			
Propeller	Propeller	Propeller	Propeller
No. Blade/Blades in. (mm)	1.08 (800.4)	1.08 (800.4)	1.08 (800.4)
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1
CFM (L/s)	3000 (2764)	3000 (2764)	3000 (2764)
No. Motor HP	1 at 1/2 HP	1 at 1/2 HP	1 at 1/2 HP
Motor RPM	1075	1075	1075
Indoor Fan – Type			
EC Centrifugal	EC Centrifugal	EC Centrifugal	EC Centrifugal
No. Blade/Blades in. (mm)	1.11 (871) (2764) (276)	1.11 (871) (2764) (276)	1.11 (871) (2764) (276)
Drive Type	Direct	Direct	Direct
No. Speeds	Multiple	Multiple	Multiple
No. Motors	1	1	1
Motor HP	1	1 1/2	1 1/2
Motor RPM	1000	1000	1000
Motor Frame Size	40	40	40
Filter – Type			
Disposable	Disposable	Disposable	Disposable
Flangeless	Yes	Yes	Yes
(d) (2) Fan Recommended in. (mm) x mm x mm	(40) (1016) (21) (533) (40)	(40) (1016) (21) (533) (40)	(40) (1016) (21) (533) (40)
Refrigerant Charge Gt. (g)			
140 (4130)	140 (4130)	140 (4130)	140 (4130)
Weights			
Net Weight lbs. (kg)	380 (149)	380 (149)	380 (149)
Ship Weight lbs. (kg)	440 (200)	440 (200)	440 (200)

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Appendix A – General Product Data

Model (HFC120 Series)	RT2A2T	RT2A2D	RT2A2DT	RT2A2DR
Cooling Performance¹				
Gross Cooling Capacity (kW (kW))	72,000 (21.11)	72,000 (21.11)	72,000 (21.11)	72,000 (21.11)
SEER	11	11	11	11
EER	14.1	14.1	14.1	14.1
Nominal CFM (L/s)	2400 (1133)	2400 (1133)	2400 (1133)	2400 (1133)
AMV (Nom) CFM (L/s)	2300 (1114)	2300 (1114)	2300 (1114)	2300 (1114)
AMV (Net Cooling Capacity (kW (kW))	69000 (20.08)	69000 (20.08)	69000 (20.08)	69000 (20.08)
Net Sensible Capacity (kW (kW))	51000 (15.00)	51000 (15.00)	51000 (15.00)	51000 (15.00)
Net Latent Capacity (kW (kW))	17000 (4.98)	17000 (4.98)	17000 (4.98)	17000 (4.98)
Net System Power (kW)	6.78 (1.9)	6.78 (1.9)	6.78 (1.9)	6.78 (1.9)
Heating Performance (Heat Pumps)				
High Temp. Output (kW (kW))	69000 (19.83)	69000 (19.83)	69000 (19.83)	69000 (19.83)
System Power (kW / COP)	5.86 (3.4)	5.86 (3.4)	5.86 (3.4)	5.86 (3.4)
Low Temp. Output (kW (kW))	38000 (11.20)	38000 (11.20)	38000 (11.20)	38000 (11.20)
System Power (kW / COP)	5.87 (2.25)	5.87 (2.25)	5.87 (2.25)	5.87 (2.25)
HCFC (lb/oz/kg)	0.6	0.6	0.6	0.6
Compressor				
Ref / Type	1/20-40	1/20-40	1/20-40	1/20-40
Ref. Stages	2	2	2	2
Outdoor Sound Rating (dB)²				
Outdoor SdL - Fin Type	Coaxial	Coaxial	Coaxial	Coaxial
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))	15.52 (1.44)	15.52 (1.44)	15.52 (1.44)	15.52 (1.44)
Noise / FR, dBA	1 / 10 (3)	1 / 10 (3)	1 / 10 (3)	1 / 10 (3)
Refrigerant Control	TX Valve	TX Valve	TX Valve	TX Valve
Indoor SdL - 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))	7.52 (0.7)	7.52 (0.7)	7.52 (0.7)	7.52 (0.7)
Noise / FR, dBA	1 / 20 (3)	1 / 20 (3)	1 / 20 (3)	1 / 20 (3)
Refrigerant Control	TX Valve	TX Valve	TX Valve	TX Valve
Coax. Coefficient Ref. Size (in (mm))	140.75 (3570)	140.75 (3570)	140.75 (3570)	140.75 (3570)
Outdoor Fan - Type				
Ref. Installation (in (mm))	100 (254)	100 (254)	100 (254)	100 (254)
Drive Type/Ref. Speed	Direct/1	Direct/1	Direct/1	Direct/1
CFM (L/s)	5800 (2784)	5800 (2784)	5800 (2784)	5800 (2784)
Ref. Motor HP	1 at 1/2 HP	1 at 1/2 HP	1 at 1/2 HP	1 at 1/2 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan - Type				
Ref. Installation (in (mm))	101.6 (2579)	101.6 (2579)	101.6 (2579)	101.6 (2579)
Drive Type	Direct	Direct	Direct	Direct
Ref. Speed	Multiple	Multiple	Multiple	Multiple
Ref. Motor	1	1	1	1
Motor HP	1 1/2	1 1/2	1 1/2	1 1/2
Motor RPM	1100	1100	1100	1100
Motor Frame Size	40	40	40	40
Filter - Type				
Filterable	Yes	Yes	Yes	Yes
ACI / Size Recommended (in (mm) x mm x mm)	400 (160 x 100 x 400)	400 (160 x 100 x 400)	400 (160 x 100 x 400)	400 (160 x 100 x 400)
Refrigerant Charge (lb. (kg))				
	142 (64.0)	142 (64.0)	142 (64.0)	142 (64.0)
Weights				
Net Weight (lb. (kg))	580 (264)	580 (264)	580 (264)	580 (264)
Gross Weight (lb. (kg))	621 (282)	621 (282)	621 (282)	621 (282)

Appendix A – General Product Data

A. Cooling Performance is 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 suitable for operation to + 20% of nominal CFM. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240.

B. EER/SEER2 and/or SEER2 are rated at AHRI conditions and in accordance with DOE test procedures.

C. Integrated Energy Efficiency Rating (IEER) is rated in accordance with AHRI Standard 340/360.

D. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

Unit Size - Series	Standard Rating (tBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)							
		63	125	250	500	1000	2000	4000	8000
(J)HPCYB036	78.0	55.2	58.2	64.0	68.4	69.3	65.7	61.0	58.3
(J)HPCYB048	83.0	61.0	66.8	76.2	75.6	75.2	71.9	67.8	60.8
(J)HPCYB060	84.0	67.1	65.6	71.5	73.1	74.8	70.4	65.7	60.2
(J)HPCYB072	84.0	68.5	66.6	71.8	73.1	75.0	71.2	66.8	60.0

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Appendix B – Electrical Data

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

ELECTRICAL DATA – (-)HPC SERIES WITHOUT POWERED EXHAUST						
		036AET	036ACU	036ADT	036ADU	036AJT
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-508	414-508	187-253
	Volts	208/230	208/230	480	480	208/230
	Phase	3	3	3	3	1
	Hz	60	60	60	60	60
	Minimum Circuit Ampacity	23	28	11	12	29
	Minimum Overcurrent Protection Device Size	30	35	15	15	35
	Maximum Discurrent Protection Device Size	30	40	15	15	40
Compressor Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	480	480	208-230
	Phase	3	3	3	3	1
	Amps (FLA), Comp. 1	12.2	12.2	5.8	5.8	18.7
	Amps (LRA), Comp. 1	97.5	97.5	44.3	44.3	93.5
Condenser Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	480	480	208-230
	Phase	1	1	1	1	1
	HP	1/5	1/5	1/5	1/5	1/5
	Amps (FLA, each)	1.2	1.2	0.8	0.8	1.2
	Amps (LRA, each)	2.3	2.3	1.4	1.4	2.3
Evaporator Fan	No.	1	1	1	1	1
	Volts	208-230	208-230	480	480	208-230
	Phase	1	1	1	1	1
	HP	3/4	1 1/2	3/4	1	3/4
	Amps (FLA, each)	6	11.5	2.7	3.5	6
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

Appendix B – Electrical Data (Cont.)

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

ELECTRICAL DATA – (-)HPC SERIES WITH POWERED EXHAUST						
		036ACT	036ACU	036ADT	036ADU	036AJT
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506	187-253
	Volts	208/230	208/230	400	460	208/230
	Phase	3	3	3	3	1
	Fz	60	60	60	60	60
	Minimum Circuit Ampacity	26	32	13	14	33
	Minimum Overcurrent Protection Device Size	30	35	15	20	40
	Maximum Overcurrent Protection Device Size	35	40	15	20	45
Compressor Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	400	460	208-230
	Phase	3	3	3	3	1
	Amps (FLA, Comp. 1)	12.2	12.2	5.8	5.8	16.7
	Amps (LRA, Comp. 1)	97.5	97.5	44.3	44.3	93.5
Condenser Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	400	460	208-230
	Phase	1	1	1	1	1
	HP	1/5	1/5	1/5	1/5	1/5
	Amps (FLA, each)	1.2	1.2	0.8	0.8	1.2
	Amps (LRA, each)	2.3	2.3	1.4	1.4	2.3
Evaporator Fan	No.	1	1	1	1	1
	Volts	208-230	208-230	400	460	208-230
	Phase	1	1	1	1	1
	HP	3/4	1 1/2	3/4	1	3/4
	Amps (FLA, each)	6	11.5	2.7	3.5	8
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

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Appendix B – Electrical Data

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

ELECTRICAL DATA – (-)HPC SERIES WITHOUT POWERED EXHAUST						
		048AC1	048ACU	048AD1	048ADU	048AJT
Unit Information	Unit Operating Voltage Range	107-253	137-253	414-506	414-506	187-293
	Volts	208/230	208/230	460	460	208/230
	Phase	3	3	3	3	1
	Hz	60	60	60	60	60
	Minimum Circuit Ampacity	25	30	12	13	27
	Minimum Overcurrent Protection Device Size	30	35	15	15	45
	Maximum Overcurrent Protection Device Size	35	40	15	15	50
Compressor Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	3	3	3	3	1
	Amps (FLA), Comp. 1	12.8	12.8	6	6	22.4
	Amps (LRA), Comp. 1	126.4	126.4	49.4	49.4	126
Condenser Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1/2	1/2	1/2	1/2	1/2
	Amps (FLA, each)	2.3	2.3	1.5	1.5	2.3
	Amps (LRA, each)	5.1	5.1	3.1	3.1	5.1
Evaporator Fan	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	3/4	1 1/2	3/4	1	3/4
	Amps (FLA, each)	6	11.5	2.7	3.5	6
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

Appendix B – Electrical Data (Cont.)

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

ELECTRICAL DATA – (-)HPC SERIES WITH POWERED EXHAUST						
		048ACT	048ADU	048ADT	048ADU	048AJT
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-508	414-508	187-253
	Volt	208/230	208/230	460	460	208/230
	Phase	3	3	3	3	1
	Hz	60	60	60	60	60
	Minimum Circuit Ampacity	28	33	14	15	40
	Minimum Overcurrent Protection Device Size	35	40	20	20	45
	Maximum Overcurrent Protection Device Size	40	45	25	20	60
Compressor Motor	No.	1	1	1	1	1
	Volt	208-230	208-230	460	460	208-230
	Phase	3	3	3	3	1
	Amps (FLA), Comp. 1	12.8	12.8	6	6	22.4
	Amps (LRA), Comp. 1	120.4	120.4	48.4	48.4	126
Condenser Motor	No.	1	1	1	1	1
	Volt	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1/3	1/3	1/3	1/3	1/3
	Amps (FLA, each)	2.3	2.3	1.3	1.3	2.3
	Amps (LRA, each)	6.1	6.1	3.1	3.1	6.1
Evaporator Fan	No.	1	1	1	1	1
	Volt	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	3/4	1 1/2	3/4	1	3/4
	Amps (FLA, each)	6	11.5	2.7	3.5	6
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

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Appendix B – Electrical Data

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

ELECTRICAL DATA – (-)HPC SERIES WITHOUT POWERED EXHAUST						
		DGDACT	DEDACT	DGDACT	DGDACT	DGDACT
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506	187-253
	Volts	208/230	208/230	460	460	208/230
	Phase	3	3	3	3	1
	Hz	60	60	60	60	60
	Minimum Circuit Ampacity	33	37	15	15	43
	Minimum Overcurrent Protection Device Size	40	45	20	20	60
	Maximum Overcurrent Protection Device Size	45	50	20	20	60
Compressor Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	3	3	3	3	1
	Amps (FLA), Comp. 1	16	16	7.1	7.1	23.7
	Amps (LRA), Comp. 1	156.4	156.4	58.1	58.1	157
Condenser Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1/2	1/2	1/2	1/2	1/2
	Amps (FLA, each)	5.3	5.3	2.3	2.3	5.3
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A
Evaporator Fan	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1	1 1/2	1	1 1/8	1
	Amps (FLA, each)	7.6	11.3	3.3	3.7	7.6
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

Appendix B – Electrical Data (Cont.)

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

ELECTRICAL DATA – (-)HPC SERIES WITH POWERED EXHAUST						
		060ACT	060ACU	060ADT	060ADU	060AJT
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506	187-253
	Volts	208/230	208/230	460	460	208/230
	Phase	3	3	3	3	1
	Hz	60	60	60	60	60
	Minimum Circuit Ampacity	35	45	17	17	45
	Minimum Overcurrent Protection Device Size	40	45	20	20	60
	Maximum Overcurrent Protection Device Size	50	55	20	25	60
Compressor Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	3	3	3	3	1
	Amps (FLA), Comp. 1	36	18	7.1	7.1	23.7
	Amps (LRA), Comp. 1	136.4	156.4	58.1	58.1	157
Condenser Motor	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1/2	1/2	1/2	1/2	1/2
	Amps (FLA, each)	5.3	5.3	2.3	2.3	5.3
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A
Evaporator Fan	No.	1	1	1	1	1
	Volts	208-230	208-230	460	460	208-230
	Phase	1	1	1	1	1
	HP	1	1 1/2	1	1 1/5	1
	Amps (FLA, each)	7.6	11.5	3.3	3.7	7.6
	Amps (LRA, each)	N/A	N/A	N/A	N/A	N/A

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Appendix B – Electrical Data

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

ELECTRICAL DATA – (-)HPC SERIES WITHOUT POWERED EXHAUST					
		072AC1	072AC9	072AD1	072AD9
Unit Information:	Unit Operating Voltage Range	187-253	187-253	414-506	414-506
	Volts	208/230	208/230	460	460
	Phase	3	3	3	3
	Hz	60	60	60	60
	Minimum Circuit Ampacity	38	38	18	18
	Minimum Overcurrent Protection Device Size	45	45	20	20
	Maximum Overcurrent Protection Device Size	60	50	25	25
Compressor Motor	No.	1	1	1	1
	Volts	208-230	208-230	460	460
	Phase	3	3	3	3
	Amps (FLA), Comp. 1	19.2	19.2	9.1	9.1
	Amps (LRA), Comp. 1	162	162	70.8	70.8
Condenser Motor	No.	1	1	1	1
	Volts	208-230	208-230	460	460
	Phase	1	1	1	1
	HP	1/2	1/2	1/2	1/2
	Amps (FLA, each)	5.3	5.3	2.3	2.3
	Amps (LRA, each)	N/A	N/A	N/A	N/A
Evaporator Fan	No.	1	1	1	1
	Volts	208-230	208-230	400	460
	Phase	1	1	1	1
	HP	1 1/5	1 1/5	1 1/5	1 1/5
	Amps (FLA, each)	8.5	8.5	3.7	3.7
	Amps (LRA, each)	N/A	N/A	N/A	N/A

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Appendix B – Electrical Data (Cont.)

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

ELECTRICAL DATA – (-)HPC SERIES WITH POWERED EXHAUST					
		072ACT	072ACU	072ADT	072ADU
Unit Information	Unit Operating Voltage Range	107-253	167-253	414-506	414-506
	Volts	208/230	208/230	460	460
	Phase	3	3	3	3
	Hz	60	60	60	60
	Minimum Circuit Ampacity	41	41	20	20
	Minimum Overcurrent Protection Device Size	50	50	25	25
	Maximum Overcurrent Protection Device Size	60	60	25	25
Compressor Motor	Nc.	1	1	1	1
	Volts	208-230	208-230	460	460
	Phase	3	3	3	3
	Amps (FLA), Comp. 1	19.2	19.2	9.1	9.1
	Amps (LRA), Comp. 1	162	162	70.8	70.8
Condenser Motor	Nc.	1	1	1	1
	Volts	208-230	208-230	460	460
	Phase	1	1	1	1
	HP	1/2	1/2	1/2	1/2
	Amps (FLA, each)	5.3	5.3	2.3	2.3
	Amps (LRA, each)	N/A	N/A	N/A	N/A
Evaporator Fan	Nc.	1	1	1	1
	Volts	208-230	208-230	460	460
	Phase	1	1	1	1
	HP	1 1/5	1 1/5	1 1/5	1 1/5
	Amps (FLA, each)	8.5	8.5	3.7	3.7
	Amps (LRA, each)	N/A	N/A	N/A	N/A

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Appendix C – Air Flow Performance Data

3-RT - Low Static - Backflow (258/230/19/750)												
Unit Model (Footnote)	Manufacturer Recommended Airflow Range (Minimum) CFM	Motor HP (W)	Motor Speed	CFM/WATTS	External Static Pressure - Inches W.C. (kPa)							
					0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.13]	0.6 [.15]	0.7 [.17]	0.8 [.20]
(-)PC218038 (RT)	1050/1250	3/4 HP (550W)	Fan - Tap 1	CFM	1444	1354	1009	833	732	621	534	448
			WATTS	190	156	124	107	104	103	100	100	
		3/4 HP (550W)	Tap 2	CFM	1452	1412	1441	1386	1315	1257	1198	1140
			WATTS	238	253	261	276	288	303	311	324	
		3/4 HP (550W)	Tap 3	CFM	1822	1752	1687	1653	1571	1517	1447	1389
			WATTS	335	361	381	393	394	405	421	435	
		3/4 HP (550W)	Coasting - Tap 4 *	CFM	1462	1414	1342	1283	1212	1147	1079	1023
			WATTS	209	220	231	241	252	263	274	284	
		3/4 HP (550W)	High Speed - Tap 5	CFM	1717	1683	1585	1551	1478	1416	1354	1307
			WATTS	348	363	371	382	404	417	432	445	
(-)PC218048 (RT)	1400/1800	3/4 HP (550W)	Fan - Tap 1	CFM	1409	1376	993	821	838	743	658	612
			WATTS	177	186	129	137	144	154	160	168	
		3/4 HP (550W)	Tap 2	CFM	1858	1881	1791	1676	1623	1579	1518	1456
			WATTS	348	363	371	382	404	417	432	445	
		3/4 HP (550W)	Tap 3	CFM	1535	1475	1510	1352	1331	1345	1587	1540
			WATTS	381	400	413	436	443	455	471	484	
		3/4 HP (550W)	Coasting - Tap 4 *	CFM	1750	1686	1637	1525	1439	1383	1418	1388
			WATTS	321	337	351	383	375	387	401	413	
		3/4 HP (550W)	High Speed - Tap 5	CFM	2113	2048	2007	1948	1843	1844	1763	1748
			WATTS	481	507	524	541	557	570	586	600	
(-)PC218060 (RT)	1750/2250	1 HP (745W)	Fan - Tap 1	CFM	1786	1767	1675	1615	1507	1481	1418	1388
			WATTS	322	331	341	348	357	364	374	383	
		1 HP (745W)	Tap 2	CFM	1719	1685	1507	1541	1442	1425	1360	1301
			WATTS	292	304	319	331	344	355	369	382	
		1 HP (745W)	Tap 3	CFM	1844	1807	1637	1769	1717	1661	1609	1552
			WATTS	384	409	425	443	462	481	493	505	
		1 HP (745W)	Coasting - Tap 4 *	CFM	2218	2151	2110	2080	2015	1969	1924	1877
			WATTS	584	606	621	633	652	672	684	696	
		1 HP (745W)	High Speed - Tap 5	CFM	2365	2291	2261	2204	2131	2111	2065	2028
			WATTS	684	703	713	727	732	744	759	765	
(-)PC218072 (RT)	2100/2700	1.2 HP (885W)	Fan/Low Heat - Tap 1	CFM	1384	1319	1249	1188	1127	1066	1006	947
			WATTS	193	204	211	225	240	245	255	265	
		1.2 HP (885W)	High Heat - Tap 2	CFM	1874	1812	1718	1739	1680	1631	1584	1539
			WATTS	401	425	450	465	480	495	513	525	
		1.2 HP (885W)	Low Heat - Tap 3	CFM	1546	1488	1427	1332	1274	1261	1203	1149
			WATTS	253	270	285	298	310	315	319	318	
		1.2 HP (885W)	High Heat - Tap 4	CFM	2458	2412	2346	2279	2209	2181	2153	2082
			WATTS	738	756	764	803	827	847	877	904	
		1.2 HP (885W)	High Speed - Tap 5	CFM	2463	2336	2280	2237	2198	2164	2110	2071
			WATTS	771	792	803	824	843	869	875	899	

NOTES

Factory tap settings are marked with an asterisk.
Pressure drops across the 3-57 CFM range (1050-2250). Pressure drops across the 67 CFM range (2100-2700). Unit code -0.09 inches W.C.
Downflow -0.1 inches W.C. Return coil -0.09 inches W.C.

Appendix C – Air Flow Performance Data (Cont.)

3-6" - Low Static - Standard (600)												
Ball Model (Range)	Manufacturer Recommended Airflow Range (Min/Max) CFM	Motor HP (W)	Water Speed	CFM/WATTS	External Static Pressure - Inches W.C. (kPa)							
					0.1 [.03]	0.2 [.06]	0.3 [.07]	0.4 [.10]	0.5 [.13]	0.6 [.16]	0.7 [.17]	0.8 [.20]
(-46C/100F) (BT)	1050/1500	3/4 HP (550)	Fan - Tap 1	CFM	957	867	777	688	592	477	388	303
				WATTS	34	30	27	23	19	15	12	10
		3/4 HP (550)	Tap 2	CFM	1112	1055	1010	942	865	780	695	621
				WATTS	143	135	131	124	115	106	98	90
		3/4 HP (550)	Tap 3	CFM	1007	944	886	820	747	673	598	524
				WATTS	365	338	320	294	268	242	216	190
		3/4 HP (550)	Cooling - Tap 4 *	CFM	1472	1392	1321	1255	1181	1123	1065	1007
				WATTS	195	208	219	231	243	253	264	273
		3/4 HP (550)	High Speed - Tap 5	CFM	1610	1561	1490	1426	1373	1318	1261	1205
				WATTS	218	229	241	251	263	273	282	291
(-46C/100F) (BT)	1400/1800	3/4 HP (550)	Fan - Tap 1	CFM	1041	965	892	821	757	685	615	551
				WATTS	114	124	132	140	148	154	160	166
		3/4 HP (550)	Tap 2	CFM	1318	1247	1170	1105	1038	972	904	837
				WATTS	129	200	211	223	231	242	252	259
		3/4 HP (550)	Tap 3	CFM	1737	1684	1624	1564	1508	1453	1400	1345
				WATTS	374	391	404	417	430	445	458	471
		3/4 HP (550)	Cooling - Tap 4 *	CFM	1544	1476	1408	1349	1282	1226	1178	1122
				WATTS	201	205	211	216	223	228	233	238
		3/4 HP (550)	High Speed - Tap 5	CFM	1625	1562	1493	1423	1357	1292	1230	1168
				WATTS	405	500	514	532	545	563	576	594
(-46C/100F) (BT)	1750/2250	1 HP (745)	Fan - Tap 1	CFM	1107	1017	938	865	790	717	642	567
				WATTS	128	125	143	151	158	168	174	181
		1 HP (745)	Tap 2	CFM	1344	1271	1203	1134	1064	994	925	847
				WATTS	184	177	188	195	203	212	223	230
		1 HP (745)	Tap 3	CFM	1927	1778	1718	1654	1597	1546	1487	1428
				WATTS	408	442	455	468	483	494	508	518
		1 HP (745)	Cooling - Tap 4 *	CFM	2078	2041	1991	1925	1847	1827	1760	1711
				WATTS	606	620	635	651	667	683	695	709
		1 HP (745)	High Speed - Tap 5	CFM	2192	2121	2056	1994	1933	1867	1803	1744
				WATTS	728	737	752	767	784	801	815	828
(-46C/100F) (BT)	2100/2700	1.2 HP (865)	Fan/Load Heat - Tap 1	CFM	1384	1316	1245	1169	1127	1066	1006	947
				WATTS	192	204	213	225	240	245	255	265
		1.2 HP (865)	High Heat - Tap 2	CFM	1840	1821	1785	1717	1650	1587	1527	1468
				WATTS	413	426	442	453	468	483	498	518
		1.2 HP (865)	Low Cool - Tap 3	CFM	1546	1484	1427	1372	1318	1261	1203	1148
				WATTS	252	270	283	298	310	323	335	348
		1.2 HP (865)	High Cool - Tap 4	CFM	2168	2094	2020	1951	1882	1842	1783	1721
				WATTS	677	701	718	730	752	775	795	818
		1.2 HP (865)	High Speed - Tap 5	CFM	2483	2336	2280	2220	2158	2104	2110	2071
				WATTS	771	792	808	824	843	860	875	890

NOTES

Factory tap settings are marked with an asterisk.
 Pressure drops across the 3-5" CFM range (1050 - 2250). Pressure drops across the 6" CFM range (2100 - 2700). Water cost -0.09 inches W.C.
 Downflow -0.1 inches W.C. Return cost -0.09 inches W.C.

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Appendix C – Air Flow Performance Data (Cont.)

3-6T - High Static - Sidelow (008226/015154)																
Unit Model (Nameplate)	Manufacturer Recommended Airflow Range (Std/Max) CFM	Motor HP [W]	Motor Speed	CFM/WATTS	External Static Pressure - Inches W.C. (kPa)											
					0.1 [2.7]	0.2 [5.2]	0.3 [7.7]	0.4 [10.2]	0.5 [12.7]	0.6 [15.2]	0.7 [17.7]	0.8 [20.2]	0.9 [22.7]	1.0 [25.2]		
14PC21803B (3T)	1050/1350	1.5 HP [1115]	Free - Tap 1	CFM WATTS	603 224	591 221	431 157	368 133	308 112	245 90	181 67	120 44	60 22	1.4 [37]		
		1.5 HP [1115]	Tap 2	CFM WATTS	1103 371	1044 352	981 331	920 317	858 303	797 280	738 267	680 244	623 221	1.4 [37]		
		1.5 HP [1115]	Tap 3	CFM WATTS	1104 371	1107 372	1105 371	1102 370	1100 369	1097 368	1094 367	1091 366	1088 365	1.4 [37]		
		1.5 HP [1115]	Cooling - Tap 4 *	CFM WATTS	688 237	614 214	543 191	488 177	431 157	381 138	341 125	295 108	255 93	218 79	1.4 [37]	
		1.5 HP [1115]	High Speed - Tap 5	CFM WATTS	1581 568	1512 537	1443 516	1375 495	1306 474	1238 453	1169 432	1101 411	1033 390	965 350	1.4 [37]	
		1.5 HP [1115]	Free - Tap 1	CFM WATTS	883 303	828 289	773 275	718 261	663 247	608 233	553 219	498 205	443 191	388 177	333 144	1.4 [37]
14PC21804B (4T)	1400/1800	1.5 HP [1115]	Tap 2	CFM WATTS	1378 504	1333 490	1288 476	1243 462	1198 448	1153 434	1108 420	1063 406	1018 392	973 374	1.4 [37]	
		1.5 HP [1115]	Tap 3	CFM WATTS	1422 514	1384 507	1346 499	1308 492	1269 485	1231 478	1193 471	1155 464	1117 457	1079 440	1.4 [37]	
		1.5 HP [1115]	Cooling - Tap 4 *	CFM WATTS	1022 358	965 344	908 330	851 316	794 302	737 288	680 274	623 260	566 246	509 221	1.4 [37]	
		1.5 HP [1115]	High Speed - Tap 5	CFM WATTS	1408 504	1413 505	1380 498	1347 491	1314 484	1281 477	1248 470	1215 463	1182 456	1149 449	1113 432	1.4 [37]
		1.5 HP [1115]	Free - Tap 1	CFM WATTS	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1.4 [37]
		1.5 HP [1115]	Tap 2	CFM WATTS	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1.4 [37]
14PC21806B (5T)	1750/2250	1.5 HP [1115]	Tap 3	CFM WATTS	1456 504	1418 505	1380 498	1342 491	1304 484	1266 477	1228 470	1190 463	1152 456	1114 449	1.4 [37]	
		1.5 HP [1115]	Cooling - Tap 4 *	CFM WATTS	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1022 358	1.4 [37]
		1.5 HP [1115]	High Speed - Tap 5	CFM WATTS	1806 607	1768 599	1730 591	1692 583	1654 575	1616 567	1578 559	1540 551	1502 543	1464 535	1426 527	1.4 [37]
		1.2 HP [895]	Free/Coast - Tap 1	CFM WATTS	1237 364	1182 350	1127 336	1072 322	1017 308	962 294	907 280	852 266	797 252	742 238	687 224	1.4 [37]
		1.2 HP [895]	High Heat - Tap 2	CFM WATTS	1543 534	1488 520	1433 506	1378 492	1323 478	1268 464	1213 450	1158 436	1103 422	1048 408	993 394	1.4 [37]
		1.2 HP [895]	Low Cool - Tap 3	CFM WATTS	1149 338	1094 324	1039 310	984 296	929 282	874 268	819 254	764 240	709 226	654 212	599 208	1.4 [37]
14PC21807B (6T)	2100/2700	1.2 HP [895]	High Cool - Tap 4	CFM WATTS	904 264	849 250	794 236	739 222	684 208	629 194	574 180	519 166	464 152	409 138	354 124	1.4 [37]
		1.2 HP [895]	High Speed - Tap 5	CFM WATTS	1582 524	1544 516	1506 508	1468 500	1430 492	1392 484	1354 476	1316 468	1278 460	1240 452	1202 444	1.4 [37]
		1.2 HP [895]	Free/Coast - Tap 1	CFM WATTS	1462 422	1407 408	1352 394	1297 380	1242 366	1187 352	1132 338	1077 324	1022 310	967 296	912 282	1.4 [37]
		1.2 HP [895]	Low Cool - Tap 3	CFM WATTS	1342 382	1287 368	1232 354	1177 340	1122 326	1067 312	1012 298	957 284	902 270	847 256	792 242	1.4 [37]
		1.2 HP [895]	High Cool - Tap 4	CFM WATTS	1042 302	987 288	932 274	877 260	822 246	767 232	712 218	657 204	602 190	547 176	492 162	1.4 [37]
		1.2 HP [895]	High Speed - Tap 5	CFM WATTS	1662 502	1624 494	1586 486	1548 478	1510 470	1472 462	1434 454	1396 446	1358 438	1320 430	1282 422	1244 414

NOTES

Factory tap settings are marked with an asterisk.
Pressure drops across the 3-6T CFM range (1050-2250). Pressure drops across the 6T CFM range (2100-2700). Unit code - 0.09 inches W.C.
Downflow: -0.1 inches W.C. Return code: -0.09 inches W.C.

Appendix C – Air Flow Performance Data (Cont.)

3-ET - High Static - 500/500 (4000)														
Ball Model (Range)	Manufacturer Recommended Airflow Range (Min/Max) CFM	Water HP (W)	Water Speed	CFM/WATTS	External Static Pressure - Inches W.C. (kPa)									
					0.1 [.01]	0.3 [.02]	1.0 [.07]	1.5 [.10]	2.0 [.13]	2.5 [.17]	3.0 [.20]	3.5 [.23]	4.0 [.27]	4.5 [.30]
(-40°C/180.34 (BT))	1050/1500	1 HP [745]	Free - Tap 1	CFM WATTS	729 534	644 472	554 408	469 348	388 287	329 242	278 202	234 172	194 142	154 112
		1 HP [745]	Tap 2	CFM WATTS	723 528	644 472	554 408	469 348	388 287	329 242	278 202	234 172	194 142	154 112
		1 HP [745]	Tap 3	CFM WATTS	1465 1033	1421 947	1372 921	1320 875	1272 843	1228 803	1176 763	1128 735	1078 703	1028 673
		1 HP [745]	Cooling - Tap 4 *	CFM WATTS	820 593	860 620	743 534	710 505	643 458	585 418	528 375	476 337	428 303	378 268
		1 HP [745]	High Speed - Tap 5	CFM WATTS	1145 805	1182 852	1118 792	1054 750	990 703	926 658	862 612	798 562	734 512	670 462
		1 HP [745]	Free - Tap 1	CFM WATTS	871 597	794 563	722 505	654 462	580 418	508 362	438 303	368 252	298 202	228 152
(-40°C/180.34 (BT))	1400/1800	1 HP [745]	Tap 2	CFM WATTS	1344 928	1362 970	1236 843	1158 803	1080 750	1002 682	924 632	846 572	768 512	690 462
		1 HP [745]	Tap 3	CFM WATTS	1514 1033	1484 1052	1415 982	1324 922	1228 843	1128 772	1028 692	928 632	828 552	728 492
		1 HP [745]	Cooling - Tap 4 *	CFM WATTS	738 507	1182 852	1152 822	1026 712	922 642	822 572	722 502	622 432	522 352	422 282
		1 HP [745]	High Speed - Tap 5	CFM WATTS	1580 1082	1542 1082	1487 1052	1402 982	1302 902	1202 822	1102 742	1002 662	902 582	802 502
		1 HP [745]	Free - Tap 1	CFM WATTS	613 418	833 592	647 452	580 412	512 362	444 312	376 252	308 202	240 162	172 112
		1 HP [745]	Tap 2	CFM WATTS	1301 902	1318 942	1182 822	1082 752	982 682	882 602	782 522	682 452	582 382	482 302
(-40°C/180.34 (BT))	1750/2250	1.2 HP [855]	Free - Tap 1	CFM WATTS	343 242	553 392	349 242	371 262	380 262	397 272	404 272	404 272	404 272	404 272
		1.2 HP [855]	Tap 2	CFM WATTS	1841 1282	1794 1252	1746 1222	1698 1192	1650 1162	1602 1132	1554 1092	1506 1062	1458 1032	1410 992
		1.2 HP [855]	Tap 3	CFM WATTS	2044 1402	2004 1362	1956 1322	1908 1282	1860 1242	1812 1202	1764 1162	1716 1122	1668 1082	1620 1042
		1.2 HP [855]	Cooling - Tap 4 *	CFM WATTS	1762 1252	1714 1212	1666 1162	1618 1112	1570 1062	1522 1012	1474 962	1426 912	1378 862	1330 812
		1.2 HP [855]	High Speed - Tap 5	CFM WATTS	2546 1762	2504 1722	2456 1672	2408 1622	2360 1572	2312 1522	2264 1472	2216 1422	2168 1372	2120 1322
		1.2 HP [855]	Free/Low Heat - Tap 1	CFM WATTS	988 682	987 682	986 682	985 682	984 682	983 682	982 682	981 682	980 682	979 682
(-40°C/180.34 (BT))	2100/2700	1.2 HP [855]	High Heat - Tap 2	CFM WATTS	3543 2504	3504 2464	3456 2424	3408 2384	3360 2344	3312 2304	3264 2264	3216 2216	3168 2168	3120 2120
		1.2 HP [855]	Tap 3	CFM WATTS	3643 2564	3604 2524	3556 2484	3508 2436	3460 2388	3412 2340	3364 2292	3316 2244	3268 2196	3220 2148
		1.2 HP [855]	Low Cool - Tap 3	CFM WATTS	1148 802	1146 802	1144 802	1142 802	1140 802	1138 802	1136 802	1134 802	1132 802	1130 802
		1.2 HP [855]	Free - Tap 1	CFM WATTS	134 92	134 92	134 92	134 92	134 92	134 92	134 92	134 92	134 92	134 92
		1.2 HP [855]	High Cool - Tap 4	CFM WATTS	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261	1801 1261
		1.2 HP [855]	High Speed - Tap 5	CFM WATTS	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712	2462 1712

NOTES

Factory tap settings are marked with an asterisk.
 Pressure drops across the 3-ET CPM range (1050 - 2250). Pressure drops across the 5T CPM range (2100 - 2700). Water code -0.09 inches W.C.
 Downflow: -0.1 inches W.C. Reheat coil: -0.09 inches W.C.

P. APPENDICES

Appendix C – Air Flow Performance Data (Cont.)

FLUSH MOUNT CONCENTRIC DIFFUSER PERFORMANCE INFORMATION								
Diffuser Model Number	CFM	Minimum Throw (feet)	Maximum Throw (feet)	Static Pressure Drop (Diffuser)	Static Pressure Drop (Adapter)	Sound (in dB)	Diffuser Face Return Area (sq. ft.)	Diffuser Face Supply Area (sq. ft.)
					CN-1805-142			
1017-0206A-00010	1000	9	12	0.14	0.057	20	2.1	1.37
	1200	12	16	0.2	0.08	25	2.1	1.37
	1400	15	20	0.26	0.105	30	2.1	1.37
	1600	17	23	0.33	0.134	30	2.1	1.37
	1800	20	26	0.41	0.17	35	2.1	1.37
	2000	22	29	0.5	0.21	40	2.1	1.37
	2400	25	32	0.68	0.29	45	2.1	1.37

DROP CONCENTRIC DIFFUSER PERFORMANCE INFORMATION								
Diffuser Model Number	CFM	Minimum Throw (feet)	Maximum Throw (feet)	Static Pressure Drop (Diffuser)	Static Pressure Drop (Adapter)	Sound (in dB)	Diffuser Face Return Area (sq. ft.)	Diffuser Face Supply Area (sq. ft.)
					CN-1805-142			
1018-0206A-00010	1000	9	23	0.07	0.057	12	4.58	2.82
	1200	10	24	0.11	0.08	15	4.58	2.82
	1400	12	26	0.15	0.105	19	4.58	2.82
	1600	13	28	0.19	0.134	21	4.58	2.82
	1800	15	30	0.24	0.17	28	4.58	2.82
	2000	17	32	0.3	0.21	30	4.58	2.82
	2400	19	34	0.43	0.29	32	4.58	2.82

FLUSH MOUNT CONCENTRIC DIFFUSER PERFORMANCE INFORMATION								
Diffuser Model Number For	CFM	Minimum Throw (feet)	Maximum Throw (feet)	Static Pressure Drop (Diffuser)	Static Pressure Drop (Adapter)	Sound (in dB)	Diffuser Face Return Area (sq. ft.)	Diffuser Face Supply Area (sq. ft.)
					CN-1805-141			
1017-300A-00010	2600	17	24	0.49	0.21	30	3.48	1.76
	2800	18	28	0.55	0.24	35	3.48	1.76
	3000	20	30	0.62	0.27	35	3.48	1.76
	3200	22	32	0.69	0.31	40	3.48	1.76
	3400	23	37	0.77	0.34	40	3.48	1.76

DROP CONCENTRIC DIFFUSER PERFORMANCE INFORMATION								
Diffuser Model Number	CFM	Minimum Throw (feet)	Maximum Throw (feet)	Static Pressure Drop (Diffuser)	Static Pressure Drop (Adapter)	Sound (in dB)	Diffuser Face Return Area (sq. ft.)	Diffuser Face Supply Area (sq. ft.)
					CN-1805-141			
1018-300A-00010	2600	22	39	0.34	0.21	32	5.68	3.1
	2800	23	40	0.39	0.24	38	5.68	3.1
	3000	25	42	0.45	0.27	40	5.68	3.1
	3200	26	43	0.53	0.31	41	5.68	3.1
	3400	27	45	0.61	0.34	42	5.68	3.1

Appendix C – Air Flow Performance Data (Cont.)

Airflow (cfm)	Downflow dP (inH ₂ O)	Horizontal dP (inH ₂ O)
1050	0.06	0.01
1150	0.07	0.01
1250	0.09	0.01
1350	0.10	0.01
1450	0.12	0.01
1550	0.13	0.02
1650	0.15	0.02
1750	0.17	0.02
1850	0.19	0.02
1950	0.21	0.02
2050	0.23	0.03
2150	0.26	0.03
2250	0.28	0.03
2350	0.31	0.04

Appendix D – Performance Data for 3 Ton

3 Ton Performance Data - Indoor Unit									
Indoor Unit		40°F (4.4°C)		70°F (21.1°C)		95°F (35.0°C)		120°F (48.9°C)	
Outdoor Unit		1350 (803)	1175 (708)	1075 (663)	1350 (803)	1175 (708)	1075 (663)	875 (540)	600 (375)
300 (-17.8°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-15.0°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-12.2°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-9.4°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-6.7°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-3.9°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (-1.1°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (1.7°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (4.4°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (7.2°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
300 (10.0°C)	Total BTU/hr (kW)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)	1400 (4.1)
	Power	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1

Indoor air dry bulb () Designated Metric Conversions

P. APPENDICES

Appendix D – Performance Data for 4 Ton

[illegible]

THF = Depression ratio Total / Total capacity x 1000 BTU/Hour

boE — Entering air dry bulb 50's — Sensible capacity x 1000 BTU/h. When the entering air dry bulb is other than 50°F (12°C), adjust the variable

note—Entering air wet bulb Power—kW input capacity from the table by adding $1.10 \times \text{CFM} \times (7 - \text{DB}) \times (\text{WB} - \text{DB})$.

Appendix D – Performance Data for 4 Ton

HEATING PERFORMANCE DATA – (05/01/2014)										
IDB		60°F (18.3°C)			70°F (21.1°C)			80°F (26.7°C)		
COP (3.0)		1720 (3.5)	1450 (3.0)	1250 (2.8)	1450 (3.0)	1250 (2.8)	1050 (2.4)	1020 (2.3)	840 (1.9)	710 (1.6)
COV (0-15.0%)	Total BTU/hr (kW)	31.2 (9.2)	27.1 (8.2)	20.4 (6.1)	29.1 (8.6)	19.8 (5.8)	13.8 (4.1)	13.8 (4.1)	10.4 (3.1)	10.4 (3.1)
	Power	3	2.7	2.1	2.4	2.3	2.2	2.2	2.7	2.9
COV (0-15.0%)	Total BTU/hr (kW)	39.1 (11.7)	33.8 (10.0)	22.8 (6.6)	32.8 (9.7)	22.6 (6.6)	12.4 (3.6)	12.4 (3.6)	9.1 (2.6)	9.1 (2.6)
	Power	3.1	2.7	2.2	2.4	2.3	2.0	2.0	2.6	2.8
COV (0-12.0%)	Total BTU/hr (kW)	55.9 (16.3)	50.8 (15.0)	38.2 (11.2)	50.7 (15.0)	38.1 (11.2)	24.9 (7.4)	24.9 (7.4)	24.1 (7.1)	23.9 (7.0)
	Power	3.1	2.8	2.3	3.5	3.3	3.0	3.0	3.5	4
COV (0-10.0%)	Total BTU/hr (kW)	50.7 (15.0)	48.2 (14.2)	36.1 (10.6)	48.1 (14.2)	36.0 (10.6)	27.8 (8.2)	27.8 (8.2)	25.3 (7.5)	25.3 (7.5)
	Power	3.1	2.8	2.3	3.5	3.3	3.2	3.2	4	4
COV (0-10.0%)	Total BTU/hr (kW)	32.5 (9.6)	22.1 (6.4)	21.8 (6.4)	31.3 (9.2)	20.9 (6.1)	10.8 (3.1)	10.8 (3.1)	10.7 (3.1)	10.4 (3.1)
	Power	2.2	2.2	2.2	3.6	3.7	3.7	3.7	4.1	4.1
COV (0-10.0%)	Total BTU/hr (kW)	35.4 (10.4)	30.9 (9.1)	24.1 (7.1)	33.7 (9.9)	23.4 (6.9)	13.4 (3.8)	13.4 (3.8)	12.9 (3.8)	12.1 (3.5)
	Power	2.2	2.3	1.4	3.6	3.7	3.7	4	4.1	4.1
COV (0-10.0%)	Total BTU/hr (kW)	38.2 (11.2)	37.7 (11.1)	37.3 (10.9)	37 (10.9)	36.5 (10.7)	28.3 (8.4)	28.3 (8.4)	28.3 (8.4)	24.5 (7.2)
	Power	2.3	2.4	2.4	3.6	3.7	3.8	4	4.1	4.2
COV (0-10.0%)	Total BTU/hr (kW)	41 (12)	40.5 (11.8)	40.1 (11.6)	39.8 (11.6)	39.2 (11.5)	30.9 (9.1)	30.9 (9.1)	30.9 (9.1)	27.8 (8.1)
	Power	2.3	2.4	2.4	3.7	3.8	4.1	4.1	4.2	4.2
COV (0-10.0%)	Total BTU/hr (kW)	43.8 (12.8)	43.2 (12.7)	42.8 (12.6)	42.8 (12.6)	42.1 (12.5)	41.5 (12.5)	41.5 (12.5)	40.8 (12.5)	40.4 (12.5)
	Power	2.4	2.4	2.4	3.7	3.8	4.1	4.1	4.2	4.3
COV (0-10.0%)	Total BTU/hr (kW)	46.8 (13.7)	46.1 (13.6)	45.6 (13.4)	45.4 (13.4)	44.8 (13.3)	44.2 (13.2)	44.2 (13.2)	43.5 (13.2)	42.3 (12.8)
	Power	2.4	2.4	2.4	3.8	3.8	4.2	4.2	4.3	4.3
COV (0-10.0%)	Total BTU/hr (kW)	49.4 (14.5)	48.9 (14.4)	48.3 (14.3)	48.2 (14.3)	47.6 (14.1)	47.1 (14.1)	47.1 (14.1)	46.3 (13.6)	45.8 (13.6)
	Power	2.5	2.6	2.6	3.8	3.8	4.2	4.2	4.3	4.4

Outdoor Dry Bulb Temperature

IDB—Indoor air dry bulb (°) Designates Metric Conversions

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Appendix D – Performance Data for 5 Ton

HEATING PERFORMANCE DATA - COP/SEER												
COOLING		Heating Airflow				Cooling Airflow				Heating Airflow		
Indoor DB / Outdoor DB		2000 (547)	1000 (273)	2000 (547)	1000 (273)	2000 (547)	1000 (273)	2000 (547)	1000 (273)	2000 (547)	1000 (273)	2000 (547)
37° [1-13.3°C]	Total BTU/hr [kW]	12,750	17,750	18,714 (5.4)	30,738 (9.1)	28,830	38,830	38,830 (5.4)	24,872 (7.2)	34,872 (10.2)	23,872 (7.0)	34,872 (10.2)
	Power	3.4	5.0	5.4	8.4	8.4	4.2	4.2	4.0	4.2	4.7	4.7
37° [1-13.3°C]	Total BTU/hr [kW]	18,830 (5.5)	28,830 (8.4)	28,830 (5.4)	34,872 (10.2)	34,872 (10.2)	24,872 (7.2)	34,872 (10.2)	27,838 (8.1)	37,838 (11.0)	27,838 (8.1)	37,838 (11.0)
	Power	5.5	8.4	8.4	10.2	10.2	7.2	10.2	8.1	11.0	8.1	11.0
37° [1-13.3°C]	Total BTU/hr [kW]	24,872 (7.2)	34,872 (10.2)	34,872 (10.2)	44,872 (13.0)	44,872 (13.0)	34,872 (10.2)	44,872 (13.0)	37,838 (11.0)	47,838 (14.0)	37,838 (11.0)	47,838 (14.0)
	Power	7.2	10.2	10.2	13.0	13.0	10.2	13.0	11.0	14.0	11.0	14.0
37° [1-13.3°C]	Total BTU/hr [kW]	30,872 (9.0)	40,872 (12.0)	40,872 (12.0)	50,872 (14.9)	50,872 (14.9)	40,872 (12.0)	50,872 (14.9)	43,838 (12.7)	53,838 (15.7)	43,838 (12.7)	53,838 (15.7)
	Power	9.0	12.0	12.0	14.9	14.9	12.0	14.9	12.7	15.7	12.7	15.7
37° [1-13.3°C]	Total BTU/hr [kW]	36,872 (10.8)	46,872 (13.7)	46,872 (13.7)	56,872 (16.6)	56,872 (16.6)	46,872 (13.7)	56,872 (16.6)	49,838 (14.6)	59,838 (17.6)	49,838 (14.6)	59,838 (17.6)
	Power	10.8	13.7	13.7	16.6	16.6	13.7	16.6	14.6	17.6	14.6	17.6
37° [1-13.3°C]	Total BTU/hr [kW]	42,872 (12.5)	52,872 (15.5)	52,872 (15.5)	62,872 (18.5)	62,872 (18.5)	52,872 (15.5)	62,872 (18.5)	55,838 (16.3)	65,838 (19.3)	55,838 (16.3)	65,838 (19.3)
	Power	12.5	15.5	15.5	18.5	18.5	15.5	18.5	16.3	19.3	16.3	19.3
37° [1-13.3°C]	Total BTU/hr [kW]	48,872 (14.2)	58,872 (17.2)	58,872 (17.2)	68,872 (20.2)	68,872 (20.2)	58,872 (17.2)	68,872 (20.2)	61,838 (18.0)	71,838 (21.0)	61,838 (18.0)	71,838 (21.0)
	Power	14.2	17.2	17.2	20.2	20.2	17.2	20.2	18.0	21.0	18.0	21.0
37° [1-13.3°C]	Total BTU/hr [kW]	54,872 (16.0)	64,872 (19.0)	64,872 (19.0)	74,872 (22.0)	74,872 (22.0)	64,872 (19.0)	74,872 (22.0)	67,838 (19.8)	77,838 (22.8)	67,838 (19.8)	77,838 (22.8)
	Power	16.0	19.0	19.0	22.0	22.0	19.0	22.0	19.8	22.8	19.8	22.8
37° [1-13.3°C]	Total BTU/hr [kW]	60,872 (17.8)	70,872 (20.8)	70,872 (20.8)	80,872 (23.8)	80,872 (23.8)	70,872 (20.8)	80,872 (23.8)	73,838 (21.6)	83,838 (24.6)	73,838 (21.6)	83,838 (24.6)
	Power	17.8	20.8	20.8	23.8	23.8	20.8	23.8	21.6	24.6	21.6	24.6
37° [1-13.3°C]	Total BTU/hr [kW]	66,872 (19.6)	76,872 (22.6)	76,872 (22.6)	86,872 (25.6)	86,872 (25.6)	76,872 (22.6)	86,872 (25.6)	79,838 (23.4)	89,838 (26.4)	79,838 (23.4)	89,838 (26.4)
	Power	19.6	22.6	22.6	25.6	25.6	22.6	25.6	23.4	26.4	23.4	26.4
37° [1-13.3°C]	Total BTU/hr [kW]	72,872 (21.4)	82,872 (24.4)	82,872 (24.4)	92,872 (27.4)	92,872 (27.4)	82,872 (24.4)	92,872 (27.4)	85,838 (25.2)	95,838 (28.2)	85,838 (25.2)	95,838 (28.2)
	Power	21.4	24.4	24.4	27.4	27.4	24.4	27.4	25.2	28.2	25.2	28.2
37° [1-13.3°C]	Total BTU/hr [kW]	78,872 (23.2)	88,872 (26.2)	88,872 (26.2)	98,872 (30.4)	98,872 (30.4)	88,872 (26.2)	98,872 (30.4)	91,838 (27.0)	101,838 (32.4)	91,838 (27.0)	101,838 (32.4)
	Power	23.2	26.2	26.2	30.4	30.4	26.2	30.4	27.0	32.4	27.0	32.4
37° [1-13.3°C]	Total BTU/hr [kW]	84,872 (25.0)	94,872 (28.0)	94,872 (28.0)	104,872 (33.4)	104,872 (33.4)	94,872 (28.0)	104,872 (33.4)	97,838 (28.8)	107,838 (34.4)	97,838 (28.8)	107,838 (34.4)
	Power	25.0	28.0	28.0	33.4	33.4	28.0	33.4	28.8	34.4	28.8	34.4
37° [1-13.3°C]	Total BTU/hr [kW]	90,872 (26.8)	100,872 (30.0)	100,872 (30.0)	110,872 (35.4)	110,872 (35.4)	100,872 (30.0)	110,872 (35.4)	103,838 (30.6)	113,838 (40.4)	103,838 (30.6)	113,838 (40.4)
	Power	26.8	30.0	30.0	35.4	35.4	30.0	35.4	30.6	40.4	30.6	40.4
37° [1-13.3°C]	Total BTU/hr [kW]	96,872 (28.6)	106,872 (32.0)	106,872 (32.0)	116,872 (37.4)	116,872 (37.4)	106,872 (32.0)	116,872 (37.4)	109,838 (32.4)	119,838 (42.4)	109,838 (32.4)	119,838 (42.4)
	Power	28.6	32.0	32.0	37.4	37.4	32.0	37.4	32.4	42.4	32.4	42.4
37° [1-13.3°C]	Total BTU/hr [kW]	102,872 (30.4)	112,872 (34.0)	112,872 (34.0)	122,872 (41.4)	122,872 (41.4)	112,872 (34.0)	122,872 (41.4)	115,838 (34.2)	125,838 (44.4)	115,838 (34.2)	125,838 (44.4)
	Power	30.4	34.0	34.0	41.4	41.4	34.0	41.4	34.2	44.4	34.2	44.4
37° [1-13.3°C]	Total BTU/hr [kW]	108,872 (32.2)	118,872 (36.0)	118,872 (36.0)	128,872 (45.4)	128,872 (45.4)	118,872 (36.0)	128,872 (45.4)	121,838 (36.0)	131,838 (46.4)	121,838 (36.0)	131,838 (46.4)
	Power	32.2	36.0	36.0	45.4	45.4	36.0	45.4	36.0	46.4	36.0	46.4
37° [1-13.3°C]	Total BTU/hr [kW]	114,872 (34.0)	124,872 (38.0)	124,872 (38.0)	134,872 (49.4)	134,872 (49.4)	124,872 (38.0)	134,872 (49.4)	127,838 (37.8)	137,838 (48.4)	127,838 (37.8)	137,838 (48.4)
	Power	34.0	38.0	38.0	49.4	49.4	38.0	49.4	37.8	48.4	37.8	48.4
37° [1-13.3°C]	Total BTU/hr [kW]	120,872 (35.8)	130,872 (40.0)	130,872 (40.0)	140,872 (53.4)	140,872 (53.4)	130,872 (40.0)	140,872 (53.4)	133,838 (40.6)	143,838 (50.4)	133,838 (40.6)	143,838 (50.4)
	Power	35.8	40.0	40.0	53.4	53.4	40.0	53.4	40.6	50.4	40.6	50.4
37° [1-13.3°C]	Total BTU/hr [kW]	126,872 (37.6)	136,872 (42.0)	136,872 (42.0)	146,872 (57.4)	146,872 (57.4)	136,872 (42.0)	146,872 (57.4)	139,838 (42.4)	149,838 (54.4)	139,838 (42.4)	149,838 (54.4)
	Power	37.6	42.0	42.0	57.4	57.4	42.0	57.4	42.4	54.4	42.4	54.4
37° [1-13.3°C]	Total BTU/hr [kW]	132,872 (39.4)	142,872 (44.0)	142,872 (44.0)	152,872 (61.4)	152,872 (61.4)	142,872 (44.0)	152,872 (61.4)	145,838 (44.2)	155,838 (58.4)	145,838 (44.2)	155,838 (58.4)
	Power	39.4	44.0	44.0	61.4	61.4	44.0	61.4	44.2	58.4	44.2	58.4
37° [1-13.3°C]	Total BTU/hr [kW]	138,872 (41.2)	148,872 (46.0)	148,872 (46.0)	158,872 (65.4)	158,872 (65.4)	148,872 (46.0)	158,872 (65.4)	151,838 (46.0)	161,838 (62.4)	151,838 (46.0)	161,838 (62.4)
	Power	41.2	46.0	46.0	65.4	65.4	46.0	65.4	46.0	62.4	46.0	62.4
37° [1-13.3°C]	Total BTU/hr [kW]	144,872 (43.0)	154,872 (48.0)	154,872 (48.0)	164,872 (69.4)	164,872 (69.4)	154,872 (48.0)	164,872 (69.4)	157,838 (47.8)	167,838 (66.4)	157,838 (47.8)	167,838 (66.4)
	Power	43.0	48.0	48.0	69.4	69.4	48.0	69.4	47.8	66.4	47.8	66.4
37° [1-13.3°C]	Total BTU/hr [kW]	150,872 (44.8)	160,872 (50.0)	160,872 (50.0)	170,872 (73.4)	170,872 (73.4)	160,872 (50.0)	170,872 (73.4)	163,838 (49.6)	173,838 (70.4)	163,838 (49.6)	173,838 (70.4)
	Power	44.8	50.0	50.0	73.4	73.4	50.0	73.4	49.6	70.4	49.6	70.4
37° [1-13.3°C]	Total BTU/hr [kW]	156,872 (46.6)	166,872 (52.0)	166,872 (52.0)	176,872 (77.4)	176,872 (77.4)	166,872 (52.0)	176,872 (77.4)	169,838 (51.4)	179,838 (74.4)	169,838 (51.4)	179,838 (74.4)
	Power	46.6	52.0	52.0	77.4	77.4	52.0	77.4	51.4	74.4	51.4	74.4
37° [1-13.3°C]	Total BTU/hr [kW]	162,872 (48.4)	172,872 (54.0)	172,872 (54.0)	182,872 (81.4)	182,872 (81.4)	172,872 (54.0)	182,872 (81.4)	175,838 (53.2)	185,838 (78.4)	175,838 (53.2)	185,838 (78.4)
	Power	48.4	54.0	54.0	81.4	81.4	54.0	81.4	53.2	78.4	53.2	78.4
37° [1-13.3°C]	Total BTU/hr [kW]	168,872 (50.2)	178,872 (56.0)	178,872 (56.0)	188,872 (85.4)	188,872 (85.4)	178,872 (56.0)	188,872 (85.4)	181,838 (55.0)	191,838 (82.4)	181,838 (55.0)	191,838 (82.4)
	Power	50.2	56.0	56.0	85.4	85.4	56.0	85.4	55.0	82.4	55.0	82.4
37° [1-13.3°C]	Total BTU/hr [kW]	174,872 (52.0)	184,872 (58.0)	184,872 (58.0)	194,872 (89.4)	194,872 (89.4)	184,872 (58.0)	194,872 (89.4)	187,838 (56.8)	197,838 (86.4)	187,838 (56.8)	197,838 (86.4)
	Power	52.0	58.0	58.0	89.4	89.4	58.0	89.4	56.8	86.4	56.8	86.4
37° [1-13.3°C]	Total BTU/hr [kW]	180,872 (53.8)	190,872 (60.0)	190,872 (60.0)	200,872 (93.4)	200,872 (93.4)	190,872 (60.0)	200,872 (93.4)	193,838 (58.6)	203,838 (90.4)	193,838 (58.6)	203,838 (90.4)
	Power	53.8	60.0	60.0	93.4	93.4	60.0	93.4	58.6	90.4	58.6	90.4
37° [1-13.3°C]	Total BTU/hr [kW]	186,872 (55.6)	196,872 (62.0)	196,872 (62.0)	206,872 (97.4)	206,872 (97.4)	196,872 (62.0)	206,872 (97.4)	199,838 (60.4)	209,838 (94.4)	199,838 (60.4)	209,838 (94.4)
	Power	55.6	62.0	62.0	97.4	97.4	62.0	97.4	60.4	94.4	60.4	94.4
37° [1-13.3°C]	Total BTU/hr [kW]	192,872 (57.4)	202,872 (64.0)	202,872 (64.0)	212,872 (101.4)	212,872 (101.4)	202,872 (64.0)	212,872 (101.4)	205,838 (62.2)	215,838 (98.4)	205,838 (62.2)	215,838 (98.4)
	Power	57.4	64.0	64.0	101.4	101.4	64.0	101.4	62.2	98.4	62.2	98.4
37° [1-13.3°C]	Total BTU/hr [kW]	198,872 (59.2)	208,872 (66.0)	208,872 (66.0)	218,872 (105.4)	218,872 (105.4)	208,872 (66.0)	218,872 (105.4)	211,838 (64.0)	221,838 (102.4)	211,838 (64.0)	221,838 (102.4)
	Power	59.2	66.0	66.0	105.4	105.4	66.0	105.4	64.0	102.4	64.0	102.4
37° [1-13.3°C]	Total BTU/hr [kW]	204,872 (61.0)	214,872 (68.0)	214,872 (68.0)	224,872 (109.4)	224,872 (109.4)	214,872 (68.0)	224,872 (109.4)	217,838 (65.8)	227,838 (106.4)	217,838 (65.8)	227,838 (106.4)
	Power	61.0	68.0	68.0	109.4	109.4	68.0	109.4	65.8	106.4	65.8	106.4
37° [1-13.3°C]	Total BTU/hr [kW]	210,872 (62.8)	220,872 (70.0)	220,872 (70.0)	230,872 (113.4)	230,872 (113.4)	220,872 (70.0)	230,872 (113.4)	223,838 (67.6)	233,838 (110.4)	223,838 (67.6)	233,838 (110.4)
	Power	62.8	70.0	70.0	113.4	113.4	70.0	113.4	67.6	110.4	67.6	110.4
37° [1-13.3°C]	Total BTU/hr [kW]	216,872 (64.6)	226,872 (72.0)	226,872 (72.0)	236,872 (117.4)	236,872 (117.4)	226,872 (72.0)	236,872 (117.4)	229,838 (69.4)	239,838 (114.4)	229,838 (69.4)	239,838 (114.4)
	Power	64.6	72.0	72.0	117.4	117.4	72.0	117.4	69.4	114.4	69.4	114.4
37° [1-13.3°C]	Total BTU/hr [kW]	222,872 (66.4)	232,872 (74.0)	232,872 (74.0)	242,872 (121.4)	242,872 (121.4)	232,872 (74.0)					

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Appendix D – Performance Data for 6 Ton

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DR — Depression ratio Total — Total capacity x 1000 BTUH NOTES:
 iBE — Entering air bulb Sens — Seroable capacity x 1000 BTUH. When the entering air dry bulb is other than 80°F (27°C), adjust the sensible
 iBE — Entering air wet bulb Power — KW input capacity from the table by adding (1.10 x CFM x (1 - DR) x iBE - 80).

Appendix D – Performance Data for 6 Ton

HEATING PERFORMANCE DATA - 100% RHT									
COOLING		60°F (18.3°C)		50°F (10.0°C)		40°F (4.4°C)		30°F (-1.1°C)	
Sensible (kW)		2700 (12.74)	2300 (10.65)	1900 (8.82)	1500 (6.99)	1100 (5.16)	700 (3.23)	300 (1.39)	100 (0.46)
Cooling (kW)	Latent (kW)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)	34.6 (16.07)
	Power	3.0	4	4.1	4.1	4.3	4.6	4.6	4.6
Cooling (kW)	Latent (kW)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)	29.7 (13.8)
	Power	4	4.3	4.3	4.4	4.4	4.7	4.7	4.8
Cooling (kW)	Latent (kW)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)	44.5 (20.6)
	Power	4.1	4.2	4.3	4.3	4.4	4.6	4.6	4.7
Cooling (kW)	Latent (kW)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)	48.3 (22.4)
	Power	4.2	4.3	4.3	4.3	4.5	4.6	4.7	4.7
Cooling (kW)	Latent (kW)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)	54.1 (25.0)
	Power	4.3	4.3	4.4	4.4	4.6	4.7	4.8	4.8
Cooling (kW)	Latent (kW)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)	58.8 (27.2)
	Power	4.3	4.4	4.4	4.4	4.7	4.8	4.9	4.9
Cooling (kW)	Latent (kW)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)	63.6 (29.4)
	Power	4.4	4.4	4.5	4.5	4.8	4.9	5.1	5.1
Cooling (kW)	Latent (kW)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)	67.4 (31.2)
	Power	4.5	4.5	4.6	4.6	4.9	5.0	5.2	5.2
Cooling (kW)	Latent (kW)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)	71.2 (32.9)
	Power	4.6	4.6	4.7	4.7	5.0	5.1	5.3	5.3
Cooling (kW)	Latent (kW)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)	75.0 (34.6)
	Power	4.6	4.7	4.7	4.7	5.1	5.2	5.4	5.4
Cooling (kW)	Latent (kW)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)	78.8 (36.3)
	Power	4.7	4.8	4.8	4.8	5.2	5.3	5.5	5.5
Cooling (kW)	Latent (kW)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)	82.6 (38.0)
	Power	4.8	4.8	4.9	4.9	5.3	5.4	5.6	5.6

100%—indoor air dry bulb [] Designates Metric Conversions

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Appendix E – Heater Kit Characteristics

Includes 10000 BTU/hr. air exchanger heater package. Output limited by input gas pressure. Input Gas Pressure: 10.0 psi (10.0 psig)											
Model (See Page 10)	Product Info			Air Flow/Volume				Air Temperature			
	Model No. (See Page 10)	Product Name (See Page 10)	P.A. (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)	Air Flow, CFM (See Page 10)
10000 BTU/hr. 10000 BTU/hr.	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000	10000 10000
20000 BTU/hr. 20000 BTU/hr.	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000	20000 20000
30000 BTU/hr. 30000 BTU/hr.	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000	30000 30000
40000 BTU/hr. 40000 BTU/hr.	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000	40000 40000
50000 BTU/hr. 50000 BTU/hr.	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000	50000 50000
60000 BTU/hr. 60000 BTU/hr.	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000	60000 60000
70000 BTU/hr. 70000 BTU/hr.	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000	70000 70000
80000 BTU/hr. 80000 BTU/hr.	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000	80000 80000
90000 BTU/hr. 90000 BTU/hr.	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000	90000 90000

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Appendix E – Heater Kit Characteristics

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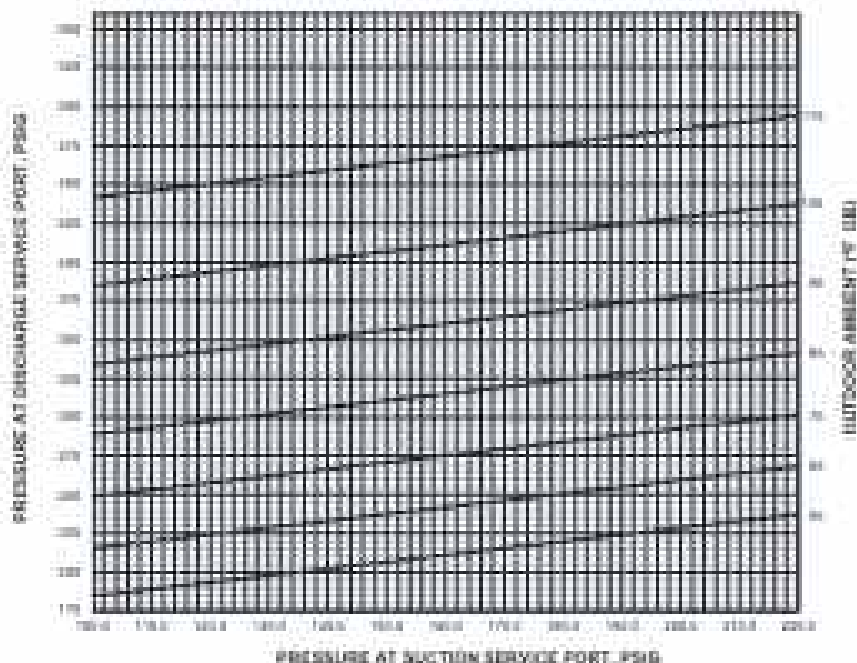
Appendix F – A2L Refrigerant Installation Safety Data

		(-)HFOYB028	(-)HFOYB048	(-)HFOYB060	(-)HFOYB072
Refrigerant Charge Weight (oz)		84	143	148	142
Minimum Circulation Airflow, Qmin (cfm)		142	242	247	240
Installed Altitude (ft above sea level)	Altitude Adjustment Factor	Minimum Total Conditioned Room Area, Tarea (sq ft)			
0	1.000	79	134	137	133
1000	1.025	81	137	140	136
2000	1.051	83	141	144	140
3000	1.078	85	145	148	144
4000	1.107	87	148	151	147
5000	1.138	90	152	156	151
6000	1.170	92	157	160	156
6500	1.187	93	159	162	158

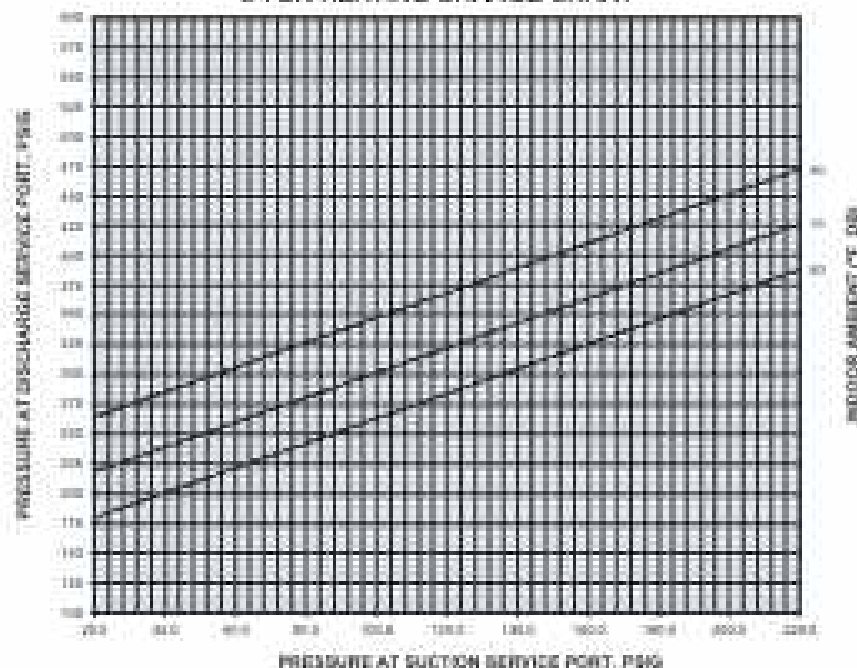
P. APPENDICES

Appendix G — Refrigerant Charging Charts

3 TON COOLING CHARGE CHART



3 TON HEATING CHARGE CHART



CAUTION: RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

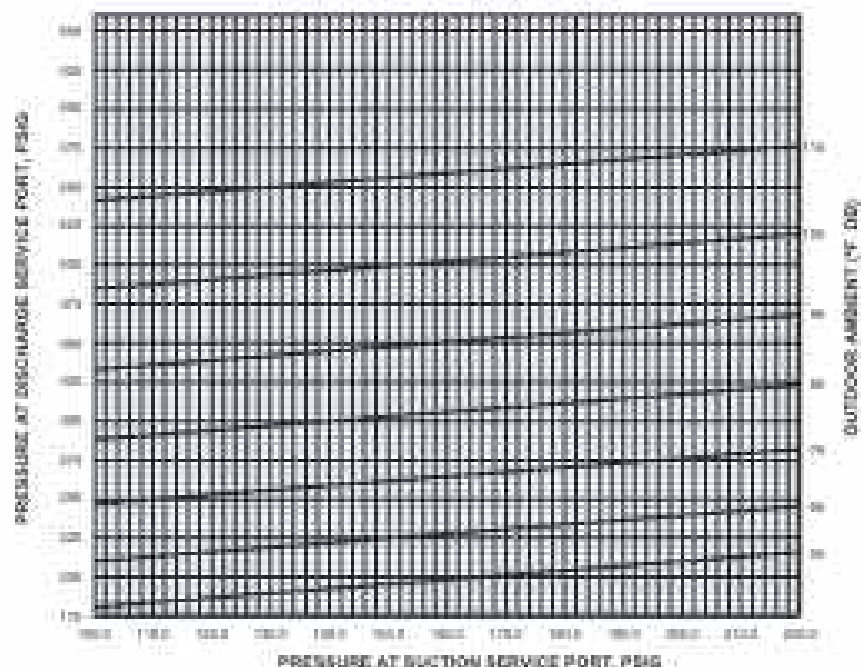
NOTE: DESIGN SUBCOOLING (AT SERVICE PORT) @ 95°F OUTDOOR = 11°F

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/M MANUAL FOR INSTRUCTIONS ON USING THIS CHARGE CHART.

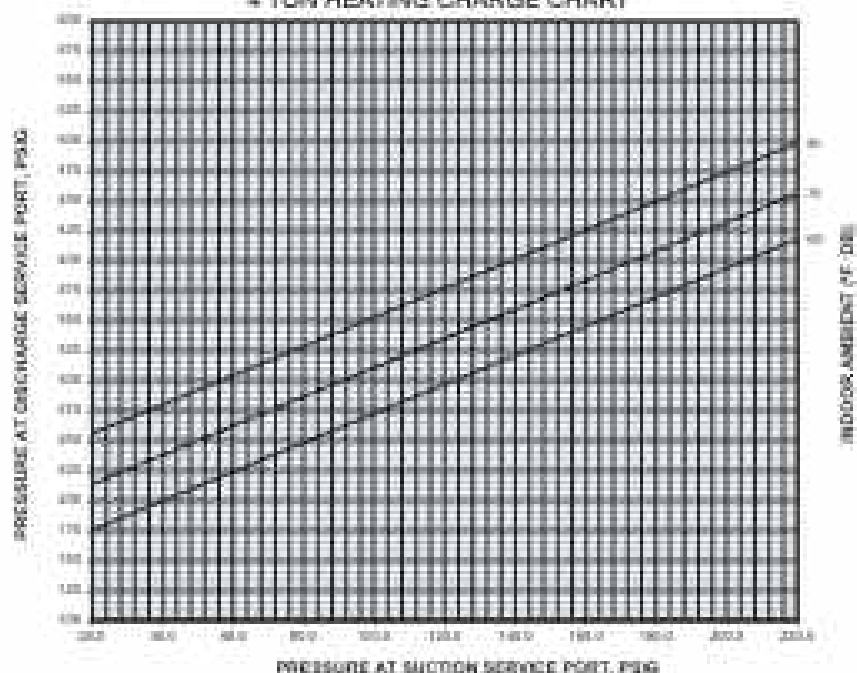
50-108006-07-00

Appendix G — Refrigerant Charging Charts (Cont.)

4 TON COOLING CHARGE CHART



4 TON HEATING CHARGE CHART



CAUTION: RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

NOTE: DESIGN SUBCOOLING (AT SERVICE PORT) @ 55°F OUTDOOR = 12°F.

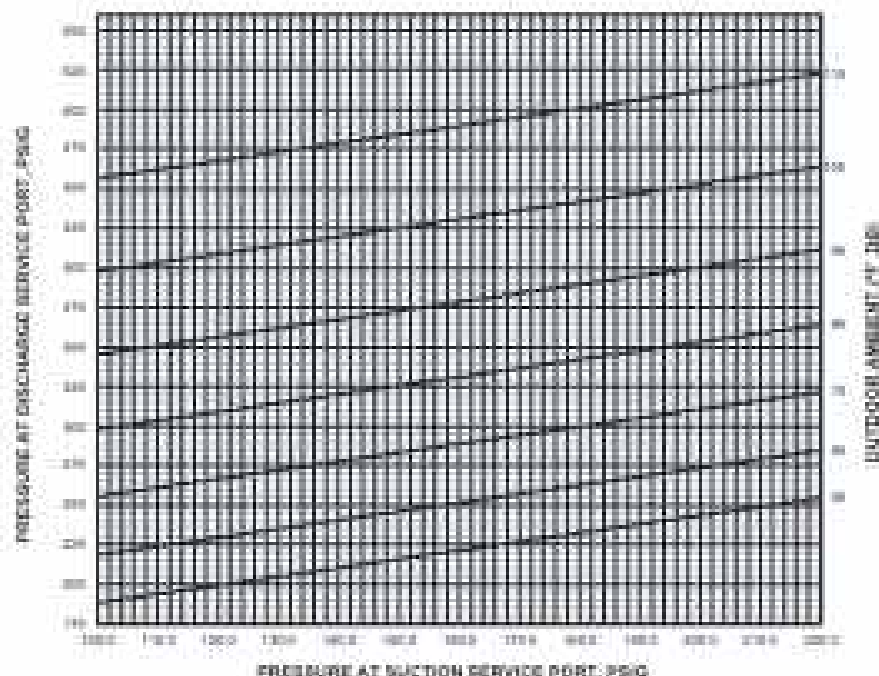
NOTE: FACTORY CHARGE CHART AND/OR DESIGN TARGET SUBCOOLING ARE FOR GROSS CHARGE VERIFICATION. ANY ADJUSTMENT SHALL NOT EXCEED 2% OF THE TOTAL REFRIGERANT WEIGHT LISTED ON THE RATING PLATE OF THE UNIT AND SHOULD NOT SUPERSEDE CORRECTLY WEIGHED-IN REFRIGERANT. REFER TO THE REFRIGERANT CHARGE VERIFICATION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

52-106626-08-05

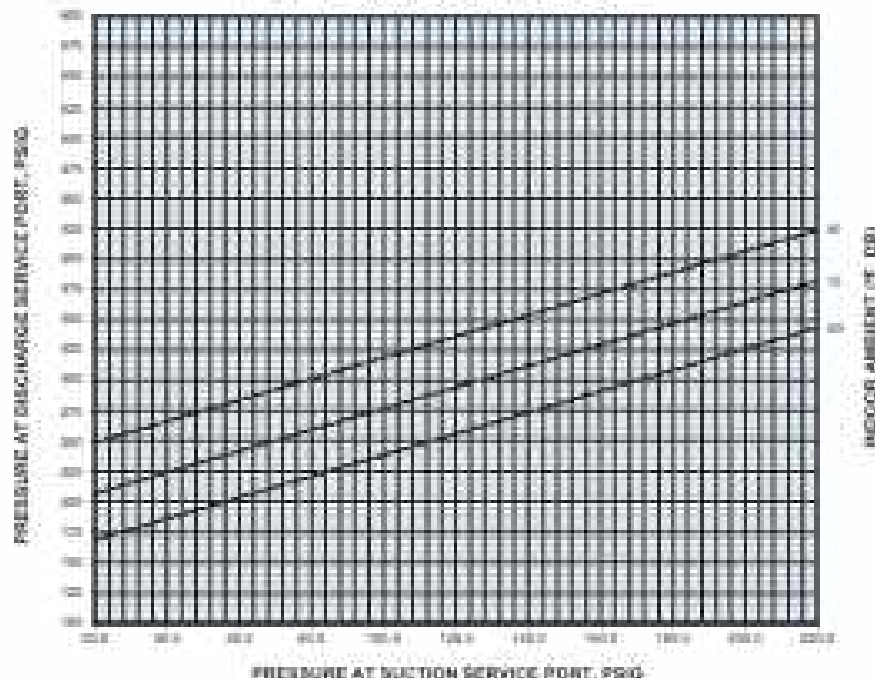
P. APPENDICES

Appendix G — Refrigerant Charging Charts (Cont.)

5 TON COOLING CHARGE CHART



5 TON HEATING CHARGE CHART



CAUTION: RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

NOTE: DESIGN SUBCOOLING (AT SERVICE PORT) @ 95°F OUTDOOR = 12°F.

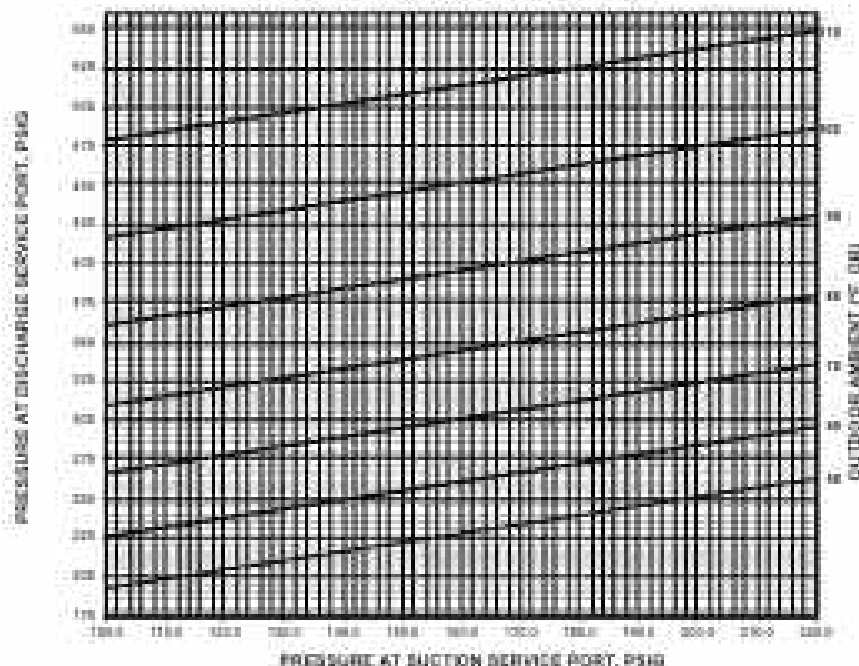
NOTE: FACTORY CHARGE CHART AND/OR DESIGN TARGET SUBCOOLING ARE FOR GROSS CHARGE VERIFICATION. ANY ADJUSTMENT SHALL NOT EXCEED 2% OF THE TOTAL REFRIGERANT WEIGHT LISTED ON THE RATING PLATE OF THE UNIT AND SHOULD NOT SUPERSEDE CORRECTLY WEIGHED-IN REFRIGERANT. REFER TO THE REFRIGERANT CHARGE VERIFICATION AND ADJUSTMENT SECTION IN THE I&O MANUAL FOR INSTRUCTIONS ON USING THIS CHARGE CHART.



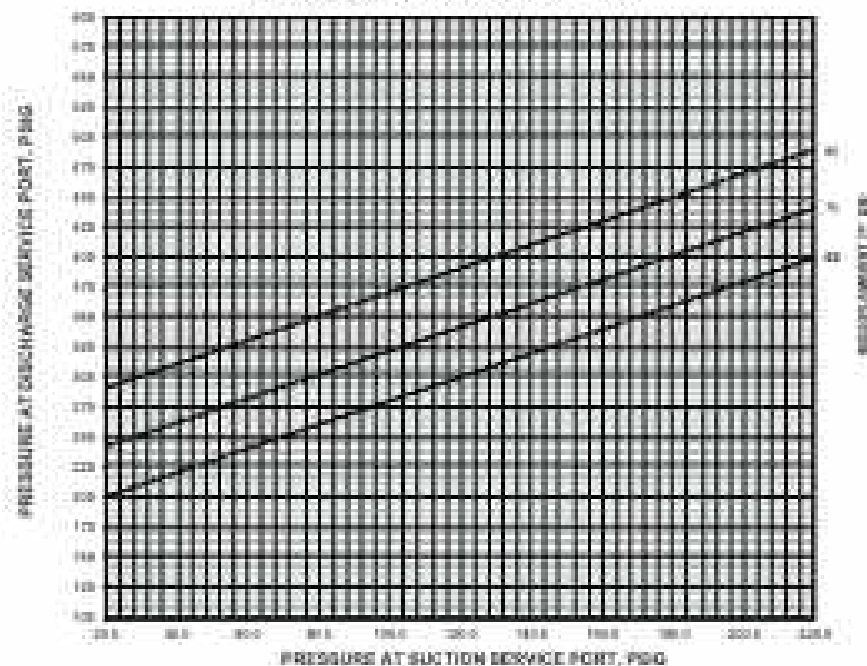
52-10685-05-00

Appendix G — Refrigerant Charging Charts (Cont.)

5 TON COOLING CHARGE CHART



5 TON HEATING CHARGE CHART



CAUTION: RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

NOTE: DESIGN SUBCOOLING (AT SERVICE PORT) @ 35°F OUTDOOR = 17°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.

ED-04669-09-00

P. APPENDICES

Appendix G — Refrigerant Charging Charts (Cont.)

SYSTEM CHARGE CHART – REFRIGERANT R-454B

SUB COOLING REQUIREMENTS – FINAL CHARGE VERIFICATION

OUTDOOR DRY BULB (°F)	3-TON	4-TON	5-TON	6-TON
	SUBCOOLING (°F)			
115	15	14	15	21
105	13	13	14	19
95	11	12	13	17
85	9	11	11	15
75	8	9	10	13
65	12	8	8	11
55	13	10	10	11

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, $\pm 0.5^\circ\text{F}$.

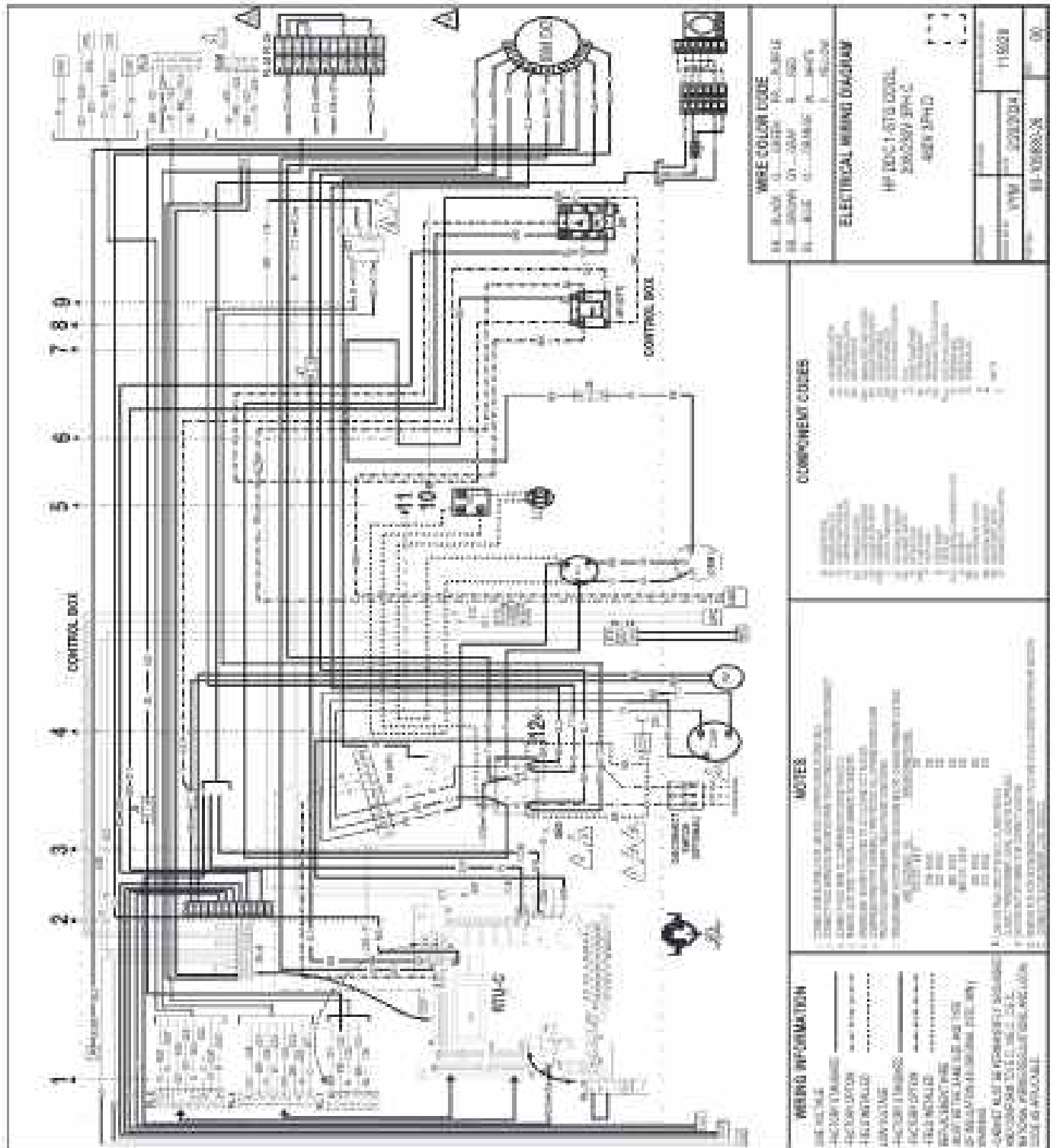
- a. Take extreme care not to overfill the refrigerating system.

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.

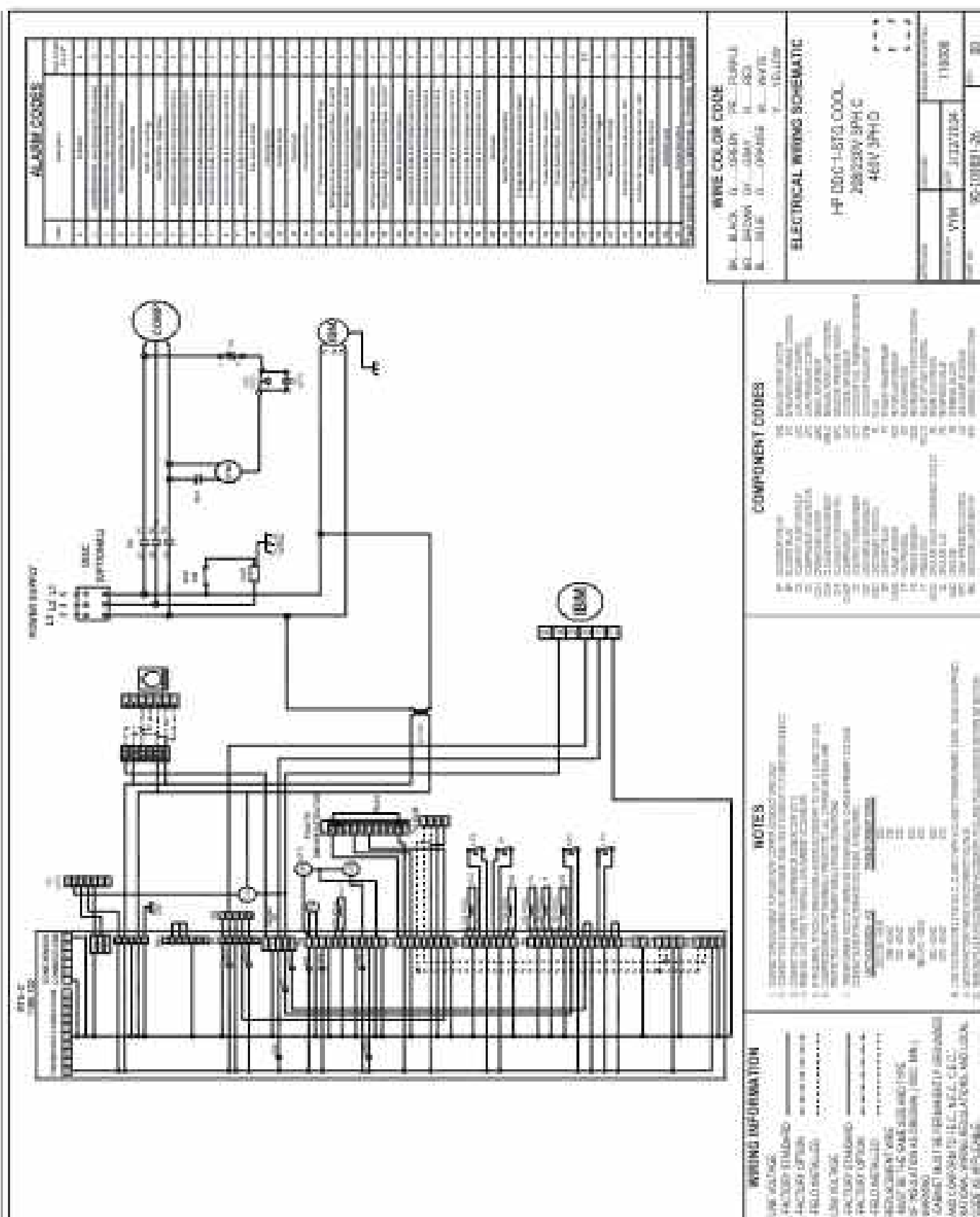


Appendix H — Wiring Diagrams & Schematics (Cont.)



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Appendix H – Wiring Diagrams & Schematics (Cont.)



Appendix H – Wiring Diagrams & Schematics (Cont.)



Appendix H – Wiring Diagrams & Schematics (Cont.)



Appendix H – Wiring Diagrams & Schematics (Cont.)

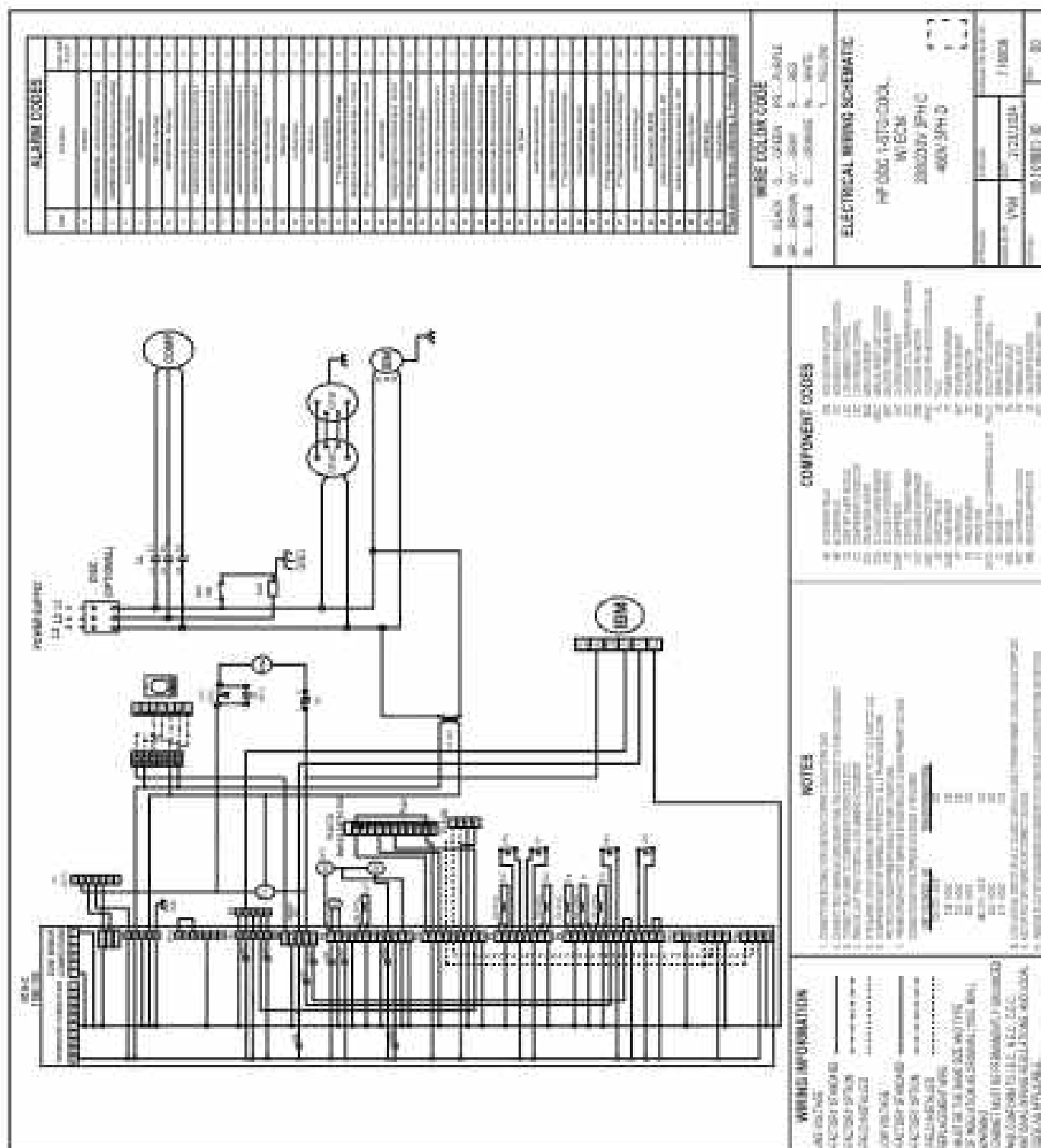


Appendix H – Wiring Diagrams & Schematics (Cont.)



P. APPENDICES

Appendix H – Wiring Diagrams & Schematics (Cont.)

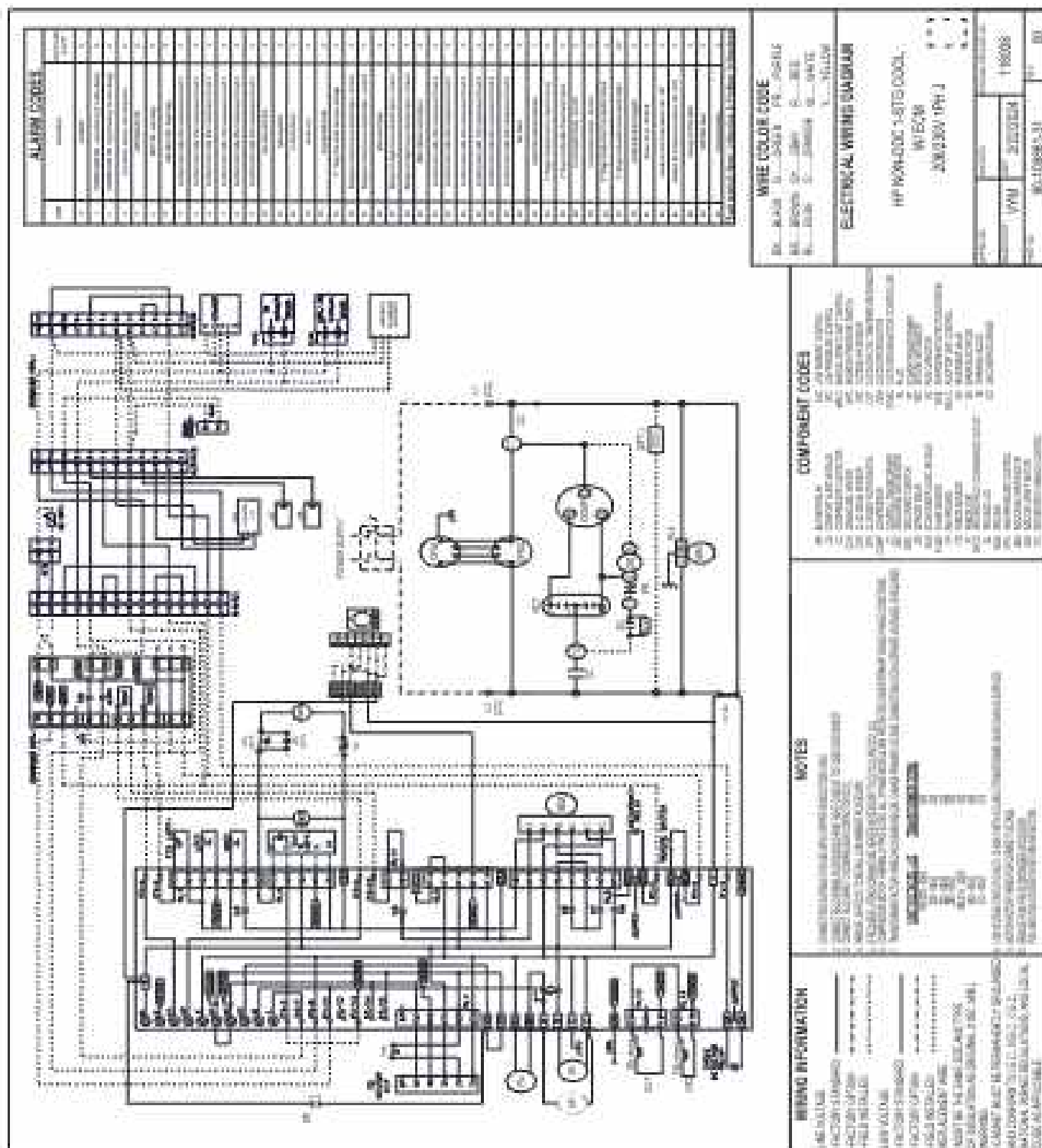


Appendix H – Wiring Diagrams & Schematics (Cont.)

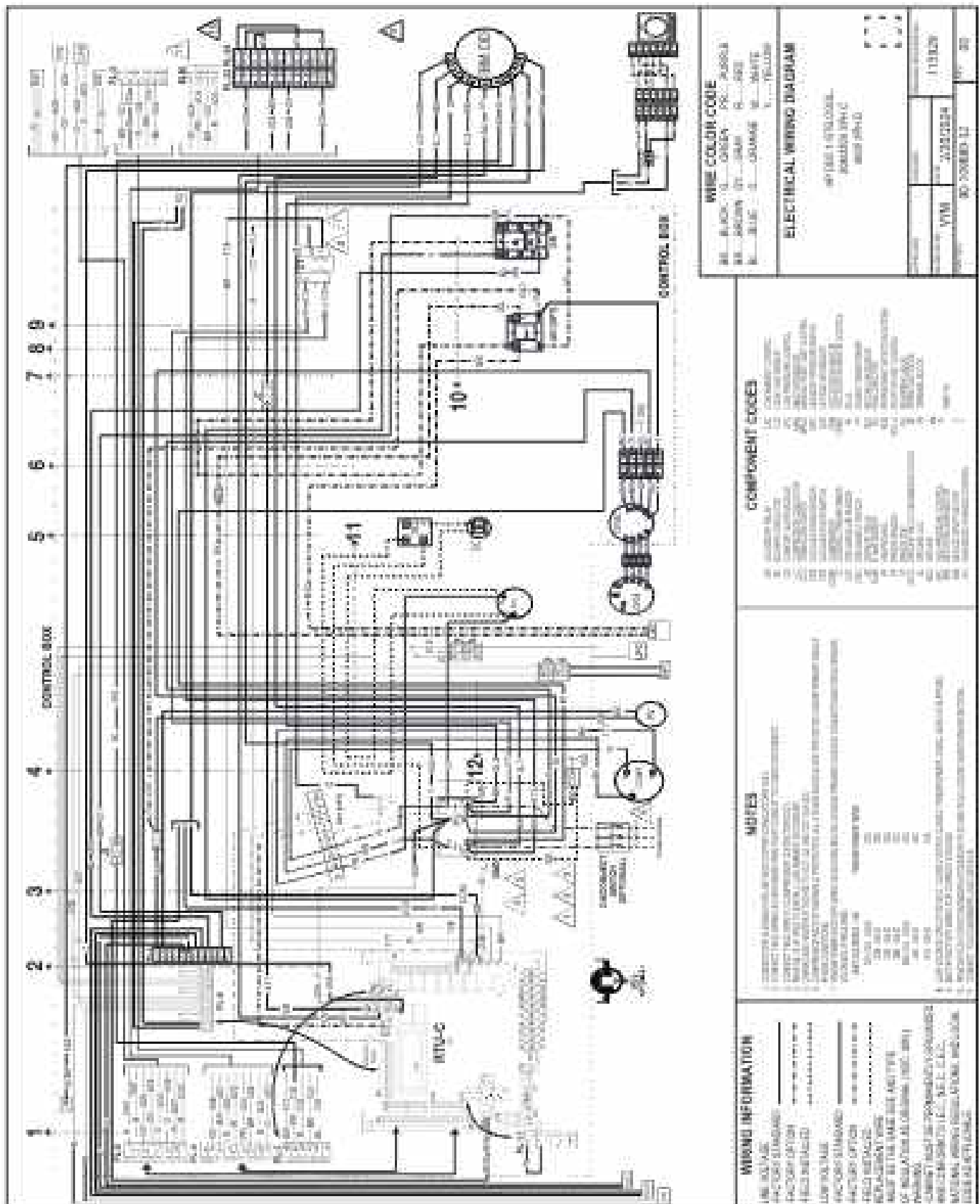


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Appendix H – Wiring Diagrams & Schematics (Cont.)



Appendix H – Wiring Diagrams & Schematics (Cont.)

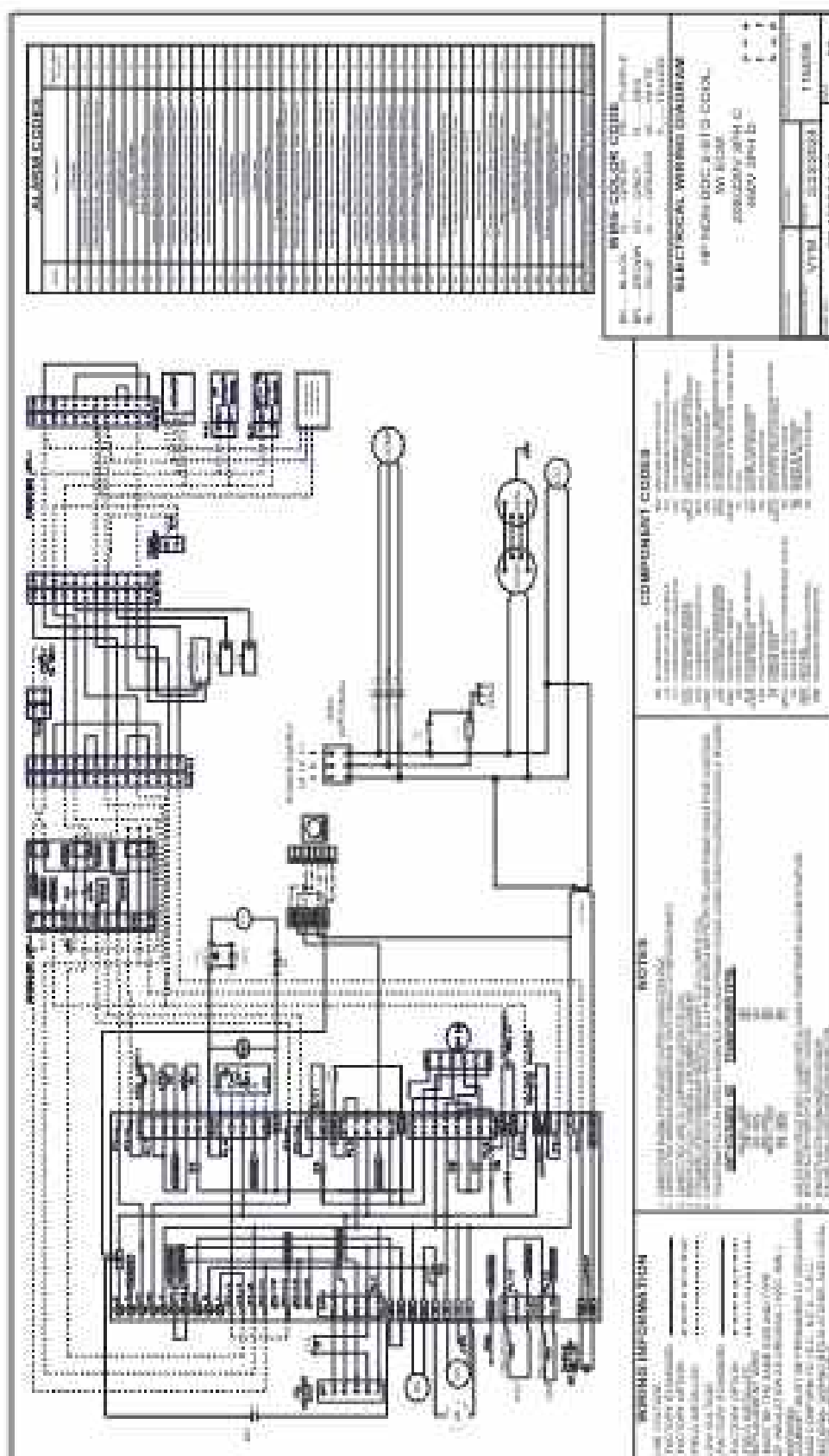


Appendix H – Wiring Diagrams & Schematics (Cont.)



P. APPENDICES

Appendix H – Wiring Diagrams & Schematics (Cont.)

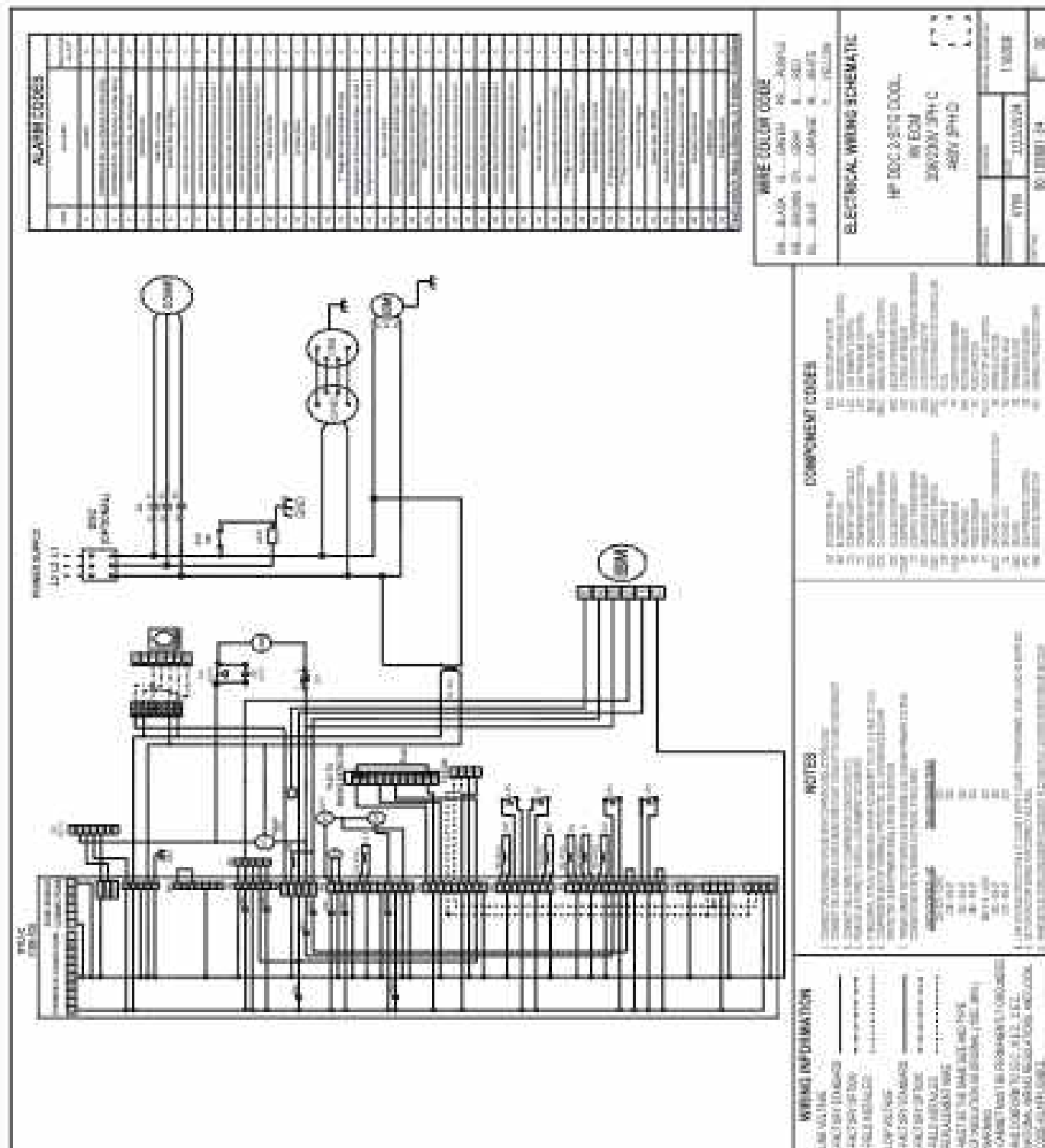


Appendix H – Wiring Diagrams & Schematics (Cont.)



P. APPENDICES

Appendix H – Wiring Diagrams & Schematics (Cont.)



J. Unit Tie-Down



16000 13th Ave. Suite 105, Doral, FL 33142
(304) 554-0050 | info@engexp.com

Technical Evaluation Report

DIVISION: 23 SE 65-COMMISSIONING OF HVAC

FL 26881,1
THIS DOCUMENT CONTAINS (3) PAGES

EVALUATION SUBJECT: RHEEM PACKAGED UNITS

17-4893

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 code(s):

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

This Product Evaluation Report is being issued in accordance with the requirements of the Florida Building Code Sixth Edition (2017) per FBC Section 10A.11, FBC 201.15, FBC Building Ch. 16, ASCE 7-16, FBC Existing Building sections 107.1, 107.2, FBC Building 1622.2, FBC Residential M1002.1, M1001.1, & PS 407.005. The product noted on this report has been tested and evaluated as manufactured herein.

SUBSTANTIATING DATA:

• Product Evaluation Documents: Test Reports

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

Test Report: R520-01-18 (American Test Lab of South FL)

• Structural Engineering Calculations

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

- Maximum allowable uplift, lateral, & overturning moment for ground and top of 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 noted above shall be installed in strict compliance with the 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 procedure & anchor manufacturer's published installation instructions.

LIMITATIONS & CONDITIONS OF USE:

Use of this product shall be in strict accordance with the product evaluation as noted herein. The supporting test structure shall be designed to resist all anticipated loads as determined by others on a site-specific basis as may be required by the Authority Having Jurisdiction. No 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 test 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, deterioration, and other such damage at all times.

OPTIONS:

This evaluation is valid for models shown in the last page.

PREPARED BY:

Bekim Enayef



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 5 side covers secured with #10 Steel metal Hex Head Screws

Handout provided for utility & service connections

INSTALLATION:

Install follow manufacturer's specifications, as well as efforts noted and listed herein.

STRUCTURAL PERFORMANCE:

Models referenced herein are subject to the following design limitations:

ASCE-7-10 Exposure Categories C & D (MCH2)

Maximum Main Roof Height (MCH) = 400ft

Up to and including 175mph (WVI) for the following Design Pressures:

Maximum Rated Wind Pressure:

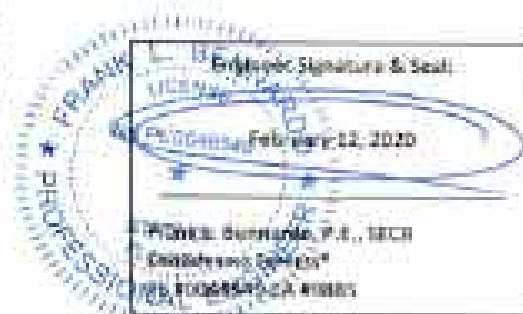
200psf Lateral 133psf Uplift (WVI)

Site specific wind analysis may produce alternate limitations; provided maximum rated wind pressure is not exceeded.

For more information and deviations to this evaluation visit ewalc.io/187759 or scan the QR code



SCALE: 10/16mm



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J. Unit Tie-Down

RHEEM PACKAGED UNITS

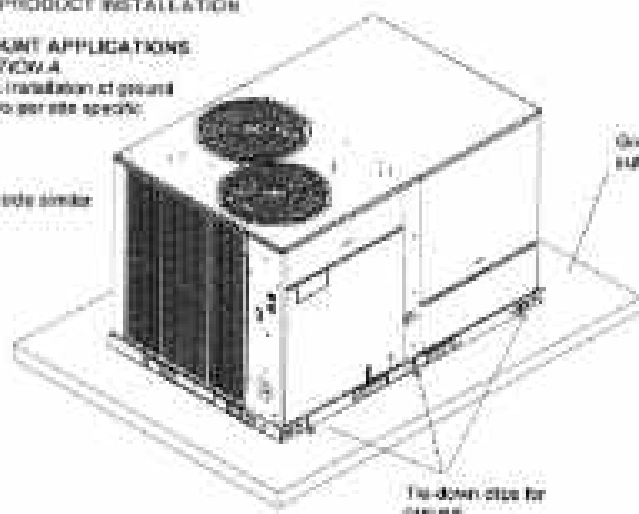
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SECTION 2 PRODUCT INSTALLATION

GROUND MOUNT APPLICATIONS CONFIGURATION A

Note: Design & installation of ground tie-down is the others per site specific conditions.

Opposite side similar



Ground structure / SURFACE (CONCRETE)



TIE-DOWN CLIP (GROUND APPLICATION)

Material: CUTD 1" wide ASTM A653 galvanized steel, 0.07" thick or varying length (PLM731.2) or equivalent for all cabinets tied down to a ground structure. Weld clip to structure using anchor from Anchor Schedule A to Host Structure Table and (C) #12 SAE Gr 2 self-drilling screws to fasten clip to unit base rail. Install in unit with quantities shown (13 per side). Locate clips at 4.5" 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)	-	-	1
Up to 201 (138)	-	2	-

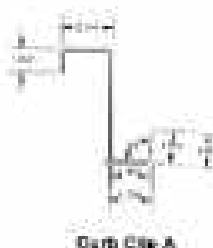
A. - 5/8" ELOD ULTRACOR Anchor embedded 2" to 3.515 per concrete, 3" min. from edge minimum & 3" spacing minimum, NOA No. 17-1227-22

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 8" O.C., (10) per long side and (10) per short side.

CURB MOUNT APPLICATIONS CONFIGURATION B

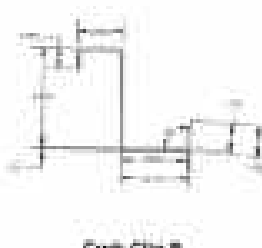
Note: Design & installation of curb to host by others per site specific conditions.



Curb Clip A



Curb Clip C



Curb Clip B

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.

ENGINEERING EXPRESS® 150 SW 12TH AVE. SUITE 106 OCEAN RIDGE, FL 32442
(954) 314-0660 EngineeringExpress.com

Page 2

J. Unit Tie-Down

RHEEM PACKAGED UNITS

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CURB CLIP LOCATION

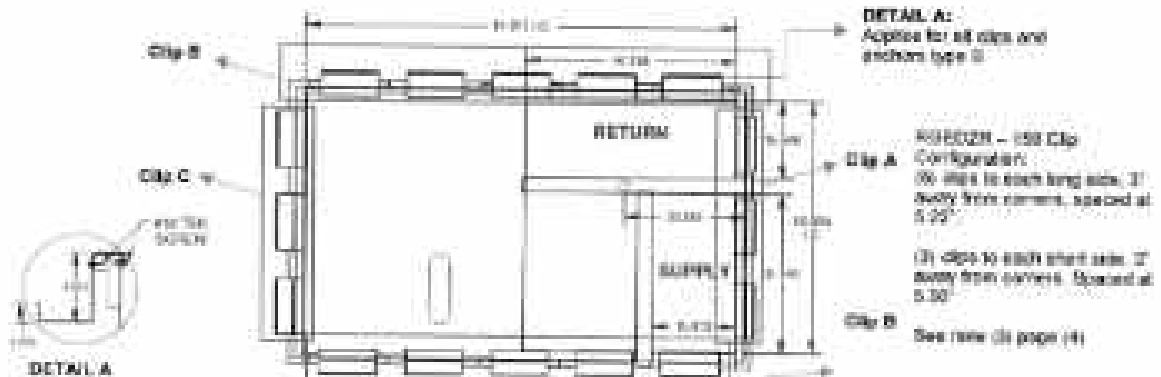


Table 1: Clip Count Schedule

Unit Model			Number of Clips (Pcs)
HAEC - 040	HAEC - 058	HAEC - 068	4 LB - 2 SB
HAEC - 040	HAEC - 068	HAEC - 068	4 LB - 2 SB
HAEC - 060	HAEC - 060	HAEC - 060	4 LB - 2 SB
HAEC - 072	HAEC - 072	HAEC - 072	4 LB - 2 SB
HAEC - 080	HAEC - 080	HAEC - 080	5 LB - 3 SB
HAEC - 102	HAEC - 102	HAEC - 102	5 LB - 3 SB
HAEC - 120	HAEC - 120	HAEC - 120	5 LB - 3 SB
HAEC - 150	HAEC - 150	HAEC - 150	5 LB - 3 SB

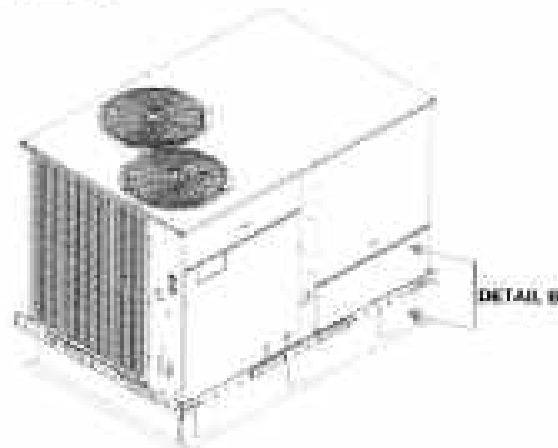
*Clip Designated LB (Long Side) 5' away from Long Side
SB (Short Side) 3' away from Short Side, evenly spaced

Unit Model Note: "1" designates equivalent frame brands with similar capacity and may vary depending on brand

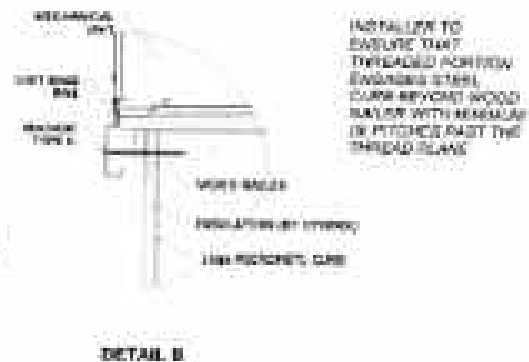
See pressures on page (3) for alternative anchor limitations

ALTERNATIVE ANCHORAGE TO CURB

STEEL CURB WITH SCREW CONFIGURATION C



Mechanical Unit Curb Mounted



P. APPENDICES

J. Unit Tie-Down

RHEEM PACKAGED UNITS

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SECTION 3 MODELS SUMMARY, DIMENSION & NOTES

TABLE 2: Qualified Tested Unit Construction Model Summary				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
PHEDR-230	50 1/2	50 1/10	58 7/10	3870

TESTED UNIT LIMITATIONS

1. The unit model listed above was tested and designed as worst-case configurations of model units listed in Qualification Study 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. Insulators shall verify any interference between clip attachment and internal components of the unit and remove clip within the tolerance allowed.

TABLE 3: Qualification Model Series Matrix (Unit Construction Model Summary)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
1-ACE-E65	45 3/8	72 1/8	41 3/8	412
1-ACE-E45	45 3/8	72 1/8	41 3/8	471
1-ACE-E40	45 3/8	72 1/8	41 3/8	482
1-ACE-E72	45 3/8	72 1/8	41 3/8	444
1-ACE-E85	45 3/8	72 1/8	41 3/8	472
1-ACE-E92	45 3/8	72 1/8	41 3/8	488
1-ACE-E10	45 3/8	72 1/8	41 3/8	477
1-ACE-E15	45 3/8	72 1/8	41 3/8	477
1-ACE-E18	45 3/8	72 1/8	41 3/8	490

TABLE 4: Qualification Model Series Matrix (Unit Construction Model Summary)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
1-ACE-E25	45 3/8	72 1/8	41 3/8	444
1-ACE-E40	45 3/8	72 1/8	41 3/8	477
1-ACE-E45	45 3/8	72 1/8	41 3/8	482
1-ACE-E72	45 3/8	72 1/8	41 3/8	444
1-ACE-E85	45 3/8	72 1/8	41 3/8	472
1-ACE-E92	45 3/8	72 1/8	41 3/8	488
1-ACE-E10	45 3/8	72 1/8	41 3/8	477
1-ACE-E15	45 3/8	72 1/8	41 3/8	477
1-ACE-E18	45 3/8	72 1/8	41 3/8	490

TABLE 5: Qualification Model Series Matrix (Unit Construction Model Summary)				
Unit Model	Operating Dimensions w/ screw heads			Operating Weight (lbs)
	Width (in)	Length (in)	Height (in)	
1-APC-006	78 5/8	40 3/4	41 5/8	524
1-APC-008	78 5/8	40 3/4	41 5/8	552
1-APC-009	78 5/8	40 3/4	41 5/8	552
1-APC-010	78 5/8	40 3/4	41 5/8	552
1-APC-006	88 5/8	40 3/4	41 5/8	552
1-APC-010	88 5/8	40 3/4	41 5/8	552
1-APC-010	88 5/8	40 3/4	41 5/8	574

Unit Model Note: 1-7 (see previous equivalent trade break with similar cabinetry and may vary depending on brand)

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 pressure capacity values listed herein for any capacity as shown.

TEST REPORTS UTILIZED

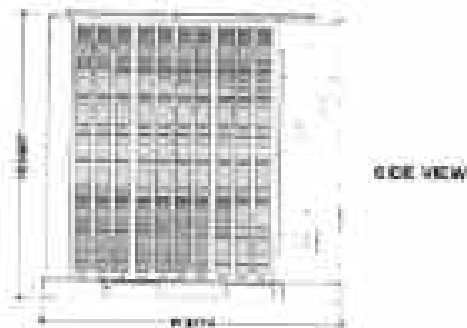
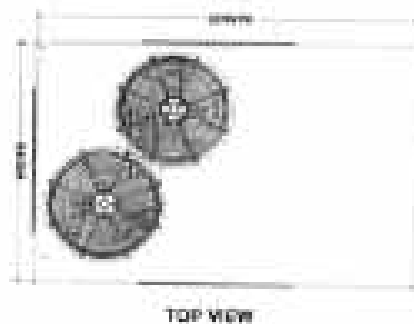
Design and certification of the unit cabinetry is approved through American Test Lab of South Florida Report #: 0020-01-15
 Tested according ASTM E330-05 and TAS 202-04

J. Unit Tie-Down

RHEEM PACKAGED UNITS

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UNIT VIEWS & ELEVATIONS



Note: RSED2R-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 it 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 CHECKLIST AND JOB SITE SHEET

Commercial Job Site Information

Site Information and Application Details:

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

Dealer/Contractor Information:

Business Name : _____	Technician Name : _____
Address : _____	Visit Date : _____
City : _____ State : _____ Zip : _____	Technician Name : _____
Site Contact : _____	Visit Date : _____
Phone : _____ Mobile : _____	Technician Name : _____
Email : _____	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 : 208 240 480 (Circle one)	Phase : 1 3 (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 : 208 240 480 (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 :

Section 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) : _____

Circuit 2 :

Section Line	Liquid Line
Pressure (PSI) : _____	Pressure (PSI) : _____
Temperature (°F) : _____	Temperature (°F) : _____
Sub-cooling (°F) : _____	Sub-cooling (°F) : _____
Supply Air Temperature (°F) : _____	
Supply Air Wet Bulb (°F) : _____	

S. INSTALLATION CHECKLIST AND JOB SITE SHEET

Commercial Job Site Information

Site Information and Application Details:

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

Dealer/Contractor Information:

Business Name: _____	Technician Name: _____
Address: _____	Visit Date: _____
City: _____ State: _____ Zip: _____	Technician Name: _____
Site Contact: _____	Visit Date: _____
Phone: _____ Mobile: _____	Technician Name: _____
Email: _____	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: 208 240 480 (Circle one) Phase: 1 3 (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: 208 240 480 (Circle one)

24VAC Measured Voltage: R to C: _____

24VAC Measured Amp Load:

Transformer Load: _____

Total 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:

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): _____

Circuit 2:

Suction Line	Liquid Line
Pressure (PSI): _____	Pressure (PSI): _____
Temperature (°F): _____	Temperature (°F): _____
Sub-cooling (°F): _____	Sub-cooling (°F): _____
Supply Air Temperature (°F): _____	
Supply Air Wet Bulb (°F): _____	

