Installation, Operation, and Maintenance

Packaged Rooftop Arrangements

For Heating, Cooling and Ventilating Systems

Model Numbers:

GRAA	GRDA
GRBA	AHAA
GRCA	AHBA

J30-05816

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

April 2026 **MUA-SVX003E-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

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⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

⚠ WARNING

Cancer and Reproductive Harm!

This product can expose you to chemicals including lead and bisphenol A (BPA), which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠ WARNING

Safety Hazard!

Failure to follow instructions below could result in death or serious injury or property damage.

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

Do not allow children to play or climb on the unit or to clean or maintain the unit without supervision.

⚠ WARNING

Toxic Fumes and Fibers!

Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which could result in death or serious illness. The State of California has determined that these substances may cause cancer, birth defects, or other reproductive harm. Install and Service this product to avoid exposure to airborne particles of glasswool fibers and/or ceramic fibers known to the State of California to cause cancer through inhalation.

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Revision History

- In the Location section, added maximum allowable installation altitude and updated clearance figures.
- In the Installation chapter, updates to:
  - Installation Clearances
  - Mounting on Field Furnished Supports
  - Venting
  - Duct Connections
  - Chilled Water Coil Equipped Units
- In the Operation chapter, updates to:
  - Air Handling Requirements and Adjustments
  - Controls
- Updated tables in Unit Net and Ship Weights section.
- Updated tables in Center of Gravity section.
- Updates to the Model Number Description.
- Added the A2L Cooling Coil Supplemental Information chapter.

Table of Contents

Receiving Instructions

Inspect shipment immediately when received to determine if any damage has occurred to the crate during shipment.

After the unit has been uncrated, check for any visible damage to the unit. Check motor position and turn blower wheel to determine if damage has occurred to these critical parts.

If any damage is found, the cosignee should sign the bill of lading indicating such damage and immediately file claim for damage with transportation company.

Pre-Installation Instructions

Installer Please Note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer's responsibility to inspect and correct any problems that may be found.

When the unit is received and uncrated, check the external data plate and all labels on the unit for type of gas, electrical, and operational specifications to confirm that these agree with those at point of installation. If the unit is equipped with an Outdoor Duct Furnace, also check the data plate and all labels located inside each furnace.

Every rooftop unit will include an informational packet which will include the following: The blower manual, outdoor duct furnace and evaporative cooler/cooling coil manuals (if applicable to the unit order), wiring diagram(s), factory installed service convenience options manual (if applicable to unit order) and special controls/data sheets.

Note: *It is the owner's responsibility to provide any scaffolding or other apparatus required to perform emergency service or annual/periodic maintenance to this equipment.*

General Safety Requirements

⚠ WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

Important:

- *Open all disconnect switches before installing the unit. Failure to do so may result in personal injury or death from electrical shock.*
- *Failure to comply with the general requirements may result in extensive property damage, severe personal injury or death.*
- *This product must be installed by a licensed plumber or gas fitter when installed within the Commonwealth of Massachusetts.*
- *Do not alter the duct furnace in any way or damage to the unit, severe personal injury or death will occur.*
- *Never service any component without first disconnecting all electrical and gas supplies to the unit or severe personal injury or death may occur.*
- *Confirm that all power sources conform to the unit requirements or damage to the unit may result.*

- The use or storage of gasoline or other flammable vapors or liquids in open containers in the vicinity of this appliance is hazardous.
- If you smell gas:
  - Do not touch electrical switches.
  - Extinguish any open flames.
  - Immediately call your gas supplier.
- For all units that are equipped with gas fired outdoor duct furnaces (certified by ETL) installation must be made in accordance with local codes, or in the absence of local codes, with the latest edition of ANSI Standard Z223.1 (N.F.P.A. No. 54) National Fuel Gas Code. All of the ANSI and NFPA Standards referred to in these installation instructions are those that were applicable at the time the design was certified. The ANSI Standards are available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY, 10036 or www.ansi.org. The NFPA Standards are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
- If installed in Canada, the installation must conform with local building codes, or in the absence of local building codes, with CSA B149.1 “Installation Codes for Natural Gas Burning Appliances and Equipment” or CSA B149.2 “Installation Codes for Propane Gas Burning Appliances and Equipment”. These outdoor duct furnaces have been designed for and certified to comply with CSA 2.8.
- These units have been designed certified for outdoor use only, and may be located on the roof of the building or at any convenient location external to the building to be heated.
- Make certain that the power sources conform to the requirements of the heater.
- Follow installation instructions CAREFULLY to avoid creating unsafe conditions. All wiring should be done and checked by a qualified electrician, using copper wire only. All gas connections should be made and leak-tested by a suitably qualified individual, per instructions in this manual.
- Use only the fuel for which the heater is designed (see nameplate). Using LP gas in a heater that requires natural gas, or vice versa, will create the risk of gas leaks, carbon monoxide poisoning and explosion.

⚠ WARNING

Proper Fuel Required!

Failure to follow instructions below could create unsafe conditions such as gas leaks, carbon monoxide poisoning and explosion, which could result in death or serious injury.

Use only the fuel for which the heater is designed (see nameplate). Do not attempt to convert the heater for use with a fuel other than the one intended.

- Confirm that power source conforms to electrical requirements of heater. Disconnect power before installing or servicing heater. If power disconnect is out of sight, lock it in open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electric shock.

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

- Special attention must be given to any grounding information pertaining to this heater. To prevent the risk of electrocution the heater must be securely and adequately grounded. This should be accomplished by connecting a grounded conductor from the service panel to the conduit box of the heater. To ensure proper ground, the grounding means must be tested by qualifi edfield technician.
- Do not insert fingers or foreign objects into the heater or its air moving device. Do not block or tamper with the heater in any manner while in operation or just after it has been turned off, as some parts may be hot enough to cause injury.
- This heater is intended for general heating applications ONLY. It must NOT be used in potentially dangerous locations such as flammable explosive, chemical-laden or wet atmospheres.
- In cases in which property damage may result from malfunction of the heater, a backup system or a temperature sensitive alarm should be used.
- The venting is an integral part of the unit and must not be altered in the field. The Power Vented unit has a induced draft venting system. The combustion air inlet and products of combustion discharge grills are located in the upper section of the Duct Furnace side access panel.
- A pilot burner plate is provided in the Duct Furnace for access to the pilot burner and ignition system without removing the burner drawer. Clearance between the external unit and any obstruction must be sufficient for proper servicing of pull out burner drawer. See Figure 2, p. 11 and Figure 3, p. 12 for this clearance.
- These units are certified for operation on either natural or propane gases. If a unit is to be installed at an altitude exceeding 2000 feet (610 m) above sea level, derate the unit input of each duct furnace by 4% for each 1000 feet (305 m) above sea level. Special main burner gas orifices are required for installations above 2000 feet (610 m).
- In Canada, if unit is to be installed at altitudes of 2000 feet (610 m) to 4500 feet (1372 m), each duct furnace must have the main burners re-orificed to give 90% of the normal altitude input rating.
- If the unit was ordered from the factory for high altitude operation, confirm input rating. See Gas Input Adjustment.

Unless otherwise specified, the following conversions may be used for calculating SI unit measurements:

- 1 inch = 25.4 mm
- 1 foot = 0.305 m
- 1 gallon = 3.785 L
- 1 pound = 0.454 kg
- 1 psig = 6.894 kPa
- 1 cubic foot = 0.028 m^3
- 1000 Btu/Cu. Ft. = 37.5 MJ/m^3
- 1000 Btu per hour = 0.293 kW
- 1 inch water column = 0.249 kPa
- liter/second = CFM x 0.472
- meter/second = FPM ÷ 196.8

Rigging

⚠ WARNING

Heavy Object!

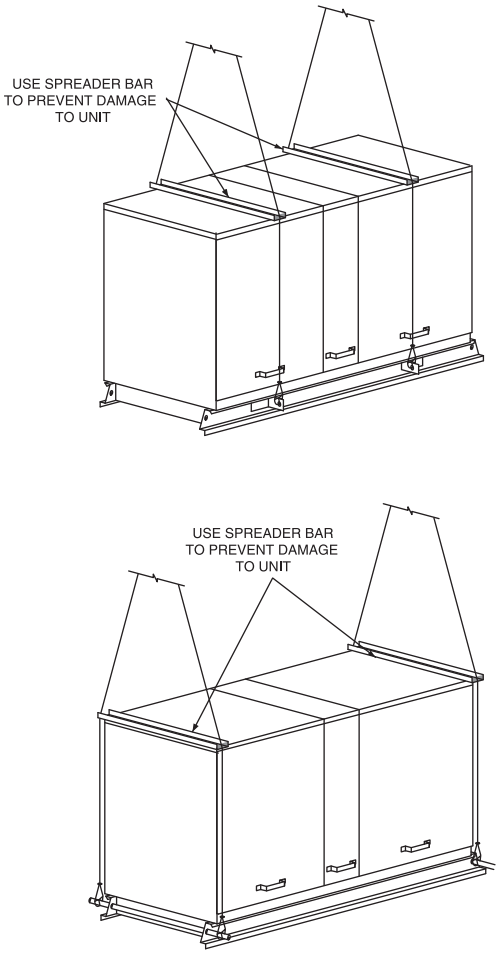
Failure to follow these instructions could result in death, serious injury, and property damage.
Make certain that the lifting methods used to lift the duct furnace are capable of supporting the weight of the heater during installation. Ensure that all hardware used in the suspension of each duct furnace is properly rated for the job. Make certain that the structure to which the duct furnace is to be mounted is capable of safely supporting its weight. Under no circumstances must the gas lines, venting system, or the electrical conduit be used to support the duct furnace. Do not allow objects (i.e. ladder) or people to lean against the gas lines, venting system, or electrical conduit for support.

Rig unit using either belt or cable slings. Use spreader bars to protect the top of the unit when it is lifted. See Figure 1, p. 10

On units with a total length of less than 104 inch (2642 mm), excluding evaporative cooler, two holes are provided in the base rail on each side of the unit. Slide pipes beneath the unit through these holes and attach rigging to pipes for lifting the unit.

On units with a total length of a 104 inch (2642 mm) or greater, excluding evaporative cooler, lifting lugs attached to the base rail are provided. Attach rigging to lugs for lifting the unit. For distance between lifting lugs and total unit lengths, refer to original Submittal Sheets supplied specified for the unit. Also see Center of Gravity and Weights Sections in this manual.

Figure 1. Rigging



Combustion Air Considerations

The presence of chlorine vapors or other corrosive vapors in the combustion air supply for gas-fi red heating equipment presents a potential corrosive hazard. Chlorine will, when exposed to flame, precipitate from the compound (usually freon or

degreaser vapors) and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid which will readily attack all metals, including 300 grade stainless steel. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of the unit with regard to exhausters or prevailing wind direction.

Location

⚠ WARNING

Risk of Roof Collapsing!

Failure to ensure proper structural roof support could cause the roof to collapse, which could result in death or serious injury and property damage.

Confirm with a structural engineer that the roof structure is strong enough to support the combined weight of the roofcurb, the unit, and any accessories.

Before placing rooftop unit in its permanent location, make certain that the roof is capable of carrying the additional load of this equipment. Check the unit weight given at the end of this manual.

Maximum allowable installation altitude is 12,000 feet (3,658 meters).

Refer to Figure 2, p. 11 and Figure 3, p. 12 for required clearances to combustible material.

⚠ WARNING

Proper Installation Location Required!

Failure to follow instructions below could result in death or serious injury.

Do not place unit in a location where service personnel can not safely service this equipment (i.e. roof edge, skylights, etc.).

Note: *If your unit is equipped with through the base utilities and/or service convenience package - refer to Submittal, review in entirety before mounting the unit.*

Figure 2. Minimum clearances to combustible material or obstructions

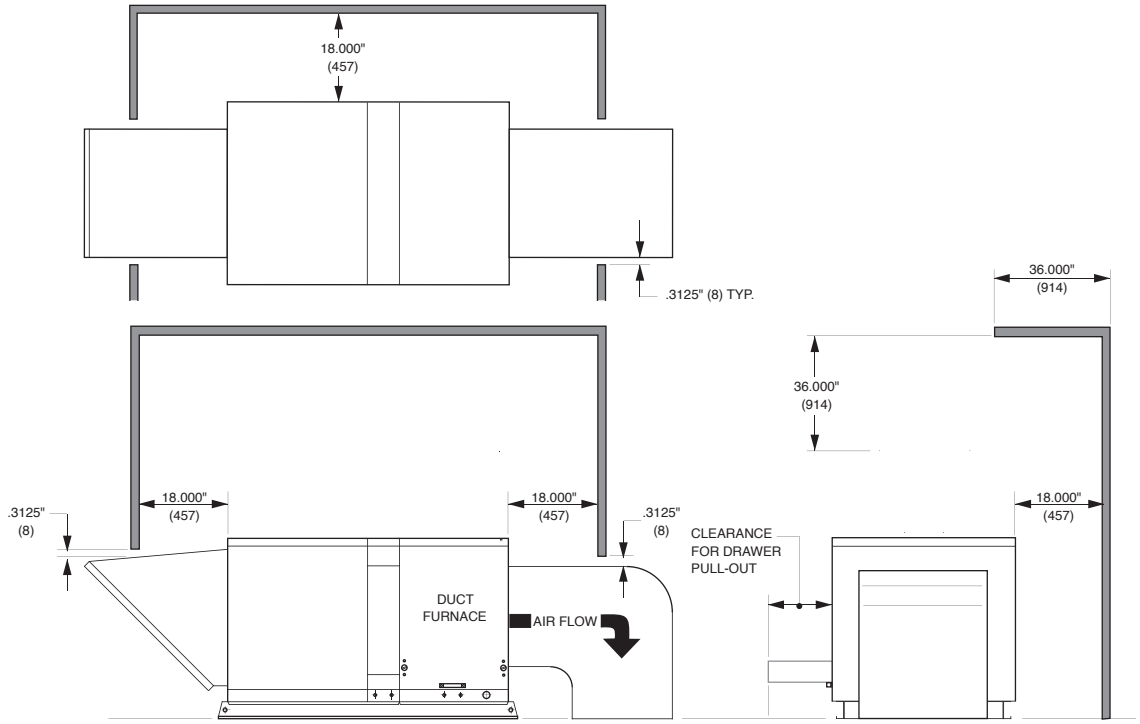
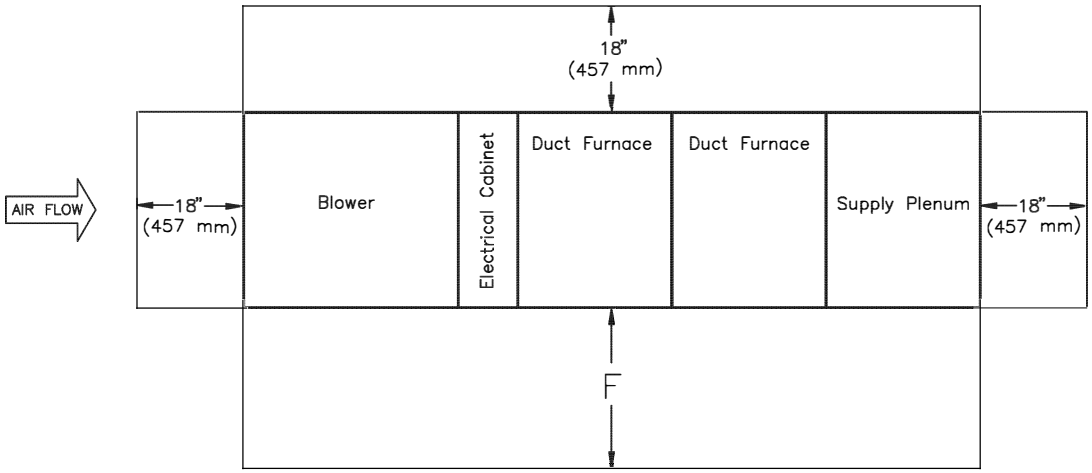


Figure 3. Minimum clearances to combustible material or obstructions



Note: *The unit is equipped with hinged access doors: allow 36 inches minimum for clearance (on access side) to fully open door and lock in an open position.*

Mounting/Locations

These units are suitable for installation on combustible flooring.

Single, double and triple duct furnace only models have base rails which can be mounted either on solid planking or steel channels. All other units installed on field furnished supports must use the recommended method shown in Mounting on Field Furnished Supports or equivalent.

Roof curb kits for rooftop units are shipped unassembled. Included with the roof curb kit are insulated or uninsulated curb rails, bolts and screws needed for assembly, sealant, a roll of self-adhering rubber gasketing, and installation instructions. Roof insulation, cant stripping, flashing, roof felts, caulking, and nails must be furnished by the installer. See , separate roof curb specifications.

If a variable frequency drive (VFD) has been ordered with the unit, consideration should be made for the VFD operating temperature range: 14°F to 130°F. For temperatures below 14°F, VFD must be factory-installed within the VFD Enclosure accessory (Model Digit 22, option 9), or field-mounted indoors.

Installation

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.
Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

Installation must conform with local building codes or in the absence of local codes with the latest edition of the National Fuel Gas Code ANSI Z223.1 (N.F.P.A. No. 54) National Fuel Gas Code.

A heat loss study and a complete layout of the system should be made first.

When locating the unit in its permanent location, make certain that the roof is capable of carrying the additional load of the equipment. **Check the unit net weights section of this manual**.

Make certain that clearances are provided for service, minimum clearance to combustible material and to venting cap. See Figure 2, p. 11 for this information.

Ducts connected to units which do not have either a blower section or a supply plenum must have a removable access panel in the duct, which is connected to a duct furnace. The duct openings shall be accessible when the unit is installed in service and shall be of such size that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heating element. The covers for the panels shall be attached in such manner as to prevent leaks. Ducts exposed to the outdoors must be insulated and sealed to prevent water from entering either the unit or building through the duct.

The duct furnace must be installed on the positive pressure side of the air circulating blower.

NOTICE

Unit Damage!

Failure to follow instructions below could result in unit damage.
Remove wooden shipping support from beneath blower housing of blower Section.

Installation Clearances

⚠ WARNING

Combustible Materials!

Failure to maintain proper clearance between the unit and combustible materials could cause a fire which could result in death, serious injury, or property damage.
Refer to unit nameplate and installation instructions for proper clearances.

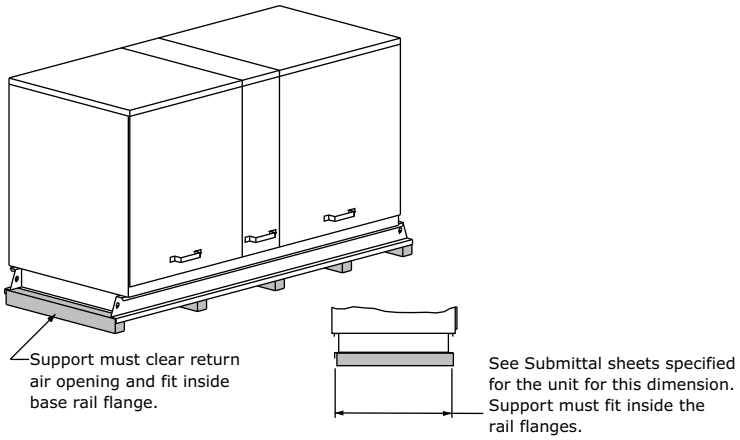
Minimum clearances to combustible material are shown on the unit data plate. It is important that clearances be maintained for servicing the unit (refer to Submittal for service clearances), and that minimum clearances are provided from the unit to combustible material. Clearances around the outside air hood (if unit is so equipped) must be unobstructed. See Figure 2, p. 11.

Mounting on Field Furnished Supports

Single, double, triple duct furnace only models have base rails which are suitable for mounting either directly on solid planking or steel channels. Never install the unit on a soft roof where the rails could sink, reducing clearance between the bottom panel and the roof, or cause damage to the roofing surface.

All other models must use the following method or an equivalent when unit supports are field furnished: Each section of the Rooftop unit must be supported, which includes supports located at both ends. If the unit consists of a High CFM Blower section, a DX Coil, a Duct Furnace and a Supply Plenum, five supports are required. See Figure 4, p. 14.

Figure 4. Mounting on field-furnished supports



Mounting on Roof Curb

Assemble and install roof curb per Roof Curb Installation Instructions. See Figures Figure 5, p. 15, Figure 6, p. 21, Figure 7, p. 22, and Figure 8, p. 23 for roof opening sizes, distance between openings and unit relationship to roof curb.

Figure 5. Roof curb kits dimensional data

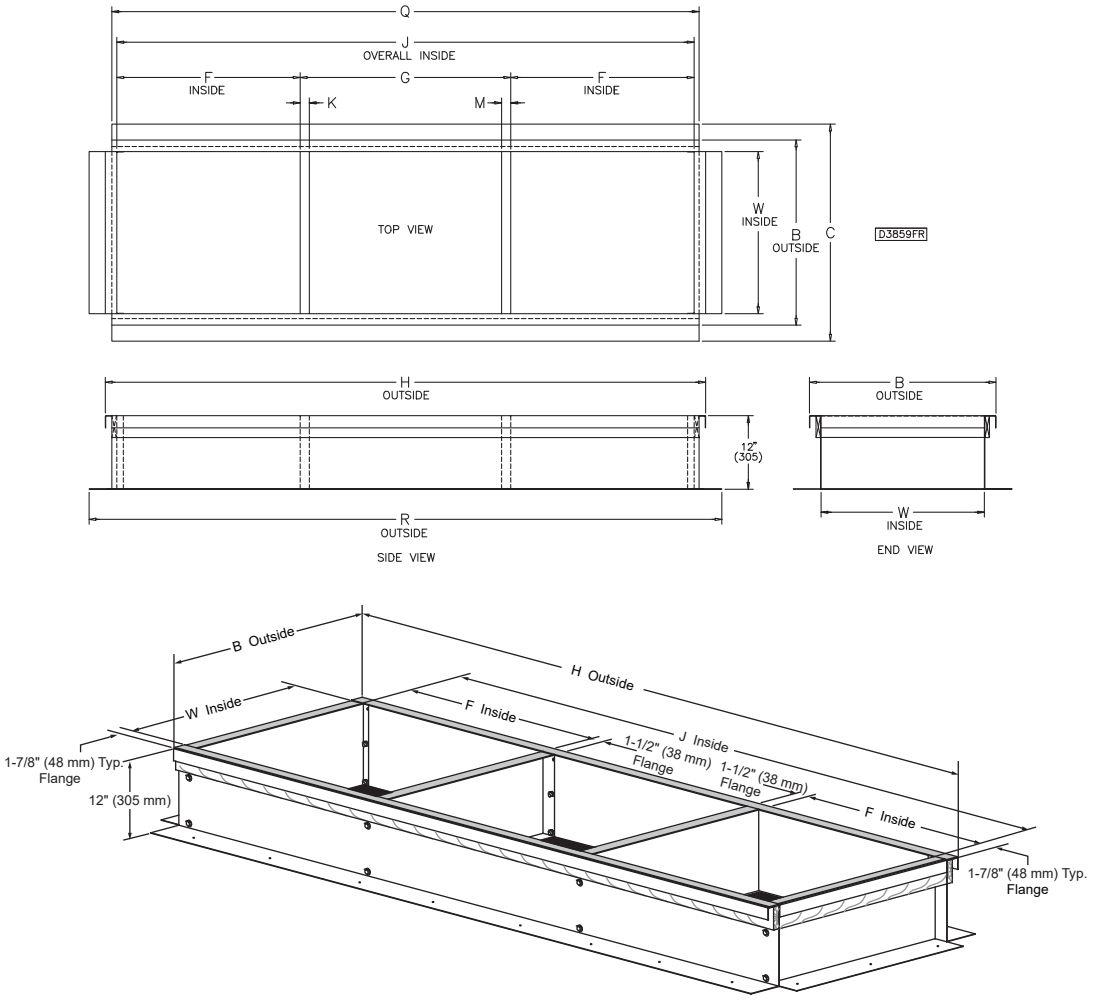


Table 1. GR roof curb kit dimensions

Rooftop Arrangement	Capacity	Trane P/N	F	G	H	J	Q	R	K	M	W	B	C
B	10/15	0134-0205-01	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(671)	(767)	(900)
B	20/25	0134-0205-02	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(951)	(1,046)	(1,179)
B	30/35	0134-0205-03	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,230)	(1,325)	(1,459)
B	40	0134-0205-04	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,370)	(1,465)	(1,599)
C	10/15	0134-0205-05	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(671)	(767)	(900)
C	20/25	0134-0205-06	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(951)	(1,046)	(1,179)
B	50	0134-0205-06	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(951)	(1,046)	(1,179)
C	30/35	0134-0205-07	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
B	60/70		(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(1,230)	(1,325)	(1,459)
C	40	0134-0205-08	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
B	80		(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(1,370)	(1,465)	(1,599)
C	50	0134-0205-09	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(951)	(1,046)	(1,179)
C	60/70	0134-0205-10	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(1,230)	(1,325)	(1,459)
C	80	0134-0205-11	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(1,370)	(1,465)	(1,599)
D	10/15	0134-0205-12	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(671)	(767)	(900)
D	20/25	0134-0205-13	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(951)	(1,046)	(1,179)

Table 1. GR roof curb kit dimensions (continued)

Rooftop Arrangement	Capacity	Trane P/N	F	G	H	J	Q	R	K	M	W	B	C
D	30/35	0134-0205-14	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,230)	(1,325)	(1,459)
D	40	0134-0205-15	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,370)	(1,465)	(1,599)
D	50	0134-0205-16	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
E	20/25		(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(951)	(1,046)	(1,179)
D	60/70	0134-0205-17	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
E	30/35		(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(1,230)	(1,325)	(1,459)
D	80	0134-0205-18	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
E	40		(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(1,370)	(1,465)	(1,599)
E	10/15	0134-0205-19	29-5/8	34-1/8	97-1/8	93-3/8	95	102-3/8	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(752)	(867)	(2,467)	(2,371)	(2,413)	(2,600)	(38)	(38)	(671)	(767)	(900)
E	50	0134-0205-20	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(951)	(1,046)	(1,179)
E	60/70	0134-0205-21	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(1,230)	(1,325)	(1,459)
E	80	0134-0205-22	30-1/8	59	123	119-1/4	120-7/8	128-1/4	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(765)	(1,499)	(3,124)	(3,029)	(3,070)	(3,257)	(38)	(38)	(1,370)	(1,465)	(1,599)
G	20/25	0134-0205-23	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(951)	(1,046)	(1,179)
G	30/35	0134-0205-24	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(1,230)	(1,325)	(1,459)
G	40	0134-0205-25	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(1,370)	(1,465)	(1,599)
G	50	0134-0205-26	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
J & K	20/25		(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(951)	(1,046)	(1,179)
G	60/70	0134-0205-27	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
J & K	30/35		(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(1,230)	(1,325)	(1,459)

Table 1. GR roof curb kit dimensions (continued)

Rooftop Arrangement	Capacity	Trane P/N	F	G	H	J	Q	R	K	M	W	B	C
G	80	0134-0205-28	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(1,370)	(1,465)	(1,599)
G	12	0134-0205-29	37-5/16	80-15/16	159-5/16	155-9/16	157-1/4	164-1/2	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
J & K	80		(948)	(2,056)	(4,046)	(3,951)	(3,994)	(4,178)	(38)	(38)	(1,370)	(1,465)	(1,599)
L	40												
J & K	50	0134-0205-30	37-5/16	80-15/16	159-5/16	155-9/16	157-1/4	164-1/2	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
L	20/25		(948)	(2,056)	(4,046)	(3,951)	(3,994)	(4,178)	(38)	(38)	(951)	(1,046)	(1,179)
J & K	60/70	0134-0205-31	37-5/16	80-15/16	159-5/16	155-9/16	157-1/4	164-1/2	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
L	30/35		(948)	(2,056)	(4,046)	(3,951)	(3,994)	(4,178)	(38)	(38)	(1,230)	(1,325)	(1,459)
K	10/15	0134-0205-32	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(671)	(767)	(900)
J	12	0134-0205-33	36-15/16	107-11/16	185-5/16	181-9/16	183-1/4	190-1/2	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
L	80		(938)	(2,735)	(4,707)	(4,612)	(4,655)	(4,839)	(38)	(38)	(1,370)	(1,465)	(1,599)
L	50	0134-0205-34	36-15/16	107-11/16	185-5/16	181-9/16	183-1/4	190-1/2	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(938)	(2,735)	(4,707)	(4,612)	(4,655)	(4,839)	(38)	(38)	(951)	(1,046)	(1,179)
L	30/70	0134-0205-35	36-15/16	107-11/16	185-5/16	181-9/16	183-1/4	190-1/2	1-1/2	1-1/2	48-7/16	52-3/16	57-7/16
			(938)	(2,735)	(4,707)	(4,612)	(4,655)	(4,839)	(38)	(38)	(1,230)	(1,325)	(1,459)
L	10/15	0134-0205-36	37-5/16	80-15/16	159-5/16	155-9/16	157-1/4	164-1/2	1-1/2	1-1/2	26-7/16	30-3/16	35-7/16
			(948)	(2,056)	(4,046)	(3,951)	(3,994)	(4,178)	(38)	(38)	(671)	(767)	(900)

Note: *Dimensions listed apply to both insulated and uninsulated roof curb types. Roof curb kit part numbers listed are the insulated roof curb type; contact customer service for uninsulated part numbers.*

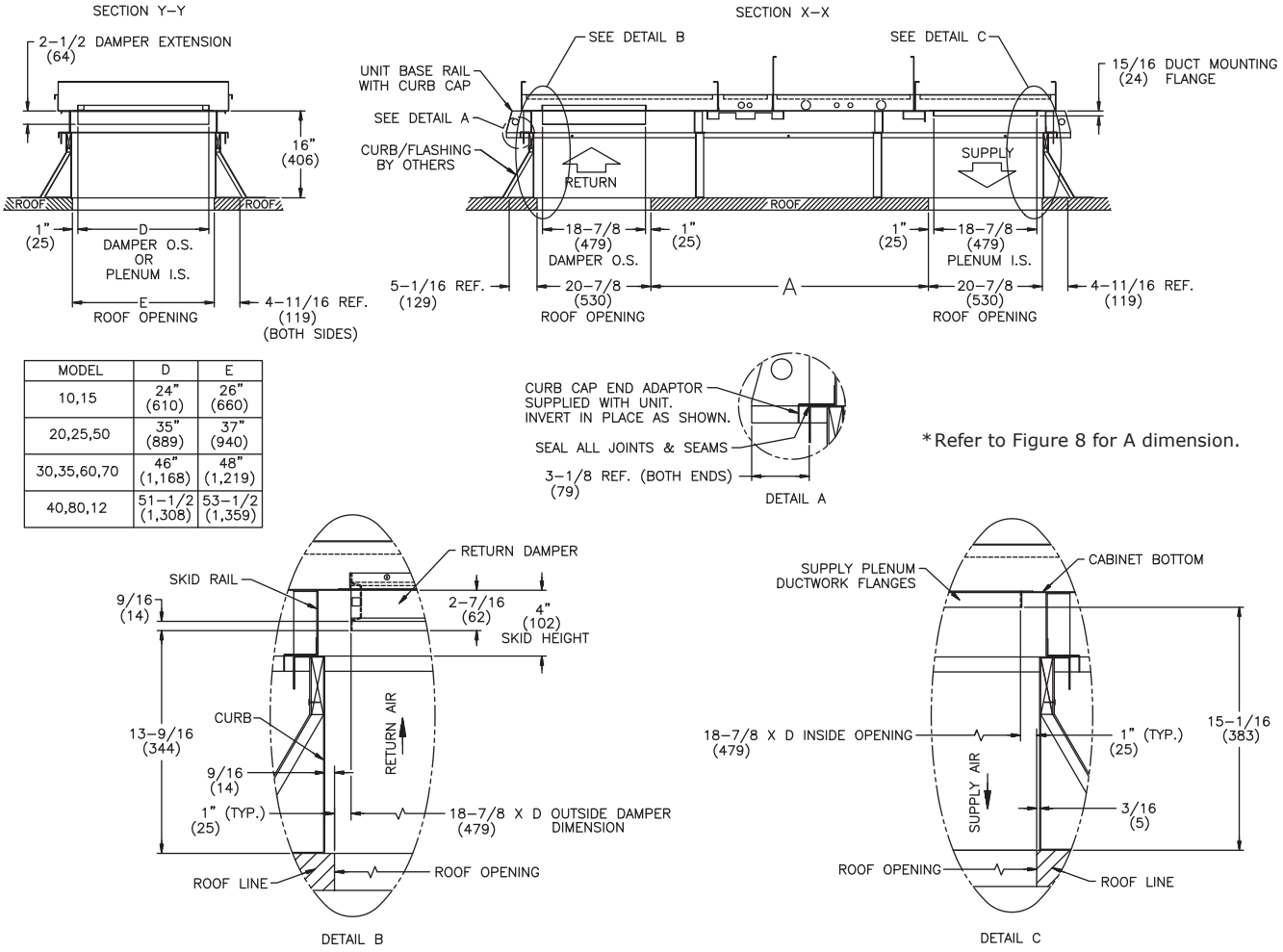
Table 2. AH roof curb kit dimensions

Air Handler Arrangement	Capacity	Trane P/N	F	G	H	J	Q	R	K	M	W	B	C
B	20	0134-0214-01	N/A	N/A	45-1/4	41-1/2	43-1/8	50-1/2	N/A	N/A	37-7/16	41-3/16	46-7/16
					(1,149)	(1,054)	(1,095)	(1,283)			(951)	(1,046)	(1,179)
B	40	0134-0214-02	N/A	N/A	45-1/4	41-1/2	43-1/8	50-1/2	N/A	N/A	53-15/16	57-11/16	62-15/16
					(1,149)	(1,054)	(1,095)	(1,283)			(1,370)	(1,465)	(1,599)
C	20	0134-0214-03	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(951)	(1,046)	(1,179)
C	40	0134-0214-04	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,370)	(1,465)	(1,599)
D	20	0134-0214-05	N/A	N/A	45-1/4	41-1/2	43-1/8	50-1/2	N/A	N/A	37-7/16	41-3/16	46-7/16
					(1,149)	(1,054)	(1,095)	(1,283)			(951)	(1,046)	(1,179)
D	40	0134-0214-06	N/A	N/A	45-1/4	41-1/2	43-1/8	50-1/2	N/A	N/A	53-15/16	57-11/16	62-15/16
					(1,149)	(1,054)	(1,095)	(1,283)			(1,370)	(1,465)	(1,599)
E	20	0134-0214-07	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(951)	(1,046)	(1,179)
E	40	0134-0214-08	29-5/8	8-1/8	71-1/8	67-3/8	69	76-3/8	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(752)	(206)	(1,806)	(1,711)	(1,753)	(1,940)	(38)	(38)	(1,370)	(1,465)	(1,599)
G	20	0134-0214-09	38-1/8	N/A	81-7/16	77-11/16	79-5/16	86-11/16	1-1/2	N/A	37-7/16	41-3/16	46-7/16
			(968)		(2,069)	(1,973)	(2,015)	(2,202)	(38)		(951)	(1,046)	(1,179)
G	40	0134-0214-10	38-1/8	N/A	81-7/16	77-11/16	79-5/16	86-11/16	1-1/2	N/A	53-15/16	57-11/16	62-15/16
			(968)		(2,069)	(1,973)	(2,015)	(2,202)	(38)		(1,370)	(1,465)	(1,599)
J	20	0134-0214-11	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(951)	(1,046)	(1,179)
J	40	0134-0214-12	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(1,370)	(1,465)	(1,599)
K	20	0134-0214-13	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(951)	(1,046)	(1,179)
K	40	0134-0214-14	37-3/16	29-3/16	107-5/16	103-9/16	105-3/16	112-9/16	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(944)	(741)	(2,726)	(2,631)	(2,672)	(2,859)	(38)	(38)	(1,370)	(1,465)	(1,599)

Table 2. AH roof curb kit dimensions (continued)

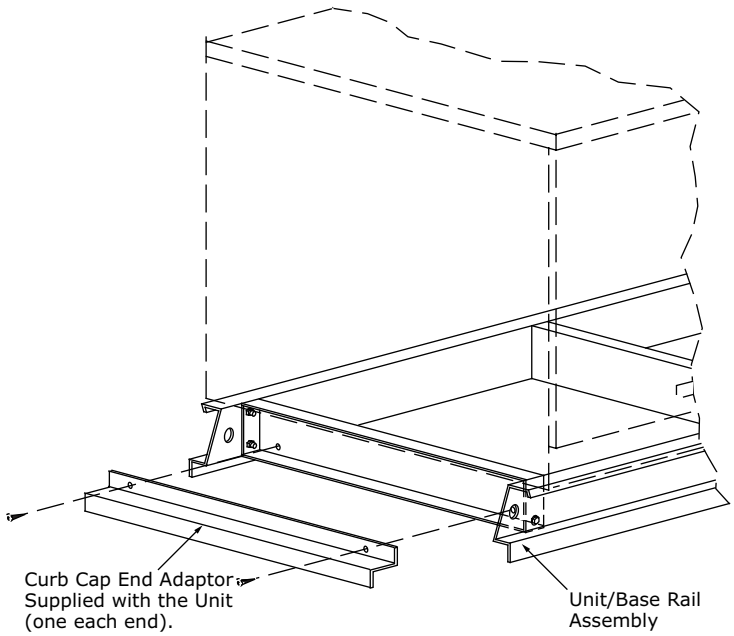
Air Handler Arrangement	Capacity	Trane P/N	F	G	H	J	Q	R	K	M	W	B	C
L	20	0134-0214-15	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	37-7/16	41-3/16	46-7/16
			(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(951)	(1,046)	(1,179)
L	40	0134-0214-16	37-1/8	55-1/4	133-1/4	129-1/2	131-1/8	138-1/2	1-1/2	1-1/2	53-15/16	57-11/16	62-15/16
			(943)	(1,403)	(3,385)	(3,289)	(3,331)	(3,518)	(38)	(38)	(1,370)	(1,465)	(1,599)

Figure 6. Roof opening dimensional data



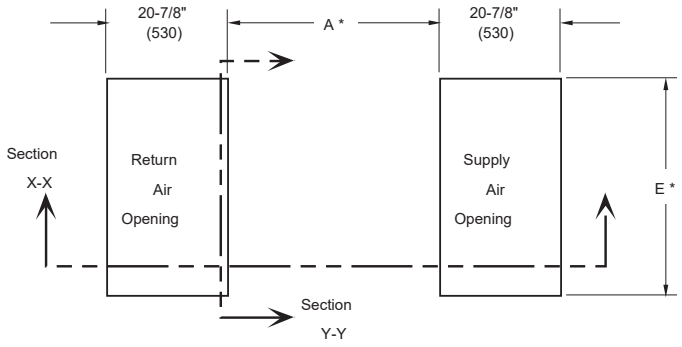
MODEL	D	E
10,15	24" (610)	26" (660)
20,25,50	35" (889)	37" (940)
30,35,60,70	46" (1,168)	48" (1,219)
40,80,12	51–1/2 (1,308)	53–1/2 (1,359)

Figure 7. Unit/curb end rail assembly



* For Field Installations: These Crossbrace/Curb Adapters (2 adapters ship with each rooftop arrangement) must be repositioned in the field when the unit is mounted on a curb or a platform (one for each end). Simply remove the screws, turn the piece over (end for end) and secure in place using the holes/hardware provided. All joints and seams must be sealed completely in the field to prevent leaks.

Figure 8. Roof curb specifications



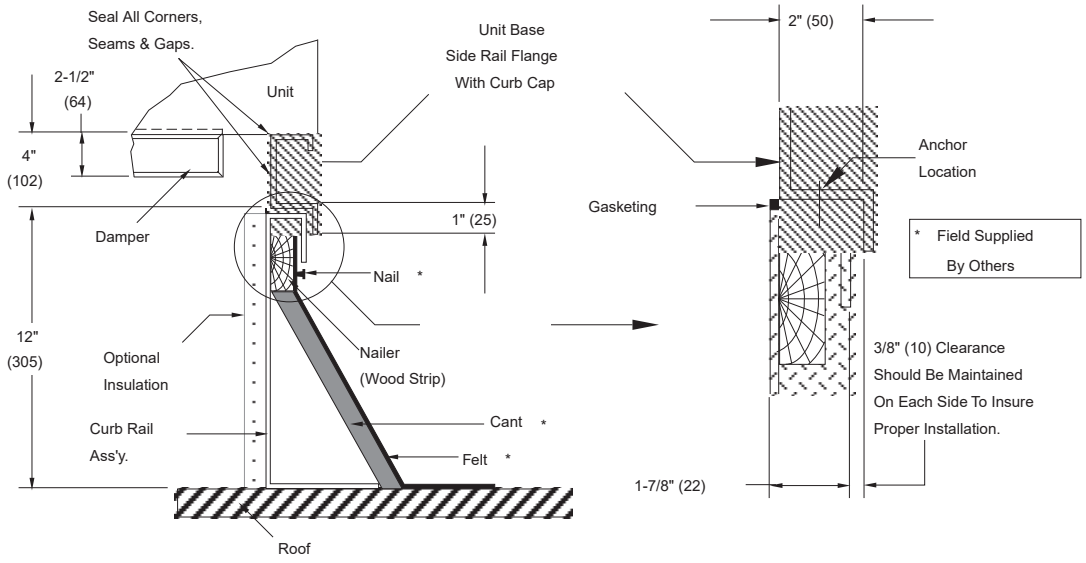
Model GR or AH	
Capacity	Dimension E *
10/15	26" (660)
20/25/50	37" (940)
30/35/60/70	48" (1219)
40/80/12	53-1/2" (1359)

* All Dimensions Shown Have Been Calculated To Include A One (1) Inch Clearance Around Return And Supply Ducts.

Model GR							
** Rooftop Arrangement	FURNACE	Capacity	Unit Specifications (References)				* Dimension A
			Blower		Coil	Supply Plenum	
			St'd.	High CFM			
C, E	SINGLE	10 - 40	√			√	50-7/8" (1292)
J	SINGLE	20 - 40		√		√	87-1/16" (2211)
L	SINGLE	10 - 40		√	√	√	113" (2871)
C, E	DUAL	50 - 80	√			√	76-7/8" (1952)
J	DUAL	50 - 80		√		√	113" (2871)
L	DUAL	50 - 80		√	√	√	139" (3531)
J	TRI	12		√		√	139" (3531)

Model AH						
** [RA]	[CA]	Blower		Coil	Supply Plenum	* A
		St'd.	Hi			
C, E	20 or 40	√			√	24-7/8" (631)
J	20 or 40		√		√	61-1/16" (1551)
L	20 or 40		√	√	√	87-1/16" (2211)

** Rooftop Arrangements [RA] B, D, G, K Are Without a Supply Plenum. For Return Air Opening dimensions, refer to unit submittal(s).



Venting

All venting installations shall be in accordance with the latest edition of Part 7, “Venting of Equipment”, of the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of local building codes.

⚠ WARNING

Proper Venting Required!

Failure to follow instructions below could result in death or serious injury.

All venting installations shall be in accordance with the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of local building codes.

Venting is an integral part of the unit and must NOT be altered in the field.

The Power Vented unit has a induced draft venting system. The combustion air inlet and products of combustion discharge louvers are located in the upper section of the Duct Furnace side access panel. **Never locate these units in an area where the flue products discharge outlet may be directed at any fresh air vents. See the Outdoor Rooftop Gas-Fired Duct Furnace Installation and Service Manual for installation and servicing requirements.**

Duct Connections

All ductwork must be properly supported so that no strain is put on the unit. Do not alter or bend the discharge duct flanges supplied on your furnace/air handler.

Ducts connected to units which do not have either a blower section or a supply plenum must have a removable access panel in the duct which is connected to a duct furnace. The duct openings shall be accessible when the unit is installed in service, and shall be of such size that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heating element. The covers for the panels shall be attached in such a manner as to prevent leaks. Ducts exposed to the outdoors must be insulated and sealed to prevent water from entering either the unit or building through the duct.

The duct furnace must be installed on the positive pressure side of the air circulating blower.

When connecting return air duct to Standard or High CFM cabinets, attach duct to return air opening flange when no dampers are used. Otherwise, if dampers are used, attach return air duct around collar at bottom of damper assembly. Also refer to the Submittal Data Sheets specified for your unit.

When connecting supply air duct to Supply Plenum, attach duct to supply air opening flange when no dampers are used. Otherwise, if dampers are used, attach supply air duct around collar at bottom of damper assembly.

Ductwork connected to this unit shall not contain potential ignition source. Ventilation openings must be kept clear of obstructions. Open areas such as false ceiling shall not be used as a return air duct.

⚠ WARNING

Risk of Fire!

Failure to follow the safety precautions could result in serious injury, death, or property damage.

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 700°C and electric switching devices.

⚠ WARNING

Ignition Sources in Ductwork!

Failure to follow instructions below could result in death or serious injury.

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

Approved auxiliary devices include:

- Lenze - SMVector VFD, Model ESV
- Maxitrol - Duct Sensor, Model TS121
- Maxitrol - Room Sensor, Model TD120
- Maxitrol - Room Override, Model T115

Gas Piping

For complete Gas Piping installation, see Outdoor Rooftop Gas-Fired Duct Furnace Installation and Service Manual, and if applicable the Factory Installed Options Manual.

All gas piping must be installed in accordance with local codes. It is required that a ground union be installed adjacent to the gas valve of each duct furnace, and a ground union be installed just external of each duct furnace for unit servicing. On vertical runs, a drip leg should be provided upstream of any control manifold. A gas shutoff valve should be, or may be required by local codes, installed upstream of the external ground union for each duct furnace. A 1/8 inch N.P.T. plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the unit gas supply connection.

It is recommended that the gas piping not be installed through the bottom of the duct furnace bottom panel. If piping must penetrate the duct furnace bottom panel, it must be sealed to prevent water leakage.

Gas piping must be installed to allow for removal of burner drawer for unit maintenance.

⚠ WARNING

Fire Hazard!

Failure to follow instructions below could result in damage to the unit gas valve and cause a fire hazard which could result in death or serious injury.

- **Do NOT connect gas piping to this unit until a supply line pressure/ leak test has been completed.**
- **Do NOT rely on a gas shutoff valve to isolate the unit while conducting gas pressure/leak tests. These valves may not be completely shutoff, exposing the unit gas valve to excessive pressure.**
- **Do not over-tighten the inlet gas piping at unit gas valve.**

⚠ WARNING

Explosion Hazard!

Failure to follow safe leak test procedures below could result in death or serious injury or equipment or property-only-damage.

Never use an open flame to detect gas leaks. Use a leak test solution for leak testing.

The gas line should be supported so that no strain is placed on the unit. Pipe compounds which are not soluble to liquid petroleum gases must be used on threaded joints.

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psi (3.5 kPa).

The appliance must be isolated from the gas supply piping system by closing the individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psi (3.5 kPa).

For additional gas piping information, including pipe sizing and drip leg installation, refer to Outdoor Rooftop Gas-Fired Duct Furnace Installation and Service Manual.

For additional piping information, refer to the National Fuel Gas Code Z233.1 (latest edition).

Before any connection is made to an existing line supplying other gas appliances, contact the local gas company to make certain that the existing line is of adequate size to handle the combined load.

Check all connections for leaks with soap solution.

⚠ WARNING

Explosion Hazard!

Failure to follow instructions below could result in death or serious injury.

In order to prevent a possible explosion, DO NOT heat the refrigerant container to speed up the charging process.

Modulating Gas Control (Optional)

Note: *Also refer to Outdoor Duct Furnace Installation Manual supplied with your unit.*

Electronic: On units equipped with electronic modulating control, follow control manufacturer's installation instructions for sensing of outlet air temperature.

Electrical Connections

⚠ WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

All electrical connections must conform to the latest edition of ANSI/NFPA No. 70 National Electrical Code and applicable local codes. In Canada, to the Canadian Electrical Code, Part I CSA Standard C22.1.

The rooftop packaged unit is wired at the factory and ready to be connected. Actual unit wiring will differ according to the options chosen. Each unit is shipped with its own wiring diagram; refer to this wiring diagram for all electrical connections to the unit.

All electrical connections, line voltage and thermostat, are made in the Electrical Cabinet (See Figure 10, p. 27). Line voltage connections are made at the High Voltage Terminal Block. Thermostat connections are made at the Main Connection Board (See Figure 10, p. 27).

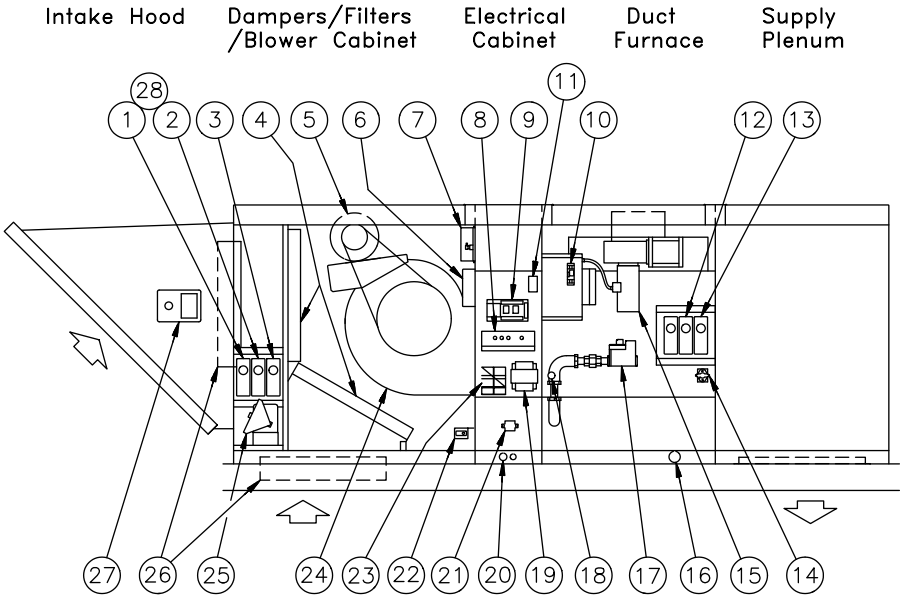
⚠ WARNING

Risk of Electrocution!

Failure to follow instructions below could result in death or serious injury.

DO NOT use any tools (i.e. screwdriver, pliers, etc.) across the terminals to check for power. You MUST use a CAT III or IV voltmeter rated per NFPA 70E.

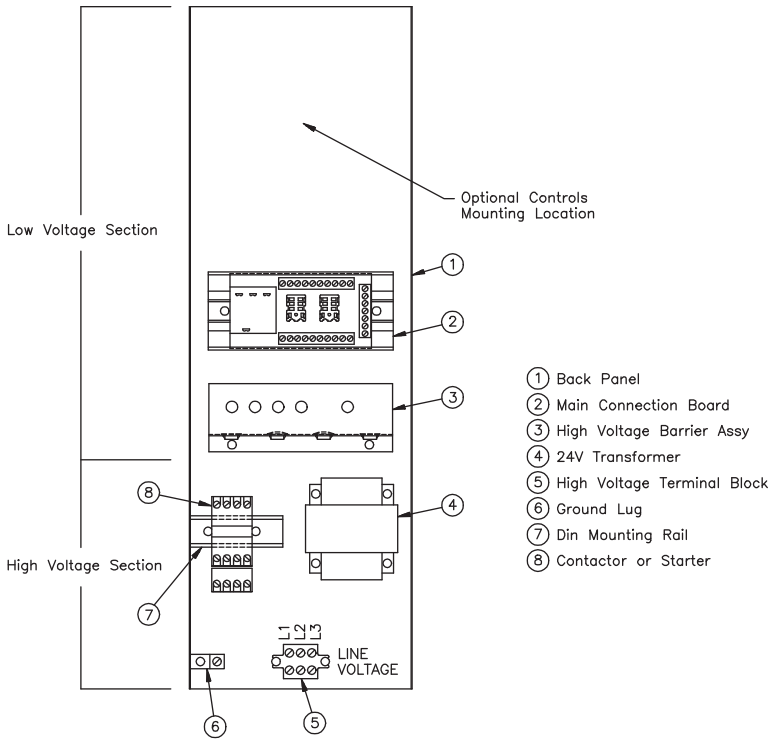
Figure 9. Standard blower cabinet, single duct furnace with supply plenum & various options shown



[Power Vented unit shown]

1. Mixed Air Controller
2. Return Firestat
3. Economizer
4. Filters
5. Blower Motor
6. Reverse Air Flow Switch
7. Clogged Filter Switch
8. High voltage Barrier and Lamp and Circuit Breaker Mount
9. Main Connection Board with Fan Time Delay and Function Relays
10. Power Ventor Relay
11. Freezestat
12. Supply Firestat
13. Duct Thermostat
14. Primary Safety Limit
15. Power Ventor Motor
16. Gas Piping Inlet
17. Gas Valve
18. High Limit Safety Switch
19. Transformer
20. Electrical Wiring Inlet
21. High Voltage Terminal Block
22. Door Safety Switch
23. Contactor
24. Centrifugal Blower Assembly
25. Damper Motor
26. Outside and Return Dampers
27. Enthalpy Controller Economizer
28. Ambient Lockout

Figure 10. Electrical cabinet



Outdoor line voltage conduits leading into the unit should be installed to prevent rain from wetting any high voltage wire. Locate the thermostat in accordance with the instructions supplied with the thermostat. All field wiring must have a minimum temperature rating of 185°F (85°C). Control wiring must be a minimum of 18 gauge wire size. Control wiring must be sized for the length of run.

Locate line voltage disconnect box per local codes. If mounting the disconnect box to the unit, never mount it to an unit access panel. Possible locations include the front of the blower or filter section, the outdoor air hood or the rear of the supply plenum (See Figure 11, p. 28). Electrical conduit must be routed so as not to interfere with removal of any access panel.

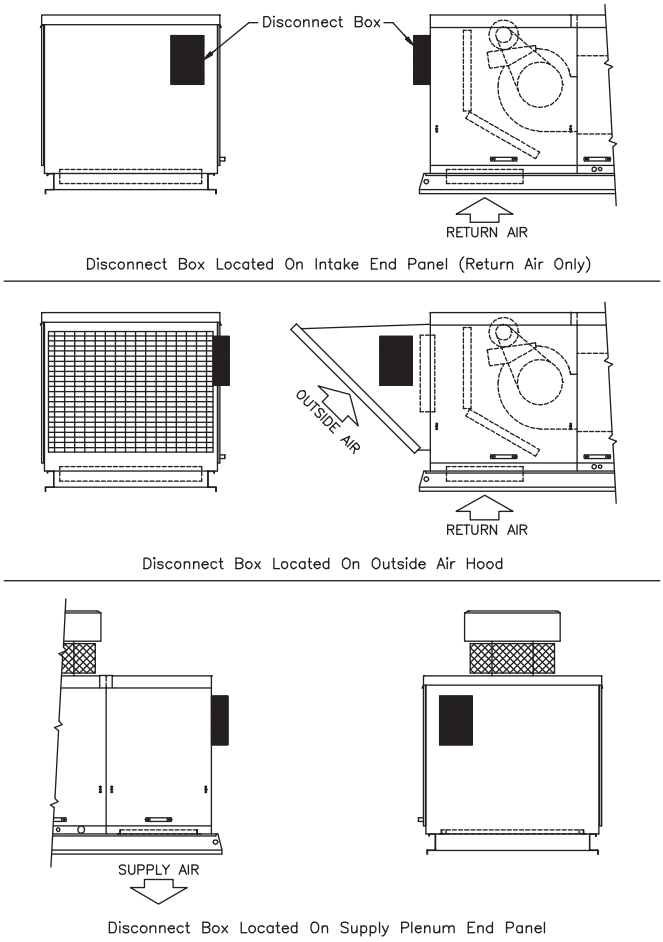
⚠ WARNING

Fire Hazard!

Failure to follow instructions below could cause a fire which could result in death or serious injury, and property damage.

DO NOT jumper factory wiring! Mis-wiring of safety circuits could cause a fire. For all wiring connections, refer to the wiring diagram shipped with the unit. Should any original wire supplied with the unit have to be replaced, it MUST be replaced with wiring material having a temperature rating of at least 221°F (105°C).

Figure 11. Disconnect box locations



DX Coil Equipped Units (Optional)

See Coil Installation/Maintenance Manual for Refrigerant Piping, Liquid and Suction Line Components, Refrigerant Charging and Thermal Expansion Valve Adjustment. Remove coil cabinet access door located next to blower section. Cut holes in fixed door to allow suction and liquid line passage. Provide weatherproof seal around suction and liquid lines at piping plate when installed.

The DX Coil has a 300 ft/min. (1.524 m/s) minimum and a 600 ft/min. (3.048 m/s) maximum velocity through the coil requirement. This is due to prevention of coil icing or condensate blow-off. To calculate the velocity through the coil, apply the following formula:

$$\text{Velocity through the coil} = \frac{\text{Cooling Air Flow in CFM } (m^3/s)}{\text{Coil Surface Area in } ft^2 (m^2)}$$

Condensate Drain piping must have a P-trap in line immediately downstream of drain pan connection, external to the unit, to prevent possible outside air leakage into unit. The P-trap shall be of sufficient differential to overcome negative pressure of the indoor air blower. A minimum height difference of 2 inch is required (See Figure 12, p. 29). Before unit operation begins, the P-trap must be primed with either water (summer) or glycol (winter).

See “A2L Cooling Coil Supplemental Information,” p. 65 for additional A2L refrigerant requirements.

Chilled Water Coil Equipped Units (Optional)

See Coil Installation/Maintenance Manual for General Coil Piping Recommendations. Remove the coil cabinet door and cut holes in door to allow chilled water piping passage. Provide weatherproof seal around chilled water pipes at piping plate when installed.

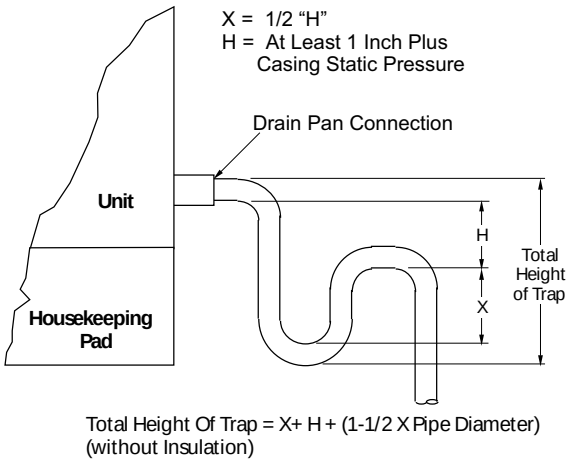
The Chilled Water Coil has a 600 ft/min (3.048 m/s) maximum velocity through the coil requirement. This is due to prevention of condensate blow-off. To calculate the velocity through the coil apply the following formula:

$$\text{Velocity through the coil} = \frac{\text{Cooling Air Flow in CFM } (m^3/s)}{\text{Coil Surface Area in } ft^2 (m^2)}$$

Condensate Drain piping must have a P-trap in line immediately downstream of drain pan connection, external to the unit, to prevent possible outside air leakage into unit. The P-trap shall be of sufficient differential to overcome negative pressure of the indoor air blower. A minimum height difference of 2 inch is required (See Figure 12, p. 29). Before unit operation begins, prime P-trap with either water (summer) or glycol (winter).

For water coils, minimum operating temperature is 40°F (4.5°C) and maximum operating temperature is 220°F (104°C). Minimum operating pressure is 0 PSI (0 kPa) and maximum operating pressure is 200 PSI (1,379 kPa).

Figure 12. Drain pan connection



Evaporative Cooler Equipped Units (Optional)

Refer to Evaporative Cooler Installation and Service Manual for water and electrical connections.

Operation

General Information

Refer to the Outdoor Rooftop Gas-Fired Duct Furnace Installation and Service Manual for specific information regarding the heating operation of this unit.

All units are equipped with a intermittent pilot ignition system. The pilot is lit and extinguished each cycle of unit heating operation.

Continuous Retry Models (Model Number Digit 12, Fuel Types N and P, Natural Gas and LP/Propane)— Continuous retry models provide multiple trials for ignition; the ignitor will continue to spark and pilot gas will continue to flow until the pilot flame is proven. If the pilot is not lit or sensed before the end of the trial for ignition time, the control shuts off the spark and pilot gas (100% shutoff). There is a 5 minute delay before another ignition sequence is initiated. The pattern of ignition sequence followed by a 5 minute delay continues until the pilot lights and is proved or the call for heat ends. The 5 minute delay time can be bypassed by cycling the system thermostat or removing and restoring system power.

Lockout Models (Model Number Digit 12, Fuel type L: Natural Gas with 100% Lockout) — Lockout models provide a single trial for pilot ignition sequence. If the pilot flame is not lit and sensed before the end of the ignition trial time, the control shuts off the pilot valve (100% shutoff) and goes to lockout. The control remains in lockout until power to the control is cycled by the system thermostat or by removing and restoring system power.

The gas control system operates at 24 VAC and is supplied by a step-down transformer found in the electrical cabinet that will match the unit line voltage specified. See Figure 10, p. 27 for unit controls location.

Do not use a thermostatic fan control switch when either two-stage firing or modulated gas controls are used.

Gas Control System

The standard unit comes equipped for single stage operation. Unit heating operation is accomplished at full input. Each duct furnace is equipped with an individual ignition control system which consists of the following components: ignition control module, gas valve and pilot burner.

The **ignition control module** is the heart of the ignition control system. This control initiates all gas flow, provides means to light the pilot burner, proves and monitors the pilot burner operation.

The **gas valve** consists of two operators which provide gas to the pilot and main burners. Both operators are energized and de-energized by the ignition control module each heating cycle.

The **pilot burner** includes an ignitor and flame sense probe. The ignitor provides the spark, originating at the ignition control module, to light the pilot. The ignition control module proves and monitors the pilot flame through the flame sensing probe.

All units follow the same basic sequence of operation and is as follows:

1. Thermostat calls for heat. Drafter relay energizes drafter with call for heat.
2. Ignition control module energizes pilot operator of gas valve and initiates spark at ignitor of the pilot burner.
3. Pilot burner ignition is proven to the ignition control by the flame sense probe and sparking of the ignitor is discontinued.
4. Once pilot burner operation is proven, the ignition control module energizes the main burner operator of the gas valve, allowing gas flow to the main burners. In addition, drafter operation must be proven by drafter end switch before ignition control module energizes main burner operator of gas valve.
5. Approximately 60 seconds after the main burners light the fan time delay initiates fan operation.
6. Thermostat is satisfied and call for heat is removed. Drafter relay de-energizes drafter with removal of call for heat.
7. Ignition control module de-energizes pilot and main burner operators of the gas valve, ceasing all gas flow.
8. Approximately two minutes after satisfying the thermostat, fan operation ceases.

Optional Gas Controls

These units are available with optional gas controls which will give either multi-stage or modulating operation. The sequence of operation of those units equipped with these optional gas controls differs only at what rate each duct furnace's main burners ignite and operate at or the order of duct furnace firing for those units equipped with two or three duct furnaces.

Two Stage Units: Two stages of heating; first stage is 40% of full rate, second stage is 100% of full rate. Main burner ignition is at first stage only.

Three Stage Units: Dual duct furnace models: First furnace is equipped with two stage heating; second furnace is equipped with a single stage heating but fired independently giving three stages of heating. Triple duct furnace models: Each duct furnace is equipped with single stage heating but fired independently, giving three stages. Each stage is 33% of the unit's full input rate. Duct furnace one will always light first and disengage last.

Four Stage Units: Dual duct furnace models only. Each duct furnace is equipped with two stage heating but fired independently, giving four stages. Each stage is 25% of the units full input rate. Duct furnace one will always light first and disengage last.

Electronic Modulation Units: These units are equipped with a electronic modulating control which provides unit fi ring capabilities of 40 to 100% of the units full input rate. This control is found in the gas train downstream of the gas valve and allows main burner ignition only at the maximum rate. A thermostat with remote setpoint adjustment modulates the gas input.

Air Handling Requirements and Adjustments

NOTICE

Unit Damage!

Failure to follow instructions below could result in unit damage.

Remove wooden shipping support from beneath blower housing of blower Section.

Static Pressure through the unit should never exceed 2.0 inch W.C. (0.50 kPa). The standard unit is operated at a temperature rise range of 20 to 60°F (11 to 33°C). The high temperature rise model is operated at a temperature rise range of 60 to 90°F (33 to 50°C).

Important: *It is important that the final temperature leaving the unit does not exceed 160°F (71°C). When final air throughput adjustments are being made, a check of the discharge air temperature should be made after unit has operated for 15 to 20 minutes.*

⚠ WARNING

Fire Hazard!

Failure to follow instructions below could result in death or serious injury, and property damage.

A unit should never be allowed to cycle on the primary limit for a prolonged period of time. It is a safety control to prevent a fire. If cycling on the primary limit is noted, corrective measures should be taken immediately.

Important: *At initial unit installation, unit should be started momentarily to confirm proper blower wheel rotation as the unit will deliver some air with the blower wheel running backwards.*

Two basic air control systems can be used to deliver conditioned air to the occupied space: intermittent or constant fan operation.

Intermittent Fan Operation: The unit employs an air control system which utilizes a fan time delay relay to operate the fan while heating and the thermostat while cooling. Refer to unit wiring diagram.

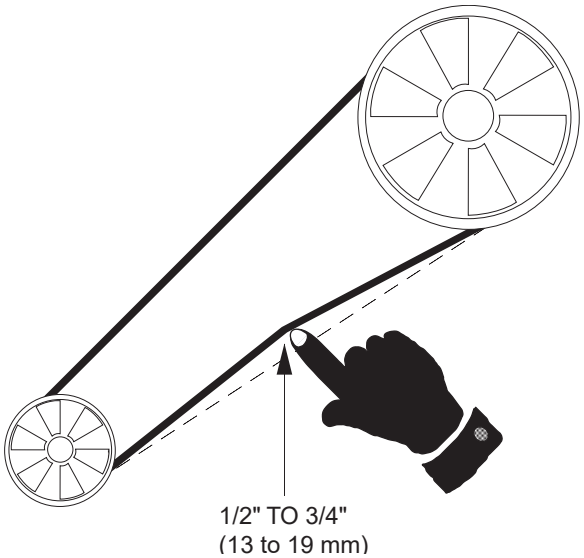
Constant Fan Operation: The unit can be wired to give an air control system which constantly circulates air through the unit and occupied space with constant fan operation. Refer to unit wiring diagram.

Important: *Check blower belt tension. Proper belt tension is important to the long life of the belt and motor. Proper belt tension will allow the belt to be depressed 1⁄2 inch to 3⁄4 inch (13 to 19 mm).*

It is important that the blower motor and the blower wheel pulleys be in good alignment, with the motor and blower shafts parallel.

Belt tension must be adjusted to give approximately 3/4 inch deflection of the belt when finger pressure is applied to the middle of the belt (See Figure 13). Small changes in this tension may be necessary for optimum operation. Belts will stretch over a period of time, requiring an adjustment to this tension. See MAINTENANCE section for belt and pulley adjustments.

Figure 13. Belt tension guide



These units are set at the factory for the RPM required to meet the air volume (CFM) and external static pressure ordered. If the estimated external static is incorrect, or changes were made to the duct system, the blower RPM may need to be changed.

Both the Standard and High CFM Blowers use motors which are equipped with adjustable pitch pulleys. After removing belt(s), loosen the pulley set screw and remove the key, turn adjustable half of a pulley clockwise to increase RPM, or counter-clockwise to decrease RPM. Insert key, tighten set screw and replace belt(s). Adjust belt tension to give 1⁄2 inch to 3⁄4 inch belt play when depressed.

NOTICE

Blower Motor Failure!

Failure to follow instructions below could result in improper unit operation and motor failure.
Blower motor full load amps should never be exceeded. Refer to motor data plate for maximum full load amps.

After changing blower RPM, confirm blower motor full load amps have not been exceeded. See motor data plate for maximum full load amps.

Lighting

(Refer to Outdoor Duct Furnace Manual for all heating functions - general comments are as follows.) Purge the gas line to the unit of air before attempting to light the pilot. Check for gas leaks.

⚠ WARNING

Explosion Hazard!

Failure to follow safe leak test procedures below could result in death or serious injury or equipment or property-only-damage.
Never use an open flame to detect gas leaks. Use a leak test solution for leak testing.

This unit is equipped with an intermittent ignition system. A lighting instruction is attached to the unit. To set the intermittent ignition system into operation proceed as follows:

1. Turn on the gas valve(s) main manual valve.
2. Turn on electrical power. The unit is now under thermostat control.
3. Set thermostat to highest level. This will initiate the sequence of operation detailed in the Gas Control System section. Check main burners for operation.
4. Set thermostat to lowest level. This will interrupt power to the ignition control and shut off gas. Confirm pilot and main burners have been extinguished.
5. Set the thermostat to the desired setting.

For complete unit shutdown, proceed as follows:

1. Turn off the gas valve(s) main manual valve.
2. Set thermostat to lowest setting.
3. Shut off all electric power.

Gas Input Adjustment

When shipped from the factory, all units are equipped for the average heat content of the gas which is stamped on the unit rating plate.

NOTICE

Heat Exchanger Damage!

Failure to follow instructions below could result in heat exchanger damage.

Heat content of gas varies by locality; check the gas input after installation of the unit to ensure proper input. Never exceed the input on the rating plate.

For an accurate input rate measurement the following meter method should be used to determine unit input rate. If the meter method is not possible, a manifold pressure check should be made.

Meter Method of Checking Input Rate

1. Obtain the heating value of the gas from the local utility or gas dealer. This should be in units of Btu/ft^3 (MJ/m^3).
2. Determine the gas flow rate as shown in the following example. EXAMPLE: Assume this unit has a input rate of 250,000 Btu/hr (73.2 kW) and the heating value of the gas is 1000 Btu/ft^3 (37.3 MJ/m^3).

$$\text{Gas Flow Rate} = \frac{250{,}000 \text{ Btu/hr}}{1000 \text{ Btu/ft}^3 \times 60 \text{ min/hr}}$$

$$= 4.17 \text{ ft}^3\text{/min}$$

3. Before determining the gas flow rate to the unit, all other gas appliances connected to the same meter must be turned off.
4. Fire unit according to instructions.
5. After approximately 15 minutes of unit operation, determine volume of gas used in five minutes of unit operation. For the Example above the unit should use 4.17 ft^3/min x 5 min or 20.8 ft^3 (1.97 L/s x 5 min x 60 s/min = 591L) of gas. Minor input adjustments can be made by removing pressure regulator cap and turning regulator clockwise to increase input or counter clockwise to decrease input. Any appreciable adjustment in input rate should be made by reorificing.

Method to Check Manifold Pressure

1. Close the manual valve of unit gas valve.
2. Install a 1⁄8 inch pipe connection in the tapped hole provided in the gas valve body near outlet of the valve.
3. Attach manometer to 1⁄8 inch pipe connection by means of a rubber hose.
4. Fire unit according to instructions and observe the pressure and confirm it matches the unit manifold pressure from the unit rating plate.
5. Small variations in the manifold pressure can be made by means of the gas valve pressure regulator. Remove pressure regulator cap and turn regulator clockwise to increase pressure or counter-clockwise to decrease pressure.

Pilot Adjustment

1. Disconnect wire from terminal marked MV at gas valve.
2. Provide call for heat.
3. Pilot adjustment is found on the gas valve. Remove pilot adjustment cap.
4. Adjust the pilot screw to provide properly sized flame.
5. A proper pilot burner flame is a soft steady flame that envelopes 3⁄8 to 1⁄2 inch (9.5 to 12.7mm) of the flame sense probe tip.
6. Replace the pilot adjustment cap.
7. Reconnect wire to terminal MV.

Primary Air Shutter Adjustment

After the unit has been in operation for at least 15 minutes, adjust the primary air flow to the burners. Turn the friction-locked manually rotated air shutters clockwise to close, counter clockwise to open. For correct air adjustment, close the air shutter until yellow tips in the flame appear. Then open the air shutter to the point just beyond the position where yellow tipping disappears.

Controls

Primary Limit Control: The primary limit control is a factory installed component surface mounted in the inlet airstream at the end of the heat exchanger. When the temperature reaches the limit set point, normally caused by insufficient air throughput, all gas is shutoff. The limit control has an automatic reset and once the unit has cooled, it will reset itself. This is a safety control and if cycling on the primary limit is noted, corrective action must be taken. See unit wiring diagram for electrical location. This control must never be bypassed. Upon completion of unit installation, the primary limit must be checked for proper operation. This can be accomplished by removing power to the indoor air blower and a call for heat.

Draftor End Switch: This switch is located at the end of the draftor motor and is integral to the motor. The switch, which is normally open, will close when draftor motor attains the minimum speed for proper combustion allowing main burner operation. The pilot burner will light without a proven draftor end switch. See unit wiring diagram for electrical location.

Clogged Filter Switch:(Optional) The clogged filter switch monitors the pressure differential across the air filters. If this pressure differential becomes too great, the switch will alert of this condition. At this point the air filters must either be cleaned or replaced. The switch will reset itself.

Firestat: (Optional) Located in either the return airstream, the supply airstream, or both, this control monitors temperatures with set points which are field adjustable. If the temperature exceeds the set point, the control will cease unit operation. To resume unit operation, a manual reset of this control is required.

Freezestat: (Optional) Located in either the return airstream, the supply airstream, or both, this control monitors temperatures with set points which are field adjustable. If the temperature does not exceed the set point, the control will cease unit operation.

Pre-Purge Delay: (Optional) On a call for heat, the pre-purge relay provides each furnace an independent 60 second pre-purge mode where the power venter is energized prior to beginning the ignition sequence.

Start-Up

Before starting the unit, use the “Gas Equipment Start Up Sheet” (located at the end of this manual) and read the Outdoor Duct Furnace Manual entirely in conjunction with the procedures outlined below to ensure that the unit is completely and properly installed and ready for start up.

⚠ WARNING

Check of Safety Devices Required!

Failure to follow instructions below could cause unsafe conditions and result in death, serious injury, or property damage.

All safety controls MUST be checked before starting the unit and during regular maintenance! Check and test the operational functions of all safety devices supplied with this unit.

1. Inspect all wiring connections; connections should be clean and tight. **Trace circuits to insure that actual wiring agrees with the “as wired” diagrams provided with the unit**. Information in the wiring diagram title block should match the data appearing on the unit nameplate.
2. Lubricate all electrical motors according to the manufacturer’s recommendations.
3. Verify that the system switch is in the OFF position.
4. Check unit supply voltage to ensure that it is within the utilization range.
5. Inspect the interior of the unit; remove any debris or tools which may be present.

Starting the Unit in Heating Mode

1. Close the unit disconnect switch which provides power to the unit.

Important: *High voltage is present in some areas of the unit (primarily the main electrical cabinet) with the unit disconnect switch closed. Failure to exercise caution when working in the presence of energized electrical components may result in injury or death from electrical shock.*

⚠ WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

2. Set the thermostat/switching subbase as indicated below:
    a. Position the heating system switch at either HEAT or AUTO;
    b. Set the fan switch to AUTO.
3. Place the system switch in the ON position.

Note: *With the thermostat calling for heat, unit operation is automatic.*

Starting Unit in Cooling Mode

1. Close the unit disconnect switch which provides power to the unit.

Important: *High voltage is present in some areas of the unit (primarily the main electrical cabinet) with the unit disconnect switch closed. Failure to exercise caution when working in the presence of energized electrical components may result in injury or death from electrical shock.*

2. Set the thermostat/switching subbase as indicated below:
    a. Position the cooling system switch at either COOL or AUTO;
    b. Set the fan switch to AUTO.
3. Place the system switch in the ON position.

Note: *With the thermostat calling for cooling, unit operation is automatic.*

Final Checkout

Start-Up

Run the unit sequentially through its stages of heating and cooling. Once proper unit operation is verified, perform these final steps:

1. Inspect unit for debris and/or misplaced tools and hardware.
2. Be sure all gas valves and controls are in the operating position if the unit will be operating immediately.
3. Cycle unit on all safety controls to verify proper unit operation.
4. Confirm proper operating control (thermostat or ductstat) operation by cycling unit.
5. Secure all exterior panels in place.

Maintenance

General Information

⚠ WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠ WARNING

Explosion Hazard!

Failure to follow safe leak test procedures below could result in death or serious injury or equipment or property-only-damage.

Never use an open flame to detect gas leaks. Use a leak test solution for leak testing.

To check gas tightness of the safety shut-off valves, turn off the manual valve upstream of the appliance combination control. Remove the 1/8 inch pipe plug on the inlet side of the combination control and connect a manometer to that tapping. Turn the manual valve on to apply pressure to the combination control. Note the pressure reading on the manometer, then turn the valve off. A loss of pressure indicates a leak. If a leak is detected, use a soap solution to check all threaded connections. If no leak is found, combination control is faulty and must be replaced before putting appliance back in service.

Note: *Gas tightness of the safety shutoff valves must be checked on at least an annual basis.*

These units have been developed for outdoor installation. Maintenance is required and it is suggested that the following unit servicing and inspections be performed routinely. Also read in entirety and refer to the Outdoor Duct Furnace Manual for maintenance requirements.

Inspect area near unit to be sure that there is no combustible material located within the minimum clearance requirements (See Figure 2, p. 11). Service panels provide easy access to the gas controls (located in duct furnace section), the blower compartment, the electrical cabinet and the supply plenum. To remove the service door from any of these compartments, refer to access panel removal section in beginning of this manual.

The pilot burner can be serviced by removing the pilot plate from the main burner drawer assembly.

Main Burner Drawer Assembly Removal (Also refer to Outdoor Rooftop Duct Furnace manual).

1. Shut off the gas supply at the gas shutoff valve and electrical power to the unit.
2. Break the union upstream of duct furnace gas valve and loosen the union external to the furnace; swing downward the piping to clear drawer.
3. Disconnect duct furnace gas valve wiring taking note of all wire locations. Disconnect ignitor and flame sensing probe wires at ignition control module and any other wires.
4. Remove the locking screws holding the burner drawer assembly in position.
5. Slide the burner drawer out of the duct furnace.
6. Removal of burners is accomplished by sliding burner towards manifold, compressing locating spring, until the rear of the burner clears slot in back of burner drawer.
7. With burner drawer removed from duct furnace, inspect the inside surfaces of the heat exchanger. Wire brush if necessary.
8. Remove any dirt, dust or other foreign matter from the burners using a wire brush and/or compressed air. Insure all parts of the burner are unobstructed. Inspect and clean pilot burner if necessary.
9. Reassemble the duct furnace by replacing all parts in order.
10. Light unit per the unit lighting instructions.
11. Check the burner adjustment. See the Primary Air Adjustment section of this manual.

12. Check all gas control valves and pipe connections for leaks.

⚠ WARNING

Combustible Materials!

Failure to maintain proper clearance between the unit and combustible materials could cause a fire which could result in death, serious injury, or property damage.

Refer to unit nameplate and installation instructions for proper clearances.

13. Check the operation of the duct furnace gas valve by lowering the setting of the thermostat, stopping the operation of the duct furnace. The duct furnace gas valve should close, extinguishing the pilot and main burner flames.
14. Inspect and service the blower section of the system.

Routine Maintenance

The unit should be thoroughly checked before the start and at the end of each heating and cooling season.

1. Motors and belts should be inspected.
2. Tighten belts if loose.
3. Check and clean DX or Chilled Water coil twice yearly, if unit is so equipped per manufacturer's service manual. Chilled Water coil must be winterized at beginning of heating season (i.e. drain water from coil per manufacturer's instructions).
4. Check air throughput at beginning of heating season to confirm unit operation is within the specified temperature rise range.
5. At beginning of heating season clear Condensate Drain Pan and P-trap of water if unit is equipped with DX or Chilled water coil. Clean out drain pan and fill P-trap with a non-toxic glycol solution.
6. Evaporative cooler must be cleaned and maintained per manufacturer's instruction frequently during the operating season.
7. Inspect Control Dampers during periodic maintenance. Damper pivot points should be cleaned to ensure free damper operation.
8. Blower wheels should be checked periodically for dirt build-up on blades. Clean as required.

Filters

It is recommended that air filters be changed or cleaned at least four times a year. More frequent attention to filters is required if the air being handled by the unit is unusually dirty. Air flow reduction, caused by the dirty air filters, will increase the discharge air temperature and may cause unit cycling on the primary limit.

Filters (by others) should be serviced regularly and changed or washed when necessary to maintain the required air throughput. In a dusty environment, filters may clog up in less than one month.

Table 3. High CFM blower air filter size requirements

Unit Input	Number of Filters Required	
	16 x 20 (in)	20 x 20 (in)
200 MBtuh (58.6 kW)		8
250 MBtuh (73.2 kW)		8
300 MBtuh (87.9 kW)	8	4
350 MBtuh (102.6 kW)	8	4
400 MBtuh (117.2 kW)		12
500 MBtuh (146.5 kW)		8
600 MBtuh (175.8 kW)	8	4
700 MBtuh (205.1 kW)	8	4
800 MBtuh (234.4 kW)		12
1,200 MBtuh (351.6kW)		12

Table 4. Standard CFM blower air filter size requirements

Unit Input	Number of Filters Required	
	16 x 20 (in)	20 x 20 (in)
100 MBtuh (29.3 kW)	4	
150 MBtuh (44.0 kW)	4	
200 MBtuh (58.6 kW)		4
250 MBtuh (73.2 kW)		4
300 MBtuh (87.9 kW)	4	2
350 MBtuh (102.6 kW)	4	2
400 MBtuh (117.2 kW)		6
500 MBtuh (146.5 kW)		4
600 MBtuh (175.8 kW)	4	2
700 MBtuh (205.1 kW)	4	2
800 MBtuh (234.4 kW)		6

Air Blower

Belt Tension Adjustment Standard CFM Blower belt tension can be adjusted by loosening motor mounting bolts marked A (See Figure 14). To tighten belt, slide motor down motor mounting bracket and re-fasten motor to mounting bracket.

High CFM Blower belt(s) tension can be adjusted by first loosening motor mounting plate bolts marked A (See Figure 14). To tighten belt tension, turn belt tension adjustment screws marked B (See Figure 14) counter-clockwise. To loosen belt tension, turn clockwise. Once belt tension has been adjusted, re-fasten motor mounting plate bolts.

Blower RPM Adjustment

1. Loosen and remove belt(s).
2. Match driver pulley to one found in Figure 15.
3. Loosen setscrew(s) marked A.
4. If driver pulley is equipped with external key, marked B, remove.
5. Adjust driver pulley pitch diameter for desired speed by opening (slower) or closing (faster) moving parts by half or full turns. Do not open sheave past point where flange projects past the hub end.
6. If driver pulley is equipped with external key, marked B, replace.
7. Tighten setscrew(s) marked A.
8. Replace and retension belt(s).
9. Realign drive if necessary.

Figure 14. Blower belt tension

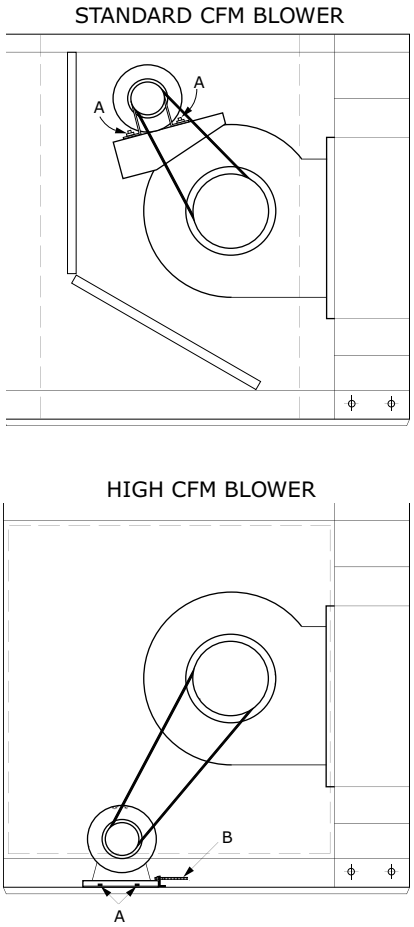
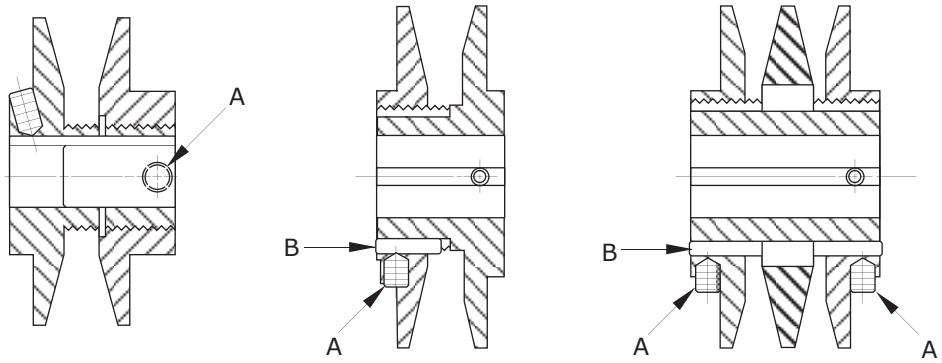


Figure 15. Blower RPM adjustment



KEY B PROJECTS TO PROVIDE A GRIP FOR REMOVING.

DO NOT OPERATE SHEAVE WITH FLANGE PROJECTING BEYOND THE HUB END.

Troubleshooting

For troubleshooting of the duct furnace, refer to Indoor Rooftop Gas-Fired Duct Furnace Installation and Service Manual. For Evaporative Cooler/Cooling Coil equipped units, refer to these specific manuals for additional troubleshooting guides.

For additional troubleshooting, see following Troubleshooting Guide.

Troubleshooting Guide — Air Blower

Problem	Probable Cause	Solution
Noise	Blower Wheel Hitting Scroll Side	1. Blower Wheel not centered in blower housing. 2. Damaged blower housing. 3. Damaged blower wheel. 4. Shaft loose in blower bearing. 5. Blower Wheel loose on shaft. 6. Blower bearing loose in bearing support.
	Blower Wheel Hitting Cutoff	1. Cutoff not secure in blower housing. 2. Cutoff damaged. 3. Cutoff improperly positioned.
	Drive	1. Pulley not tight on shaft (motor and/or blower wheel). 2. Belts too loose. Adjust for belt stretching after 48 hours of operation. 3. Belts too tight. 4. Belts wrong cross section. 5. Belts not matched in length on multi-belt drive. 6. Variable pitch pulleys not adjusted so each pulley has same pitch diameter (multi-belt drives). 7. Misaligned pulleys. 8. Belts worn. 9. Motor or motor base loose. 10. Belts oily or dirty 11. Improper drive selection
	Bearing	1. Defective bearing. 2. Needs lubrication. 3. Loose on bearing support. 4. Loose on shaft. 5. Seals misaligned. 6. Foreign material in bearing. 7. Worn bearing. 8. Fretting corrosion between inner race and shaft.
	Shaft Seal Squeal	1. Needs lubrication. 2. Misaligned.
	Blower Wheel	1. Loose on shaft 2. Defective blower wheel. Do not run blower. Contact manufacturer. 3. Unbalanced. 4. Worn as a result of contact with abrasive or corrosive material.
	Housing	1. Foreign material in housing. 2. Cutoff of other part loose (rattling during operation).

Problem	Probable Cause	Solution
	Electrical	1. Lead-in cable not secure. 2. AC hum in motor or relay 3. Starting relay chatter. 4. Noisy motor bearings. 5. Single phasing a 3–phase motor.
	Shaft	1. Bent. 2. Undersized. May cause noise at blower wheel, bearings or pulley. 3. If more than two bearings are on a shaft, they must be properly aligned.
	High Air Velocity	1. Duct work too small for application. 2. Blower selection too small for application. 3. Registers or grilles too small for application. 4. Cooling coil with insufficient face area for application.
	Obstruction in High Velocity Air Stream may cause Rattle or Pure Tone Whistle	1. Dampers. 2. Registers. 3. Grilles. 4. Sharp elbows. 5. Sudden expansion in duct work. 6. Sudden contraction in duct work. 7. Turning vanes.
	Pulsation or Surge	1. Blower too large for application. 2. Ducts vibrate at same frequency as blower pulsations.
	Rattles and/or Rumbles	1. Vibrating duct work. 2. Vibrating cabinet parts. 3. Vibrating parts not isolated from building.
CFM Low - Insufficient Air Flow	Blower	1. Forward curved blower wheel installed backwards. 2. Blower operating backwards. 3. Cutoff missing or improperly installed. 4. Blower wheel RPM too low.
	Duct System	1. Actual system is more restrictive than expected. 2. Dampers closed. 3. Registers closed. 4. Leaks in supply duct.
	Filters	Dirty or clogged.
	Coil - DX or Chilled Water	Dirty or clogged.
	Obstructions in High Velocity Air Stream	1. Obstruction near unit outlet. 2. Sharp elbows near unit outlet. 3. Improperly designed turning vanes. 4. Projections, dampers or other obstructions in part of duct system where air velocity is high.

Problem	Probable Cause	Solution
CFM High - Too Much Air Flow	System	1. Oversized duct work. 2. Access door open. 3. Registers or grilles not installed. 4. Filters not in place. 5. System resistance lower than anticipated.
	Blower	Blower RPM is too great.
Blower Does Not Operate	Installation	1. Incorrect electrical connection. 2. Wrong voltage. 3. Blown fuse.
	Unit	1. Broken belt(s). 2. Loose pulleys. 3. Power to unit is disconnected. 4. Motor overload protector has broken circuit. 5. Optional thermostats, firestats, freezestats may lockout blower operation if set incorrect.

Troubleshooting Guide — Electric Motors

Problem	Probable Cause	Solution
Motor	Blown fuse or open circuit breaker	Replace fuse or reset circuit breaker.
	Overload trip	Check and reset, if manual.
	Improper line connections	Check connections to unit wiring diagram.
	Improper current supply	Check to determine that power supply agrees with motor nameplate specifications.
	Mechanical failure.	Determine that motor and drive turn freely. Check bearings
	Motor overloaded	Reduce load or replace motor.
	With a 3 phase power source, one phase may be open	Check line for open phase.
	Defective capacitor	Replace capacitor.
Motor Stalls	Wrong application	Consult manufacturer.
	Overloaded motor	Reduce load or replace motor.
	Low line voltage.	Check across AC line and correct if possible.
Motor runs and then dies down	Partial loss of line voltage	Check for loose connections. Determine adequacy of main power supply.
Motor does not come up to speed	Motor undersized for application	Replace with larger motor.
	Voltage too low at motor terminals	Check across AC line and correct if possible.
	Line wiring to motor is too small	Install larger line wiring.

Problem	Probable Cause	Solution
Motor takes too long to accelerate	Excessive load. Loose connection	Replace with larger motor.
	Loose connection	Check connections and tighten where necessary.
Wrong Rotation (3 Phase)	Improperly wired to AC line (wrong sequence of phases)	Check unit wiring diagram. Reverse any two line voltage connections.
Motor Overheats	Motor overloaded	Replace with larger motor.
	Motor ventilation clogged	Clean motor.
	Motor (3 phase) may have open phase	Check to insure that all connections are tight.
	Line voltage too high or too low	Check across AC line and correct if possible.
	Worn blower bearings.	Replace blower bearings.
Motor Vibrates	Motor mounting bolts loose	Tighten mounting bolts.
	Driven equipment unbalanced	Balance driven equipment.
	Worn motor bearings.	Replace motor.
	3 phase Motor running on single phase	Check for open circuit and correct.
	Bent motor shaft	Replace motor.
Rapid Motor Bearing Wear	Excessive overhung load due to over-tensioned belt	Reduce belt tension.

Troubleshooting Guide — Fan Assembly

Problem	Probable Cause	Solution
Short Belt Life	Spin burns from belt slippage	Tension belt.
	High ambient temperature	Use Gripnotch belts.
	Grease or oil on belts	Clean belts and pulleys.
	Worn pulleys	Replace pulleys.
	Belt Misalignment	Realign drive.
Belts turn over in grooves	Damaged belt	Replace belt.
	Excessive vibration	Tension belts. Replace belts if damaged.
	Worn pulleys	Replace pulleys.
	Pulley Misalignment	Realign drive.
Belt Squeal	Excessive load	High starting load. Retension drive.
Belt Breakage	Foreign material in drive	Provide drive guard.
	Belts damaged during installation	Replace belts.
	Extreme Overload	Eliminate overload.

Problem	Probable Cause	Solution
Excessive Vibration	Damaged belt cord section	Replace belts.
	Loose belts	Tension drive.
	Belts improperly tensioned	Tension drive with slack of each belt on the same side of drive.
Belts mismatched after service	Belts improperly tensioned, causing more stretch of some belts than others	Replace belts and tension drive with slack of each belt on the same side of the drive.
	Old belts and new belts used on same drive	Replace with new belts.
	Different brand name belts used on same drive	Replace with a set of machine-matched belts.
	Driver and driven shafts shifted from parallel	Realign drive.
	Belt cord section damaged during installation	Replace belts and install properly.
Drive fails to adjust	Fretting corrosion (drive allowed to operate at one speed over a period of time)	Driver pulley must be disassembled, cleaned and lubricated, then reassembled.

Troubleshooting Guide — DX Cooling Coil

Problem	Probable Cause	Solution
No or Insufficient Cooling	Coil icing	1. Low liquid line pressure.* 2. Thermal expansion valve.** 3. Low air flow across coil.
	Air binding	Purge and charge system.
	Thermal expansion valve**	1. Bulb mounted at incorrect location. 2. Bulb not secured properly.
	Insufficient air flow	1. See air blower troubleshooting. 2. Clogged coil
	Air bypassing coil	Caulk safe off.
	Undersized system, demand exceeding cooling system capacity	Replace system.*
	Too much outside air	Check outside air dampers.
	Refrigerant leak	Determine leak location and correct.
	Low liquid pressure	Determine cause and correct.*
Water in Conditioned Air	Exceeding coil face velocity - 600 fpm.	Reduce unit air flow.
	Drain pan p-trap clogged.	Clean pan and p-trap.

Note: **Refer to condensing unit installation and service manual.*
***Refer to thermal expansion valve installation instruction.*

Troubleshooting Guide — Chilled Water Cooling Coil

Problem	Probable Cause	Solution
No or Insufficient Cooling	Circulating pump failure.	Repair or replace pump.*
	Chilled water temperature not cool enough.	Check chiller.*
	Air binding (air in coil).	Bleed coil.
	Insufficient chilled water flow.	1. Circulating pump capacity is inadequate.* 2. System piping losses too great.
	Insufficient air flow.	1. See air blower troubleshooting. 2. Clogged coil
	Air bypassing coil.	Caulk safe off.
	Undersized system, demand exceeding cooling system capacity.	Replace system.*
	Too much outside air.	Check outside air dampers.
Water in Conditioned Air	Exceeding coil face velocity - 600 fpm.	Reduce unit air flow.
	Drain pan p-trap clogged.	Clean pan and p-trap.

Note: **Refer to Manufacturer's Installation and Service Manual.*

Unit Net and Ship Weights

Note: *All unit weights are less motor, outside air hood and cooling coils with drain pan. For units ordered with double wall construction (Optional) add an additional 10% of the base unit weight. GR-P = Vent Type P, Power Vent (Refer to model number description)*

Table 5. Unit net and ship weights

Rooftop Arrangement "A"		
	NET WT.	SHIP.WT.
GR-P-10	262	373
GR-P-15	298	409
GR-P-20	356	475
GR-P-25	395	514
GR-P-30	455	582
GR-P-35	495	622
GR-P-40	543	675
GR-P-50	777	934
GR-P-60	885	1052
GR-P-70	964	1131
GR-P-80	1058	1230
GR-P-12	1573	1776

Rooftop Arrangement "B"		
	NET WT.	SHIP.WT.
GR-P-10	583	749
GR-P-15	619	785
GR-P-20	731	907
GR-P-25	771	947
GR-P-30	893	1078
GR-P-35	943	1128
GR-P-40	1018	1208
GR-P-50	1175	1403
GR-P-60	1349	1588
GR-P-70	1438	1677
GR-P-80	1561	1805

Rooftop Arrangement "C"		
	NET WT.	SHIP.WT.
GR-P-10	712	930
GR-P-15	748	966
GR-P-20	875	1103
GR-P-25	915	1143
GR-P-30	1054	1293
GR-P-35	1102	1341
GR-P-40	1187	1431
GR-P-50	1325	1578
GR-P-60	1518	1783
GR-P-70	1606	1871
GR-P-80	1737	2006

Rooftop Arrangement "D"		
	NET WT.	SHIP.WT.
GR-P-10	712	911
GR-P-15	749	948
GR-P-20	884	1093
GR-P-25	925	1134
GR-P-30	1069	1287
GR-P-35	1119	1337
GR-P-40	1206	1429
GR-P-50	1328	1575
GR-P-60	1526	1784
GR-P-70	1614	1872
GR-P-80	1749	2012

Rooftop Arrangement "E"		
	NET WT.	SHIP.WT.
GR-P-10	842	1079
GR-P-15	878	1115
GR-P-20	1028	1275
GR-P-25	1068	1315
GR-P-30	1230	1488
GR-P-35	1279	1537
GR-P-40	1375	1638
GR-P-50	1479	1765
GR-P-60	1694	1992
GR-P-70	1782	2080
GR-P-80	1925	2229

Rooftop Arrangement "G"		
	NET WT.	SHIP.WT.
GR-P-20	973	1197
GR-P-25	1015	1239
GR-P-30	1204	1438
GR-P-35	1246	1480
GR-P-40	1329	1569
GR-P-50	1407	1669
GR-P-60	1649	1923
GR-P-70	1729	2003
GR-P-80	1858	2138
GR-P-12	2376	2697

Rooftop Arrangement "J"		
	NET WT.	SHIP.WT.
GR-P-20	1107	1369
GR-P-25	1147	1409
GR-P-30	1353	1627
GR-P-35	1394	1668
GR-P-40	1485	1765
GR-P-50	1577	1878
GR-P-60	1835	2149
GR-P-70	1914	2228
GR-P-80	2051	2372
GR-P-12	2576	2937

Rooftop Arrangement "K"		
	NET WT.	SHIP.WT.
GR-P-10	893	1144
GR-P-15	929	1180
GR-P-20	1123	1385
GR-P-25	1164	1426
GR-P-30	1371	1645
GR-P-35	1413	1687
GR-P-40	1505	1785
GR-P-50	1594	1934
GR-P-60	1853	2207
GR-P-70	1934	2288

Rooftop Arrangement "L"		
	NET WT.	SHIP.WT.
GR-P-10	1062	1351
GR-P-15	1098	1387
GR-P-20	1307	1608
GR-P-25	1348	1649
GR-P-30	1575	1889
GR-P-35	1615	1929
GR-P-40	1716	2037
GR-P-50	1736	2076

Table 5. Unit net and ship weights (continued)

GR-P-60	2015	2369
GR-P-70	2095	2449
GR-P-80	2241	2602

Table 6. Outdoor air hood w/bird screen weight adder

Capacity	Weight
10	43
15	43
20	51
25	51
30	59
35	59
40	63
50	51
60	59
70	59
80	63

Table 7. Air handler, net weight, and ship weight

Rooftop Arrangement	AH Capacity	Net Wt.	Ship. Wt.
"B"	20	403	616
	40	513	744
"C"	20	529	705
	40	665	855
"D"	20	609	822
	40	769	1000
"E"	20	735	959
	40	921	1161
"G"	20	635	847
	40	793	1023
"J"	20	788	1012
	40	967	1207
"K"	20	797	1021
	40	987	1227
"L"	20	936	1198
	40	1152	1432

Double Wall Construction Adder

For units ordered with double wall construction: add an additional 10% to the base unit weight.

Cooling Coil Weight Adder

Table 8. Cooling coil weight adder

Capacity	DX Coil		Chilled Water Coil	
	4 Row	6 Row	4 Row	6 Row
10, 15	97 lbs.	132 lbs.	75 lbs.	102 lbs.
20, 25, 50	126 lbs.	177 lbs.	98 lbs.	135 lbs.
30, 35, 60, 70	165 lbs.	229 lbs.	125 lbs.	176 lbs.
40, 80	177 lbs.	249 lbs.	135 lbs.	196 lbs.

Approximate Motor Shipping Weights

Table 9. Approximate motor shipping weights (pounds)

	A - (115/1/60)				B - (208/1/60)				C - (230/1/60)			
	1 ODP	2 TE	3 PEODP	4 PETE	1 ODP	2 TE	3 PEODP	4 PETE	1 ODP	2 TE	3 PEODP	4 PETE
1/2 HP	20	21	29	30	21	21	29		21	21	29	30
3/4 HP	28	31	38	41	23	23	38		23	31	38	41
1 HP	32	32	40	44	32	32			32	32	40	44
1-1/2 HP	35	48	47	57		48			35	48	47	57
2 HP	42	67	65	64		67			42	48	65	64
3 HP	78	86			78	72			78	72		90
5 HP					87				87	99	95	
7-1/2 HP					134	138			134	138		
10 HP										161		
15 HP												

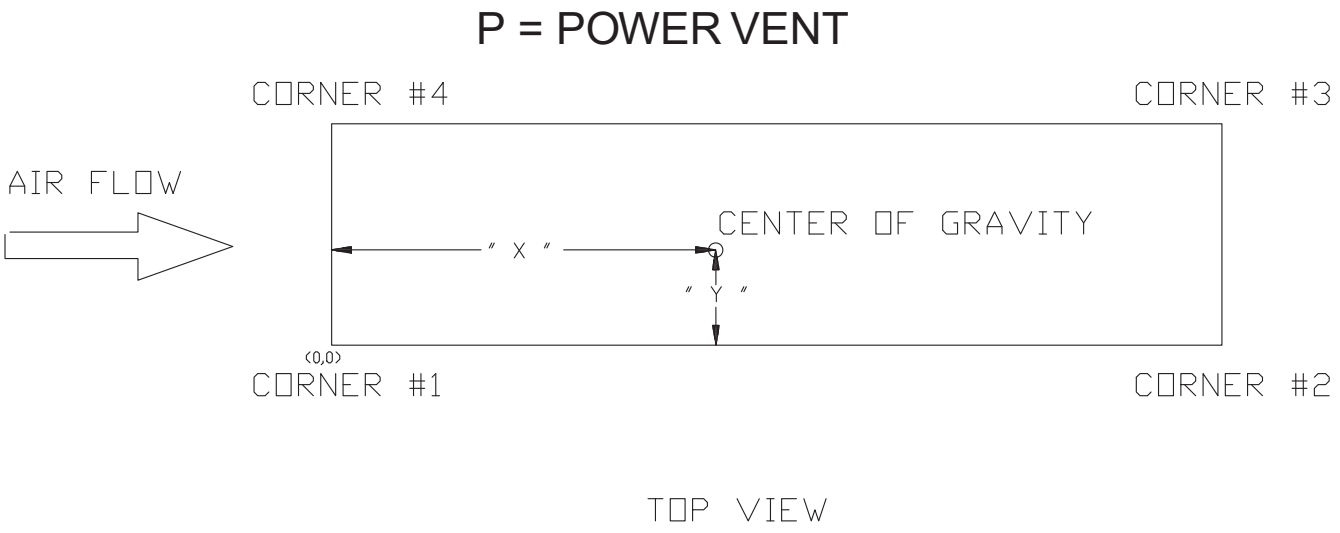
	D - (208/3/60)				E - (230/3/60)				F - (460/3/60)			
	1 ODP	2 TE	3 PEODP	4 PETE	1 ODP	2 TE	3 PEODP	4 PETE	1 ODP	2 TE	3 PEODP	4 PETE
1/2 HP	20	22	22	22	20	22	22	22	20	22	22	22
3/4 HP	27	26	27		27	26	27	31	27	26	27	31
1 HP	24	26	36	37	24	26	36	37	24	26	36	37
1-1/2 HP	31	34	40	42	31	34	40	42	31	34	40	42
2 HP	39		46	49	39		46	49	39		46	49
3 HP	47		69	69	47		69	69	47		69	69
5 HP			76	77			76	77			76	77
7-1/2 HP			117	136			117	136			117	136
10 HP			128	158			128	158			128	158
15 HP			217	255			217	255			217	255

	G - (575/3/60)			
	1 ODP	2 TE	3 PEODP	4 PETE
1/2 HP	22	22		
3/4 HP	20	22		
1 HP	28	27	33	38
1-1/2 HP			40	42
2 HP			46	48
3 HP			66	100
5 HP			74	91
7-1/2 HP			114	143
10 HP			145	153
15 HP			234	348

Motor Type Legend:
ODP - Open Drip Proof
TE - Totally Enclosed
PEODP - Premium Efficiency Open Drip Proof
PETE - Premium Efficiency Totally Enclosed

Center of Gravity

Figure 16. Center of gravity



Note: *Values based on Average Motor Weight (Actual Center of Gravity and Corner Weights for Specific Motor Size are Available Upon Request)*

Center of Gravity Data

Table 10. Arrangement B center of gravity

			Arrangement B Without Outside Air Hood						Arrangement B With Outside Air Hood					
Unit Type, Size	Width	Length	Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
	in. (mm)	in. (mm)	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	72 (1829)	35.8	15.4	161 (73)	159 (72.1)	141 (64)	142 (64.4)	32.5	15.4	187 (84.8)	154 (69.9)	137 (62.1)	167 (75.7)
P15	32.75 (832)	72 (1829)	36.7	15.4	163 (73.9)	169 (76.7)	150 (68)	145 (65.8)	33.5	15.5	189 (85.7)	164 (74.4)	147 (66.7)	170 (77.1)
P20	43.75 (1111)	72 (1829)	36.2	20.6	195 (88.5)	196 (88.9)	174 (78.9)	173 (78.5)	32.9	20.7	226 (102.5)	190 (86.2)	170 (77.1)	202 (91.6)
P25	43.75 (1111)	72 (1829)	37.0	20.6	197 (89.4)	207 (93.9)	185 (83.9)	175 (79.4)	33.7	20.7	229 (103.9)	201 (91.2)	181 (82.1)	205 (93)
P30	54.75 (1391)	72 (1829)	37.2	25.2	230 (104.3)	246 (111.6)	209 (94.8)	196 (88.9)	33.9	25.3	267 (121.1)	238 (108)	205 (93)	230 (104.3)
P35	54.75 (1391)	72 (1829)	37.2	25.1	243 (110.2)	260 (117.9)	219 (99.3)	205 (93)	34.1	25.2	280 (127)	252 (114.3)	215 (97.5)	239 (108.4)

Table 10. Arrangement B center of gravity (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement B Without Outside Air Hood						Arrangement B With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P40	60.25 (1530)	72 (1829)	37.8	27.9	253 (114.8)	278 (126.1)	239 (108.4)	217 (98.4)	34.6	28.0	292 (132.4)	270 (122.5)	234 (106.1)	253 (114.8)
P50	43.75 (1111)	98 (2489)	50.7	20.8	275 (124.7)	294 (133.4)	267 (121.1)	250 (113.4)	47.8	20.9	305 (138.3)	290 (131.5)	264 (119.7)	278 (126.1)
P60	54.75 (1391)	98 (2489)	50.7	25.6	318 (144.2)	340 (154.2)	299 (135.6)	280 (127)	47.7	25.7	353 (160.1)	335 (152)	296 (134.3)	313 (142)
P70	54.75 (1391)	98 (2489)	50.9	25.6	336 (152.4)	362 (164.2)	317 (143.8)	294 (133.4)	48.0	25.6	371 (168.3)	356 (161.5)	314 (142.4)	326 (147.9)
P80	60.25 (1530)	98 (2489)	51.6	28.3	353 (160.1)	391 (177.4)	347 (157.4)	313 (142)	48.7	28.4	390 (176.9)	385 (174.6)	344 (156)	348 (157.9)
P12	60.25 (1530)	124 (3150)	65.0	28.6	456 (206.8)	503 (228.2)	454 (205.9)	412 (186.9)	62.3	28.7	493 (223.6)	498 (225.9)	452 (205)	447 (202.8)

Table 11. Arrangement C center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement C Without Outside Air Hood						Arrangement C With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	98 (2489)	43.3	15.5	210 (95.3)	166 (75.3)	150 (68)	190 (86.2)	40.0	15.6	235 (106.6)	162 (73.5)	147 (66.7)	214 (97.1)
P15	32.75 (832)	98 (2489)	43.8	15.6	215 (97.5)	173 (78.5)	157 (71.2)	195 (88.5)	40.6	15.6	240 (108.9)	169 (76.7)	154 (69.9)	219 (99.3)
P20	43.75 (1111)	98 (2489)	43.2	20.8	255 (115.7)	201 (91.2)	181 (82.1)	230 (104.3)	40.0	20.8	285 (129.3)	196 (88.9)	178 (80.7)	259 (117.5)
P25	43.75 (1111)	98 (2489)	43.6	20.8	260 (117.9)	208 (94.3)	189 (85.7)	236 (107)	40.5	20.9	290 (131.5)	204 (92.5)	186 (84.4)	264 (119.7)
P30	54.75 (1391)	98 (2489)	43.8	25.5	304 (137.9)	245 (111.1)	213 (96.6)	265 (120.2)	40.6	25.6	339 (153.8)	239 (108.4)	210 (95.3)	297 (134.7)
P35	54.75 (1391)	98 (2489)	43.5	25.4	320 (145.1)	255 (115.7)	220 (99.8)	276 (125.2)	40.4	25.5	355 (161)	249 (112.9)	217 (98.4)	309 (140.2)
P40	60.25 (1530)	98 (2489)	43.7	28.2	336 (152.4)	271 (122.9)	237 (107.5)	295 (133.8)	40.7	28.3	374 (169.6)	265 (120.2)	234 (106.1)	330 (149.7)
P50	43.75 (1111)	124 (3150)	57.0	20.9	340 (154.2)	289 (131.1)	265 (120.2)	312 (141.5)	54.1	21.0	369 (167.4)	285 (129.3)	263 (119.3)	340 (154.2)

Table 11. Arrangement C center of gravity (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement C Without Outside Air Hood						Arrangement C With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P60	54.75 (1391)	124 (3150)	57.0	25.8	393 (178.3)	334 (151.5)	298 (135.2)	350 (158.8)	54.0	25.9	427 (193.7)	329 (149.2)	295 (133.8)	382 (173.3)
P70	54.75 (1391)	124 (3150)	56.8	25.7	420 (190.5)	355 (161)	315 (142.9)	372 (168.7)	54.1	25.8	454 (205.9)	350 (158.8)	312 (141.5)	404 (183.3)
P80	60.25 (1530)	124 (3150)	56.8	28.5	442 (200.5)	373 (169.2)	335 (152)	397 (180.1)	54.0	28.6	478 (216.8)	369 (167.4)	333 (151)	431 (195.5)
P12	60.25 (1530)	150 (3810)	70.3	28.7	545 (247.2)	481 (218.2)	438 (198.7)	496 (225)	67.7	28.8	580 (263.1)	477 (216.4)	436 (197.8)	530 (240.4)

Table 12. Arrangement D center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement D Without Water						Arrangement D With Water					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	108 (2743)	25.5	15.5	251 (113.9)	138 (62.6)	124 (56.2)	226 (102.5)	17.4	15.7	358 (162.4)	114 (51.7)	105 (47.6)	330 (149.7)
P15	32.75 (832)	108 (2743)	26.6	15.4	256 (116.1)	150 (68)	133 (60.3)	226 (102.5)	18.5	15.6	363 (164.7)	125 (56.7)	113 (51.3)	329 (149.2)
P20	43.75 (1111)	108 (2743)	25.9	20.8	304 (137.9)	171 (77.6)	154 (69.9)	275 (124.7)	17.1	21.0	445 (201.8)	139 (63)	128 (58.1)	411 (186.4)
P25	43.75 (1111)	108 (2743)	26.8	20.8	307 (139.3)	182 (82.6)	165 (74.8)	278 (126.1)	18.1	21.0	448 (203.2)	150 (68)	139 (63)	414 (187.8)
P30	54.75 (1391)	108 (2743)	26.9	25.5	359 (162.8)	214 (97.1)	187 (84.8)	314 (142.4)	17.6	25.9	537 (243.6)	174 (78.9)	156 (70.8)	483 (219.1)
P35	54.75 (1391)	108 (2743)	27.3	25.4	372 (168.7)	228 (103.4)	197 (89.4)	322 (146.1)	18.3	25.8	551 (249.9)	187 (84.8)	167 (75.7)	491 (222.7)
P40	60.25 (1530)	108 (2743)	27.7	28.2	390 (176.9)	245 (111.1)	415 (188.2)	343 (155.6)	18.3	28.6	586 (265.8)	200 (90.7)	181 (82.1)	539 (244.5)
P50	43.75 (1111)	134 (3404)	41.3	20.9	378 (171.5)	275 (124.7)	253 (114.8)	347 (157.4)	32.4	21.1	511 (231.8)	252 (114.3)	234 (106.1)	475 (215.5)
P60	54.75 (1391)	134 (3404)	41.1	25.8	438 (198.7)	317 (143.8)	283 (128.4)	392 (177.8)	31.5	26.1	606 (274.9)	287 (130.2)	261 (118.4)	552 (250.4)
P70	54.75 (1391)	134 (3404)	41.8	25.8	456 (206.8)	339 (153.8)	301 (136.5)	405 (183.7)	32.4	26.0	624 (283)	308 (139.7)	279 (126.6)	565 (256.3)

Table 12. Arrangement D center of gravity (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement D Without Water						Arrangement D With Water					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P80	60.25 (1530)	134 (3404)	42.4	28.5	481 (218.2)	367 (166.5)	330 (149.7)	433 (196.4)	32.7	28.8	666 (302.1)	333 (151)	305 (138.3)	609 (276.2)

Table 13. Arrangement E center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement E Without Water						Arrangement E With Water					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	108 (2743)	33.0	15.6	299 (135.6)	152 (68.9)	139 (63)	274 (124.3)	24.7	15.8	399 (181)	135 (61.2)	125 (56.7)	370 (167.8)
P15	32.75 (832)	108 (2743)	33.7	15.7	304 (137.9)	159 (72.1)	146 (66.2)	279 (126.6)	25.5	15.8	404 (183.3)	142 (64.4)	132 (59.9)	376 (170.6)
P20	43.75 (1111)	108 (2743)	32.8	20.9	363 (164.7)	183 (83)	167 (75.7)	332 (150.6)	23.9	21.1	496 (225)	160 (72.6)	148 (67.1)	461 (209.1)
P25	43.75 (1111)	108 (2743)	33.5	20.9	368 (166.9)	191 (86.6)	175 (79.4)	337 (152.9)	24.6	21.1	501 (227.2)	168 (76.2)	156 (70.8)	466 (211.4)
P30	54.75 (1391)	108 (2743)	33.5	25.7	430 (195)	224 (101.6)	198 (89.8)	380 (172.4)	24.0	26.0	598 (271.2)	194 (88)	175 (79.4)	540 (244.9)
P35	54.75 (1391)	108 (2743)	33.6	25.5	447 (202.8)	234 (106.1)	204 (92.5)	391 (177.4)	24.3	25.9	615 (279)	203 (92.1)	182 (82.6)	550 (249.5)
P40	60.25 (1530)	108 (2743)	33.8	28.3	472 (214.1)	248 (112.5)	220 (99.8)	418 (189.6)	24.2	28.6	656 (297.6)	215 (97.5)	195 (88.5)	594 (269.4)
P50	43.75 (1111)	134 (3404)	47.4	21.0	445 (201.8)	275 (124.7)	254 (115.2)	411 (186.4)	38.3	21.1	573 (259.9)	257 (116.6)	239 (108.4)	535 (242.7)
P60	54.75 (1391)	134 (3404)	47.3	25.9	515 (233.6)	317 (143.8)	283 (128.4)	462 (209.6)	37.5	26.1	677 (307.1)	293 (132.9)	267 (121.1)	617 (279.9)
P70	54.75 (1391)	134 (3404)	47.7	25.8	542 (245.8)	339 (153.8)	302 (137)	484 (219.5)	38.3	26.0	704 (319.3)	314 (142.4)	285 (129.3)	638 (289.4)
P80	60.25 (1530)	134 (3404)	47.5	28.6	573 (259.9)	356 (161.5)	321 (145.6)	517 (234.5)	37.8	28.8	750 (340.2)	330 (149.7)	302 (137)	688 (312.1)

Table 14. Arrangement G center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement G Without Outside Air Hood						Arrangement G With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P20	43.75 (1111)	108 (2743)	59.6	20.7	223 (101.2)	274 (124.3)	246 (111.6)	200 (90.7)	55.8	20.8	252 (114.3)	269 (122)	244 (110.7)	228 (103.4)
P25	43.75 (1111)	108 (2743)	60.5	20.8	229 (103.9)	292 (132.4)	264 (119.7)	207 (93.9)	56.9	20.8	259 (117.5)	288 (130.6)	262 (118.8)	235 (106.6)
P30	54.75 (1391)	108 (2743)	61.5	25.4	266 (120.7)	351 (159.2)	304 (137.9)	230 (104.3)	57.7	25.2	301 (136.5)	346 (156.9)	301 (136.5)	262 (118.8)
P35	54.75 (1391)	108 (2743)	60.9	25.1	283 (128.4)	365 (165.6)	308 (139.7)	239 (108.4)	57.3	25.2	318 (144.2)	359 (162.8)	306 (138.8)	271 (122.9)
P40	60.25 (1530)	108 (2743)	61.1	27.9	295 (133.8)	385 (174.6)	332 (150.6)	255 (115.7)	57.5	28.0	333 (151)	379 (171.9)	329 (149.2)	289 (131.1)
P50	43.75 (1111)	134 (3404)	75.0	20.9	301 (136.5)	382 (173.3)	350 (158.8)	275 (124.7)	71.6	20.9	330 (149.7)	378 (171.5)	348 (157.9)	303 (137.4)
P60	54.75 (1391)	134 (3404)	75.4	25.7	348 (157.9)	448 (203.2)	396 (179.6)	308 (139.7)	72.0	25.8	382 (173.3)	443 (200.9)	394 (178.7)	340 (154.2)
P70	54.75 (1391)	134 (3404)	75.2	25.5	368 (166.9)	471 (213.6)	410 (186)	320 (145.1)	72.0	25.6	402 (182.3)	466 (211.4)	408 (185.1)	352 (159.7)
P80	60.25 (1530)	134 (3404)	75.4	28.3	389 (176.4)	500 (226.8)	443 (200.9)	344 (156)	72.1	28.3	426 (193.2)	496 (225)	441 (200)	378 (171.5)
P12	60.25 (1530)	160 (4064)	89.5	28.5	485 (220)	615 (279)	553 (250.8)	435 (197.3)	86.5	28.6	520 (235.9)	611 (277.1)	551 (249.9)	469 (212.7)

Table 15. Arrangement J center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement J Without Outside Air Hood						Arrangement J With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P20	43.75 (1111)	134 (3404)	66.4	20.9	282 (127.9)	277 (125.6)	252 (114.3)	257 (116.6)	62.7	20.9	311 (141.1)	273 (123.8)	250 (113.4)	284 (128.8)
P25	43.75 (1111)	134 (3404)	67.0	20.9	292 (132.4)	292 (132.4)	267 (121.1)	267 (121.1)	63.4	20.9	321 (145.6)	288 (130.6)	265 (120.2)	295 (133.8)
P30	54.75 (1391)	134 (3404)	67.7	25.6	341 (154.7)	348 (157.9)	306 (138.8)	299 (135.6)	64.1	25.7	375 (170.1)	344 (156)	304 (137.9)	331 (150.1)
P35	54.75 (1391)	134 (3404)	66.9	25.3	360 (163.3)	358 (162.4)	309 (140.2)	310 (140.6)	63.4	25.4	394 (178.7)	354 (160.6)	307 (139.3)	341 (154.7)

Table 15. Arrangement J center of gravity (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement J Without Outside Air Hood						Arrangement J With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P40	60.25 (1530)	134 (3404)	67.1	28.1	377 (171)	378 (171.5)	331 (150.1)	330 (149.7)	63.6	28.2	413 (187.3)	373 (169.2)	329 (149.2)	364 (165.1)
P50	43.75 (1111)	160 (4064)	81.0	21.0	368 (166.9)	377 (171)	348 (157.9)	339 (153.8)	77.7	21.0	396 (179.6)	374 (169.6)	346 (156.9)	367 (166.5)
P60	54.75 (1391)	160 (4064)	82.0	25.8	423 (191.9)	445 (201.8)	397 (180.1)	378 (171.5)	78.6	25.9	456 (206.8)	441 (200)	396 (179.6)	409 (185.5)
P70	54.75 (1391)	160 (4064)	81.1	25.6	447 (202.8)	460 (208.7)	405 (183.7)	393 (178.3)	77.9	25.7	480 (217.7)	456 (206.8)	403 (182.8)	425 (192.8)
P80	60.25 (1530)	160 (4064)	81.3	28.4	475 (215.5)	490 (222.3)	438 (198.7)	424 (192.3)	78.1	28.5	510 (231.3)	486 (220.4)	436 (197.8)	458 (207.7)
P12	60.25 (1530)	186 (4724)	93.2	28.5	544 (246.8)	547 (248.1)	491 (222.7)	488 (221.4)	90.0	28.6	579 (262.6)	543 (246.3)	489 (221.8)	521 (236.3)

Table 16. Arrangement K with chilled water coil center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement K with Chilled Water Coil Without Outside Air Hood						Arrangement K with Chilled Water Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	134 (3404)	70.0	15.8	254 (115.2)	278 (126.1)	259 (117.5)	237 (107.5)	66.7	15.8	278 (126.1)	276 (125.2)	257 (116.6)	260 (117.9)
P15	32.75 (832)	134 (3404)	71.2	15.9	254 (115.2)	288 (130.6)	271 (122.9)	239 (108.4)	67.8	15.9	278 (126.1)	286 (129.7)	270 (122.5)	263 (119.3)
P20	43.75 (1111)	134 (3404)	71.7	21.1	287 (130.2)	330 (149.7)	306 (138.8)	266 (120.7)	68.2	21.1	315 (142.9)	327 (148.3)	304 (137.9)	294 (133.4)
P25	43.75 (1111)	134 (3404)	72.8	21.1	293 (132.9)	348 (157.9)	324 (147)	273 (123.8)	69.3	21.1	322 (146.1)	345 (156.5)	322 (146.1)	301 (136.5)
P30	54.75 (1391)	134 (3404)	73.9	26.1	330 (149.7)	407 (184.6)	370 (167.8)	301 (136.5)	70.4	26.1	364 (165.1)	402 (182.3)	368 (166.9)	333 (151)
P35	54.75 (1391)	134 (3404)	73.9	25.9	343 (155.6)	422 (191.4)	379 (171.9)	308 (139.7)	70.5	26.0	377 (171)	418 (189.6)	377 (171)	340 (154.2)
P40	60.25 (1530)	134 (3404)	74.3	28.7	357 (161.9)	444 (201.4)	403 (182.8)	324 (147)	70.8	28.7	393 (178.3)	440 (199.6)	401 (181.9)	358 (162.4)
P50	43.75 (1111)	160 (4064)	87.2	21.1	377 (171)	452 (205)	420 (190.5)	351 (159.2)	84.1	21.1	405 (183.7)	449 (203.7)	418 (189.6)	378 (171.5)

Table 16. Arrangement K with chilled water coil center of gravity (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement K with Chilled Water Coil Without Outside Air Hood						Arrangement K with Chilled Water Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P60	54.75 (1391)	160 (4064)	87.5	26.0	430 (195)	518 (235)	468 (212.3)	388 (176)	84.2	26.0	463 (210)	514 (233.1)	466 (211.4)	419 (190.1)
P70	54.75 (1391)	160 (4064)	88.5	25.8	443 (200.9)	548 (248.6)	488 (221.4)	394 (178.7)	85.3	25.8	476 (215.9)	544 (246.8)	486 (220.4)	426 (193.2)
P80	60.25 (1530)	160 (4064)	89.2	28.6	462 (209.6)	582 (264)	525 (238.1)	416 (188.7)	86.0	28.6	479 (217.3)	578 (262.2)	523 (237.2)	450 (204.1)

Table 17. Arrangement K with DX cooling coil center of gravity

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement K with DX Cooling Coil Without Outside Air Hood						Arrangement K with DX Cooling Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	134 (3404)	73.0	15.7	217 (98.4)	259 (117.5)	239 (108.4)	200 (90.7)	69.1	15.7	241 (109.3)	257 (116.6)	238 (108)	223 (101.2)
P15	32.75 (832)	134 (3404)	74.3	15.8	217 (98.4)	269 (122)	252 (114.3)	203 (92.1)	70.4	15.8	241 (109.3)	267 (121.1)	250 (113.4)	226 (102.5)
P20	43.75 (1111)	134 (3404)	74.4	21.0	249 (112.9)	311 (141.1)	287 (130.2)	229 (103.9)	70.4	21.0	278 (126.1)	308 (139.7)	284 (128.8)	257 (116.6)
P25	43.75 (1111)	134 (3404)	75.5	21.0	255 (115.7)	329 (149.2)	305 (138.3)	236 (107)	71.6	21.1	284 (128.8)	326 (147.9)	303 (137.4)	264 (119.7)
P30	54.75 (1391)	134 (3404)	73.9	26.1	330 (149.7)	407 (184.6)	370 (167.8)	301 (136.5)	70.4	26.1	364 (165.1)	402 (182.3)	368 (166.9)	333 (151)
P35	54.75 (1391)	134 (3404)	76.3	25.8	305 (138.3)	403 (182.8)	359 (162.8)	272 (123.4)	72.4	25.9	339 (153.8)	399 (181)	357 (161.9)	303 (137.4)
P40	60.25 (1530)	134 (3404)	76.6	28.6	319 (144.7)	426 (193.2)	383 (173.7)	288 (130.6)	72.7	28.6	355 (161)	421 (191)	381 (172.8)	322 (146.1)
P50	43.75 (1111)	160 (4064)	90.4	21.0	336 (152.4)	436 (197.8)	403 (182.8)	311 (141.1)	86.9	21.1	364 (165.1)	433 (196.4)	402 (182.3)	338 (153.3)
P60	54.75 (1391)	160 (4064)	90.3	25.9	388 (176)	503 (228.2)	451 (204.6)	348 (157.9)	86.7	25.9	422 (191.4)	499 (226.3)	449 (203.7)	380 (172.4)
P70	54.75 (1391)	160 (4064)	91.2	25.7	402 (182.3)	532 (241.3)	470 (213.2)	355 (161)	87.8	25.7	435 (197.3)	528 (239.5)	469 (212.7)	386 (175.1)
P80	60.25 (1530)	160 (4064)	91.9	28.5	421 (191)	567 (257.2)	508 (230.4)	377 (171)	88.4	28.5	456 (206.8)	563 (255.4)	506 (229.5)	410 (186)

Table 18. Arrangement L with chilled water coil center of gravity

Unit Type, Size	Width	Length	Arrangement L with Chilled Water Coil Without Outside Air Hood						Arrangement L with Chilled Water Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
	in. (mm)	in. (mm)	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	160 (4064)	74.5	15.8	314 (142.4)	273 (123.8)	256 (116.1)	294 (133.4)	71.3	15.9	337 (152.9)	271 (122.9)	255 (115.7)	317 (143.8)
P15	32.75 (832)	160 (4064)	77.7	15.9	307 (139.3)	289 (131.1)	274 (124.3)	291 (132)	74.4	15.9	331 (150.1)	287 (130.2)	273 (123.8)	314 (142.4)
P20	43.75 (1111)	160 (4064)	78.2	21.1	347 (157.4)	332 (150.6)	310 (140.6)	324 (147)	74.8	21.2	375 (170.1)	329 (149.2)	309 (140.2)	352 (159.7)
P25	43.75 (1111)	160 (4064)	78.8	21.2	357 (161.9)	346 (156.9)	325 (147.4)	335 (152)	75.4	21.2	385 (174.6)	344 (156)	323 (146.5)	362 (164.2)
P30	54.75 (1391)	160 (4064)	79.8	26.2	405 (183.7)	403 (182.8)	371 (168.3)	372 (168.7)	76.4	26.3	438 (198.7)	400 (181.4)	369 (167.4)	403 (182.8)
P35	54.75 (1391)	160 (4064)	79.6	26.0	420 (190.5)	416 (188.7)	377 (171)	381 (172.8)	76.2	26.1	453 (205.5)	412 (186.9)	375 (170.1)	412 (186.9)
P40	60.25 (1530)	160 (4064)	80.0	28.8	438 (198.7)	438 (198.7)	401 (181.9)	402 (182.3)	76.5	28.9	474 (215)	434 (196.9)	399 (181)	435 (197.3)
P50	43.75 (1111)	186 (4724)	93.2	21.1	447 (202.8)	448 (203.2)	419 (190.1)	418 (189.6)	90.1	21.2	475 (215.5)	446 (202.3)	418 (189.6)	445 (201.8)
P60	54.75 (1391)	186 (4724)	94.1	26.1	506 (229.5)	518 (235)	471 (213.6)	460 (208.7)	90.9	26.1	538 (244)	514 (233.1)	469 (212.7)	491 (222.7)
P70	54.75 (1391)	186 (4724)	94.1	25.9	527 (239)	539 (244.5)	484 (219.5)	473 (214.5)	91.0	25.9	559 (253.6)	536 (243.1)	483 (219.1)	504 (228.6)
P80	60.25 (1530)	186 (4724)	94.8	28.9	548 (248.6)	569 (258.1)	523 (237.2)	504 (228.6)	91.6	28.9	583 (264.4)	566 (256.7)	522 (236.8)	537 (243.6)

Table 19. Arrangement L with DX cooling coil

Unit Type, Size	Width	Length	Arrangement L with DX Cooling Coil Without Outside Air Hood						Arrangement L with DX Cooling Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
	in. (mm)	in. (mm)	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P10	32.75 (832)	160 (4064)	77.7	15.8	273 (123.8)	257 (116.6)	240 (108.9)	254 (115.2)	74.0	15.8	297 (134.7)	255 (115.7)	238 (108)	277 (125.6)
P15	32.75 (832)	160 (4064)	81.1	15.9	266 (120.7)	274 (124.3)	258 (117)	251 (113.9)	77.3	15.9	290 (131.5)	271 (122.9)	256 (116.1)	274 (124.3)
P20	43.75 (1111)	160 (4064)	81.3	21.1	306 (138.8)	316 (143.3)	294 (133.4)	284 (128.8)	77.4	21.1	335 (152)	313 (142)	292 (132.4)	312 (141.5)

Table 19. Arrangement L with DX cooling coil (continued)

Unit Type, Size	Width in. (mm)	Length in. (mm)	Arrangement L with DX Cooling Coil Without Outside Air Hood						Arrangement L with DX Cooling Coil With Outside Air Hood					
			Center of Gravity		Corner Weights - lbs (kg)				Center of Gravity		Corner Weights - lbs (kg)			
			X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4	X-Coor	Y-Coor	Corner #1	Corner #2	Corner #3	Corner #4
P25	43.75 (1111)	160 (4064)	81.8	21.1	316 (143.3)	331 (150.1)	308 (139.7)	295 (133.8)	78.0	21.1	345 (156.5)	328 (148.8)	307 (139.3)	322 (146.1)
P30	54.75 (1391)	160 (4064)	82.5	26.1	364 (165.1)	388 (176)	354 (160.6)	332 (150.6)	78.7	26.2	397 (180.1)	384 (174.2)	352 (159.7)	364 (165.1)
P35	54.75 (1391)	160 (4064)	82.2	25.9	379 (171.9)	400 (181.4)	360 (163.3)	341 (154.7)	78.5	26.0	412 (186.9)	397 (180.1)	359 (162.8)	372 (168.7)
P40	60.25 (1530)	160 (4064)	82.4	28.7	398 (180.5)	422 (191.4)	384 (174.2)	362 (164.2)	78.7	28.8	433 (196.4)	419 (190.1)	382 (173.3)	395 (179.2)
P50	43.75 (1111)	186 (4724)	96.5	21.1	403 (182.8)	435 (197.3)	405 (183.7)	376 (170.6)	93.1	21.1	431 (195.5)	433 (196.4)	404 (183.3)	403 (182.8)
P60	54.75 (1391)	186 (4724)	97.0	26.0	462 (209.6)	504 (228.6)	456 (206.8)	418 (189.6)	93.6	26.1	495 (224.5)	501 (227.2)	455 (206.4)	449 (203.7)
P70	54.75 (1391)	186 (4724)	96.9	25.8	483 (219.1)	526 (238.6)	469 (212.7)	431 (195.5)	93.6	25.9	516 (234.1)	522 (236.8)	468 (212.3)	462 (209.6)
P80	60.25 (1530)	186 (4724)	97.5	28.8	505 (229.1)	556 (252.2)	509 (230.9)	462 (209.6)	94.1	28.8	539 (244.5)	552 (250.4)	507 (230)	495 (224.5)

Model Number Description

AH Model Number Description

Digits 1, 2 — Unit Type

AH — Air Handling Unit

Digit 3 — Connection Side

A – Left-hand access
B – Right-hand access

Digit 4 — Development Sequence

A — First Generation

Digits 5, 6 — Unit Size

20 — 1500 - 8000 Cfm
40 — 4000 - 14000 Cfm

Digit 7 — Venting Type

O — None

Digit 8 — Main Power Supply

A — 115/60/1
B — 208/60/1
C — 230/60/1
D — 208/60/3
E — 230/60/3
F — 460/60/3
G — 575/60/3

Digit 9 — Gas Control Option

0 — No gas control option

Digits 10, 11 — Design Sequence

F0 — Design Sequence

Digit 12 — Fuel Type

0 — No selection

Digit 13 — Heat Exchanger Material

0 — No selection

Digit 14 — Air Handler Arrangements

B — Blower (Standard)
C — Blower (Standard) Plenum
D — Blower (Standard) Evaporative Cooler
E — Blower (Standard) Evaporative Cooler/ Plenum
G — Blower (High CFM)
J — Blower (High CFM)/Plenum
K — Blower (High CFM)/Coil Cabinet
L — Blower (High CFM)/Coil Cabinet/ Plenum

Digit 15 — Motor Selection

A — 1/2 HP. w/Contactor
B — 3/4 HP. w/Contactor
C — 1 HP. w/Contactor
D — 1-1/2 HP. w/Contactor
E — 2 HP. w/Contactor
F — 3 HP. w/Contactor
G — 5 HP. w/Contactor
H — 1/2 HP. w/Magnetic Starter
J — 3/4 HP. w/Magnetic Starter
K — 1 HP. w/Magnetic Starter
L — 1-1/2 HP. w/Magnetic Starter
N — 2 HP. w/Magnetic Starter
P — 3 HP. w/Magnetic Starter
Q — 5 HP. w/Magnetic Starter
R — 7-1/2 HP. w/Magnetic Starter
T — 10 HP. w/Magnetic Starter
U — 15 HP. w/Magnetic Starter
V — 1 HP. w/VFD
W — 1–1/2 HP. w/VFD
X — 2 HP. w/VFD
Y — 3 HP. w/VFD
Z — 5 HP. w/VFD
1 — 7–1/2 HP. w/VFD
2 — 10 HP. w/VFD
3 — 15 HP. w/VFD

Digit 16 — Motor Speed

1 — Single Speed ODP 1800 RPM
2 — Single Speed TEFC 1800 RPM
3 — Single Speed High Efficiency ODP 1800 RPM
4 — Single Speed High Efficiency TEFC 1800 RPM

Digit 17 — Coil Options

O — No cooling coil selection
A — DX coil, 4 Row, Single Circuit
B — DX coil, 4 Row, Dual Circuit
C — DX coil, 6 Row, Single Circuit
D — DX coil, 6 Row, Dual Circuit
E — Chilled Water Coil, 4 Row, Single Circuit
G — Chilled Water Coil, 6 Row, Dual Circuit

Digit 18 — Air Inlet Configuration

1 — Outside Air (OA) Horizontal Inlet
2 — Outside Air W/Air Hood, Horizontal Inlet
3 — Bottom Return Air (RA)
4 — Outside and Return Air (OA/RA)
5 — Outside and Return Air W/Air Hood

Digit 19— Air Control and Damper Arrangements

0 — No selection
A — Outside Air 2 Pos. Motor / SR
B — Return Air 2 Pos. Motor / SR
C — OA/RA 2 Pos. / SR
Q — OA/RA Mod. Mtr. w/CO_2Sensor
E — OA/RA Mod. Mtr. w/Mixed Air Control / Min. Pot. / SR
H — OA/RA Mod. Mtr. w/Mixed Air Control / SR
K — OA/RA Mod. Mtr. w/Min. Pot. / SR
M — OA/RA Mod. Mtr. w/Dry Bulb / Mixed Air Control / Min. Pot. /SR
N — OA/RA Mod. Mtr. w/Enthalpy Controlled Economizer / SR
P — OA/RA Mod. Mtr. w/Pressure Control (Space Pressure)
U — OA/RA MTR. W/External 0-10 VDC and 4-20 mA Analog Input/SR (External Input)
W — ASHRAE Cycle I (OA/RA 2 pos. w/warm-up stat/SR
X — ASHRAE Cycle II (OA/RA Mod W/Warm-up Stat/Mixed Air/min pot/SR)
Y — ASHRAE Cycle III (OA/RA Mod. W/Warm-up Stat/Mixed Air/SR)
Z — Manual Dampers

Digit 20 — California Shipment

0 — Non-California Shipment
1 — California Shipment

Model Number Description

Digit 21 — Miscellaneous Options

B — 12” Evaporative Media (Celdek)
C — Moisture Eliminators
D — Horizontal Return
E — Air Flow Proving Switch
F — Freezestat
H — Return Air Firestat
J — Supply Air Firestat
K — Manual Blower Switch
N — Double Wall Construction
P — Low Leak Dampers
Q — Clogged Filter Switch
T — Status Indicator Lights (Elec Cabinet)
W — 8" Evaporative Media (Glasdek)
X — 12" Evaporative Media (Glasdek)
Y — Ambient Lockout
Z — Freezestat for Evap. Cooler
0 — No Filters Selected
1 — 1" Washable (Standard) Filters
2 — 2" Washable Filters
3 — 2" Throwaway Filters
4 — 1" Pleated Media Filters
5 — 2" Pleated Media Filters

Digit 22 — VFD Accessories

1 — Field Installed VFD
2 — Factory Installed VFD
3 — VFD Remote Keypad (Field Installed)
4 — CO_2 Sensor, 100% Outside Air
5 — CO_2 Sensor, Mixed Air
6 — Pressure Sensor
7 — 2-Speed VFD Relays
8 — 3-Speed VFD Relays
9 — VFD Enclosure

GR Model Number Description

Digit 1 — Gas Heating Equipment

G — Gas

Digit 2 — Unit Type

F – Rooftop Duct Furnace
R – Rooftop Heating Unit
S – Special Unit Type

Digit 3 — Furnace Type

A – Standard Temp Rise (20-60 F) LH
B – Standard Temp Rise (20-60 F) RH
C – High Temp Rise (60-90 F) LH
D – High Temp Rise (60-90 F) RH
S – Special Furnace Type

Note: *LH = Left Hand, RH = Right Hand*

Digit 4 — Development Sequence

A – First Generation

Digit 5, 6 — Input Capacity

Single Furnace

10 – 100 MBh Input
15 – 150 MBh Input
20 – 200 MBh Input
25 – 250 MBh Input
30 – 300 MBh Input
35 – 350 MBh Input
40 – 400 MBh Input

Double Furnace

50 – 500 MBh Input
60 – 600 MBh Input
70 – 700 MBh Input
80 – 800 MBh Input

Triple Furnace

12 – 1200 MBh Input
SS – Special Unit

Digit 7 — Venting Type

P – Power Venting
S – Special Venting

Digit 8 — Main Power Supply

A – 115/60/1
B – 208/60/1
C – 230/60/1
D – 208/60/3
E – 230/60/3
F – 460/60/3
G – 575/60/3
S – Special Main Power Supply

Digit 9 — Gas Control Option (Intermittent Pilot Ignition)

A – Single-Stage
B – Two-Stage
G – Electronic Modulating With Room T-Stat
H – Electronic Modulating With Duct T-Stat
J – Electronic Modulating With Duct T-Stat and Override Room Thermostat
K – Electronic Modulating W/External 4-20 mA Input (Furnace 1)
L – Electronic Modulating W/External 4-20 mA Input (All furnaces)
M – Electronic Modulating W/External 0-10 VDC Input (Furnace 1)
N – Electronic Modulating W/External 0-10 VDC Input (All furnaces)
P – Two-Stage Remote Temperature Control
R – Three-Stage Remote Temperature Control
T – Four-Stage Remote Temperature Control
S – Special Gas Control

Digits 10,11 — Design Sequence

F0 – Design Sequence

Digit 12 — Fuel Type

N – Natural Gas
P – LP (Propane) Gas
L – Natural Gas with 100% Lockout
S – Special Fuel Type

Digit 13 — Heat Exchanger Material

1 – Aluminized Steel
2– #409 Stainless Steel (First Furnace Only)
3 – #409 Stainless Steel (All Furnace Sections)
4 – #321 Stainless Steel (First Furnace Only)
5 – #321 Stainless Steel (All Furnace Sections)
6 – #409 Stainless Steel Package (First Furnace Only)
7 – #409 Stainless Steel Package (All Furnace Sections)
8 – #321 Stainless Steel Package (First Furnace Only)
9 – #321 Stainless Steel Package (All Furnace Sections)
S – Special Heat Exchanger Package

Digit 14 — Rooftop Arrangements

A – Duct Furnace
B — Blower (Standard)
C — Blower (Standard) Plenum
D — Blower (Standard) Evaporative Cooler
E — Blower (Standard) Evaporative Cooler/ Plenum
G — Blower (High CFM)
J — Blower (High CFM)/Plenum
K — Blower (High CFM)/Coil Cabinet
L — Blower (High CFM)/Coil Cabinet/ Plenum
S – Special Rooftop Arrangement

Digit 15 — Rooftop Heating Unit Motor Selection

0 – None (Rooftop duct furnace)
A — 1/2 HP. w/Contactor
B — 3/4 HP. w/Contactor
C — 1 HP. w/Contactor
D — 1-1/2 HP. w/Contactor
E — 2 HP. w/Contactor
F — 3 HP. w/Contactor
G — 5 HP. w/Contactor
H — 1/2 HP. w/Magnetic Starter
J — 3/4 HP. w/Magnetic Starter
K — 1 HP. w/Magnetic Starter
L — 1-1/2 HP. w/Magnetic Starter
N — 2 HP. w/Magnetic Starter
P — 3 HP. w/Magnetic Starter
Q — 5 HP. w/Magnetic Starter
R — 7-1/2 HP. w/Magnetic Starter
T — 10 HP. w/Magnetic Starter
U — 15 HP. w/Magnetic Starter
V — 1 HP. w/VFD
W — 1–1/2 HP. w/VFD

Model Number Description

Digit 15 — Rooftop Heating Unit Motor Selection (cont.)

X — 2 HP. w/VFD
Y — 3 HP. w/VFD
Z — 5 HP. w/VFD
1 — 7–1/2 HP. w/VFD
2 — 10 HP. w/VFD
3 — 15 HP. w/VFD
S – Special Motor

Digit 16 — Motor Speed

1 — Single Speed ODP 1800 RPM
2 — Single Speed TEFC 1800 RPM
3 — Single Speed High Efficiency ODP 1800 RPM
4 — Single Speed High Efficiency TEFC 1800 RPM
S — Special Motor Speed

Digit 17 — Coil Options

O — No cooling coil selection
A — DX coil, 4 Row, Single Circuit
B — DX coil, 4 Row, Dual Circuit
C — DX coil, 6 Row, Single Circuit
D — DX coil, 6 Row, Dual Circuit
E — Chilled Water Coil, 4 Row, Single Circuit
G — Chilled Water Coil, 6 Row, Dual Circuit
S — Special Coil

Digit 18 — Air Inlet Configuration

O — None (Rooftop Duct Furnace)
1 — Outside Air (OA) Horizontal Inlet
2 — Outside Air W/Air Hood, Horizontal Inlet
3 — Bottom Return Air (RA)
4 — Outside and Return Air (OA/RA)
5 — Outside and Return Air W/Air Hood
S — Special Air inlet configuration

Digit 19— Air Control and Damper Arrangements

0 — No selection
A — Outside Air 2 Pos. Motor / SR
B — Return Air 2 Pos. Motor / SR
C — OA/RA 2 Pos. / SR
E — OA/RA Mod. Mtr. w/Mixed Air Control / Min. Pot. / SR
H — OA/RA Mod. Mtr. w/Mixed Air Control / SR
K — OA/RA Mod. Mtr. w/Min. Pot. / SR
M — OA/RA Mod. Mtr. w/Dry Bulb / Mixed Air Control / Min. Pot. /SR

Digit 19— Air Control and Damper Arrangements (cont.)

N — OA/RA Mod. Mtr. w/Enthalpy Controlled Economizer / SR
P — OA/RA Mod. Mtr. w/Pressure Control (Space Pressure)
Q — OA/RA Mod. Mtr. w/CO_2Sensor
U — OA/RA MTR. W/External 0-10 VDC and 4-20 mA Analog Input/SR (External Input)
W — ASHRAE Cycle I (OA/RA 2 pos. w/warm-up stat/SR
X — ASHRAE Cycle II (OA/RA Mod W/Warm-up Stat/Mixed Air/min pot/SR)
Y — ASHRAE Cycle III (OA/RA Mod. W/Warm-up Stat/Mixed Air/SR)
Z — Manual Dampers
S — Special Air Control and Damper Arrangement

Digit 20 — California Shipment

0 — Non-California Shipment
1 — California Shipment

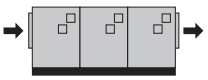
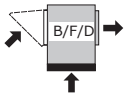
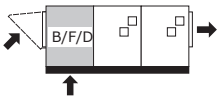
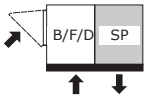
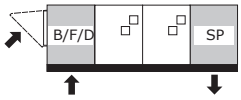
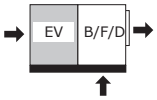
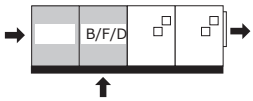
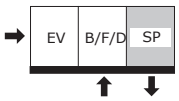
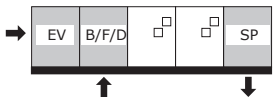
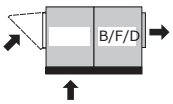
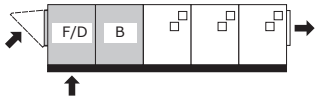
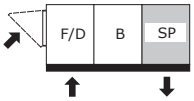
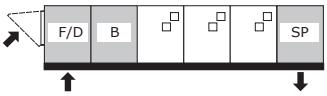
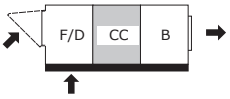
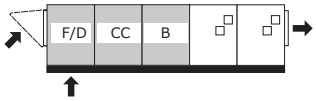
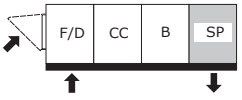
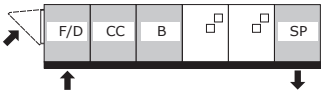
Digit 21 — Miscellaneous Options

A — Orifices For Elevation Above 2000 Feet (Specify Elevation)
B — 12" Evaporative Media (Celdek)
C — Moisture Eliminators
D — Horizontal Return
E — Air Flow Proving Switch
F — Freezestat
G — Fan Time Delay Control (Duct Furnace Only)
H — Return Air Firestat
J — Supply Air Firestat
K — Manual Blower Switch
L — 409 Stainless Steel Furnace Drip Pan
M — Input De-rate
N — Double Wall Construction
P — Low Leak Dampers
Q — Clogged Filter Switch
R — High/Low Gas Pressure Limit Switches
T — Status Indicator Lights (Elec Cabinet)
V — Manual Reset High Limit Switch
W — 8" Evaporative Media (Glasdek)
X — 12" Evaporative Media (Glasdek)
Y — Ambient Lockout
Z — Freezestat for Evap. Cooler
0 — No Filters Selected
1 — 1" Washable (Standard) Filters
2 — 2" Washable Filters
3 — 2" Throwaway Filters
4 — 1" Pleated Media Filters
5 — 2" Pleated Media Filters
6 — Service Convenience Package
7 — Through the Base Utilities

Digit 22 — VFD Accessories

1 — Field Installed VFD
2 — Factory Installed VFD
3 — VFD Remote Keypad (Field Installed)
4 — CO_2 Sensor, 100% Outside Air
5 — CO_2 Sensor, Mixed Air
6 — Pressure Sensor
7 — 2-Speed VFD Relays
8 — 3-Speed VFD Relays
9 — VFD Enclosure

Engineered Products Rooftop Arrangements (RA)

(RA)	POWER VENT	AIR HANDLERS	(RA)
A			B
B			C
C			D
D			E
E			G
G			J
J			K
K			L
L			

***Notes:** **

1. *Arrangements are shown with the maximum number of furnaces available.*
2. *Optional air inlet hood shown in dotted lines.*

Legend: B/F/D = Standard Blower/Filter/Damper, **SP** = Supply Plenum, **EV** = Evaporative Cooler, **F/D** = Filter/Damper, **B** = High CFM Blower, **CC** = Cooling Coil

Capacity: 10/40 = 1 furnace **50/80** = 2 furnaces **12** = 3 furnaces

Gas Equipment Start-Up

Customer _____ **Job Name & Number** _____

PRE-INSPECTION INFORMATION

With power and gas off.

Type of Equip: Unit Heater Duct Furnace Indoor Rooftop

Serial Number _____ Model Number _____

Name Plate Voltage: _____ Name Plate Amperage: _____

Type of Gas: Natural LP Tank Capacity _____ lbs. Rating: _____ BTU @ ____ °F
_____ kg _____ kw @ ____ °C

- ❒ Are all panels and doors in place?
- ❒ Has the unit suffered any external damage? Damage _____
- ❒ Does the gas piping and electric wiring appear to be installed in a professional manner?
- ❒ Has the gas and electric been inspected by the local authority having jurisdiction?
- ❒ Is the gas supply properly sized for the equipment?
- ❒ Were the installation instructions followed when the equipment was installed?
- ❒ Have all field installed controls been installed?
- ❒ Do you understand all the controls on this equipment? If not, contact your wholesaler or rep.

(DO NOT START this equipment unless you fully understand the controls.)

GENERAL

With power and gas off.

- ❒ Make certain all packing has been removed.
- ❒ Tighten all electrical terminals and connections.
- ❒ Check damper linkages for tightness.
- ❒ Check all fans & blowers for free movement.
- ❒ Check all controls for proper settings.
- ❒ Check all set screws on blowers and bearings.
- ❒ Check belt tightness.

BLOWER

With power on and gas off.

- ❒ Check voltage L1 _____ L2 _____ L3 _____
- ❒ Check rotation of main blower.
- ❒ Check motor amps L1 _____ L2 _____ L3 _____
- ❒ Blower RPM _____
- ❒ Check air filters (Record quantity & size.)

GAS HEATING

With power and gas on.

- ❒ Inlet gas pressure. ____ in. W.C. or ____ kPa
- ❒ Pilot & main burner ignition.
- ❒ Manifold gas pressure. ____ in. W.C. or ____ kPa
- ❒ Cycle on HIGH LIMIT.
- ❒ Cycle firestat and/or freezestat.
- ❒ Check electronic modulation. Set at: _____
- ❒ Cycle and check all other controls not listed.
- ❒ Check operation of remote panel.
- ❒ Entering air temp. _____ °F or ____ °C
- ❒ Discharge air temp. (high fire) ____ °F. or ____ °C
- ❒ External static pressure ____ in. W.C. or ____ kPa
- ❒ Cycle by thermostat or operating control.
- ❒ Combustion Reading.
  Carbon Mononxide _____ PPM
  Carbon Dioxide _____ %

A2L Cooling Coil Supplemental Information

⚠ WARNING

Risk of Fire — Flammable Refrigerant!

Failure to follow instructions below could result in death or serious injury, and equipment damage.

- **To be repaired only by trained service personnel.**
- **Do not puncture refrigerant tubing.**
- **Dispose of properly in accordance with federal or local regulations.**

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames or an operating electric heater). Do not pierce or burn. Be aware that refrigerants may not contain an odor.

Handling, installation, cleaning, servicing and disposal of refrigerant must be in accordance with Federal, State and Local Regulations. Ensure proper signage in work area per Local Regulations for health and safety.

Installation

Pipe work shall be kept to a minimum and shall be installed per UL 60335-2-40. All refrigerant piping connections must be accessible for maintenance purposes. Pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52.

For units with A2L refrigerant, units shall be installed in space with a minimum floor area (TA_{min}) per table below.

TA_{min} should be adjusted for altitude using the following formula:

$TA_{min(adj)} = TA_{min}$ x Altitude Adj. Factor x Height Adj. x F_{occ}

The Height Adjustment is the addition unit height above the ground in meters. For institutional occupancies, ASHRAE Standard applies an additional adjustment factor (F_{occ}) to the amount of charge allowed in a space. For all other applications $F_{occ} = 1$.

All field joints shall be accessible for inspection prior to being covered or enclosed. After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:

1. The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
2. Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected.

Table 20. Refrigerant charge (M_{max}), minimum floor area (TA_{min})

Size	Refrigerant	Maximum Charge (lbs)	Maximum Charge (kgs)	TAmin Sq ft	TAmin Sq m	Qmin cubic m/ hr.	Qmin CFM
10/15	R32	33	15.0	580.2	53.9	See Duct Furnace IOM (MUA-SVX004*-EN) for minimum furnace airflows	
20/25/50	R32	38	17.2				
30/35/60/70	R32	40	18.1				
40/80	R32	40	18.1				
10/15	R454b	33	15.0	599.8	55.7		
20/25/50	R454b	38	17.2				
30/35/60/70	R454b	40	18.1				
40/80	R454b	40	18.1				

Note: For system installation and refrigerant charging, follow outdoor unit manufacturer instructions.

Table 21. TA_{min} altitude adjustment factor

Altitude – ft (m)	0 - 2,000 (0 - 610)	2,001 - 4,000 (610 - 1219)	4,001 - 6,000 (1219 - 1829)	6,001 - 8,000 (1829 - 2438)	8,001 - 10,000 (2439 - 3048)	10,001 - 12,000 (3048 - 3658)
TA_{min} Adjustment	1	1.05	1.11	1.17	1.24	1.32

⚠ WARNING

Risk of Fire!

Failure to follow the safety precautions could result in serious injury, death, or property damage.
This is a partial unit air conditioner and should only be connected to an appliance suitable for the same refrigerant.

For appliances using FLAMMABLE REFRIGERANTS, all joints made in the installation between parts of the REFRIGERATING SYSTEM, with at least one part charged, shall be made in accordance with the following:

- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the REFRIGERATING SYSTEM parts. A vacuum valve shall be provided to evacuate the interconnecting pipe or any uncharged REFRIGERATING SYSTEM part.
- Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be refabricated.
- Refrigerant tubing shall be protected or enclosed to avoid damage.
- Flexible refrigerant connectors (such as connecting lines between the indoor and outdoor unit) that may be displaced during NORMAL OPERATION shall be protected against mechanical damage.

Refrigerant Detection System (Included with A2L DX coils)

All A2L refrigerant coils ship with refrigerant detection system factory installed. In the event a refrigerant leak is detected, the system shall turn on the supply blower and lock-out the mechanical heating and cooling. Sensor shall be self-monitoring and provide a flash code (blinking red) for end of life. Sensor should be replaced at end of life via the two screws on sensor mounting bracket. All parts of the refrigerant detection system, including the sensor must be replaced with the same parts as provided with the original unit (or equivalent as approved by the manufacturer).

NOTICE: On initial power up, the refrigerant sensor goes through an initialization sequence. This includes briefly sending an alarm signal which will trigger the 5 minute delay and blower force the blower on. To be clear this only happens when power is first connected to the unit. Unless the unit loses power, the boot up will not happen again.

⚠ WARNING

Leak Detection System Installed!

Failure to follow instructions below could result in death or serious injury or equipment damage.
The unit is equipped with electrically powered safety measures and must be powered at all times after installation, except during servicing, to detect any leak.

To test the refrigerant mitigation system, jumper the refrigerant sensor to confirm operation. Remove jumper after testing.

⚠ WARNING

Risk of Fire!

Failure to follow the safety precautions could result in serious injury, death, or property damage.
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.

- Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Note: *Charging must be done per the condensing unit manufacturer's instructions. See condensing unit manufacturer's installation manual for additional information.*

Servicing

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the REFRIGERATING SYSTEM, the following steps shall be completed prior to conducting work on the system:

- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.
- No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Defective intrinsically safe components must be replaced.

Initial safety checks shall include:

- That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering or purging the system;
- That there is continuity of earth bonding.

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Leak Detection

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems:

- Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

Notes: *Examples of leak detection fluids are:*

- *Bubble method*
- *Fluorescent method agents*

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to the Removal and Evacuation Section.

Removal and Evacuation

When breaking into the refrigerant circuit to make repairs or for any other purpose, conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations;
  - Evacuate;
  - Purge the circuit with inert gas (optional for A2L);
  - Evacuate (optional for A2L);
  - Continuously flush or purge with inert gas when using flame to open circuit; and
  - Open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be 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 atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Recovery

A2L refrigerant shall be disposed of according applicable Federal, State and local regulations. When removing refrigerant from a system, either for servicing or decommissioning, it is recommended by UL 60335-2-40 that all refrigerants are removed safely per the below guidelines.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for

the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the

flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall 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 and especially not in cylinders.

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

Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended by UL-60335-2-40 that all refrigerants are recovered safely using the following steps: Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that:
   a. Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
   b. All personal protective equipment is available and being used correctly;
   c. The recovery process is supervised at all times by a competent person;
   d. Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80 % volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

Notes

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