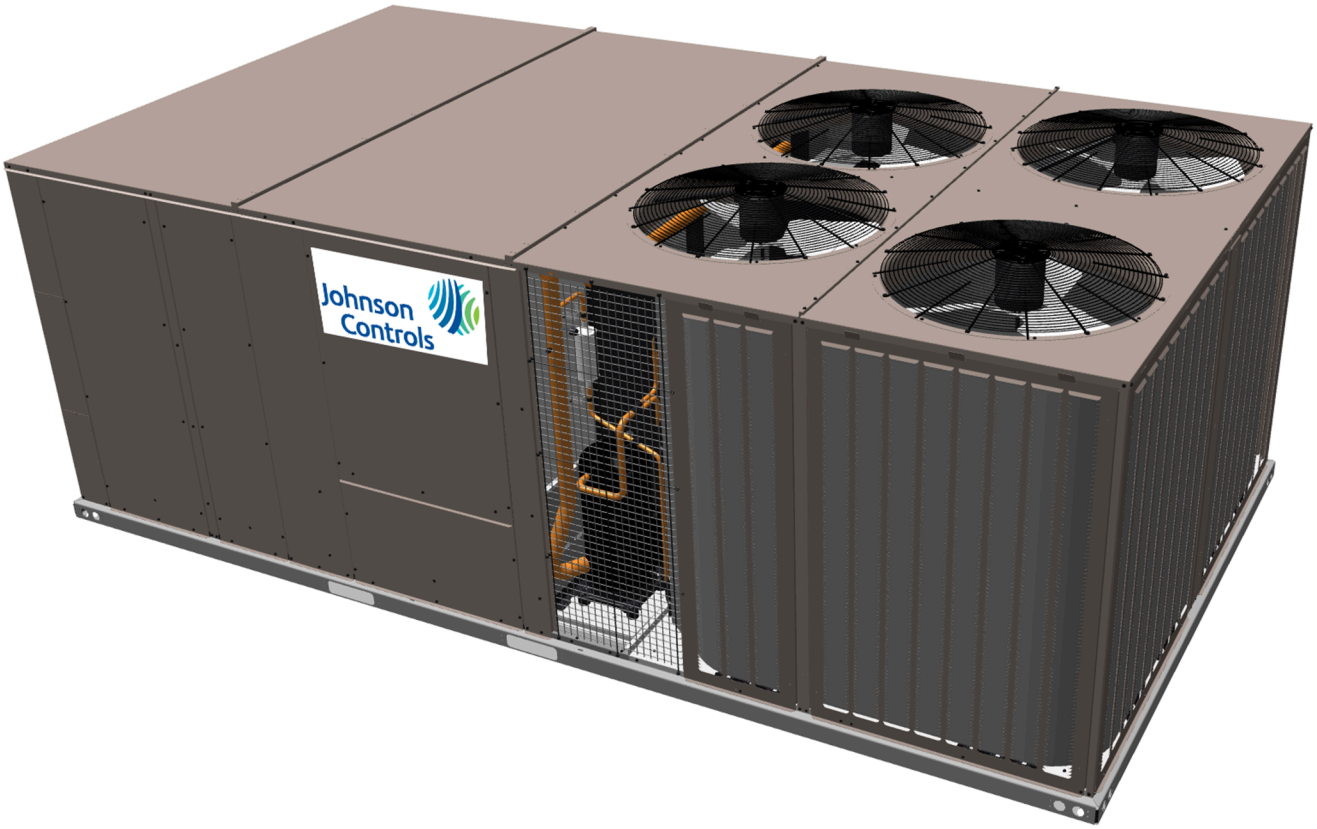
Installation Manual: Johnson Controls Choice KS15 to KS25 and KK15 to KK25

R-454B, 60 hertz



BHC Residential & Light Commercial LLC, 5005 York Drive, Norman, OK 73069

www.johnsoncontrols.com

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General

Certifications

Tested in accordance with:

GoTemp Pro App

BHC Residential and Light Commercial LLC believes in empowering our customers with up-to-date, unit-specific information. Download the GoTemp Pro app, a powerful-comprehensive app designed for contractors on the jobsite, available now in the App Store for iOS and Google Play for Android. Use the App to scan the unique QR code on the unit rating plate for easy access to product information and resources such as nomenclature, technical guide, installation manual, wiring diagrams, parts list, product registration, warranty and much more. Simplify your tasks, save time, and stay ahead with the most comprehensive app built for professionals.

GoTemp Pro integrates functionality previously provided by CWa and MAP, allowing you to utilize the on-board communication card or simply plug in the CWCVT to enable Bluetooth connectivity.

Safety considerations

This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention the signal words DANGER, WARNING or CAUTION.

DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

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 may result in minor or moderate injury. It is also used to alert against unsafe practices and hazards involving only property damage.

WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual for assistance or for additional information, consult a qualified contractor, installer, or service agency.

CAUTION

This product must be installed in strict compliance with the installation instructions and any applicable local, state and national codes including, but not limited to building, electrical, and mechanical codes.

WARNING

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

Children should be supervised to ensure they do not play with the unit. Cleaning and maintenance shall not be performed by children without supervision.

WARNING

Before you perform service or maintenance operations on the unit, turn off the main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency, or the gas supplier.

WARNING

Do not use any other means to clean or accelerate the defrosting process, use only what is recommended by the manufacturer. Store the appliance in a room without continuously operating ignition sources. For example, open flames, an operating gas appliance, or an operating electric heater.
Do not pierce or burn.
Be aware that refrigerants may not have an odor.

WARNING

ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death, or property damage.
Improper servicing could result in dangerous operation, serious injury, death, or property damage.
*Before servicing, disconnect all electrical power to the furnace.
*When servicing controls, label all wires prior to disconnecting. Reconnect the wires correctly.
*Verify proper operation after servicing.

CAUTION

R-454B is a mildly flammable refrigerant. Unit installation must comply with UL/CSA 60335-2-40, the installation and operations manuals available on Solution Navigator, the DS Solutions app, and documentation shipped with the unit.

WARNING

Risk of fire

This unit has over 4 lb of mildly flammable A2L refrigerant, which may require the installation of an RDS (Refrigerant Detection System) for specific applications. To determine if a specific application needs a field-installed RDS, use the RDS calculator on Solution Navigator or the DS Solutions App.

CAUTION

This system uses R-454B refrigerant, which is a mildly flammable refrigerant. Do not use any other refrigerant in this system. Gage sets, hoses, refrigerant containers, and recovery systems, must be designed to handle R-454B. If you are unsure, consult the equipment manufacturer. Failure to use R-454B compatible servicing equipment may result in property damage or injury.

WARNING

FIRE OR EXPLOSION HAZARD

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
WHAT TO DO IF YOU SMELL GAS:
- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

Installation and service must be performed by a qualified installer or service agency.

The installation and servicing of air conditioning equipment can be hazardous, due to the system pressure, a mildly flammable refrigerant, moving parts, and electrical components. Only qualified and trained service personnel must install, repair, or service this equipment. Untrained personnel can perform the basic maintenance functions such as cleaning coils and cleaning or replacing filters.

Observe all the precautions in the literature, labels, and tags that accompany the equipment whenever you work on air conditioning equipment. Follow all other applicable safety precautions and codes including ANSI Z223.1 or CSA-B149.1-latest edition.

Wear safety glasses and work gloves. Use a quenching cloth and have a fire extinguisher available during brazing operations.

ⓘ **Note:** This unit is classified as an appliance not accessible to the general public and should be installed only in locations not accessible to the general public. Locate appliances in a secured location with restricted access, at a level that is not less than 2.5 m, or in secured areas such as rooftops or machine rooms.

Inspection

As soon as you receive a unit, you must inspect it for possible damage during transit. If damage is evident, note the extent of the damage on the carrier's freight bill. You must make a separate request for inspection by the carrier's agent in writing.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG. Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG.

Reference

Additional information is available in the following reference forms:

- Technical Guide - 6486185
- General Installation - 6324810
- Smart Equipment Control Quick Start Guide 1136326
- A2L Refrigerant Installation Manual - 6651753

Renewal parts

Contact your local Ducted Systems parts distribution center for authorized replacement parts.

Approvals

The unit is certified by CSA as follows:

- For use as a cooling only unit, cooling unit with supplemental electric heat or a forced air furnace.
- For outdoor installation only.
- For installation on combustible material and may be installed directly on combustible flooring or, in the United States, on wood flooring or Class A, Class B, or Class C roof covering materials.
- For use with natural gas. The unit can be converted to LP with a kit.

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

⚠ WARNING

Improper installation may create a condition where the operation of the product could cause personal injury or property damage.

-

⚠ CAUTION

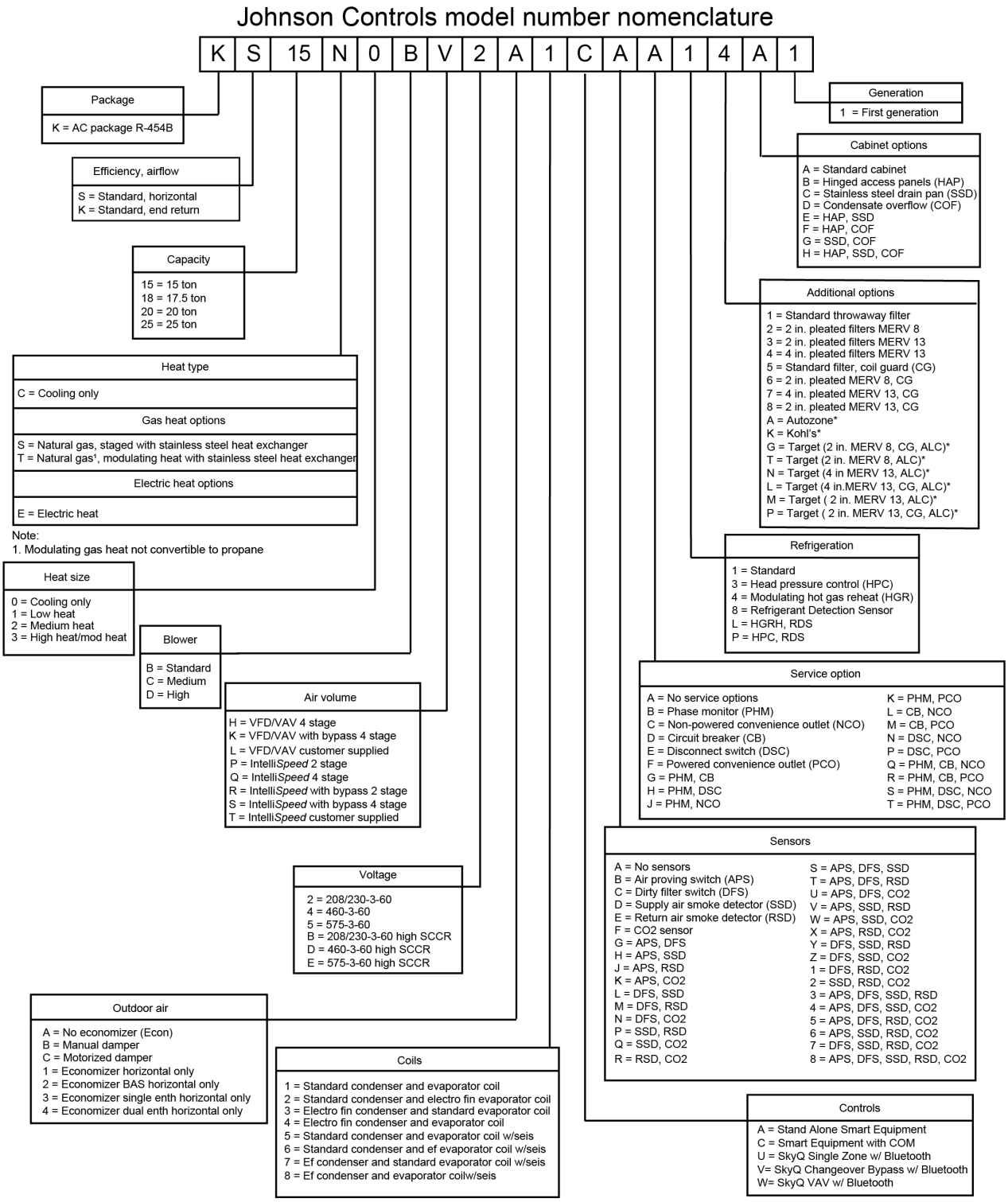
This system uses R-454B refrigerant, which is a mildly flammable refrigerant. Do not use any other refrigerant in this system.

⚠ CAUTION

Install this product only in locations not accessible to the general public. Appliances are to be located in a secured location with restricted access, such as machine rooms, rooftops, etc., at a level not less than 8.2 ft (2.5 m).

Nomenclature

Figure 1: Product nomenclature



Installation

Installation safety information

Read the following instructions before you install this appliance. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer. The installer must instruct the consumer to retain the instructions for future reference.

- Refer to the unit rating plate for the approved type of gas for this product.
- Install this unit only in a location and position as specified in the Location section.
- Never test for gas leaks with an open flame. Use commercially available soap solution made specifically for the detection of leaks when you check all connections.
- Always install the furnace to operate within the furnace's intended temperature-rise range with the duct system and within the allowable external static pressure range. This information is specified on the unit name/rating plate. See Adjustment of temperature rise.
- Do not use this equipment for the temporary heating of buildings or structures under construction.
- Provide adequate combustion and ventilation air to the furnace space as specified in the section.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death, or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

Limitations

You must install these units in accordance with national wiring regulations and the following standards.

Requirements in the United States

- *National Electrical Code, ANSI/NFPA No. 70* - latest edition
- *National Fuel Gas Code, ANSI Z223.1* - latest edition
- *Gas-Fired Central Furnace Standard, ANSI Z21.47a.* - latest edition
- Local building codes
- Local gas utility requirements

Requirements in Canada

- *Canadian Electrical Code, CSA C22.1*
- *Installation Codes, CSA - B149.1*
- Local plumbing and wastewater codes
- Other applicable local codes

See the application data found in this document and refer to the *A2L Refrigerant Installation Manual*.

After the installation is complete, you must adjust gas fired units to obtain a temperature rise in the range specified on the unit rating plate.

If components are added to a unit to meet local codes, they are installed at the dealer's and/or customer's expense.

Base the size of the unit for the proposed installation on the heat loss/heat gain calculation made according to the methods of the Air Conditioning Contractors of America (ACCA).

This furnace is not to be used for temporary heating of buildings or structures under construction.

NOTICE

The Smart Equipment control board used in this product can effectively operate the cooling system down to 0°F when this product is applied in a comfort cooling application for people. An economizer is typically included in this type of application. When you apply this product for process cooling applications, such as computer rooms or switchgear, call the applications department for Ducted Systems at 1-877-874-SERV for guidance. Additional accessories may be needed for stable operation at temperatures below 30°F.

Unit components

Figure 2: Component location front

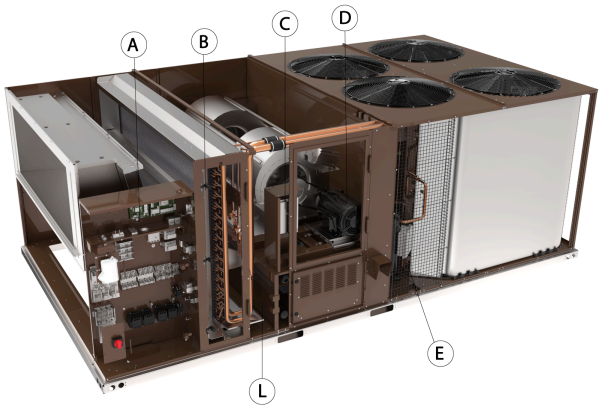


Figure 3: Component location back

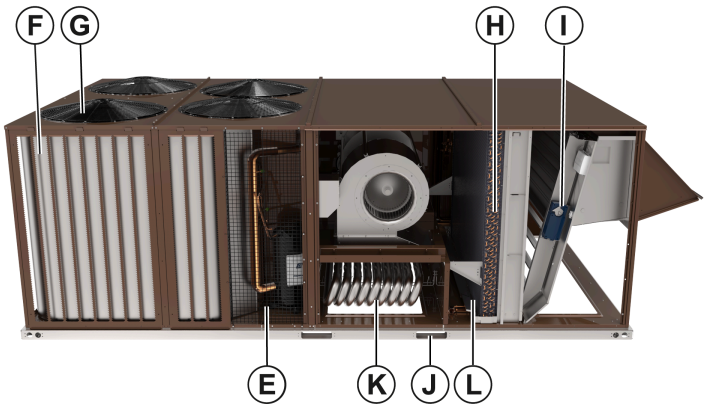


Table 1: Component location table

Item	Description	Item	Description
A	Smart Equipment controls	G	Condenser fans
B	Filter access, 2 in. or 4 in. filter options	H	Copper tube/aluminum fin evaporator coil
C	Optional variable frequency drive	I	Optional economizer only for end return option, optional manual or motorized outside air dampers not shown
D	Belt drive blower motor with dual centrifugal fan design	J	Full perimeter base rails with holes for overhead rigging
E	Scroll compressors in various arrangements to produce 2 or 4 stages of cooling depending on the selected model	K	Optional staged or modulating gas heat with aluminized or stainless steel heat exchanger. Optional electric heat not shown.
F	MicroChannel condenser coils	L	Refrigerant leak detection sensor

Unit limitations

Table 2: KS15 to KS25 and KK15 to KK25 unit limitations

Unit voltage (V)	Applied voltage (V)		Outdoor DB temperature
	Minimum	Maximum	Maximum °F
208/230-3-60	180	254	125
460-3-60	416	508	125
575-3-60	520	635	125

Location

Use the following guidelines to select a suitable location for these units:

- The unit is designed for outdoor installation only.
- Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either the north or the east side of the building.
- Suitable for mounting on a roof curb.
- For ground level installation, use a level concrete slab with a minimum thickness of 4 in. The length and width must be at least 6 in. greater than the unit base rails. Do not tie the slab to the building foundation.
- Roof structures must be able to support the weight of the unit and its options and accessories. The unit must be installed on a solid level roof curb or on an appropriate angle iron frame.

Maintain level tolerance to 1/2 in. across the entire width and length of the unit.

Clearances

All units require particular clearances for proper operation and service. The installer must make provisions for adequate combustion and ventilation air in accordance with section 5.3 of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 – latest edition (in the U.S.A.), or Sections 7.2, 7.3, or 7.4 of Gas Installation Codes, CSA-B149.1 (in Canada) - latest edition, and/or applicable provisions of the local building codes.

Detailed unit clearances required for combustible construction, servicing, and correct unit operation are available in the Weights and dimensions section.

WARNING

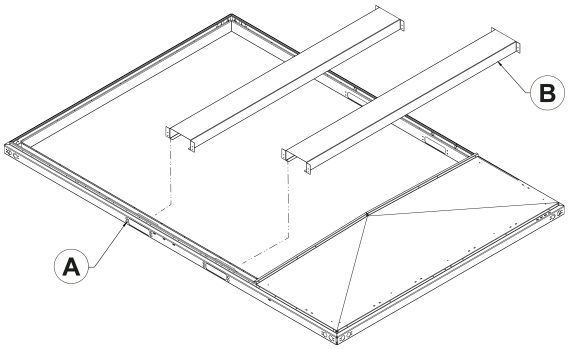
Do not permit overhanging structures or shrubs to obstruct the condenser air discharge outlet, combustion air inlet, or vent outlets.

Removing the forklift tunnels

Note: Before placing a unit on a roof curb, you must remove the protective fork lift tunnels from the underside of the unit.

1. To remove the protective forklift tunnels, locate the fork pockets visible on the exterior of the unit base rail shown in Figure 4.

Figure 4: Protective forklift tunnels



Item	Description
A	Example screw location
B	Fork tunnel

2. Remove the 16 screws securing the fork tunnels to the unit base rail and remove the fork tunnels from the bottom of the unit as the unit is lifted.

   Note: You can discard the fork tunnels and screws after they are removed.

Removing the shipping covers from the supply and return opening

You must remove the shipping covers before you install the duct on the supply and return opening of the unit.

1. To remove the shipping covers, locate the supply and return opening visible on the exterior of the unit as shown in Figure 5 and Figure 6.
2. Remove the shipping covers from the supply and return opening as shown in Figure 5 and Figure 6.

Figure 5: Unit with side return option

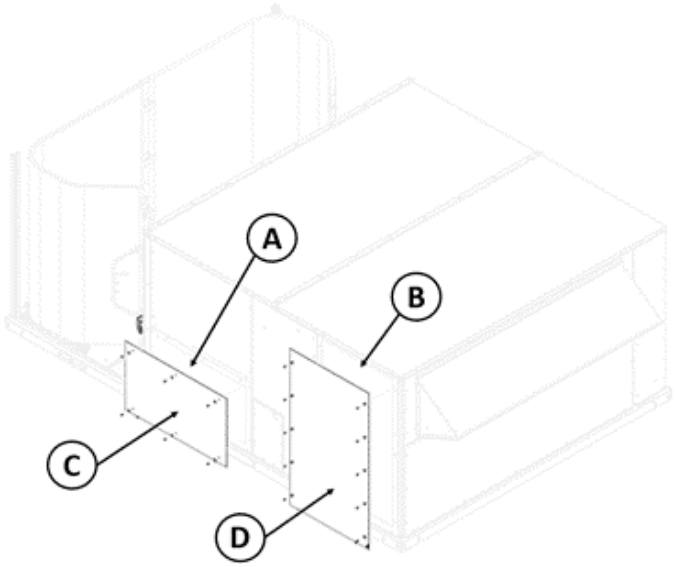
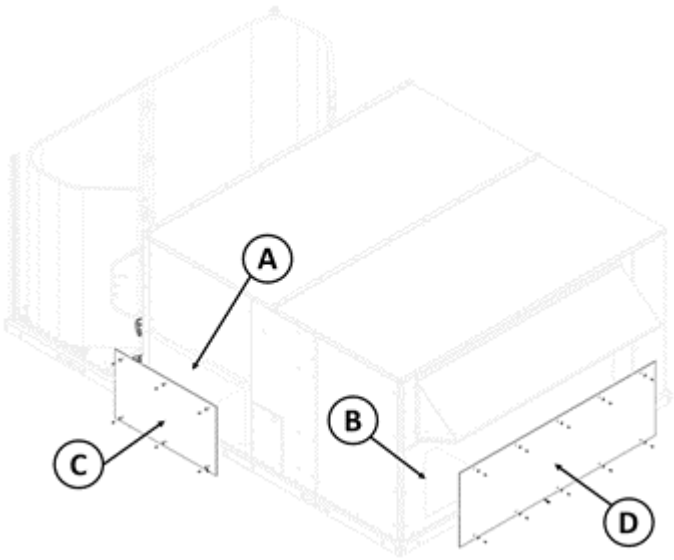


Figure 6: Unit with end return option



Item	Description
A	Supply opening
B	Return opening
C	Shipping cover (supply side)
D	Shipping cover (return side)

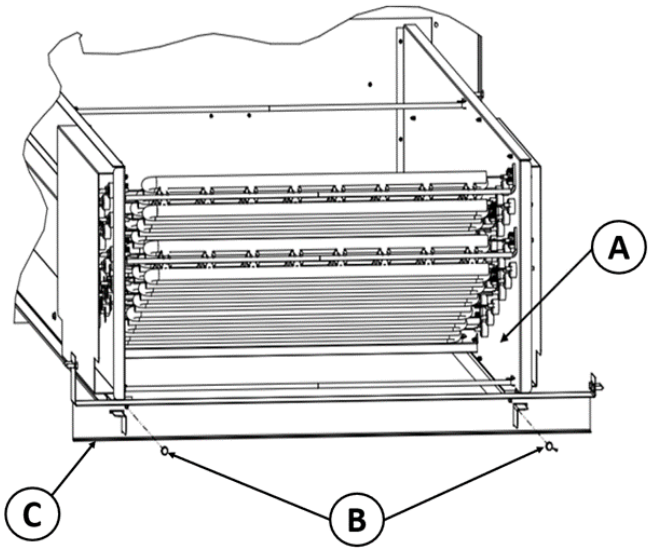
Note: You can discard the shipping covers after they are removed.

Removing the shipping screws from the electric heater

Before you install the duct on the supply opening of the unit, you must remove the shipping screws from the electric heat support channel.

1. To remove the shipping screws of the electric heater, locate the supply opening visible on the exterior of the unit (back side) as shown in Figure 7.
2. Remove the two shipping screws secured to the electric heat support channel as shown in Figure 7.

Figure 7: Removing the shipping screws



Item	Description
A	Supply opening
B	Shipping screws
C	Support channel (electric heat)

Rigging and handling

Adhere to the following guidelines when rigging and handling the unit:

- Exercise care when you move the unit.
- Do no remove any packaging until the unit is near the place of installation.
- To rig the unit, attach chain or cable slings to the lifting holes provided in the base rails.
- You must use spreader bars across the top of the rail unit.
- The spreader bars must have a length that exceeds the largest dimension across the unit.

CAUTION

If a unit is installed on a roof curb other than a ducted systems roof curb, you must apply gasketing to all surfaces that come in contact with the unit underside.

CAUTION

Before lifting the unit, make sure that the unit weight is distributed equally on the rigging cables so that it lifts evenly.

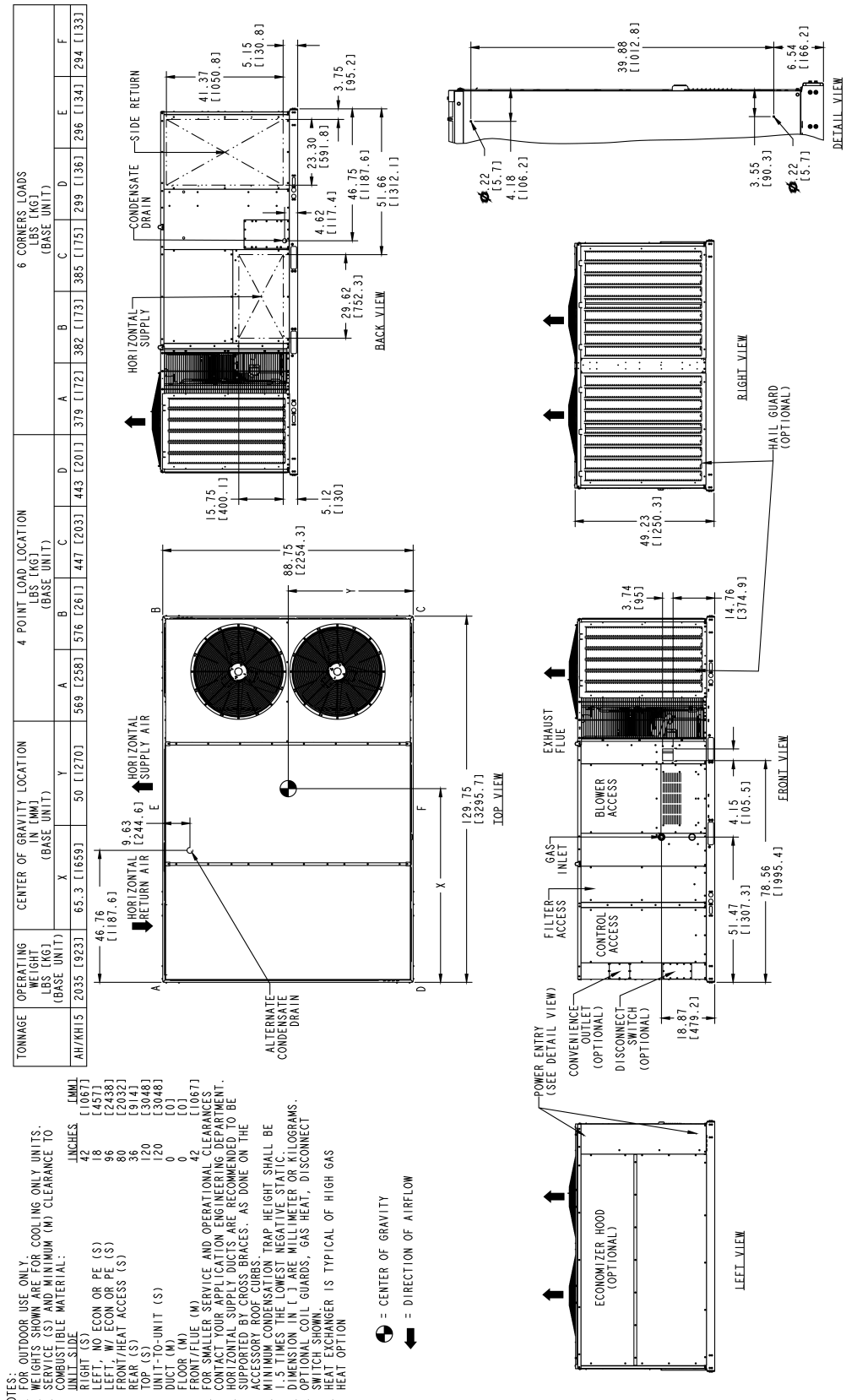
Units may be moved or lifted with a forklift from the side only.
The length of the forks must be a minimum of 52 in.

CAUTION

All panels must be secured in place when the unit is lifted. The condenser coils must be protected from rigging cable damage with plywood or other suitable material.

Weights and dimensions

Figure 8: KS15 and KK15 physical dimensions



NOTES:
1. FOR OUTDOOR USE ONLY.
2. WEIGHTS SHOWN ARE FOR COOLING ONLY UNITS.
3. SERVICE (S) AND MINIMUM (M) CLEARANCE TO COMBUSTIBLE MATERIAL:

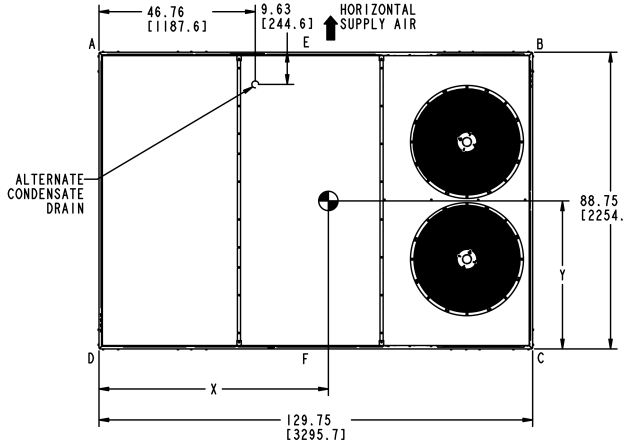
UNIT SIDE	INCHES	[MM]
RIGHT (S)	42	[1067]
LEFT, NO ECON OR PE (S)	18	[457]
LEFT, W/ ECON OR PE (S)	96	[2438]
FRONT/HEAT ACCESS (S)	80	[2032]
REAR (S)	36	[914]
TOP (S)	120	[3048]
UNIT-TO-UNIT (S)	120	[3048]
DUCT (M)	0	[0]
FLOOR (M)	0	[0]
FRONT/FLUE (M)	42	[1067]

4. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES CONTACT YOUR APPLICATION ENGINEERING DEPARTMENT.
5. HORIZONTAL SUPPLY DUCTS ARE RECOMMENDED TO BE SUPPORTED BY CROSS BRACES. AS DONE ON THE ACCESSORY ROOF CURBS.
6. MINIMUM CONDENSATION TRAP HEIGHT SHALL BE 1.5 TIMES THE LOWEST NEGATIVE STATIC.
7. DIMENSION IN [ ] ARE MILLIMETER OR KILOGRAMS.
8. OPTIONAL COIL GUARDS, GAS HEAT, DISCONNECT SWITCH SHOWN.
9. HEAT EXCHANGER IS TYPICAL OF HIGH GAS HEAT OPTION

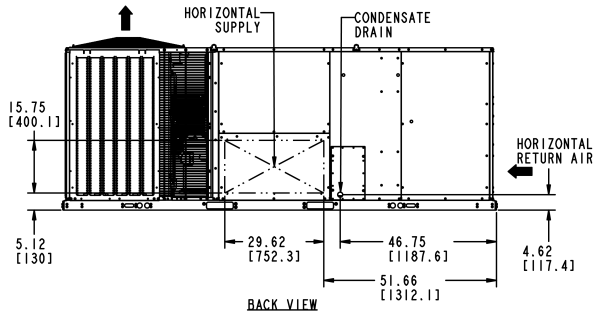
= CENTER OF GRAVITY

= DIRECTION OF AIRFLOW

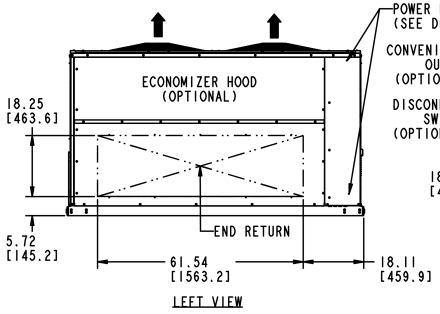
TONNAGE	OPERATING WEIGHT LBS [KG] (BASE UNIT)	CENTER OF GRAVITY LOCATION IN [MM] (BASE UNIT)		4 POINT LOAD LOCATION LBS [KG] (BASE UNIT)				6 CORNERS LOADS LBS [KG] (BASE UNIT)					
		X	Y	A	B	C	D	A	B	C	D	E	F
AL/KL15	2035 [923]	65.3 [1659]	50 [1270]	569 [258]	576 [261]	447 [203]	443 [201]	379 [172]	382 [173]	385 [175]	299 [136]	296 [134]	294 [133]



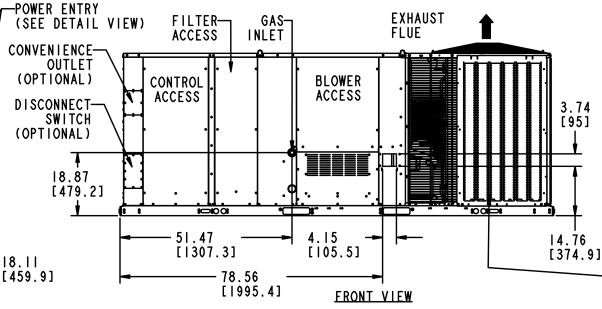
TOP VIEW



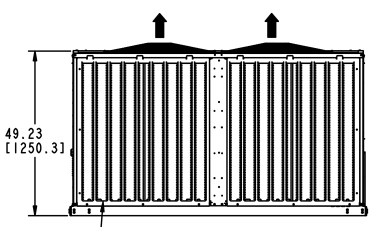
BACK VIEW



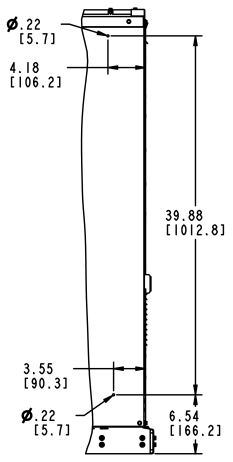
LEFT VIEW



FRONT VIEW

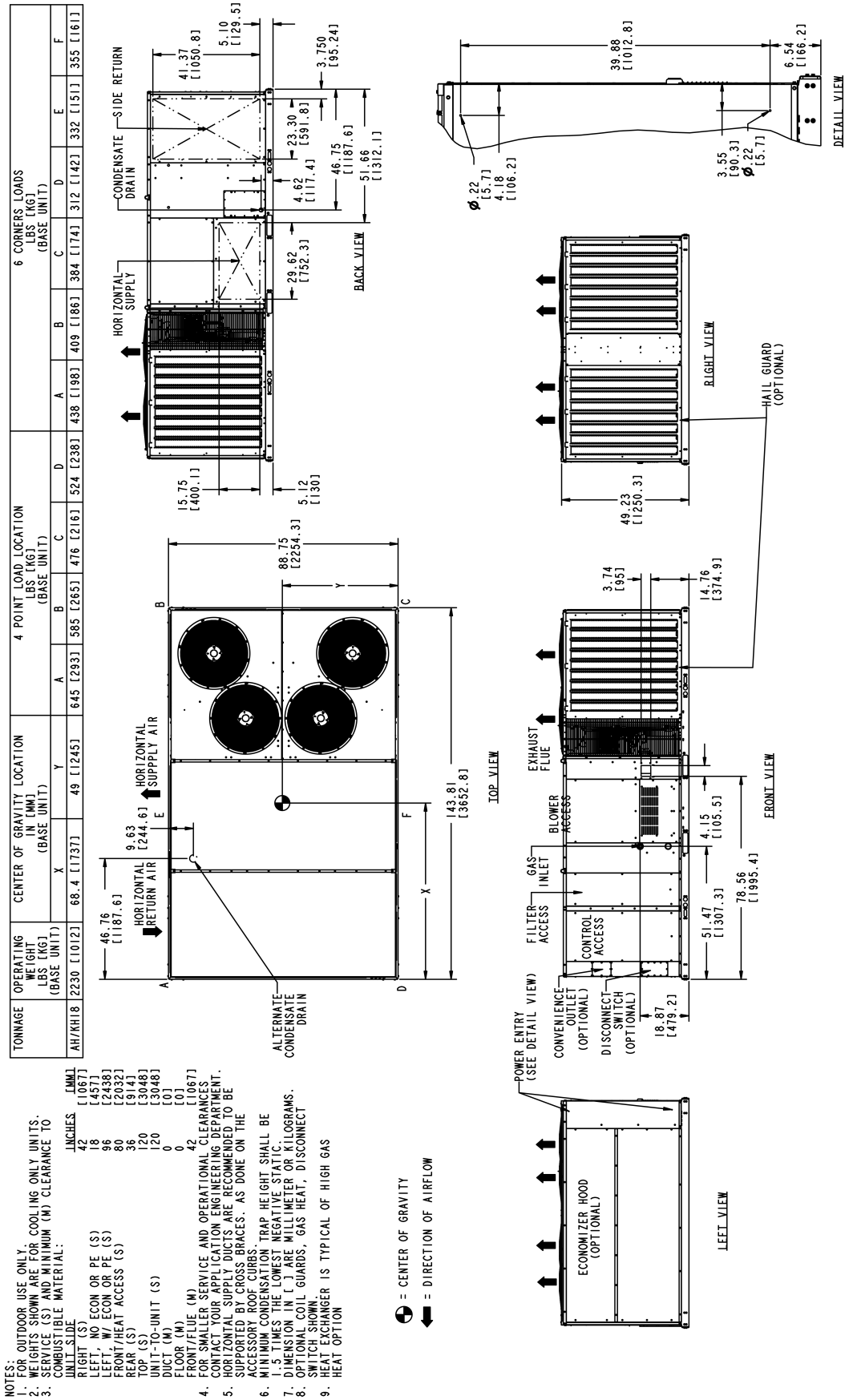


RIGHT VIEW



DETAIL VIEW

Figure 9: KS18 and KK18 physical dimensions

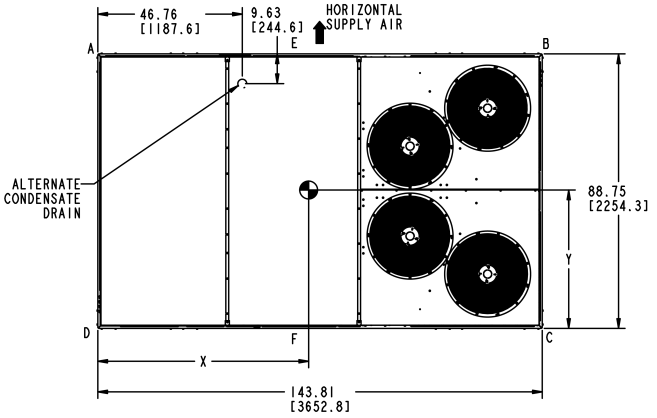


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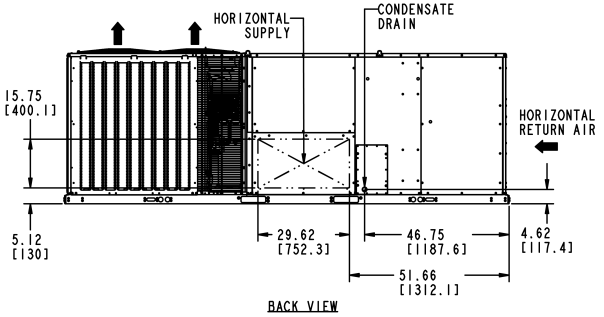
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LEFT, NO ECON OR PE (S)	18	[457]
LEFT, W/ ECON OR PE (S)	96	[2438]
FRONT/HEAT ACCESS (S)	80	[2032]
REAR (S)	36	[914]
TOP (S)	120	[3048]
UNIT-TO-UNIT (S)	120	[3048]
DUCT (M)	0	[0]
FLOOR (M)	0	[0]
FRONT/FLUE (M)	42	[1067]

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6. MINIMUM CONDENSATION TRAP HEIGHT SHALL BE 1.5 TIMES THE LOWEST NEGATIVE STATIC.
7. DIMENSION IN [ ] ARE MILLIMETER OR KILOGRAMS.
8. OPTIONAL COIL GUARDS, GAS HEAT, DISCONNECT SWITCH SHOWN.
9. HEAT EXCHANGER IS TYPICAL OF HIGH GAS HEAT OPTION

TONNAGE	OPERATING WEIGHT LBS [KG] (BASE UNIT)	CENTER OF GRAVITY LOCATION IN [MM] (BASE UNIT)		4 POINT LOAD LOCATION LBS [KG] (BASE UNIT)				6 CORNERS LOADS LBS [KG] (BASE UNIT)					
		X	Y	A	B	C	D	A	B	C	D	E	F
AL/KL18	2230 [1012]	68.4 [1737]	49 [1245]	645 [293]	585 [265]	476 [216]	524 [238]	438 [198]	409 [186]	384 [174]	312 [142]	332 [151]	355 [161]



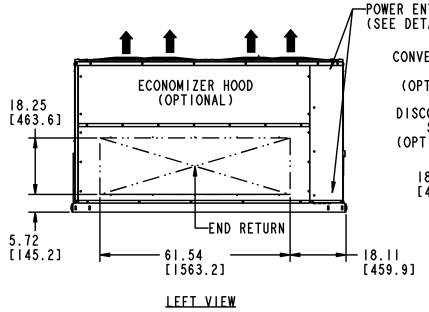
TOP VIEW



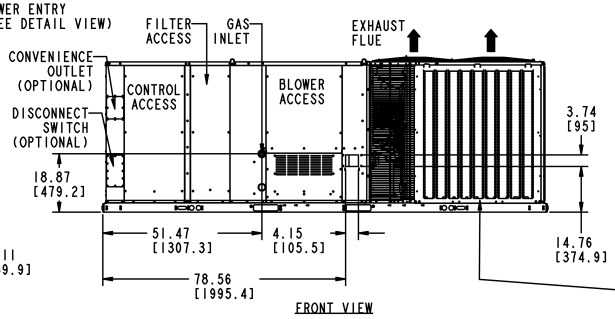
BACK VIEW

= CENTER OF GRAVITY

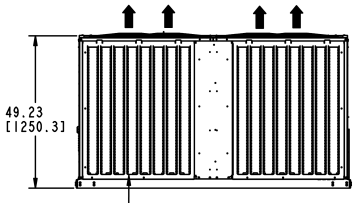
= DIRECTION OF AIRFLOW



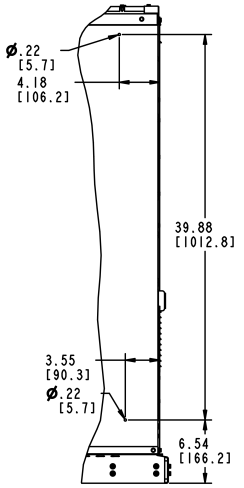
LEFT VIEW



FRONT VIEW

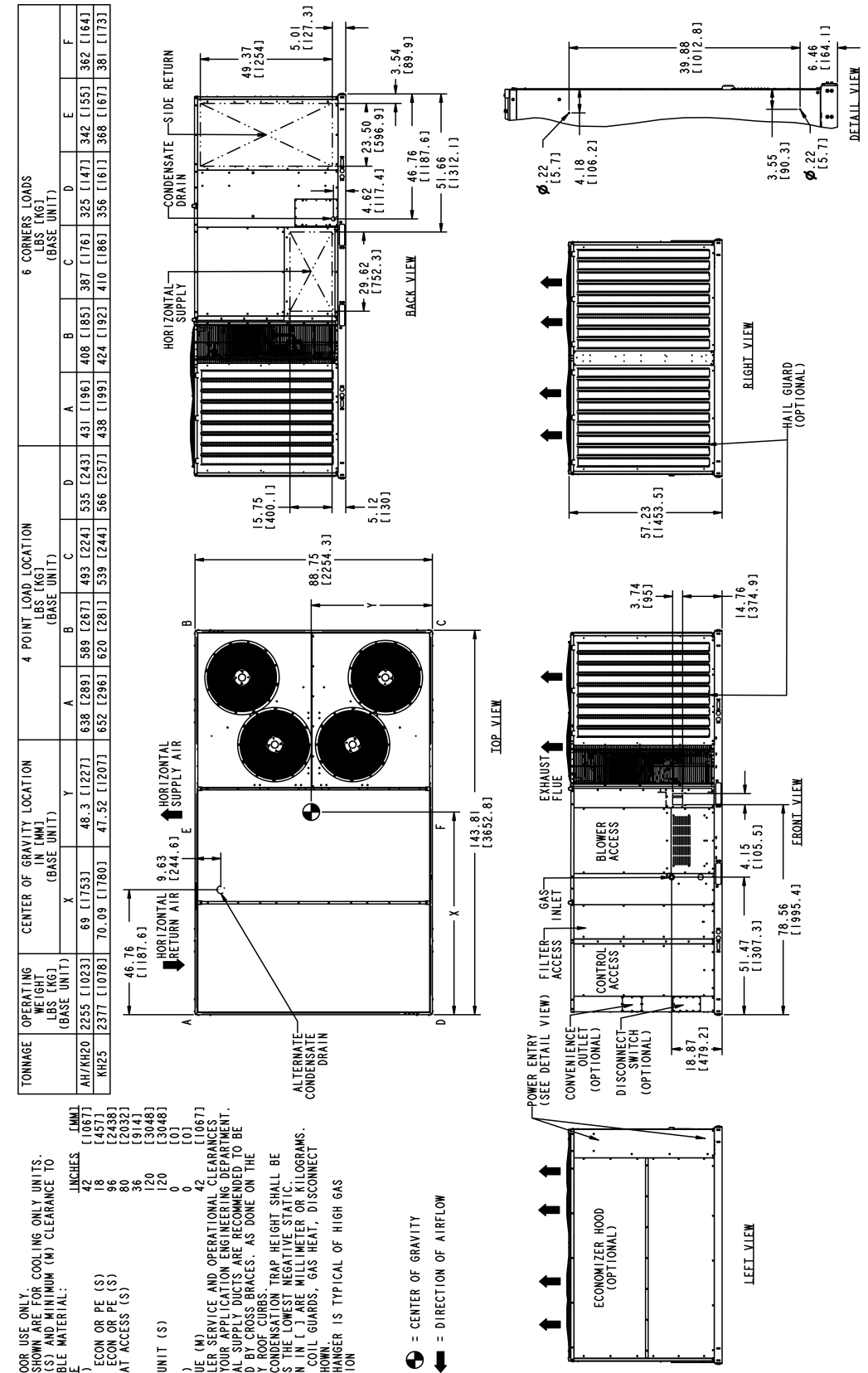


RIGHT VIEW



DETAIL VIEW

Figure 10: KS20 , KK20, KS25, and KK25 physical dimensions



NOTES:
1. FOR OUTDOOR USE ONLY.
2. WEIGHTS SHOWN ARE FOR COOLING ONLY UNITS.
3. SERVICE (S) AND MINIMUM (M) CLEARANCE TO COMBUSTIBLE MATERIAL:

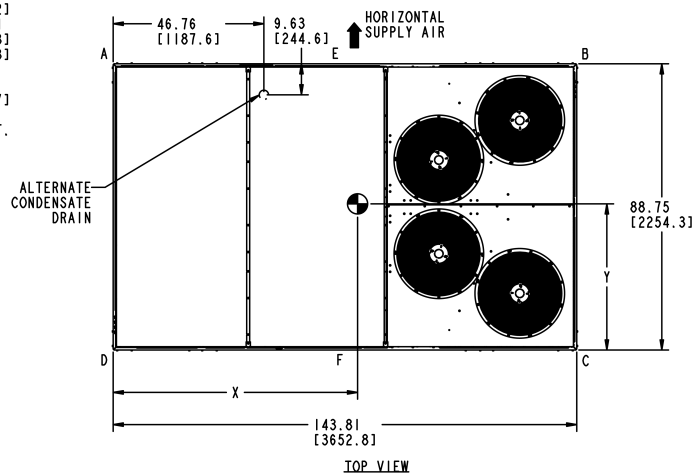
UNIT SIDE	INCHES	[MM]
RIGHT (S)	42	[1067]
LEFT, NO ECON OR PE (S)	18	[457]
LEFT, W/ ECON OR PE (S)	96	[2438]
FRONT/HEAT ACCESS (S)	80	[2032]
REAR (S)	36	[914]
TOP (S)	120	[3048]
UNIT-TO-UNIT (S)	120	[3048]
DUCT (M)	0	[0]
FLOOR (M)	0	[0]
FRONT/FLUE (M)	42	[1067]

4. FOR SMALLER SERVICE AND OPERATIONAL CLEARANCES CONTACT YOUR APPLICATION ENGINEERING DEPARTMENT.
5. HORIZONTAL SUPPLY DUCTS ARE RECOMMENDED TO BE SUPPORTED BY CROSS BRACES. AS DONE ON THE ACCESSORY ROOF CURBS.
6. MINIMUM CONDENSATION TRAP HEIGHT SHALL BE 1.5 TIMES THE LOWEST NEGATIVE STATIC.
7. DIMENSION IN [ ] ARE MILLIMETER OR KILOGRAMS.
8. OPTIONAL COIL GUARDS, GAS HEAT, DISCONNECT SWITCH SHOWN.
9. HEAT EXCHANGER IS TYPICAL OF HIGH GAS HEAT OPTION

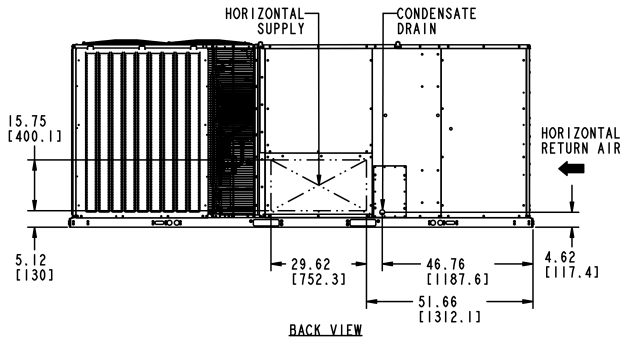
TONNAGE	OPERATING WEIGHT LBS [KG] (BASE UNIT)	CENTER OF GRAVITY LOCATION IN [MM] (BASE UNIT)		4 POINT LOAD LOCATION LBS [KG] (BASE UNIT)				6 CORNERS LOADS LBS [KG] (BASE UNIT)					
		X	Y	A	B	C	D	A	B	C	D	E	F
AL/KL20	2255 [1023]	69 [1753]	48.3 [1227]	638 [289]	589 [267]	493 [224]	535 [243]	431 [196]	408 [185]	387 [176]	325 [147]	342 [155]	362 [164]
KL25	2377 [1078]	70.09 [1780]	47.52 [1207]	652 [296]	620 [281]	539 [244]	566 [257]	438 [199]	424 [192]	410 [186]	356 [161]	368 [167]	381 [173]

= CENTER OF GRAVITY

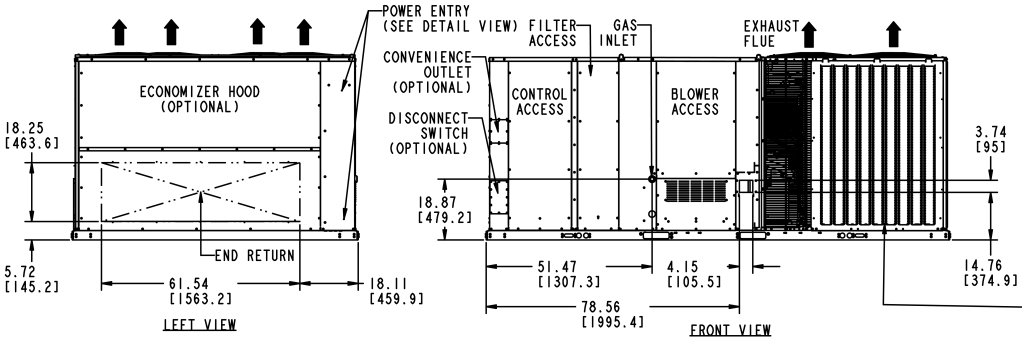
= DIRECTION OF AIRFLOW



TOP VIEW

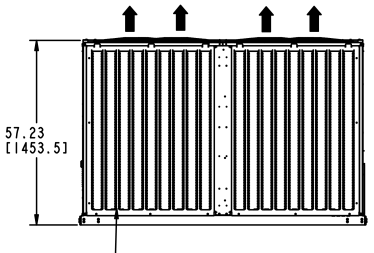


BACK VIEW

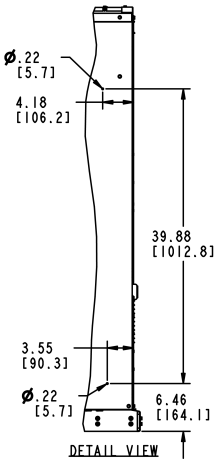


LEFT VIEW

FRONT VIEW



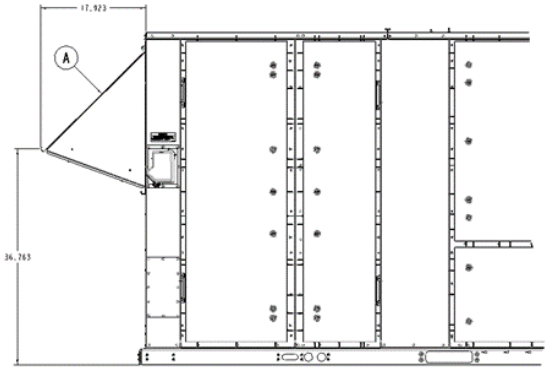
RIGHT VIEW



DETAIL VIEW

Rain hood dimensions

Figure 11: Rain hood dimensions



Item	Description
A	Economizer, manual damper, and motorized damper rain hood

Outdoor air hood assembly

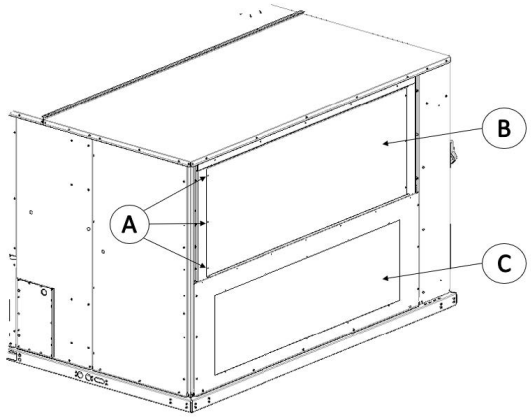
After a unit with an economizer, manual damper, or motorized damper is installed in the field, the outside air hood needs to be assembled.

To install the outdoor air hood, complete the following steps.

Note: The outdoor air hood assembly is only applicable for End Return with Econ option.

While transporting the unit, the hood top panel is used as a shipping cover attached to the unit exterior as shown in Figure 12.

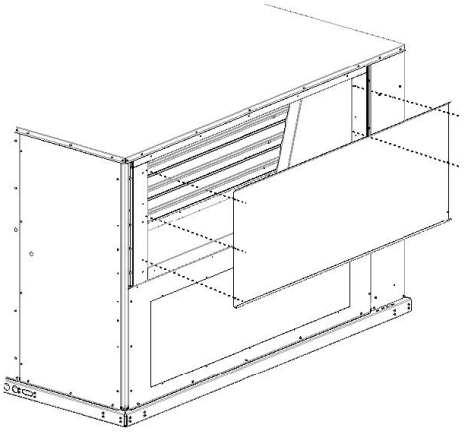
Figure 12: Hood top panel



Item	Description
A	Corner screws
B	Hood top panel
C	Return opening

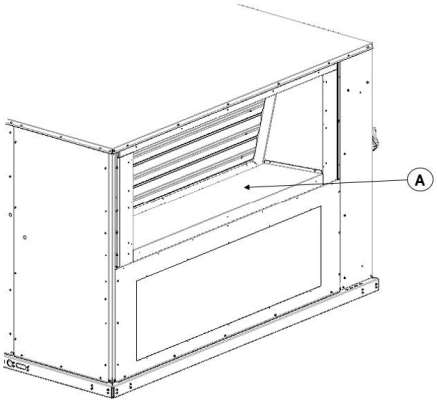
1. Remove the corner screws and the hood top panel as shown in Figure 12 and Figure 13. Keep both the screws and the top panel for use in a later step.

Figure 13: Removing the corner screws



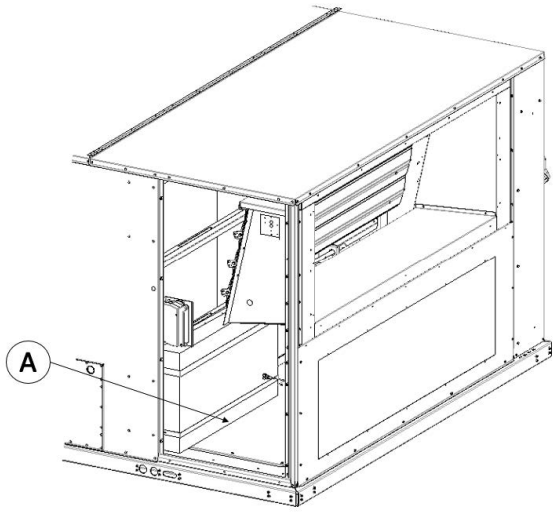
2. For units with an economizer, the additional outside air hood assembly parts are shipped behind the top panel removed in the previous step. This location is shown in Figure 14. For units with a manual or motorized damper, the additional outside air hood assembly parts are shipped in the return air section of the unit as shown in Figure 15.

Figure 14: Economizer hood assembly parts



Item	Description
A	Economizer hood assembly parts shipping location

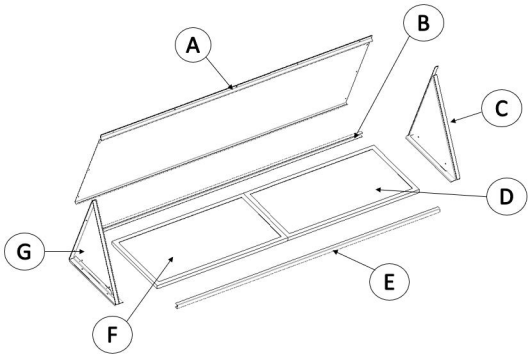
Figure 15: Manual or motorized damper hood assembly parts



Item	Description
A	Manual or motorized damper hood assembly parts shipping location

3. Before beginning assembly, check that you have all of the factory provided parts for the economizer outside air hood, as shown in Figure 16.

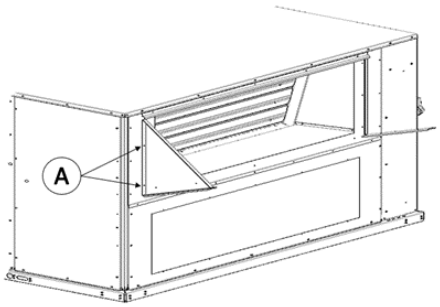
Figure 16: Economizer outside air hood parts



Item	Description
A	Hood top panel
B	Filter channel 1
C	Right side panel sub-assembly
D	Filter 1
E	Filter channel 2
F	Filter 2
G	Left side panel sub-assembly

4. Using two #10 screws from the hardware bag, fasten the left side panel sub-assembly on the unit as shown in Figure 17. Note that the flange should be oriented at the bottom of the side panel and facing the center of the unit.

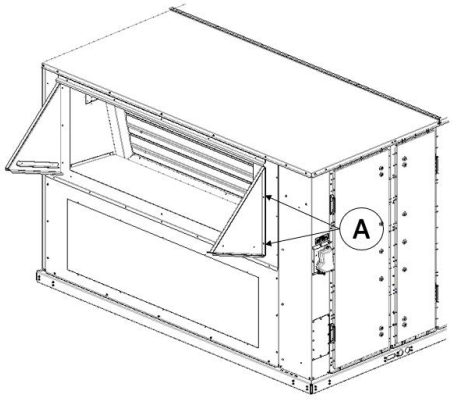
Figure 17: Fastening the left side panel



Item	Description
A	Screws

5. Using two #10 screws from the hardware bag, fasten the right side panel sub-assembly on the unit as shown in Figure 18. Note that the flange should be oriented at the bottom of the side panel and facing the center of the unit.

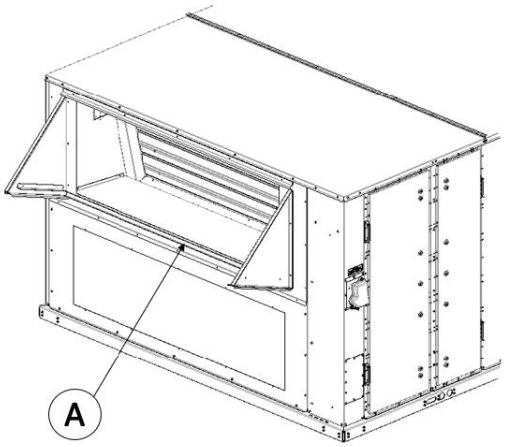
Figure 18: Right side panel



Item	Description
A	Screws

6. Before you install the filter channel, ensure the open end of the channel is pointing away from the unit. The filters are inserted into this opening. Insert filter channel 1 as shown in Figure 19. The filer channel is designed to rest on top of the flange of both of the side panels installed in the previous step.

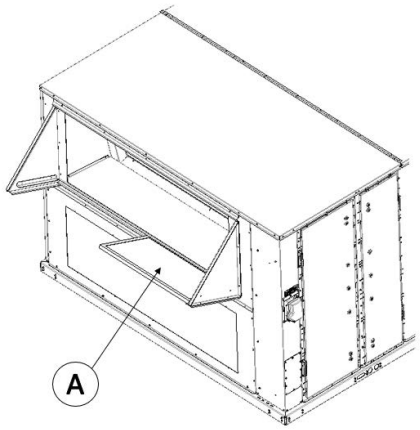
Figure 19: Filter Channel 1



Item	Description
A	Filter Channel 1

7. Insert the first filter into the filter channel to rest with one edge inside of the filter channel and the other on top of the flange of the side panel. See Figure 20.

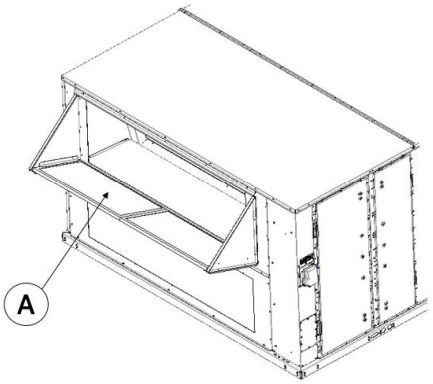
Figure 20: Filter



Item	Description
A	Filter

8. Repeat step 7 to insert the second filter into the filter channel as shown in Figure 21.

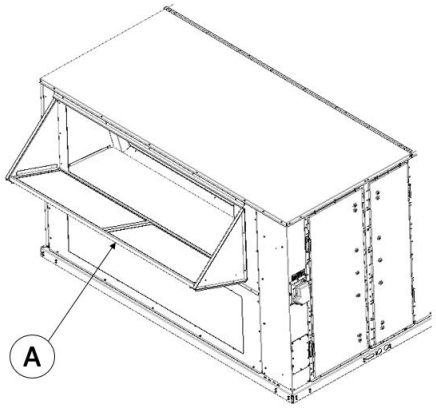
Figure 21: Filter



Item	Description
A	Filter

9. Insert filter channel 2 with the open end of the channel facing toward the unit and going over the end of the filters. See Figure 22.

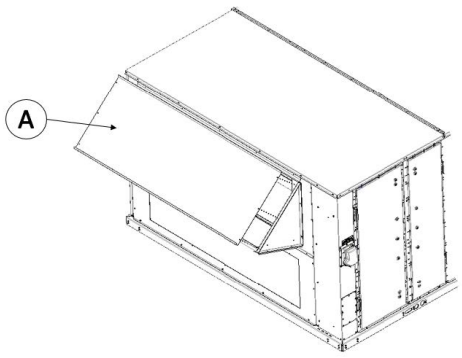
Figure 22: Inserting filter channel 2



Item	Description
A	Filter channel 2

10. Taking the hood top panel that you removed in Step 1, hook the angled flange under the top bracket and then set on top of the side panels. Using the screws that you removed earlier, attach the top panel to the side panels, as shown in Figure 23.

Figure 23: Hood Top Panel



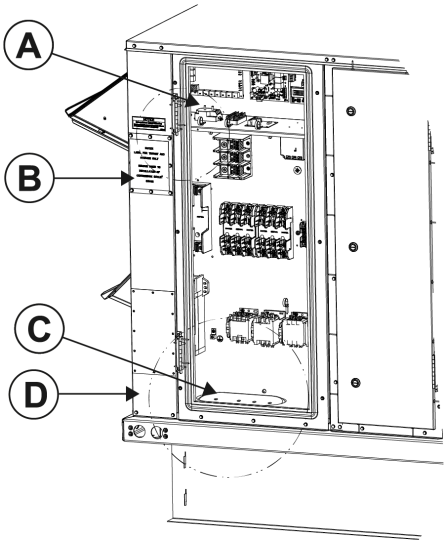
Item	Description
A	Hood top panel

Connecting the pressure lines for VAV

For VAV unit operation, field setup of the pressure lines is required to obtain readings of the supply duct pressure and building space pressure. Follow the instructions below to complete this setup.

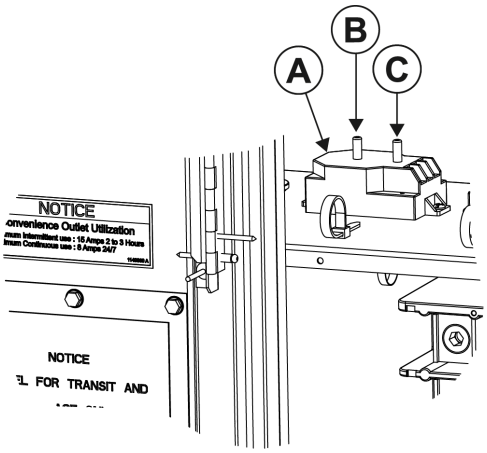
1. Open the control panel access door. The duct pressure sensor (DPS) will be located on the shelf as shown in Figure 24 and Figure 25.

Figure 24: Control Panel



Item	Description
A	Duct Pressure Sensor
B	See Figure 25
C	Dimple Embossment
D	See Figure 26

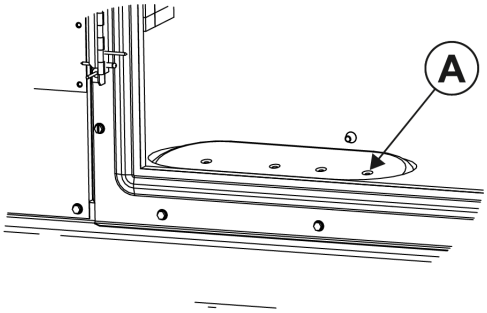
Figure 25: Duct Pressure Sensor detail



Item	Description
A	DPS
B	High Port
C	Low Port

2. For best results, use a pressure-transmitting tubing with 3/16 in. I.D. for tubing lengths of up to 100 feet, 1/4 in. I.D. for tubing lengths up to 300 feet, and 3/8 in. I.D. for tubing lengths up to 900 feet.
3. Drill a hole in the dimpled embossment in the bottom of the control box, as shown in Figure 24 and Figure 26. Drill the hole in a size that will fit both the building pressure and supply-air pressure tubes. Use protective measures to ensure that the tubing will not develop a cut from contact with any sharp edges.

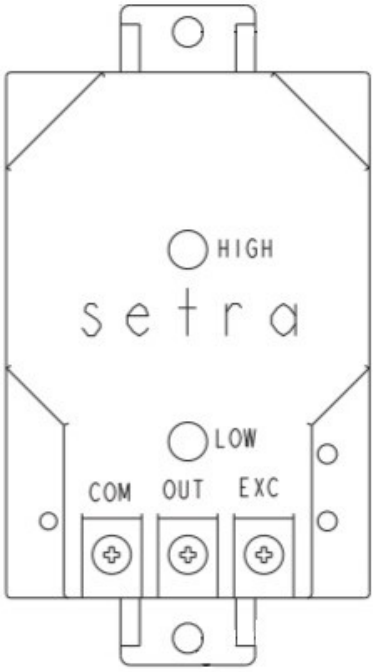
Figure 26: Dimple Embossment detail



Item	Description
A	Drill holes here Pressure tubes

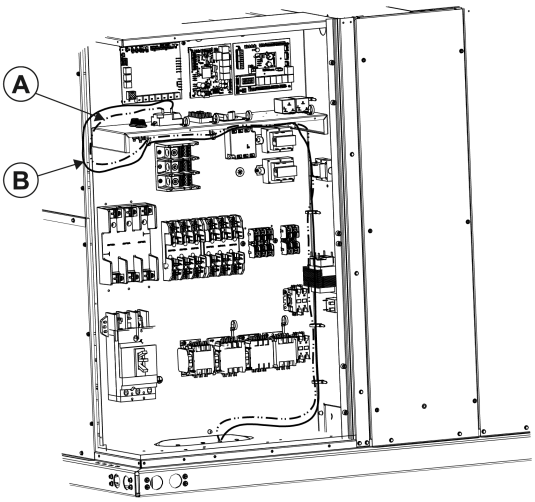
4. Determine the length of tubing required to run from the DPS, as highlighted in step 1, down through the hole drilled in the embossment in the bottom of the control box, and to the chosen location for obtaining the building pressure.
5. Connect the field-supplied tubing to the Low pressure port of the DPS. You can identify the Low and High ports by the sticker and embossment on the sensor, as shown in Figure 25 and Figure 27.

Figure 27: DPS Port Locations



6. Route the tubing through the control box and down through the hole drilled in the control box base embossment, as shown in Figure 28.

Figure 28: Routing the tubing

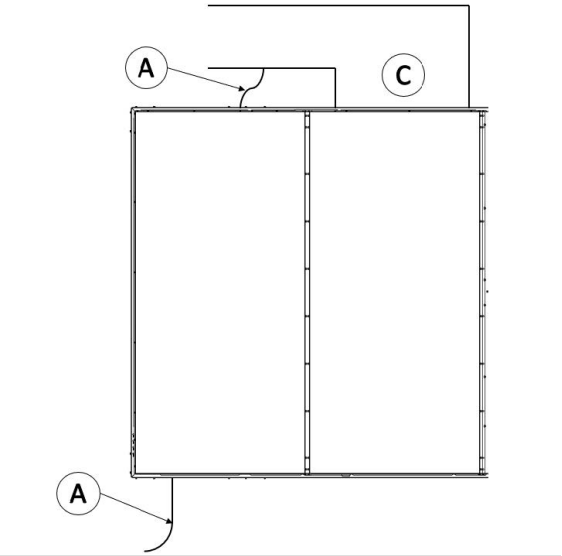


Item	Description
A	High tube
B	Low tube

7. When the cable exits the unit base, route the tubing to the chosen location for obtaining a constant building pressure reading.
8. Determine the length of tubing required to run from the DPS, down through the hole drilled in the embossment in the bottom of the control box, and to the chosen location for obtaining the supply-air duct pressure.

9. Connect the field-supplied tubing to the High pressure port of the DPS. The Low and High ports can be identified by the sticker and embossment on the sensor and are shown in Figure 26 and Figure 27.
10. Following the same path as the building pressure tubing in Step 6, route the tubing through the control box, and down through the hole drilled in the control box base embossment, as shown in Figure 28. Route both tubes along the cable straps and use the wire ties to secure the tubes to the cable straps.
11. After exiting the unit base, route the tubing to a field-supplied static pressure tap in the supply duct located at a point where constant pressure is expected. See Figure 29 for an example of the full tubing routing.

Figure 29: Routing the tubing



Item	Description
A	Low building pressure
B	High SA duct pressure
C	Supply air duct

12. To prevent an unstable signal due to air turbulence, check that there are no obstructions, turns, or VAV terminal boxes up-stream or down-stream of the sensing tube location, for at least a distance of 6 to 10 times the duct diameter.

Utilities entry

Note: Field-seal all entry holes to prevent rainwater entry into the building.

Table 3: Utilities entry

Entry description		Opening size diameter (in.)
Control wiring	Left	Field drilled[1] to maximum of 7/8 in.
	Bottom	Field drilled[1] to maximum of 7/8 in.
Power wiring	Left	Field drilled[1] to maximum of 3 in.
	Bottom	Field drilled[1] to maximum of 3 in.
Gas piping	Left [2,3]	2 in. hole with 3/4 in. grommet
	Bottom[3]	1 1/4 in. hole
Condensate drain	Front[4]	1 1/2 in. hole
	Bottom[4]	2 in. hole with 1 1/4 in. grommet

Note:
1. Factory provided dimples show the hole location to facilitate the drilling of entry holes.
2. 3/4 in. NPT gas piping is required.
3. You must insert the piping through the factory-installed grommet for a watertight seal.
4. 1 in. NPT female connection piping is required.

Refrigerant detection system

Choice refrigeration detection systems (RDS) includes two refrigerant leak detection sensors to protect the unit from any damage caused by the leakage of the mildly flammable R454B refrigerant.

Choice units provide an RDS as factory and field installed options.

The RDS sensor can detect a refrigerant leak according to UL60335-2-40 (edition 4.0) with an accuracy of +/- 5% LFL across the working range (0-25% LFL)

Mounting suggestions are as follows:

- Mounting holes are sized for #10 sheet metal screws.
- For optimal performance, put the sensor on a flat, smooth, surface.
- Connector location is crucial. Position the sensor as indicated in the mounting instructions.
- Do not position sensors in an open-up orientation because this prevents any condensation on the mounting surface from dripping onto the sensor membrane.
- Refer to the *A2L Refrigerant Installation Manual* for RDS operation and safety requirements.

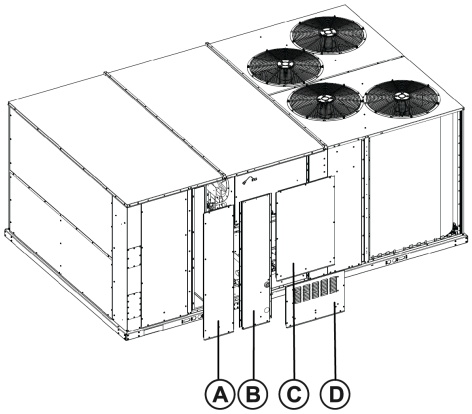


Field mounting the RDS

Mounting instructions for sensor 1

1. Remove or open the following section panels:
   - Filter
   - Blower
   - Heating section
   - Evaporator

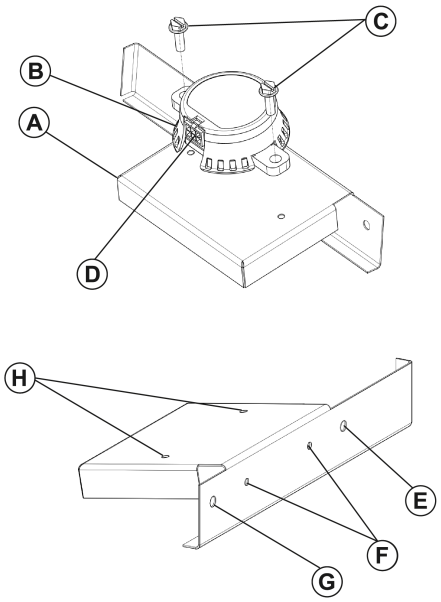
Figure 30: Unit with section panels



Item	Description
A	Filter section panel
B	Evaporator section panel
C	Blower section panel
D	Heating section panel

2. Use the bracket to install the RDS sensor 1. Secure the sub-assembly of the RDS sensor 1 and the bracket with two #10 screws as shown in Figure 31.

Figure 31: Refrigerant detection sensor



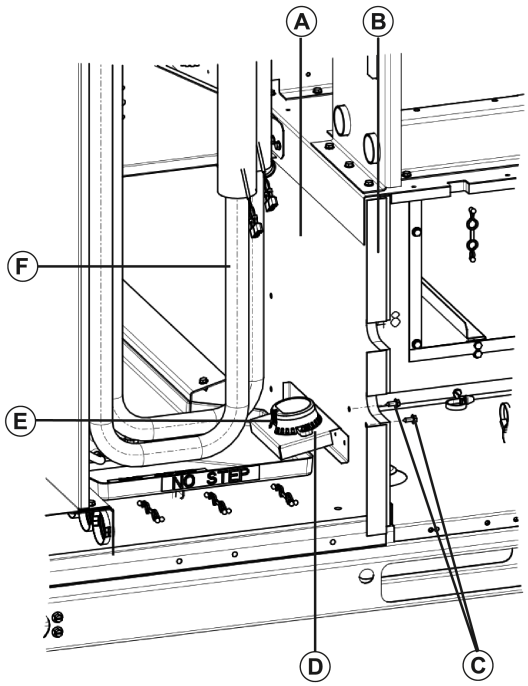
Item	Description
A	RDS bracket
B	RDS sensor
C	Number 10 screws
D	RDS connector position
E	Sensor 2 location mounting holes
F	Sensor 1 location mounting holes
G	Sensor 2 location mounting holes
H	Sensor mounting holes

3. Assemble the RDS sensor 1 and the bracket sub-assembly to the supply base pan, using the locating holes given on insulation.

   Note: The connector position for the RDS Sensor 1 is critical. The sensor position must be the same as shown in the sub-assembly, see Figure 31, Figure 32 and Figure 33

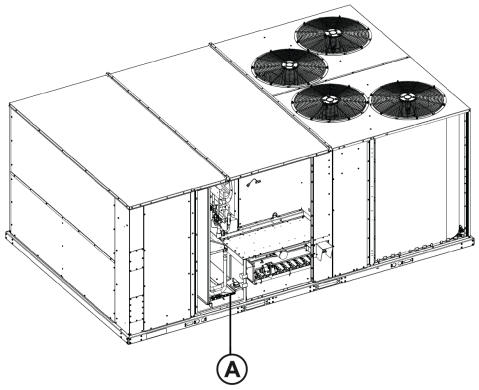
   Use two #10 screws to assemble the sub-assembly to the supply base pan.
   Mount the sub-assembly using the inner holes on the bracket. For the precise placement, see Figure 32
   Fasten the screws from the heating section toward the evaporator section.

Figure 32: Assembly for RDS detail



Item	Description
A	Insulation
B	Supply base pan
C	Number 10 screws
D	RDS 1 Sub assembly
E	Connector position facing evaporator
F	Evaporator headers

Figure 33: RDS location

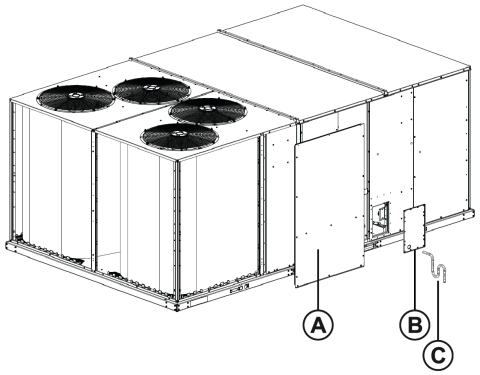


Item	Description
A	RDS sensor location

Mounting Instructions for sensor 2

1. Remove the access patch plate and drain-pipe. If necessary, remove the blower section panel.

Figure 34: Unit with access section panels

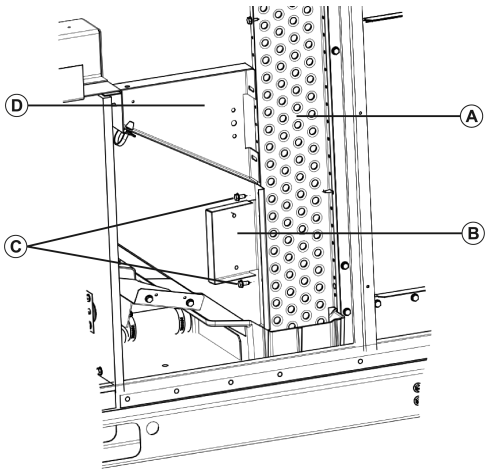


Item	Description
A	Blower section panel
B	Access patch plate
C	Drainpipe

2. Use the bracket to install RDS sensor 2. The sub-assembly of the RDS sensor 2 and the bracket requires two #10 screws, similar to the RDS sensor 1 sub-assembly, see Figure 31.
3. The sub-assembly of the RDS sensor 2 and the bracket must be placed below the evaporator coil support bracket to align with the locating holes. Use the outer holes on the bracket flange to connect the sub-assembly to the evaporator end sheet.

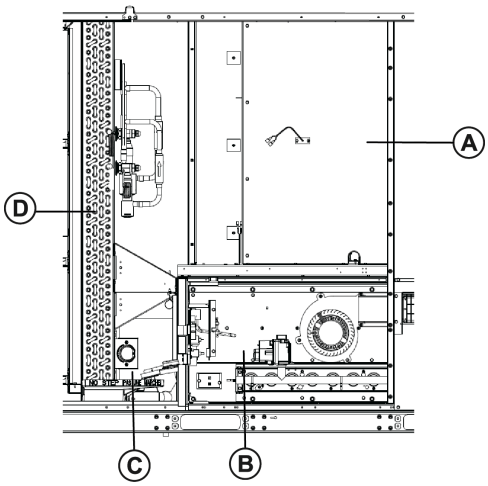
   Use two #10 screws to assemble the RDS sensor 2 and the bracket sub-assembly to the evaporator end sheet. See Figure 35

Figure 35: RDS Sensor 2 assembly



Item	Description
A	Evaporator end sheet
B	RDS sensor 2 sub assembly
C	#10 screws
D	Evaporator coil support

Figure 36: RDS Sensor 2 assembly - front side view



Item	Description
A	Blower
B	Heating section
C	Sensor 2 inside position
D	Evaporator

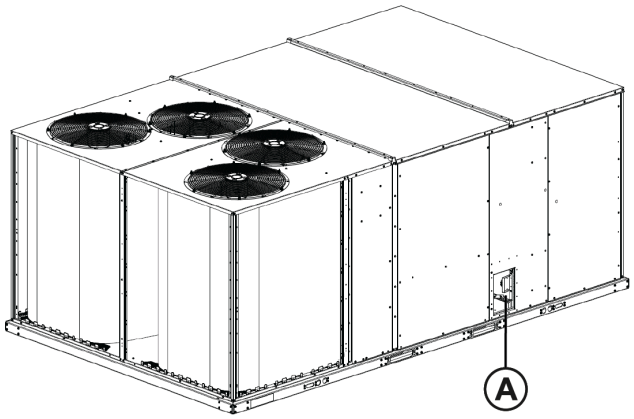
4. Position the RDS sensor 2 inside the unit facing toward the front side-panels. See Figure 37.

   Position the sensor inside the unit while you are assembling the RDS sensor 2 and the bracket sub-assembly. This positioning is critical for sensing the refrigerant leak.

   The refrigerant detection sensors have a common mounting bracket.

   Note: The connector position for RDS sensor 2 is critical. The sensor position must be the same as shown in the sub-assembly, see Figure 31 and Figure 37.

Figure 37: RDS sensor 2 location



Item	Description
A	RDS sensor 2 sub assembly

Connecting the RDS sensors wiring harness

1. When you have installed both RDS sensors, you must connect the harness. Route the harness from the UCB board connector points, see Figure 38, to RDS sensor 1, and from RDS sensor 1 to RDS sensor 2, see Figure 39, the highlighted routing direction.

Figure 38: SSE board

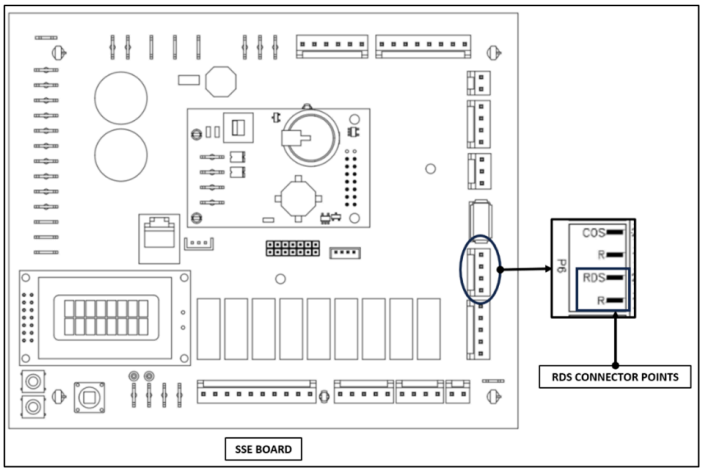
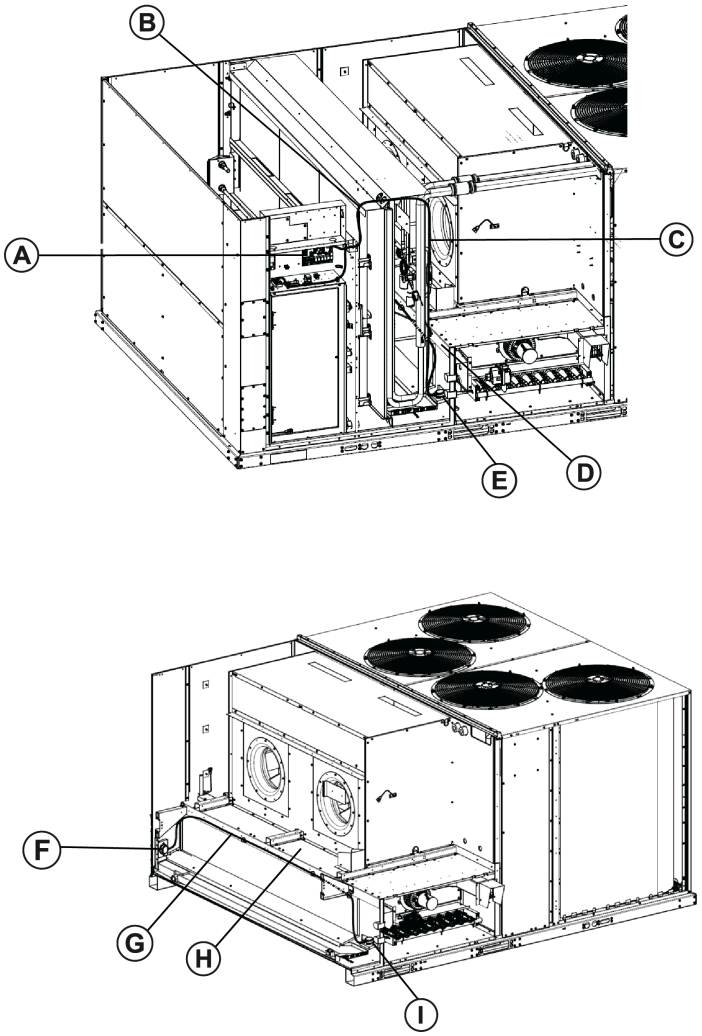


Figure 39: RDS sensor routing



Item	Description
A	SSE board
B	RDS harness
C	Wire routing
D	Blower deck
E	RDS sensor 1
F	RDS sensor 2
G	RDS harness
H	Blower deck
I	RDS sensor 1

2. After you complete routing the harness, close all the panels removed in Step 1 and Step 4.

Installing the condensate drain line

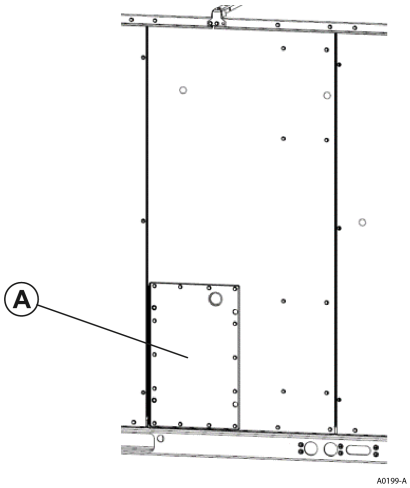
After a unit is installed in the field, the condensate drain line will need to be connected to the field supplied drain line. The orientation of the condensate drain connection is adjustable. The drain connection leaves the factory oriented to the rear

of the cabinet for a through the side connection. The drain connection can be reoriented downward through the base pan for piping inside the roof curb. Separate instructions are included in the following section for each orientation.

Through the side condensate drain:

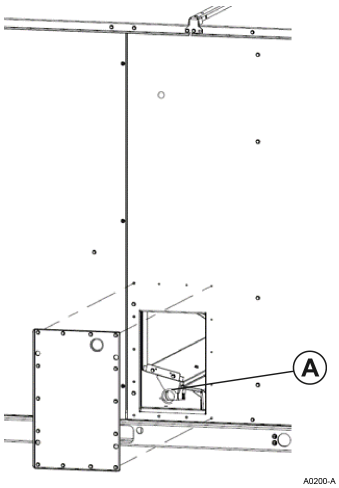
1. Remove the condensate drain line access patch plate shown in Figure 40 and Figure 41. Keep the screws for use in a later step.

Figure 40: Access patch plate



Item	Description
A	Access patch plate

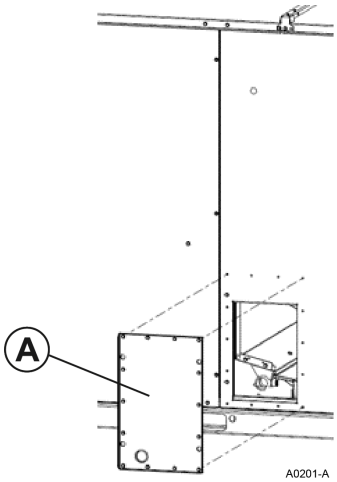
Figure 41: Patch plate removal



Item	Description
A	Threaded elbow

2. Rotate the patch plate 180° clockwise from its original orientation so that the drain line hole is in bottom left corner as shown in Figure 42.

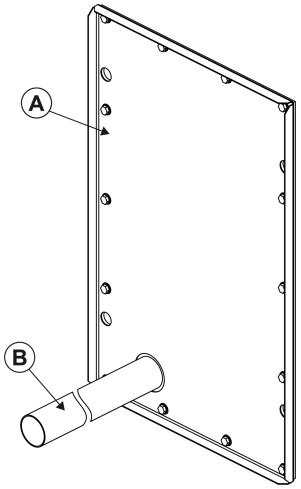
Figure 42: Access patch plate rotated orientation



Item	Description
A	Access patch plate rotated orientation

3. Pass the field-supplied condensate drain line through hole in the patch plate while it is detached from the unit. See Figure 43.

Figure 43: Detached patch plate

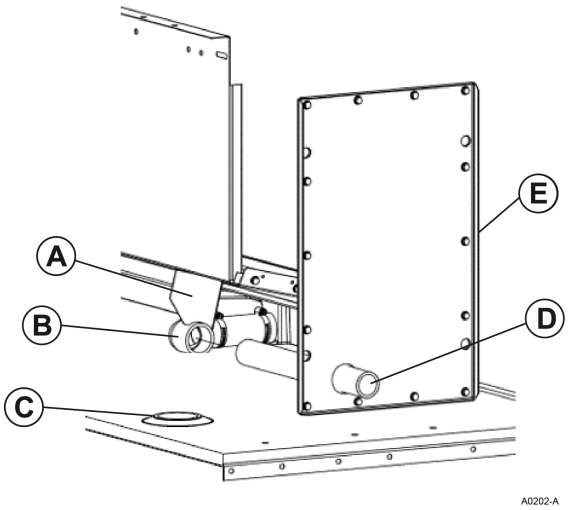


Item	Description
A	Access patch plate
B	Condensate drain line

4. Check that the plug C is fully inserted in the hole on the unit floor and the elbow is correctly secured and orientated using the elbow retaining bracket E. See Figure 44.
5. Connect the drain line to the 1 in. NPT female connection on the elbow located inside of the unit. Ensure that there is a correct seal between the drain line and the elbow. See Figure 44 for the component orientation.

Note: The condensate line should be supported external to the unit so it does not stress the internal connection

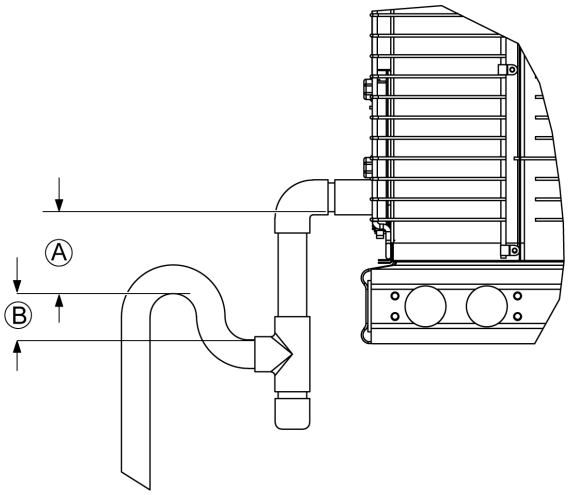
Figure 44: Correct component orientation



Item	Description
A	Elbow retaining bracket
B	Threaded elbow
C	Plug
D	Drain line
E	Patch plate

6. Trap the condensate drain line per Figure 45. The trap and drain lines should be protected from freezing and the plumbing must conform to local codes. Use a sealing compound on male pipe threads. The condensate line should be supported external to the unit so it does not stress the internal connection.

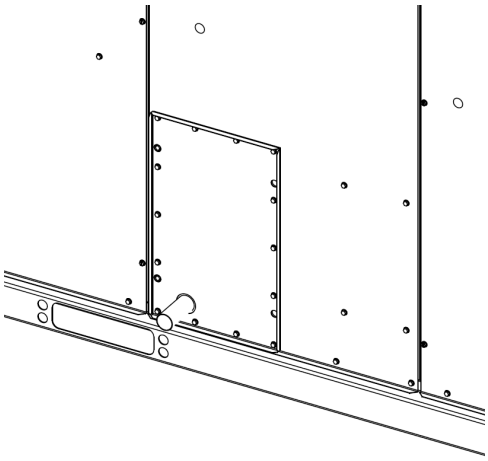
Figure 45: Trap and drain lines



Item	Description
A	3 in. minimum
B	2 in.

7. Using the screws that were removed in Step 1, attach the patch plate to the unit as shown in Figure 46. This will be in the same position the patch plate was rotated to in Step 2.

Figure 46: Attaching the patch plate

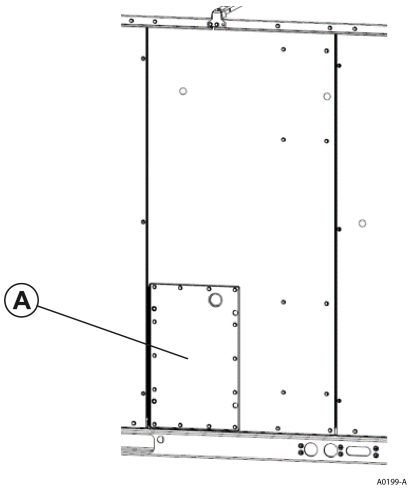


8. Use caulk, gasket, and/or other means to create a water-tight seal around the drain line where it passes through the patch plate to ensure no water enters the unit.
9. Ensure the drain line is installed horizontally level for proper drainage. If the drain line sags outside of the unit then the elbow/tube assembly inside lifts upward and do not allow proper drainage.

Through the base condensate drain:

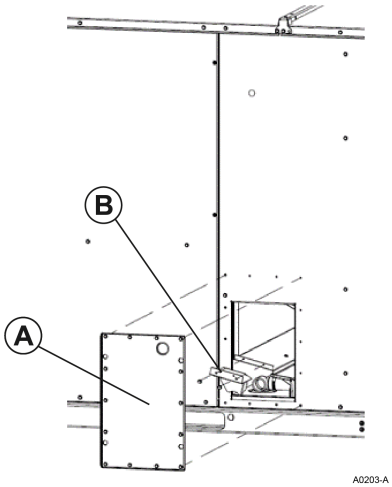
1. Remove the condensate drain line access patch plate shown in Figure 47 and the elbow retaining bracket as shown in Figure 48. Keep the screws for use in a later step.

Figure 47: Access patch plate



Item	Description
A	Access patch plate

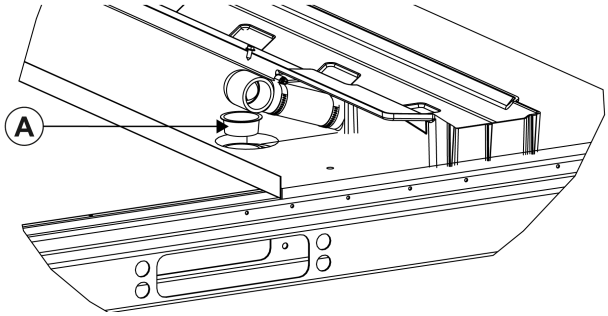
Figure 48: Access patch plate and elbow retaining bracket



Item	Description
A	Access patch plate
B	Elbow retaining bracket

2. Remove the plug from the grommet under the threaded elbow shown in Figure 48 and Figure 49.

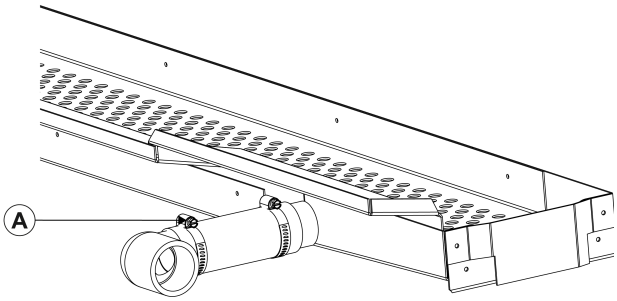
Figure 49: Removing the plug



Item	Description
A	Plug

3. Loosen the hose clamp holding the elbow to the hose. See Figure 50.

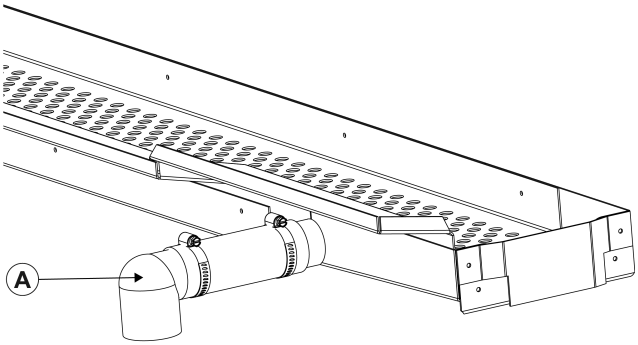
Figure 50: Loosening the hose clamp



Item	Description
A	Clamp

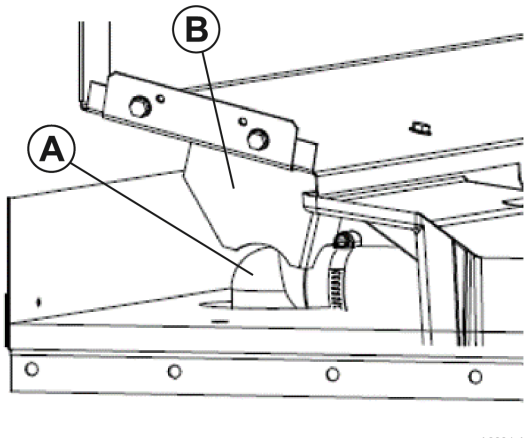
4. Rotate the elbow 90° so that the elbow points downward as shown in Figure 51. Push the elbow into the grommet as shown in Figure 52. Ensure that the hose from the drain pan to the elbow is horizontally level for proper drainage.

Figure 51: Rotating the elbow



Item	Description
A	Elbow rotated by 90°

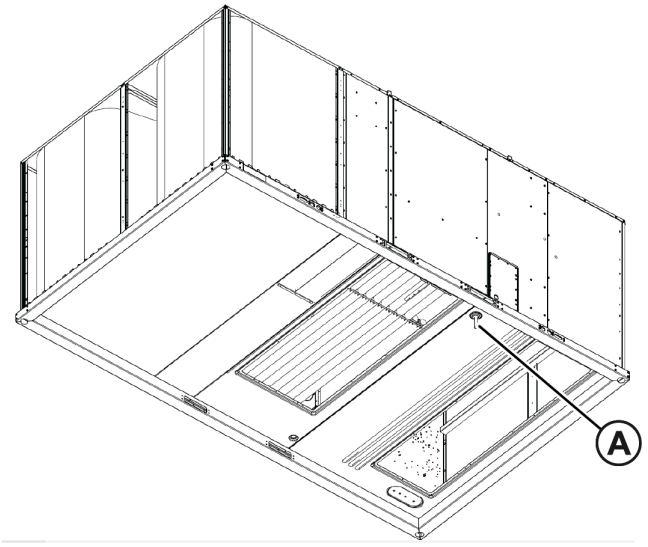
Figure 52: Inserting the elbow



Item	Description
A	Elbow inserted into grommet
B	Elbow retaining bracket

5. Tighten the hose clamp that you loosened in Step 3 to a maximum torque of 15 in-lb.
6. Secure the elbow firmly with the elbow retaining bracket as shown in Figure 52.
7. From below the unit, connect the field supplied drain line to the 1 in. NPT female connection on the elbow that is now sticking out of the grommet in the unit base pan. Ensure a proper seal is achieved between the drain line and the elbow. The through the base connection location can be seen in Figure 53.

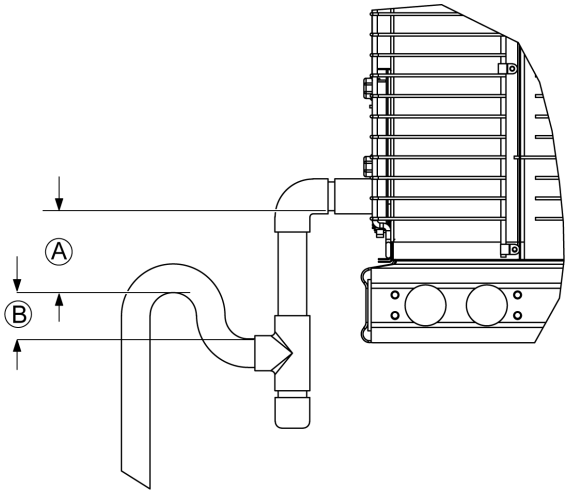
Figure 53: Connecting the drain line



Item	Description
A	Field supplied pipe

8. Route the field supplied drain line to the building exterior.
9. Trap the condensate drain line per Figure 54 .Protect the trap and drain lines from freezing. The plumbing must conform to local codes. Use a sealing compound on male pipe threads.

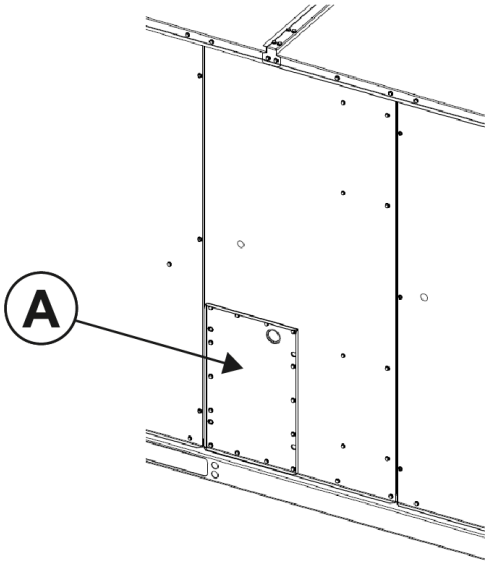
Figure 54: Trap and drain lines



Item	Description
A	3 in. minimum
B	2 in.

10. Using the screws that were removed in Step 1, replace the patch plate in its original orientation as shown in Figure 55.

Figure 55: Access patch plate



Item	Description
A	Access patch plate

Accessory weights

Table 4: Unit accessory weights (in lb)

Unit accessory	Unit size			
	15 ton	17.5 ton	20 ton	25 ton
Economizer	145	145	165	165
Motorized damper	65	65	75	75
Power Exhaust (CV, Std CFM)	170	170	170	170
Power Exhaust (Mod, Std CFM)	212	212	212	212
Power Exhaust (CV/Mod, Hi CFM)	450	450	450	450
Barometric damper	40	40	40	40
Electric heat (75 kW)	103	103	103	103
Gas heat (largest)	155	155	155	155
Hail guards	80	86	107	107
Wood skid and shipping brackets	60	70	70	70
Roof curb	215	230	230	230

Table 5: Supply fan VFD weights

Supply fan motor	208/230 V	460 V	575 V
2.9 HP	10	10	10
3.7 HP	10	10	10
5.3 HP	10	10	10
7.5 HP	15	15	15
10 HP	20	15	15
12 HP	20	15	15

Note: Add 5 lb to the supply fan VFD weights if there is a bypass.

Roof curbs

The following figures show the roof curbs for the units. All dimensions are in inches.

Figure 56: 1RC0443 and 1RC0446 roof curb dimensions

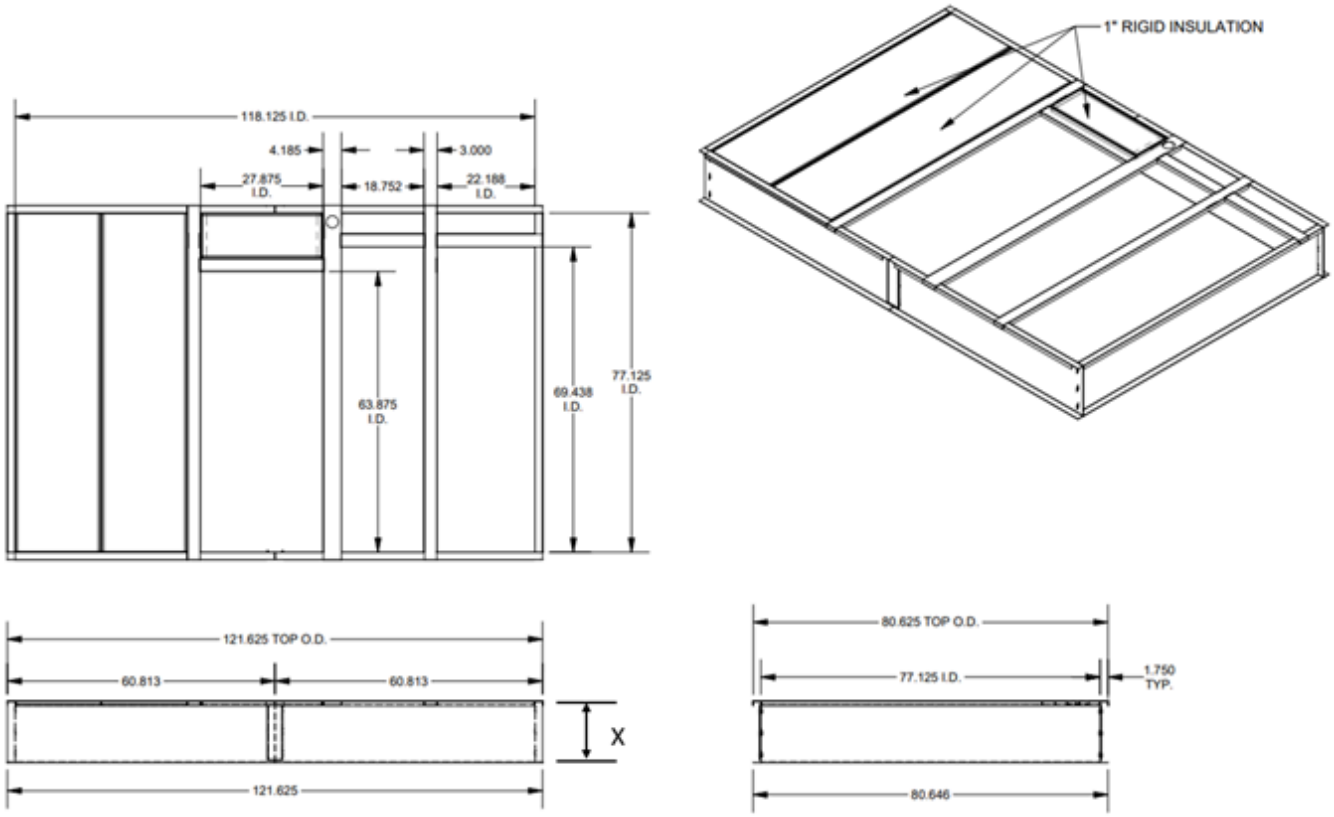


Table 6: 1RC0443 and 1RC0446 dimensions

Roof curb	X measurement (in.)
1RC0443	14
1RC0446	24

The following units are compatible with 1RC0443 and 1RC0446 roof curbs.

- KS15 and KK15

Figure 57: 1RC0444 and 1RC0447 roof curb dimensions

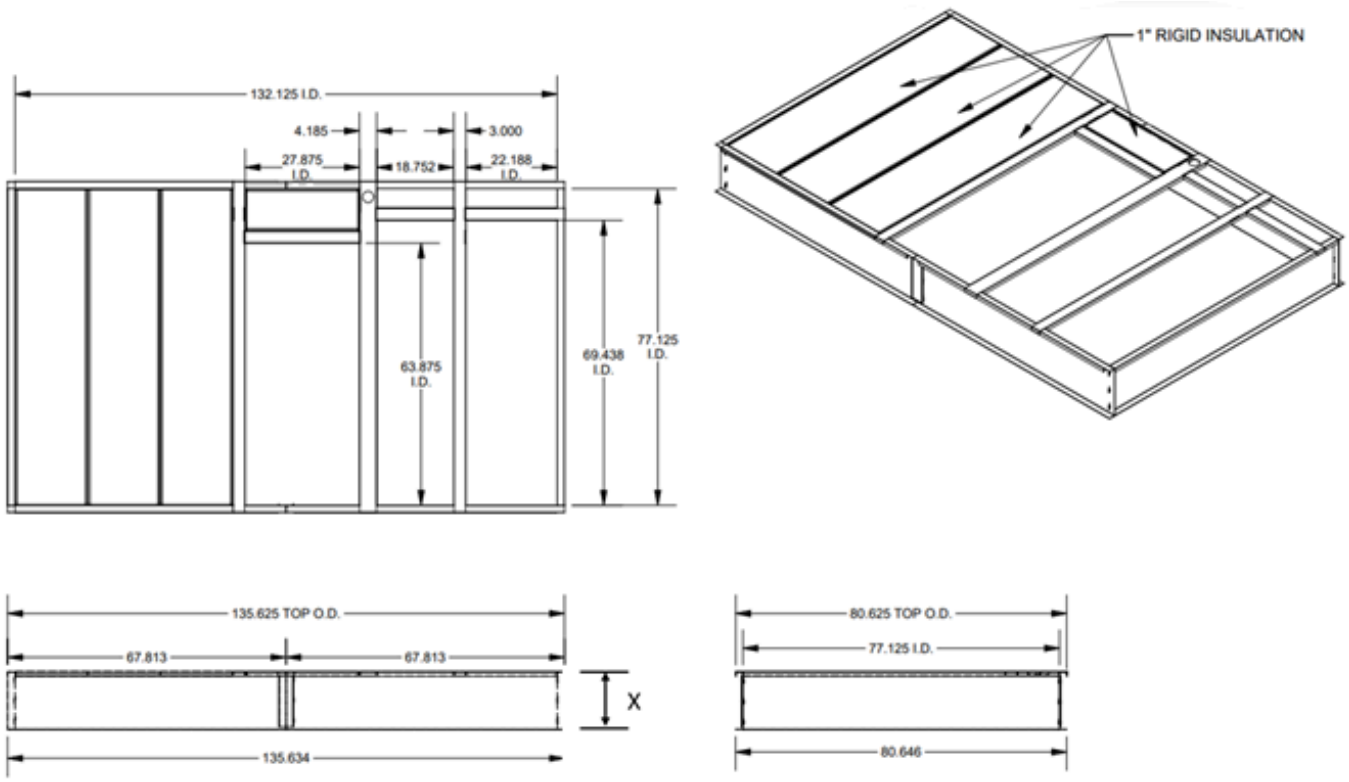


Table 7: 1RC0444 and 1RC0447 dimensions

Roof curb	X measurement (in.)
1RC0444	14
1RC0447	24

The following units are compatible with 1RC0444 and 1RC0447 roof curbs.

- KS18 and KK18
- KS20 and KK20
- KS25 and KK25

Figure 58: Roof curb cutaway

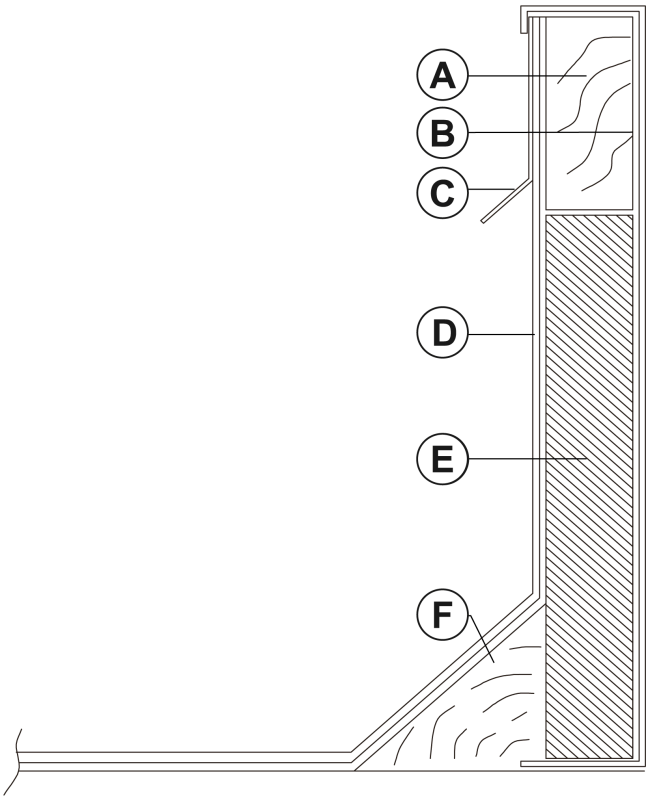


Table 8: Roof curb cutaway components

Item	Description	Item	Description
A	Wood nailer	D	Roof felt (field-supplied)
B	Curb frame	E	Rigid insulation (field-supplied)
C	Counter flashing (field-supplied)	F	Cant strip (field-supplied)

Ductwork

You must design and size ductwork according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA. When you design the duct system, apply the following recommendations:

- Use a closed return duct system. This does not preclude the use of economizers or outdoor fresh air intake.
- Make the supply and return air duct connections at the unit with flexible joints to minimize noise.
- Design the supply and return air duct systems for the CFM and static pressure requirements of the job. Do not size them to match the dimensions of the duct connections on the unit.

See the Duct openings section for information on the side and bottom air duct openings.

Note: In Canada, it is recommended that the outlet duct be fitted with a removable access panel. It is recommended that this opening is accessible when the unit is installed in service, and of such a size that smoke or reflected light can be observed inside the casing to indicate the presence of leaks in the heat exchanger. You must attach the cover in a manner adequate to prevent leakage.

Compressors

The scroll compressor used in this product is specifically designed to operate with R-454B refrigerant and cannot be interchanged.

CAUTION

This system uses R-454B refrigerant which is a mildly flammable refrigerant. Do not use any other refrigerant in this system.

The compressor also uses a polyolester oil (POE oil). This oil is extremely hygroscopic, meaning that it absorbs water readily. POE oil can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all the necessary precautions to avoid exposure of the oil to the atmosphere. Refer to the compressor nameplate or label for the correct oil grade.

CAUTION

Do not leave the system open to the atmosphere. Unit damage could occur due to moisture being absorbed by the POE oil in the system. This type of oil is highly susceptible to moisture absorption.

POE compressor lubricants are known to cause long term damage to some synthetic roofing materials.

CAUTION

Exposure, even if immediately cleaned up, may cause embrittlement (leading to cracking) to occur in one year or more. When you perform any service that may risk exposure of compressor oil to the roof, take precautions to protect the roofing.

Procedures that risk oil leakage include, but are not limited to the following:

- Compressor replacement
- Repairing refrigerant leaks
- Replacing refrigerant components such as the filter drier, pressure switch, metering device, four-way reversing valve, or coil

Units are shipped with compressor mountings that are factory-adjusted and ready for operation.

CAUTION

Do not loosen compressor mounting bolts.

Filters

Units are provided with the selected 2 in. or 4 in. filter and can easily be converted in the field to accept either size in the standard filter rack.

Always install filters ahead of the evaporator coil. Keep the filters clean and replace them with filters of the same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. See the physical data tables for the number and size of filters needed for the unit.

Do not operate the unit without filters correctly installed.

CAUTION

Ensure that panel latches are correctly positioned on the unit to maintain an airtight seal.

Dirty filter switch pressure setting

If a factory-installed dirty filter switch is present, you can change the pressure setting of the switch using the adjustment screw that is accessible with the metal cover removed. A setting of 0.5 in. WC serves as a general starting point but will likely need to be adjusted for the specific application to detect the increased pressure drop associated with a dirty filter.

Power and control wiring

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code C221, and/or local ordinances. You must electrically ground the unit in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances must be maintained at the compressor terminals during starting and running conditions. The voltage tolerances are indicated on the unit rating plate and in the unit limitations table.

CAUTION

208/230-3-60 units control transformers are factory wired for 230 V power supply. Change the tap on the transformer for 208-3-60 operation. See the unit wiring diagram.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes is not required.

If any of the wires supplied with the unit need to be replaced, you must replace them with the same type shown on the wiring diagram and the same minimum gauge as the replaced wire.

Use a disconnect with these units. Factory- and field-installed disconnects are available.

CAUTION

Avoid damage to internal components if you drill holes to install a disconnect.

Note: Not all local codes allow the installation of a disconnect on the unit. Confirm compliance with local code before you install a disconnect on the unit.

Electrical line must be sized properly to carry the load.

Note: Use copper conductors only.

Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

See the Figure 59 following figures for typical field wiring. Refer to the appropriate unit wiring diagram mounted inside the control doors for control circuit and power wiring information.

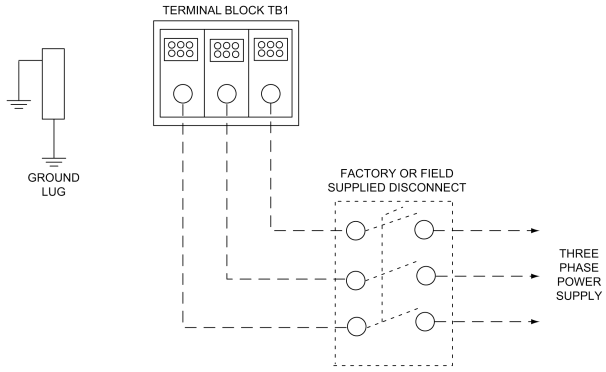
CAUTION

When you connect electrical power and control wiring to the unit, you must use water-proof connectors so that water or moisture cannot be drawn into the unit during normal operation. These water-proofing conditions also apply when you install a field-supplied disconnect switch.

Power wiring detail

Units are factory wired for the voltage shown on the unit nameplate. See the electrical data tables to size power wiring, fuses, and the disconnect switch. Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.

Figure 59: Field wiring disconnect



Thermostat wiring

Install the thermostat on an inside wall approximately 56 in. above the floor. The thermostat must not be subject to drafts, sun exposure, or heat from electrical fixtures or appliances.

Follow the manufacturer's instructions enclosed with the thermostat for the general installation procedure. Use color-coded, insulated wires to connect the thermostat to the unit. See the following table for control wire sizing and maximum length.

Table 9: Control wire sizes

Wire size	Maximum length[1]
18 AWG	150 ft

Table 9: Control wire sizes

Wire size	Maximum length[1]

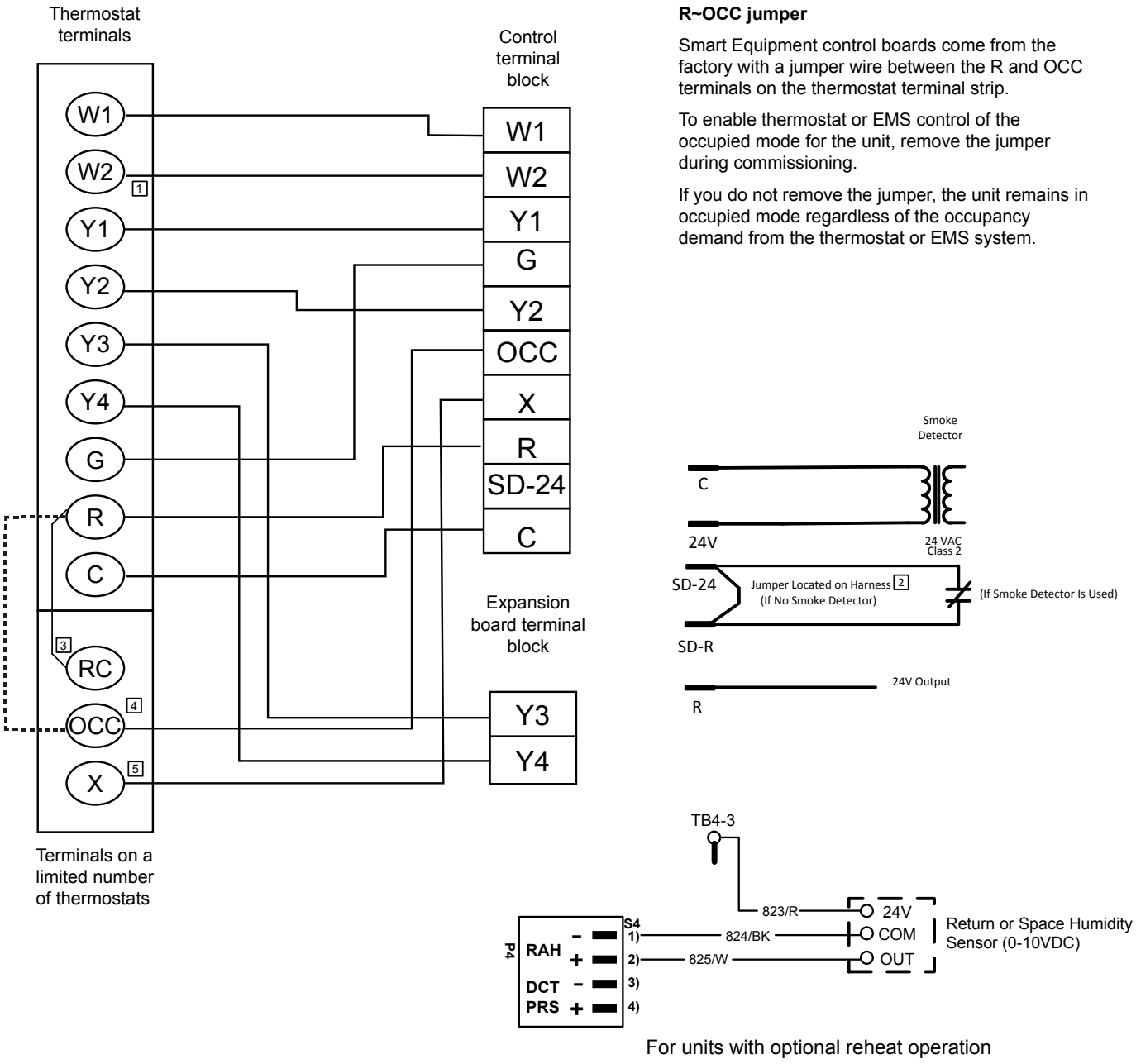
Note:

1. From the unit to the thermostat and back to the unit.

CAUTION

208/230-3-60 unit control transformer is factory wired for 230 V power supply. Change the tap on the transformer for 208-3-60 operation. See the unit wiring diagram.

Figure 60: Typical electronic thermostat field wiring



1 Second stage heating not required on single stage heating units.

2 Jumper is required if there is no Smoke Detector circuit.

3 Jumper is required for any combination of R, RC, or RH.

4 OCC is an output from the thermostat to indicate the Occupied condition.

5 X is an input to the thermostat to display Error Status conditions.

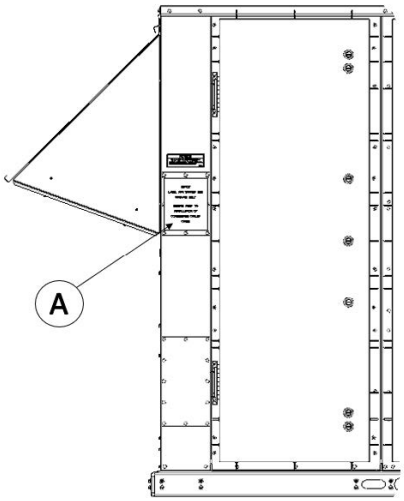
Installing the convenience outlet cover

For units with a powered or non-powered convenience outlet, you must install the convenience outlet cover in the field after the unit is installed.

To install the convenience outlet cover, complete the following steps.

1. The unit will leave the factory with a transit label covering the convenience outlet receptacle, as shown in Figure 61. Remove and discard the convenience outlet transit label.

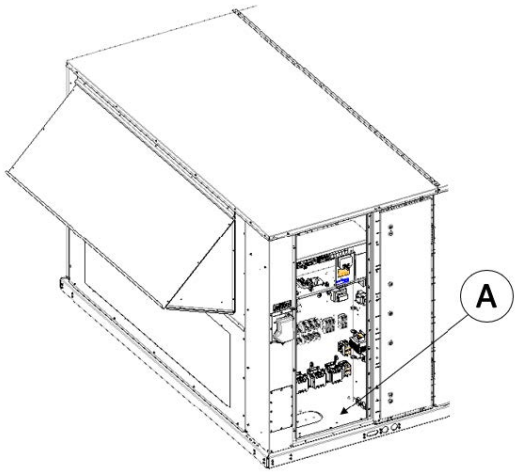
Figure 61: Convenience outlet transit label



Item	Description
A	Convenience outlet transit label

2. The convenience outlet cover is shipped in the floor of the control box behind the high-voltage access panel, as shown in Figure 62.

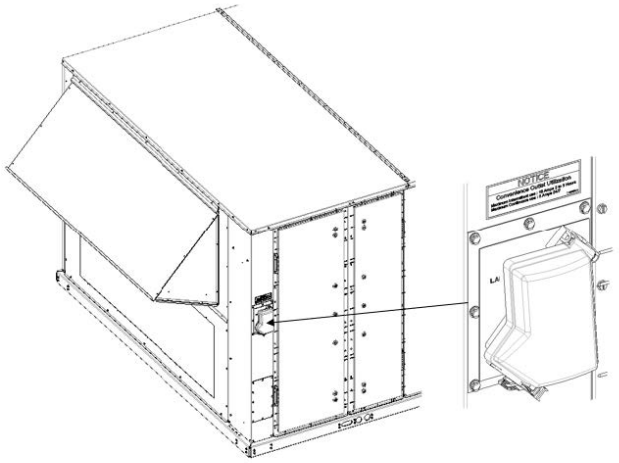
Figure 62: Location of Convenience outlet cover



Item	Description
A	Location of Convenience Outlet Cover

3. To mount the cover, follow the cover manufacturer's installation instructions that are provided with the cover. The final assembly should resemble Figure 63.

Figure 63: Convenience Outlet Cover



CAUTION

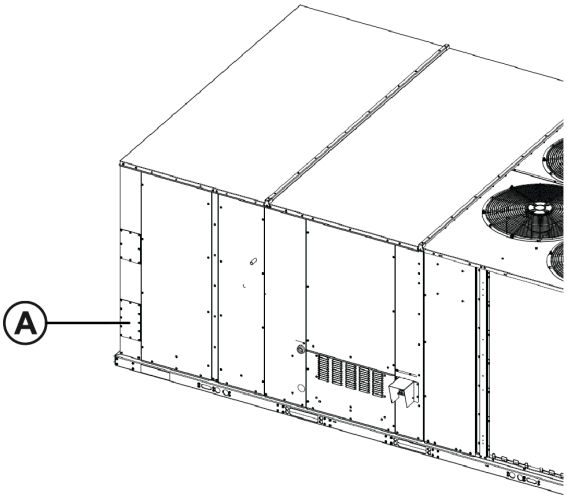
208/230-3-60 units with a factory-installed powered convenience outlet option are wired for 230v power supply. Change the tap on the transformer for 208-3-60 operation. See the unit wiring diagram.

Installing the circuit breaker and service disconnect handle

For units with a circuit breaker or a service disconnect, you must install the disconnect handle in the field after the unit is installed.

1. The unit will leave the factory with a patch plate covering the disconnect switch as shown in Figure 64.

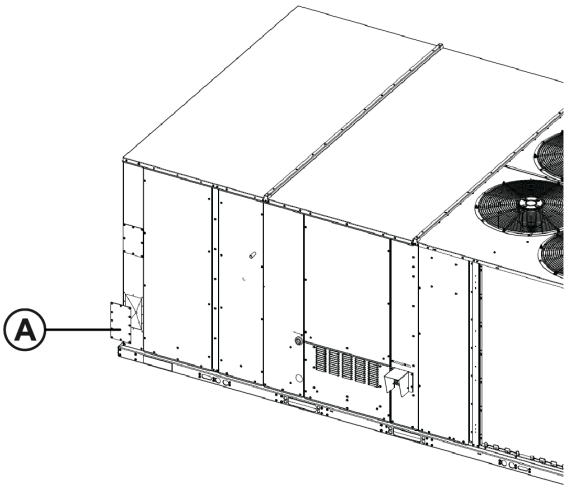
Figure 64: Patch plate



Item	Description
A	Patch plate

2. Remove the screws holding the patch plate to the unit cabinet as shown in Figure 65. Place the screws in a safe location to use in a later step. You can discard the patch plate.

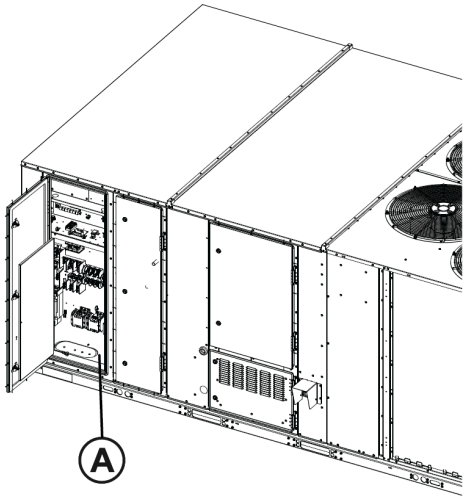
Figure 65: Removing the patch plate



Item	Description
A	Patch plate

3. The parts you need to complete the assembly are located in a box on the floor of the control box compartment, as shown in Figure 66. These parts include the permanent mounting plate with a hole for the disconnect handle, the disconnect handle, the handle manufacturer's installation instruction, and the additional parts to connect the handle to the disconnect switch.

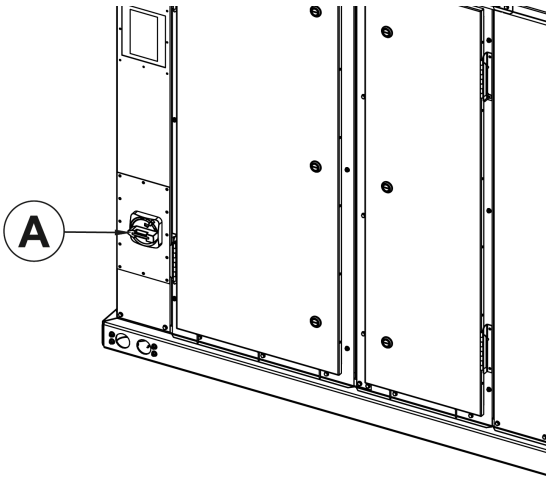
Figure 66: Disconnect handle and assembly parts



Item	Description
A	Control box floor

4. Attach the permanent mounting plate, gathered in Step 3, to the unit cabinet covering the opening that was created by removing the patch plate in Step 2. Attach the plate using the screws that you removed in step 2. Ensure that you attach the mounting plate with the hole aligned with the disconnect shaft.
5. To complete the field setup of the disconnect switch handle, follow the handle manufacturer's installation instructions that were included in the unit control box. These instructions show the installation of the disconnect handle and rod. The final assembly should resemble Figure 67.

Figure 67: Disconnect handle



Item	Description
A	Disconnect handle

Electrical data tables

The following note applies to all electrical data tables.

- MCA = minimum circuit ampacity
- f/b = fuse/breaker
- Fuse is a dual element, time delay type
- Breaker is a HACR type per NEC

VFD 2 stage standard static

Table 10: KK15 to KK25 and KS15 to KS25 VFD 2 stage standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	13.2	9.6	None	-	-	-	73.7	90	78	463	83.3	100	89	472
									2EH04532525	18.8	1	52.1	81.6	90	78	463	93.6	100	89	472
									2EH04535025	37.6	2	104.3	146.9	150	135	463	158.9	175	146	472
									2EH04537525	56.3	2	156.2	172.7	200	195	463	184.7	200	206	472
	230-3-60	25.0	190	25.0	190	2.1	13.2	8.7	None	-	-	-	73.7	90	78	471	82.4	100	88	479
									2EH04532525	23.0	1	57.7	88.6	90	82	471	99.5	100	92	479
									2EH04535025	45.9	2	115.2	160.5	175	148	471	171.4	175	158	479
									2EH04537525	68.9	2	172.9	189.4	225	214	471	200.3	225	224	479
	460-3-60	12.2	100	12.2	100	1.1	6.1	4.3	None	-	-	-	35.8	45	38	246	40.1	50	43	250
									2EH04532546	23.0	1	28.8	43.6	45	40	246	49.0	50	45	250
									2EH04535046	45.9	2	57.6	79.6	80	73	246	85.0	90	78	250
									2EH04537546	68.9	2	86.4	94.0	110	106	246	99.4	110	111	250
	575-3-60	9.3	72	9.3	72	0.9	4.9	3.5	None	-	-	-	27.6	35	29	188	31.1	40	33	192
									2EH04532558	23.0	1	23.0	34.9	35	32	188	39.3	40	36	192
									2EH04535058	45.9	2	46.0	63.6	70	59	188	68.0	70	63	192
									2EH04537558	68.9	2	69.1	75.2	90	85	188	79.6	90	89	192
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	20.4	9.6	None	-	-	-	92.8	110	98	583	102.4	125	109	593
									2EH04532525	18.8	1	52.1	92.8	110	98	583	102.6	125	109	593
									2EH04535025	37.6	2	104.3	155.9	175	143	583	167.9	175	154	593
									2EH04537525	56.3	2	156.2	181.7	200	203	583	193.7	200	214	593
	230-3-60	28.7	207.5	28.5	255	2.3	20.4	8.7	None	-	-	-	94.0	110	100	584	102.7	125	110	593
									2EH04532525	23.0	1	57.7	97.6	110	100	584	108.5	125	110	593
									2EH04535025	45.9	2	115.2	169.5	175	156	584	180.4	200	166	593
									2EH04537525	68.9	2	172.9	198.4	225	222	584	209.3	225	232	593
	460-3-60	12.4	100.2	13.5	123	1.3	9.9	4.3	None	-	-	-	44.4	50	47	286	48.7	60	52	290
									2EH04532546	23.0	1	28.8	48.4	50	47	286	53.8	60	52	290
									2EH04535046	45.9	2	57.6	84.4	90	78	286	89.8	90	83	290
									2EH04537546	68.9	2	86.4	98.8	110	111	286	104.2	110	116	290
	575-3-60	9.0	78	10.7	93.7	1.0	7.7	3.5	None	-	-	-	34.1	40	36	221	37.6	45	40	224
									2EH04532558	23.0	1	23.0	38.4	40	36	221	42.8	45	40	224
									2EH04535058	45.9	2	46.0	67.1	70	62	221	71.5	80	66	224
									2EH04537558	68.9	2	69.1	78.7	90	88	221	83.1	90	92	224

Table 10: KK15 to KK25 and KS15 to KS25 VFD 2 stage standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
20 (20)	208-3-60	28.5	255	33.3	255	2.0	20.4	9.6	None	-	-	-	98.5	125	104	630	108.1	125	115	640
									2EH04532525	18.8	1	52.1	98.5	125	104	630	108.1	125	115	640
									2EH04535025	37.6	2	104.3	155.9	175	143	630	167.9	175	154	640
									2EH04537525	56.3	2	156.2	181.7	200	203	630	193.7	200	214	640
	230-3-60	28.5	255	33.3	255	2.3	20.4	8.7	None	-	-	-	99.7	125	105	632	108.4	125	115	640
									2EH04532525	23.0	1	57.7	99.7	125	105	632	108.5	125	115	640
									2EH04535025	45.9	2	115.2	169.5	175	156	632	180.4	200	166	640
									2EH04537525	68.9	2	172.9	198.4	225	222	632	209.3	225	232	640
	460-3-60	13.5	123	15.4	140	1.3	9.9	4.3	None	-	-	-	47.9	60	51	326	52.2	60	56	330
									2EH04532546	23.0	1	28.8	48.4	60	51	326	53.8	60	56	330
									2EH04535046	45.9	2	57.6	84.4	90	78	326	89.8	90	83	330
									2EH04537546	68.9	2	86.4	98.8	110	111	326	104.2	110	116	330
	575-3-60	10.7	93.7	12.9	107.6	1.0	7.7	3.5	None	-	-	-	38.5	50	41	251	42.0	50	45	254
									2EH04532558	23.0	1	23.0	38.5	50	41	251	42.8	50	45	254
									2EH04535058	45.9	2	46.0	67.1	70	62	251	71.5	80	66	254
									2EH04537558	68.9	2	69.1	78.7	90	88	251	83.1	90	92	254
25 (25)	208-3-60	41.0	304	41.0	304	2.0	30.0	9.6	None	-	-	-	130.3	150	138	755	139.9	175	149	765
									2EH04532525	18.8	1	52.1	130.3	150	138	755	139.9	175	149	765
									2EH04535025	37.6	2	104.3	167.9	175	154	755	179.9	200	165	765
									2EH04537525	56.3	2	156.2	193.7	200	214	755	205.7	225	225	765
	230-3-60	41.0	304	41.0	304	2.3	30.0	8.7	None	-	-	-	131.5	150	139	757	140.2	175	149	766
									2EH04532525	23.0	1	57.7	131.5	150	139	757	140.2	175	149	766
									2EH04535025	45.9	2	115.2	181.5	200	167	757	192.4	200	177	766
									2EH04537525	68.9	2	172.9	210.4	225	233	757	221.3	225	243	766
	460-3-60	19.2	147	19.2	147	1.3	14.3	4.3	None	-	-	-	62.7	80	67	370	67.0	80	72	375
									2EH04532546	23.0	1	28.8	62.7	80	67	370	67.0	80	72	375
									2EH04535046	45.9	2	57.6	89.9	90	83	370	95.3	100	88	375
									2EH04537546	68.9	2	86.4	104.3	110	116	370	109.7	110	121	375
	575-3-60	16.7	122	16.7	122	1.0	11.5	3.5	None	-	-	-	53.1	60	56	302	56.6	70	60	306
									2EH04532558	23.0	1	23.0	53.1	60	56	302	56.6	70	60	306
									2EH04535058	45.9	2	46.0	71.9	80	66	302	76.3	80	70	306
									2EH04537558	68.9	2	69.1	83.5	90	93	302	87.9	90	97	306

Table 11: KK15 to KK25 VFD 2 stage standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	13.2	5.0	9.6	None	-	-	-	83.7	100	89	484	93.3	110	100	493
										2EH04532525	18.8	1	52.1	94.1	100	89	484	106.1	110	100	493
										2EH04535025	37.6	2	104.3	159.4	175	147	484	171.4	175	158	493
										2EH04537525	56.3	2	156.2	185.2	200	206	484	197.2	200	217	493
	230-3-60	25.0	190	25.0	190	2.1	13.2	5.0	8.7	None	-	-	-	83.7	100	89	492	92.4	110	99	500
										2EH04532525	23.0	1	57.7	101.1	110	93	492	112.0	125	103	500
										2EH04535025	45.9	2	115.2	173.0	175	159	492	183.9	200	169	500
										2EH04537525	68.9	2	172.9	201.9	225	226	492	212.8	225	236	500
	460-3-60	12.2	100	12.2	100	1.1	6.1	2.2	4.3	None	-	-	-	40.2	50	43	255	44.5	50	48	259
										2EH04532546	23.0	1	28.8	49.1	50	45	255	54.5	60	50	259
										2EH04535046	45.9	2	57.6	85.1	90	78	255	90.5	100	83	259
										2EH04537546	68.9	2	86.4	99.5	110	111	255	104.9	110	116	259
	575-3-60	9.3	72	9.3	72	0.9	4.9	1.5	3.5	None	-	-	-	30.6	35	33	194	34.1	40	37	198
										2EH04532558	23.0	1	23.0	38.6	40	36	194	43.0	45	40	198
										2EH04535058	45.9	2	46.0	67.4	70	62	194	71.8	80	66	198
										2EH04537558	68.9	2	69.1	79.0	90	89	194	83.4	90	93	198
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	20.4	5.0	9.6	None	-	-	-	102.8	125	110	604	112.4	125	121	614
										2EH04532525	18.8	1	52.1	103.1	125	110	604	115.1	125	121	614
										2EH04535025	37.6	2	104.3	168.4	175	155	604	180.4	200	166	614
										2EH04537525	56.3	2	156.2	194.2	200	215	604	206.2	225	226	614
	230-3-60	28.7	207.5	28.5	255	2.3	20.4	5.0	8.7	None	-	-	-	104.0	125	111	605	112.7	125	121	614
										2EH04532525	23.0	1	57.7	110.1	125	111	605	121.0	125	121	614
										2EH04535025	45.9	2	115.2	182.0	200	167	605	192.9	200	177	614
										2EH04537525	68.9	2	172.9	210.9	225	234	605	221.8	225	244	614
	460-3-60	12.4	100.2	13.5	123	1.3	9.9	2.2	4.3	None	-	-	-	48.8	60	52	295	53.1	60	57	299
										2EH04532546	23.0	1	28.8	53.9	60	52	295	59.3	60	57	299
										2EH04535046	45.9	2	57.6	89.9	90	83	295	95.3	100	88	299
										2EH04537546	68.9	2	86.4	104.3	110	116	295	109.7	110	121	299
	575-3-60	9.0	78	10.7	93.7	1.0	7.7	1.5	3.5	None	-	-	-	37.1	45	40	227	40.6	50	44	231
										2EH04532558	23.0	1	23.0	42.1	45	40	227	46.5	50	44	231
										2EH04535058	45.9	2	46.0	70.9	80	65	227	75.3	80	69	231
										2EH04537558	68.9	2	69.1	82.5	90	92	227	86.9	90	96	231
20 (20)	208-3-60	28.5	255	33.3	255	2.0	20.4	5.0	9.6	None	-	-	-	108.5	125	115	651	118.1	150	126	661
										2EH04532525	18.8	1	52.1	108.5	125	115	651	118.1	150	126	661
										2EH04535025	37.6	2	104.3	168.4	175	155	651	180.4	200	166	661
										2EH04537525	56.3	2	156.2	194.2	200	215	651	206.2	225	226	661
	230-3-60	28.5	255	33.3	255	2.3	20.4	5.0	8.7	None	-	-	-	109.7	125	117	653	118.4	150	127	661
										2EH04532525	23.0	1	57.7	110.1	125	117	653	121.0	150	127	661
										2EH04535025	45.9	2	115.2	182.0	200	167	653	192.9	200	177	661
										2EH04537525	68.9	2	172.9	210.9	225	234	653	221.8	225	244	661
	460-3-60	13.5	123	15.4	140	1.3	9.9	2.2	4.3	None	-	-	-	52.3	60	56	335	56.6	70	61	339
										2EH04532546	23.0	1	28.8	53.9	60	56	335	59.3	70	61	339
										2EH04535046	45.9	2	57.6	89.9	90	83	335	95.3	100	88	339
										2EH04537546	68.9	2	86.4	104.3	110	116	335	109.7	110	121	339
	575-3-60	10.7	93.7	12.9	107.6	1.0	7.7	1.5	3.5	None	-	-	-	41.5	50	44	257	45.0	50	48	260
										2EH04532558	23.0	1	23.0	42.1	50	44	257	46.5	50	48	260
										2EH04535058	45.9	2	46.0	70.9	80	65	257	75.3	80	69	260
										2EH04537558	68.9	2	69.1	82.5	90	92	257	86.9	90	96	260

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Table 11: KK15 to KK25 VFD 2 stage standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	30.0	5.0	9.6	None	-	-	-	140.3	175	150	776	149.9	175	161	786
										2EH04532525	18.8	1	52.1	140.3	175	150	776	149.9	175	161	786
										2EH04535025	37.6	2	104.3	180.4	200	166	776	192.4	200	177	786
										2EH04537525	56.3	2	156.2	206.2	225	226	776	218.2	225	237	786
	230-3-60	41.0	304	41.0	304	2.3	30.0	5.0	8.7	None	-	-	-	141.5	175	151	778	150.2	175	161	787
										2EH04532525	23.0	1	57.7	141.5	175	151	778	150.2	175	161	787
										2EH04535025	45.9	2	115.2	194.0	200	178	778	204.9	225	188	787
										2EH04537525	68.9	2	172.9	222.9	250	245	778	233.8	250	255	787
	460-3-60	19.2	147	19.2	147	1.3	14.3	2.2	4.3	None	-	-	-	67.1	80	72	380	71.4	90	77	384
										2EH04532546	23.0	1	28.8	67.1	80	72	380	71.4	90	77	384
										2EH04535046	45.9	2	57.6	95.4	100	88	380	100.8	110	93	384
										2EH04537546	68.9	2	86.4	109.8	110	121	380	115.2	125	126	384
	575-3-60	16.7	122	16.7	122	1.0	11.5	1.5	3.5	None	-	-	-	56.1	70	60	308	59.6	70	64	312
										2EH04532558	23.0	1	23.0	56.1	70	60	308	59.6	70	64	312
										2EH04535058	45.9	2	46.0	75.6	80	70	308	80.0	90	74	312
										2EH04537558	68.9	2	69.1	87.2	90	96	308	91.6	100	100	312

Table 12: KK15 to KK25 VFD 2 stage standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	13.2	6.7	9.6	None	-	-	-	87.1	110	93	476	96.7	110	104	486
										2EH04532525	18.8	1	52.1	98.4	110	93	476	110.4	125	104	486
										2EH04535025	37.6	2	104.3	163.6	175	151	476	175.6	200	162	486
										2EH04537525	56.3	2	156.2	189.5	200	210	476	201.5	225	221	486
	230-3-60	25.0	190	25.0	190	2.1	13.2	6.7	8.7	None	-	-	-	87.1	110	93	484	95.8	110	103	493
										2EH04532525	23.0	1	57.7	105.4	110	97	484	116.3	125	107	493
										2EH04535025	45.9	2	115.2	177.3	200	163	484	188.1	200	173	493
										2EH04537525	68.9	2	172.9	206.2	225	229	484	217.0	225	239	493
	460-3-60	12.2	100	12.2	100	1.1	6.1	3.4	4.3	None	-	-	-	42.6	50	45	253	46.9	50	50	257
										2EH04532546	23.0	1	28.8	52.1	60	48	253	57.5	60	53	257
										2EH04535046	45.9	2	57.6	88.1	90	81	253	93.5	100	86	257
										2EH04537546	68.9	2	86.4	102.5	110	114	253	107.9	110	119	257
	575-3-60	9.3	72	9.3	72	0.9	4.9	2.7	3.5	None	-	-	-	33.0	40	35	193	36.5	45	39	197
										2EH04532558	23.0	1	23.0	41.6	45	38	193	46.0	50	42	197
										2EH04535058	45.9	2	46.0	70.4	80	65	193	74.8	80	69	197
										2EH04537558	68.9	2	69.1	82.0	90	91	193	86.4	90	95	197
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	20.4	6.7	9.6	None	-	-	-	106.2	125	114	596	115.8	125	125	606
										2EH04532525	18.8	1	52.1	107.4	125	114	596	119.4	125	125	606
										2EH04535025	37.6	2	104.3	172.6	175	159	596	184.6	200	170	606
										2EH04537525	56.3	2	156.2	198.5	200	219	596	210.5	225	230	606
	230-3-60	28.7	207.5	28.5	255	2.3	20.4	6.7	8.7	None	-	-	-	107.4	125	115	598	116.1	125	125	606
										2EH04532525	23.0	1	57.7	114.4	125	115	598	125.3	150	125	606
										2EH04535025	45.9	2	115.2	186.3	200	171	598	197.1	200	181	606
										2EH04537525	68.9	2	172.9	215.2	225	238	598	226.0	250	248	606
	460-3-60	12.4	100.2	13.5	123	1.3	9.9	3.4	4.3	None	-	-	-	51.2	60	55	293	55.5	60	60	297
										2EH04532546	23.0	1	28.8	56.9	60	55	293	62.3	70	60	297
										2EH04535046	45.9	2	57.6	92.9	100	85	293	98.3	100	90	297
										2EH04537546	68.9	2	86.4	107.3	110	119	293	112.7	125	124	297
	575-3-60	9.0	78	10.7	93.7	1.0	7.7	2.7	3.5	None	-	-	-	39.5	50	42	226	43.0	50	46	230
										2EH04532558	23.0	1	23.0	45.1	50	42	226	49.5	50	46	230
										2EH04535058	45.9	2	46.0	73.9	80	68	226	78.3	80	72	230
										2EH04537558	68.9	2	69.1	85.5	90	95	226	89.9	90	99	230
20 (20)	208-3-60	28.5	255	33.3	255	2.0	20.4	6.7	9.6	None	-	-	-	111.9	125	119	644	121.5	150	130	653
										2EH04532525	18.8	1	52.1	111.9	125	119	644	121.5	150	130	653
										2EH04535025	37.6	2	104.3	172.6	175	159	644	184.6	200	170	653
										2EH04537525	56.3	2	156.2	198.5	200	219	644	210.5	225	230	653
	230-3-60	28.5	255	33.3	255	2.3	20.4	6.7	8.7	None	-	-	-	113.1	125	121	645	121.8	150	131	654
										2EH04532525	23.0	1	57.7	114.4	125	121	645	125.3	150	131	654
										2EH04535025	45.9	2	115.2	186.3	200	171	645	197.1	200	181	654
										2EH04537525	68.9	2	172.9	215.2	225	238	645	226.0	250	248	654
	460-3-60	13.5	123	15.4	140	1.3	9.9	3.4	4.3	None	-	-	-	54.7	70	58	332	59.0	70	63	337
										2EH04532546	23.0	1	28.8	56.9	70	58	332	62.3	70	63	337
										2EH04535046	45.9	2	57.6	92.9	100	85	332	98.3	100	90	337
										2EH04537546	68.9	2	86.4	107.3	110	119	332	112.7	125	124	337
	575-3-60	10.7	93.7	12.9	107.6	1.0	7.7	2.7	3.5	None	-	-	-	43.9	50	47	256	47.4	60	51	259
										2EH04532558	23.0	1	23.0	45.1	50	47	256	49.5	60	51	259
										2EH04535058	45.9	2	46.0	73.9	80	68	256	78.3	80	72	259
										2EH04537558	68.9	2	69.1	85.5	90	95	256	89.9	90	99	259

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Table 12: KK15 to KK25 VFD 2 stage standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	30.0	6.7	9.6	None	-	-	-	143.7	175	153	769	153.3	175	164	778
										2EH04532525	18.8	1	52.1	143.7	175	153	769	153.3	175	164	778
										2EH04535025	37.6	2	104.3	184.6	200	170	769	196.6	200	181	778
										2EH04537525	56.3	2	156.2	210.5	225	230	769	222.5	225	241	778
	230-3-60	41.0	304	41.0	304	2.3	30.0	6.7	8.7	None	-	-	-	144.9	175	155	771	153.6	175	165	779
										2EH04532525	23.0	1	57.7	144.9	175	155	771	153.6	175	165	779
										2EH04535025	45.9	2	115.2	198.3	200	182	771	209.1	225	192	779
										2EH04537525	68.9	2	172.9	227.2	250	249	771	238.0	250	259	779
	460-3-60	19.2	147	19.2	147	1.3	14.3	3.4	4.3	None	-	-	-	69.5	80	74	377	73.8	90	79	381
										2EH04532546	23.0	1	28.8	69.5	80	74	377	73.8	90	79	381
										2EH04535046	45.9	2	57.6	98.4	100	91	377	103.8	110	95	381
										2EH04537546	68.9	2	86.4	112.8	125	124	377	118.2	125	129	381
	575-3-60	16.7	122	16.7	122	1.0	11.5	2.7	3.5	None	-	-	-	58.5	70	62	307	62.0	70	66	311
										2EH04532558	23.0	1	23.0	58.5	70	62	307	62.0	70	66	311
										2EH04535058	45.9	2	46.0	78.6	80	72	307	83.0	90	76	311
										2EH04537558	68.9	2	69.1	90.2	100	99	307	94.6	100	103	311

VFD 2 stage medium static

Table 13: KK15 to KK25 and KS15 to KS25 VFD 2 stage medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	20.4	9.6	None	-	-	-	80.9	100	86	493	90.5	110	97	502
									2EH04532525	18.8	1	52.1	90.6	100	86	493	102.6	110	97	502
									2EH04535025	37.6	2	104.3	155.9	175	143	493	167.9	175	154	502
									2EH04537525	56.3	2	156.2	181.7	200	203	493	193.7	200	214	502
	230-3-60	25.0	190	25.0	190	2.1	20.4	8.7	None	-	-	-	80.9	100	86	492	89.6	110	96	501
									2EH04532525	23.0	1	57.7	97.6	100	90	492	108.5	110	100	501
									2EH04535025	45.9	2	115.2	169.5	175	156	492	180.4	200	166	501
									2EH04537525	68.9	2	172.9	198.4	225	222	492	209.3	225	232	501
	460-3-60	12.2	100	12.2	100	1.1	9.9	4.3	None	-	-	-	39.6	50	42	257	43.9	50	47	261
									2EH04532546	23.0	1	28.8	48.4	50	45	257	53.8	60	49	261
									2EH04535046	45.9	2	57.6	84.4	90	78	257	89.8	90	83	261
									2EH04537546	68.9	2	86.4	98.8	110	111	257	104.2	110	116	261
	575-3-60	9.3	72	9.3	72	0.9	7.7	3.5	None	-	-	-	30.4	35	32	188	33.9	40	36	192
									2EH04532558	23.0	1	23.0	38.4	40	35	188	42.8	45	39	192
									2EH04535058	45.9	2	46.0	67.1	70	62	188	71.5	80	66	192
									2EH04537558	68.9	2	69.1	78.7	90	88	188	83.1	90	92	192
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	30.0	9.6	None	-	-	-	102.7	125	109	610	112.3	125	121	619
									2EH04532525	18.8	1	52.1	102.7	125	109	610	114.6	125	121	619
									2EH04535025	37.6	2	104.3	167.9	175	154	610	179.9	200	165	619
									2EH04537525	56.3	2	156.2	193.7	200	214	610	205.7	225	225	619
	230-3-60	28.7	207.5	28.5	255	2.3	30.0	8.7	None	-	-	-	103.9	125	111	612	112.6	125	121	620
									2EH04532525	23.0	1	57.7	109.6	125	111	612	120.5	125	121	620
									2EH04535025	45.9	2	115.2	181.5	200	167	612	192.4	200	177	620
									2EH04537525	68.9	2	172.9	210.4	225	233	612	221.3	225	243	620
	460-3-60	12.4	100.2	13.5	123	1.3	14.3	4.3	None	-	-	-	49.0	60	52	300	53.3	60	57	304
									2EH04532546	23.0	1	28.8	53.9	60	52	300	59.3	60	57	304
									2EH04535046	45.9	2	57.6	89.9	90	83	300	95.3	100	88	304
									2EH04537546	68.9	2	86.4	104.3	110	116	300	109.7	110	121	304
	575-3-60	9.0	78	10.7	93.7	1.0	11.5	3.5	None	-	-	-	38.1	45	40	230	41.6	50	45	233
									2EH04532558	23.0	1	23.0	43.1	45	40	230	47.5	50	45	233
									2EH04535058	45.9	2	46.0	71.9	80	66	230	76.3	80	70	233
									2EH04537558	68.9	2	69.1	83.5	90	93	230	87.9	90	97	233
20 (20)	208-3-60	28.5	255	33.3	255	2.0	30.0	9.6	None	-	-	-	108.1	125	115	657	117.7	150	126	667
									2EH04532525	18.8	1	52.1	108.1	125	115	657	117.7	150	126	667
									2EH04535025	37.6	2	104.3	167.9	175	154	657	179.9	200	165	667
									2EH04537525	56.3	2	156.2	193.7	200	214	657	205.7	225	225	667
	230-3-60	28.5	255	33.3	255	2.3	30.0	8.7	None	-	-	-	109.3	125	116	659	118.0	150	126	668
									2EH04532525	23.0	1	57.7	109.6	125	116	659	120.5	150	126	668
									2EH04535025	45.9	2	115.2	181.5	200	167	659	192.4	200	177	668
									2EH04537525	68.9	2	172.9	210.4	225	233	659	221.3	225	243	668
	460-3-60	13.5	123	15.4	140	1.3	14.3	4.3	None	-	-	-	52.3	60	56	339	56.6	70	61	344
									2EH04532546	23.0	1	28.8	53.9	60	56	339	59.3	70	61	344
									2EH04535046	45.9	2	57.6	89.9	90	83	339	95.3	100	88	344
									2EH04537546	68.9	2	86.4	104.3	110	116	339	109.7	110	121	344
	575-3-60	10.7	93.7	12.9	107.6	1.0	11.5	3.5	None	-	-	-	42.3	50	45	259	45.8	50	49	263
									2EH04532558	23.0	1	23.0	43.1	50	45	259	47.5	50	49	263
									2EH04535058	45.9	2	46.0	71.9	80	66	259	76.3	80	70	263
									2EH04537558	68.9	2	69.1	83.5	90	93	259	87.9	90	97	263

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Table 13: KK15 to KK25 and KS15 to KS25 VFD 2 stage medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	9.6	None	-	-	-	139.9	175	149	806	149.5	175	160	815
									2EH04532525	18.8	1	52.1	139.9	175	149	806	149.5	175	160	815
									2EH04535025	37.6	2	104.3	179.9	200	165	806	191.9	200	177	815
									2EH04537525	56.3	2	156.2	205.7	225	225	806	217.7	250	236	815
	230-3-60	41.0	304	41.0	304	2.3	39.6	8.7	None	-	-	-	141.1	175	150	808	149.8	175	160	816
									2EH04532525	23.0	1	57.7	141.1	175	150	808	149.8	175	160	816
									2EH04535025	45.9	2	115.2	193.5	200	178	808	204.4	225	188	816
									2EH04537525	68.9	2	172.9	222.4	250	244	808	233.3	250	254	816
	460-3-60	19.2	147	19.2	147	1.3	18.7	4.3	None	-	-	-	67.1	80	72	396	71.4	90	77	400
									2EH04532546	23.0	1	28.8	67.1	80	72	396	71.4	90	77	400
									2EH04535046	45.9	2	57.6	95.4	100	88	396	100.8	110	93	400
									2EH04537546	68.9	2	86.4	109.8	125	121	396	115.2	125	126	400
	575-3-60	16.7	122	16.7	122	1.0	14.2	3.5	None	-	-	-	55.8	70	59	325	59.3	70	63	328
									2EH04532558	23.0	1	23.0	55.8	70	59	325	59.3	70	63	328
									2EH04535058	45.9	2	46.0	75.3	80	69	325	79.6	80	73	328
									2EH04537558	68.9	2	69.1	86.9	100	96	325	91.2	100	100	328

Table 14: KK15 to KK25 VFD 2 stage medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	20.4	5.0	9.6	None	-	-	-	90.9	110	97	514	100.5	125	108	523
										2EH04532525	18.8	1	52.1	103.1	110	97	514	115.1	125	108	523
										2EH04535025	37.6	2	104.3	168.4	175	155	514	180.4	200	166	523
										2EH04537525	56.3	2	156.2	194.2	200	215	514	206.2	225	226	523
	230-3-60	25.0	190	25.0	190	2.1	20.4	5.0	8.7	None	-	-	-	90.9	110	97	513	99.6	110	107	522
										2EH04532525	23.0	1	57.7	110.1	125	101	513	121.0	125	111	522
										2EH04535025	45.9	2	115.2	182.0	200	167	513	192.9	200	177	522
										2EH04537525	68.9	2	172.9	210.9	225	234	513	221.8	225	244	522
	460-3-60	12.2	100	12.2	100	1.1	9.9	2.2	4.3	None	-	-	-	44.0	50	47	266	48.3	60	52	270
										2EH04532546	23.0	1	28.8	53.9	60	50	266	59.3	60	55	270
										2EH04535046	45.9	2	57.6	89.9	90	83	266	95.3	100	88	270
										2EH04537546	68.9	2	86.4	104.3	110	116	266	109.7	110	121	270
	575-3-60	9.3	72	9.3	72	0.9	7.7	1.5	3.5	None	-	-	-	33.4	40	36	194	36.9	45	40	198
										2EH04532558	23.0	1	23.0	42.1	45	39	194	46.5	50	43	198
										2EH04535058	45.9	2	46.0	70.9	80	65	194	75.3	80	69	198
										2EH04537558	68.9	2	69.1	82.5	90	92	194	86.9	90	96	198
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	30.0	5.0	9.6	None	-	-	-	112.7	125	121	631	122.3	150	132	640
										2EH04532525	18.8	1	52.1	115.1	125	121	631	127.1	150	132	640
										2EH04535025	37.6	2	104.3	180.4	200	166	631	192.4	200	177	640
										2EH04537525	56.3	2	156.2	206.2	225	226	631	218.2	225	237	640
	230-3-60	28.7	207.5	28.5	255	2.3	30.0	5.0	8.7	None	-	-	-	113.9	125	122	633	122.6	150	132	641
										2EH04532525	23.0	1	57.7	122.1	125	122	633	133.0	150	132	641
										2EH04535025	45.9	2	115.2	194.0	200	178	633	204.9	225	188	641
										2EH04537525	68.9	2	172.9	222.9	250	245	633	233.8	250	255	641
	460-3-60	12.4	100.2	13.5	123	1.3	14.3	2.2	4.3	None	-	-	-	53.4	60	57	309	57.7	70	62	313
										2EH04532546	23.0	1	28.8	59.4	60	57	309	64.8	70	62	313
										2EH04535046	45.9	2	57.6	95.4	100	88	309	100.8	110	93	313
										2EH04537546	68.9	2	86.4	109.8	110	121	309	115.2	125	126	313
	575-3-60	9.0	78	10.7	93.7	1.0	11.5	1.5	3.5	None	-	-	-	41.1	50	44	236	44.6	50	48	240
										2EH04532558	23.0	1	23.0	46.9	50	44	236	51.3	60	48	240
										2EH04535058	45.9	2	46.0	75.6	80	70	236	80.0	90	74	240
										2EH04537558	68.9	2	69.1	87.2	90	96	236	91.6	100	100	240
20 (20)	208-3-60	28.5	255	33.3	255	2.0	30.0	5.0	9.6	None	-	-	-	118.1	150	126	678	127.7	150	137	688
										2EH04532525	18.8	1	52.1	118.1	150	126	678	127.7	150	137	688
										2EH04535025	37.6	2	104.3	180.4	200	166	678	192.4	200	177	688
										2EH04537525	56.3	2	156.2	206.2	225	226	678	218.2	225	237	688
	230-3-60	28.5	255	33.3	255	2.3	30.0	5.0	8.7	None	-	-	-	119.3	150	128	680	128.0	150	138	689
										2EH04532525	23.0	1	57.7	122.1	150	128	680	133.0	150	138	689
										2EH04535025	45.9	2	115.2	194.0	200	178	680	204.9	225	188	689
										2EH04537525	68.9	2	172.9	222.9	250	245	680	233.8	250	255	689
	460-3-60	13.5	123	15.4	140	1.3	14.3	2.2	4.3	None	-	-	-	56.7	70	61	349	61.0	70	66	353
										2EH04532546	23.0	1	28.8	59.4	70	61	349	64.8	70	66	353
										2EH04535046	45.9	2	57.6	95.4	100	88	349	100.8	110	93	353
										2EH04537546	68.9	2	86.4	109.8	110	121	349	115.2	125	126	353
	575-3-60	10.7	93.7	12.9	107.6	1.0	11.5	1.5	3.5	None	-	-	-	45.3	50	48	266	48.8	60	52	269
										2EH04532558	23.0	1	23.0	46.9	50	48	266	51.3	60	52	269
										2EH04535058	45.9	2	46.0	75.6	80	70	266	80.0	90	74	269
										2EH04537558	68.9	2	69.1	87.2	90	96	266	91.6	100	100	269

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Table 14: KK15 to KK25 VFD 2 stage medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	5.0	9.6	None	-	-	-	149.9	175	161	827	159.5	200	172	836
										2EH04532525	18.8	1	52.1	149.9	175	161	827	159.5	200	172	836
										2EH04535025	37.6	2	104.3	192.4	200	177	827	204.4	225	188	836
										2EH04537525	56.3	2	156.2	218.2	250	237	827	230.2	250	248	836
	230-3-60	41.0	304	41.0	304	2.3	39.6	5.0	8.7	None	-	-	-	151.1	175	162	829	159.8	200	172	837
										2EH04532525	23.0	1	57.7	151.1	175	162	829	159.8	200	172	837
										2EH04535025	45.9	2	115.2	206.0	225	190	829	216.9	225	200	837
										2EH04537525	68.9	2	172.9	234.9	250	256	829	245.8	250	266	837
	460-3-60	19.2	147	19.2	147	1.3	18.7	2.2	4.3	None	-	-	-	71.5	90	77	405	75.8	90	82	409
										2EH04532546	23.0	1	28.8	71.5	90	77	405	75.8	90	82	409
										2EH04535046	45.9	2	57.6	100.9	110	93	405	106.3	110	98	409
										2EH04537546	68.9	2	86.4	115.3	125	126	405	120.7	125	131	409
	575-3-60	16.7	122	16.7	122	1.0	14.2	1.5	3.5	None	-	-	-	58.8	70	63	331	62.3	70	67	335
										2EH04532558	23.0	1	23.0	58.8	70	63	331	62.3	70	67	335
										2EH04535058	45.9	2	46.0	79.0	80	73	331	83.4	90	77	335
										2EH04537558	68.9	2	69.1	90.6	100	99	331	95.0	100	103	335

Table 15: KK15 to KK25 VFD 2 stage medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	20.4	6.7	9.6	None	-	-	-	94.3	110	101	506	103.9	125	112	516
										2EH04532525	18.8	1	52.1	107.4	110	101	506	119.4	125	112	516
										2EH04535025	37.6	2	104.3	172.6	175	159	506	184.6	200	170	516
										2EH04537525	56.3	2	156.2	198.5	200	219	506	210.5	225	230	516
	230-3-60	25.0	190	25.0	190	2.1	20.4	6.7	8.7	None	-	-	-	94.3	110	101	505	103.0	125	111	514
										2EH04532525	23.0	1	57.7	114.4	125	105	505	125.3	150	115	514
										2EH04535025	45.9	2	115.2	186.3	200	171	505	197.1	200	181	514
										2EH04537525	68.9	2	172.9	215.2	225	238	505	226.0	250	248	514
	460-3-60	12.2	100	12.2	100	1.1	9.9	3.4	4.3	None	-	-	-	46.4	50	50	263	50.7	60	55	268
										2EH04532546	23.0	1	28.8	56.9	60	52	263	62.3	70	57	268
										2EH04535046	45.9	2	57.6	92.9	100	85	263	98.3	100	90	268
										2EH04537546	68.9	2	86.4	107.3	110	119	263	112.7	125	124	268
	575-3-60	9.3	72	9.3	72	0.9	7.7	2.7	3.5	None	-	-	-	35.8	45	39	193	39.3	45	43	197
										2EH04532558	23.0	1	23.0	45.1	50	42	193	49.5	50	46	197
										2EH04535058	45.9	2	46.0	73.9	80	68	193	78.3	80	72	197
										2EH04537558	68.9	2	69.1	85.5	90	95	193	89.9	90	99	197
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	30.0	6.7	9.6	None	-	-	-	116.1	125	125	623	125.7	150	136	633
										2EH04532525	18.8	1	52.1	119.4	125	125	623	131.4	150	136	633
										2EH04535025	37.6	2	104.3	184.6	200	170	623	196.6	200	181	633
										2EH04537525	56.3	2	156.2	210.5	225	230	623	222.5	225	241	633
	230-3-60	28.7	207.5	28.5	255	2.3	30.0	6.7	8.7	None	-	-	-	117.3	125	126	625	126.0	150	136	634
										2EH04532525	23.0	1	57.7	126.4	150	126	625	137.3	150	136	634
										2EH04535025	45.9	2	115.2	198.3	200	182	625	209.1	225	192	634
										2EH04537525	68.9	2	172.9	227.2	250	249	625	238.0	250	259	634
	460-3-60	12.4	100.2	13.5	123	1.3	14.3	3.4	4.3	None	-	-	-	55.8	70	60	306	60.1	70	65	311
										2EH04532546	23.0	1	28.8	62.4	70	60	306	67.8	70	65	311
										2EH04535046	45.9	2	57.6	98.4	100	91	306	103.8	110	95	311
										2EH04537546	68.9	2	86.4	112.8	125	124	306	118.2	125	129	311
	575-3-60	9.0	78	10.7	93.7	1.0	11.5	2.7	3.5	None	-	-	-	43.5	50	47	235	47.0	50	51	239
										2EH04532558	23.0	1	23.0	49.9	50	47	235	54.3	60	51	239
										2EH04535058	45.9	2	46.0	78.6	80	72	235	83.0	90	76	239
										2EH04537558	68.9	2	69.1	90.2	100	99	235	94.6	100	103	239
20 (20)	208-3-60	28.5	255	33.3	255	2.0	30.0	6.7	9.6	None	-	-	-	121.5	150	130	671	131.1	150	141	680
										2EH04532525	18.8	1	52.1	121.5	150	130	671	131.4	150	141	680
										2EH04535025	37.6	2	104.3	184.6	200	170	671	196.6	200	181	680
										2EH04537525	56.3	2	156.2	210.5	225	230	671	222.5	225	241	680
	230-3-60	28.5	255	33.3	255	2.3	30.0	6.7	8.7	None	-	-	-	122.7	150	132	673	131.4	150	142	681
										2EH04532525	23.0	1	57.7	126.4	150	132	673	137.3	150	142	681
										2EH04535025	45.9	2	115.2	198.3	200	182	673	209.1	225	192	681
										2EH04537525	68.9	2	172.9	227.2	250	249	673	238.0	250	259	681
	460-3-60	13.5	123	15.4	140	1.3	14.3	3.4	4.3	None	-	-	-	59.1	70	63	346	63.4	70	68	350
										2EH04532546	23.0	1	28.8	62.4	70	63	346	67.8	70	68	350
										2EH04535046	45.9	2	57.6	98.4	100	91	346	103.8	110	95	350
										2EH04537546	68.9	2	86.4	112.8	125	124	346	118.2	125	129	350
	575-3-60	10.7	93.7	12.9	107.6	1.0	11.5	2.7	3.5	None	-	-	-	47.7	60	51	265	51.2	60	55	268
										2EH04532558	23.0	1	23.0	49.9	60	51	265	54.3	60	55	268
										2EH04535058	45.9	2	46.0	78.6	80	72	265	83.0	90	76	268
										2EH04537558	68.9	2	69.1	90.2	100	99	265	94.6	100	103	268

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Table 15: KK15 to KK25 VFD 2 stage medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	6.7	9.6	None	-	-	-	153.3	175	164	819	162.9	200	175	829
										2EH04532525	18.8	1	52.1	153.3	175	164	819	162.9	200	175	829
										2EH04535025	37.6	2	104.3	196.6	200	181	819	208.6	225	192	829
										2EH04537525	56.3	2	156.2	222.5	250	241	819	234.5	250	252	829
	230-3-60	41.0	304	41.0	304	2.3	39.6	6.7	8.7	None	-	-	-	154.5	175	166	821	163.2	200	176	830
										2EH04532525	23.0	1	57.7	154.5	175	166	821	163.2	200	176	830
										2EH04535025	45.9	2	115.2	210.3	225	193	821	221.1	225	203	830
										2EH04537525	68.9	2	172.9	239.2	250	260	821	250.0	250	270	830
	460-3-60	19.2	147	19.2	147	1.3	18.7	3.4	4.3	None	-	-	-	73.9	90	79	402	78.2	90	84	407
										2EH04532546	23.0	1	28.8	73.9	90	79	402	78.2	90	84	407
										2EH04535046	45.9	2	57.6	103.9	110	96	402	109.3	110	101	407
										2EH04537546	68.9	2	86.4	118.3	125	129	402	123.7	125	134	407
	575-3-60	16.7	122	16.7	122	1.0	14.2	2.7	3.5	None	-	-	-	61.2	70	66	330	64.7	80	70	334
										2EH04532558	23.0	1	23.0	61.2	70	66	330	64.7	80	70	334
										2EH04535058	45.9	2	46.0	82.0	90	75	330	86.4	90	79	334
										2EH04537558	68.9	2	69.1	93.6	100	102	330	98.0	110	106	334

VFD 2 stage high static

Table 16: KK15 to KK25 and KS15 to KS25 VFD 2 stage high static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	30.0	9.6	None	-	-	-	91.7	110	97	520	101.3	125	108	529
									2EH04532525	18.8	1	52.1	102.6	110	97	520	114.6	125	108	529
									2EH04535025	37.6	2	104.3	167.9	175	154	520	179.9	200	165	529
									2EH04537525	56.3	2	156.2	193.7	200	214	520	205.7	225	225	529
	230-3-60	25.0	190	25.0	190	2.1	30.0	8.7	None	-	-	-	91.7	110	97	520	100.4	125	107	528
									2EH04532525	23.0	1	57.7	109.6	125	101	520	120.5	125	111	528
									2EH04535025	45.9	2	115.2	181.5	200	167	520	192.4	200	177	528
									2EH04537525	68.9	2	172.9	210.4	225	233	520	221.3	225	243	528
	460-3-60	12.2	100	12.2	100	1.1	14.3	4.3	None	-	-	-	44.5	50	47	270	48.8	60	52	275
									2EH04532546	23.0	1	28.8	53.9	60	50	270	59.3	60	55	275
									2EH04535046	45.9	2	57.6	89.9	90	83	270	95.3	100	88	275
									2EH04537546	68.9	2	86.4	104.3	110	116	270	109.7	110	121	275
	575-3-60	9.3	72	9.3	72	0.9	11.5	3.5	None	-	-	-	34.8	45	37	197	38.3	45	41	200
									2EH04532558	23.0	1	23.0	43.1	45	40	197	47.5	50	44	200
									2EH04535058	45.9	2	46.0	71.9	80	66	197	76.3	80	70	200
									2EH04537558	68.9	2	69.1	83.5	90	93	197	87.9	90	97	200
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	39.6	9.6	None	-	-	-	114.7	150	121	660	124.3	150	132	670
									2EH04532525	18.8	1	52.1	114.7	150	121	660	126.6	150	132	670
									2EH04535025	37.6	2	104.3	179.9	200	165	660	191.9	200	177	670
									2EH04537525	56.3	2	156.2	205.7	225	225	660	217.7	250	236	670
	230-3-60	28.7	207.5	28.5	255	2.3	39.6	8.7	None	-	-	-	115.9	150	122	662	124.6	150	132	671
									2EH04532525	23.0	1	57.7	121.6	150	122	662	132.5	150	132	671
									2EH04535025	45.9	2	115.2	193.5	200	178	662	204.4	225	188	671
									2EH04537525	68.9	2	172.9	222.4	250	244	662	233.3	250	254	671
	460-3-60	12.4	100.2	13.5	123	1.3	18.7	4.3	None	-	-	-	54.5	70	57	325	58.8	70	62	329
									2EH04532546	23.0	1	28.8	59.4	70	57	325	64.8	70	62	329
									2EH04535046	45.9	2	57.6	95.4	100	88	325	100.8	110	93	329
									2EH04537546	68.9	2	86.4	109.8	125	121	325	115.2	125	126	329
	575-3-60	9.0	78	10.7	93.7	1.0	14.2	3.5	None	-	-	-	41.5	50	44	253	45.0	50	48	256
									2EH04532558	23.0	1	23.0	46.5	50	44	253	50.9	60	48	256
									2EH04535058	45.9	2	46.0	75.3	80	69	253	79.6	80	73	256
									2EH04537558	68.9	2	69.1	86.9	100	96	253	91.2	100	100	256
20 (20)	208-3-60	28.5	255	33.3	255	2.0	39.6	9.6	None	-	-	-	119.3	150	126	708	128.9	150	137	717
									2EH04532525	18.8	1	52.1	119.3	150	126	708	128.9	150	137	717
									2EH04535025	37.6	2	104.3	179.9	200	165	708	191.9	200	177	717
									2EH04537525	56.3	2	156.2	205.7	225	225	708	217.7	250	236	717
	230-3-60	28.5	255	33.3	255	2.3	39.6	8.7	None	-	-	-	120.5	150	127	710	129.2	150	137	718
									2EH04532525	23.0	1	57.7	121.6	150	127	710	132.5	150	137	718
									2EH04535025	45.9	2	115.2	193.5	200	178	710	204.4	225	188	718
									2EH04537525	68.9	2	172.9	222.4	250	244	710	233.3	250	254	718
	460-3-60	13.5	123	15.4	140	1.3	18.7	4.3	None	-	-	-	57.5	70	61	365	61.8	80	66	369
									2EH04532546	23.0	1	28.8	59.4	70	61	365	64.8	80	66	369
									2EH04535046	45.9	2	57.6	95.4	100	88	365	100.8	110	93	369
									2EH04537546	68.9	2	86.4	109.8	125	121	365	115.2	125	126	369
	575-3-60	10.7	93.7	12.9	107.6	1.0	14.2	3.5	None	-	-	-	45.4	50	48	282	48.9	60	52	286
									2EH04532558	23.0	1	23.0	46.5	50	48	282	50.9	60	52	286
									2EH04535058	45.9	2	46.0	75.3	80	69	282	79.6	80	73	286
									2EH04537558	68.9	2	69.1	86.9	100	96	282	91.2	100	100	286

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Table 16: KK15 to KK25 and KS15 to KS25 VFD 2 stage high static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	9.6	None	-	-	-	139.9	175	149	866	149.5	175	160	875
									2EH04532525	18.8	1	52.1	139.9	175	149	866	149.5	175	160	875
									2EH04535025	37.6	2	104.3	179.9	200	165	866	191.9	200	177	875
									2EH04537525	56.3	2	156.2	205.7	225	225	866	217.7	250	236	875
	230-3-60	41.0	304	41.0	304	2.3	39.6	8.7	None	-	-	-	141.1	175	150	868	149.8	175	160	876
									2EH04532525	23.0	1	57.7	141.1	175	150	868	149.8	175	160	876
									2EH04535025	45.9	2	115.2	193.5	200	178	868	204.4	225	188	876
									2EH04537525	68.9	2	172.9	222.4	250	244	868	233.3	250	254	876
	460-3-60	19.2	147	19.2	147	1.3	18.7	4.3	None	-	-	-	67.1	80	72	426	71.4	90	77	430
									2EH04532546	23.0	1	28.8	67.1	80	72	426	71.4	90	77	430
									2EH04535046	45.9	2	57.6	95.4	100	88	426	100.8	110	93	430
									2EH04537546	68.9	2	86.4	109.8	125	121	426	115.2	125	126	430
	575-3-60	16.7	122	16.7	122	1.0	14.2	3.5	None	-	-	-	55.8	70	59	344	59.3	70	63	348
									2EH04532558	23.0	1	23.0	55.8	70	59	344	59.3	70	63	348
									2EH04535058	45.9	2	46.0	75.3	80	69	344	79.6	80	73	348
									2EH04537558	68.9	2	69.1	86.9	100	96	344	91.2	100	100	348

Table 17: KK15 to KK25 VFD 2 stage high static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	30.0	5.0	9.6	None	-	-	-	101.7	125	108	541	111.3	125	119	550
										2EH04532525	18.8	1	52.1	115.1	125	108	541	127.1	150	119	550
										2EH04535025	37.6	2	104.3	180.4	200	166	541	192.4	200	177	550
										2EH04537525	56.3	2	156.2	206.2	225	226	541	218.2	225	237	550
	230-3-60	25.0	190	25.0	190	2.1	30.0	5.0	8.7	None	-	-	-	101.7	125	108	541	110.4	125	118	549
										2EH04532525	23.0	1	57.7	122.1	125	112	541	133.0	150	122	549
										2EH04535025	45.9	2	115.2	194.0	200	178	541	204.9	225	188	549
										2EH04537525	68.9	2	172.9	222.9	250	245	541	233.8	250	255	549
	460-3-60	12.2	100	12.2	100	1.1	14.3	2.2	4.3	None	-	-	-	48.9	60	52	280	53.2	60	57	284
										2EH04532546	23.0	1	28.8	59.4	60	55	280	64.8	70	60	284
										2EH04535046	45.9	2	57.6	95.4	100	88	280	100.8	110	93	284
										2EH04537546	68.9	2	86.4	109.8	110	121	280	115.2	125	126	284
	575-3-60	9.3	72	9.3	72	0.9	11.5	1.5	3.5	None	-	-	-	37.8	45	40	203	41.3	50	44	207
										2EH04532558	23.0	1	23.0	46.9	50	43	203	51.3	60	47	207
										2EH04535058	45.9	2	46.0	75.6	80	70	203	80.0	90	74	207
										2EH04537558	68.9	2	69.1	87.2	90	96	203	91.6	100	100	207
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	39.6	5.0	9.6	None	-	-	-	124.7	150	132	681	134.3	150	143	691
										2EH04532525	18.8	1	52.1	127.1	150	132	681	139.1	150	143	691
										2EH04535025	37.6	2	104.3	192.4	200	177	681	204.4	225	188	691
										2EH04537525	56.3	2	156.2	218.2	250	237	681	230.2	250	248	691
	230-3-60	28.7	207.5	28.5	255	2.3	39.6	5.0	8.7	None	-	-	-	125.9	150	133	683	134.6	150	143	692
										2EH04532525	23.0	1	57.7	134.1	150	133	683	145.0	150	143	692
										2EH04535025	45.9	2	115.2	206.0	225	190	683	216.9	225	200	692
										2EH04537525	68.9	2	172.9	234.9	250	256	683	245.8	250	266	692
	460-3-60	12.4	100.2	13.5	123	1.3	18.7	2.2	4.3	None	-	-	-	58.9	70	62	334	63.2	80	67	338
										2EH04532546	23.0	1	28.8	64.9	70	62	334	70.3	80	67	338
										2EH04535046	45.9	2	57.6	100.9	110	93	334	106.3	110	98	338
										2EH04537546	68.9	2	86.4	115.3	125	126	334	120.7	125	131	338
	575-3-60	9.0	78	10.7	93.7	1.0	14.2	1.5	3.5	None	-	-	-	44.5	50	47	259	48.0	60	51	263
										2EH04532558	23.0	1	23.0	50.3	60	47	259	54.6	60	51	263
										2EH04535058	45.9	2	46.0	79.0	80	73	259	83.4	90	77	263
										2EH04537558	68.9	2	69.1	90.6	100	99	259	95.0	100	103	263
20 (20)	208-3-60	28.5	255	33.3	255	2.0	39.6	5.0	9.6	None	-	-	-	129.3	150	137	729	138.9	175	148	738
										2EH04532525	18.8	1	52.1	129.3	150	137	729	139.1	175	148	738
										2EH04535025	37.6	2	104.3	192.4	200	177	729	204.4	225	188	738
										2EH04537525	56.3	2	156.2	218.2	250	237	729	230.2	250	248	738
	230-3-60	28.5	255	33.3	255	2.3	39.6	5.0	8.7	None	-	-	-	130.5	150	139	731	139.2	175	149	739
										2EH04532525	23.0	1	57.7	134.1	150	139	731	145.0	175	149	739
										2EH04535025	45.9	2	115.2	206.0	225	190	731	216.9	225	200	739
										2EH04537525	68.9	2	172.9	234.9	250	256	731	245.8	250	266	739
	460-3-60	13.5	123	15.4	140	1.3	18.7	2.2	4.3	None	-	-	-	61.9	80	66	374	66.2	80	71	378
										2EH04532546	23.0	1	28.8	64.9	80	66	374	70.3	80	71	378
										2EH04535046	45.9	2	57.6	100.9	110	93	374	106.3	110	98	378
										2EH04537546	68.9	2	86.4	115.3	125	126	374	120.7	125	131	378
	575-3-60	10.7	93.7	12.9	107.6	1.0	14.2	1.5	3.5	None	-	-	-	48.4	60	52	289	51.9	60	56	292
										2EH04532558	23.0	1	23.0	50.3	60	52	289	54.6	60	56	292
										2EH04535058	45.9	2	46.0	79.0	80	73	289	83.4	90	77	292
										2EH04537558	68.9	2	69.1	90.6	100	99	289	95.0	100	103	292

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Table 17: KK15 to KK25 VFD 2 stage high static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	5.0	9.6	None	-	-	-	149.9	175	161	887	159.5	200	172	896
										2EH04532525	18.8	1	52.1	149.9	175	161	887	159.5	200	172	896
										2EH04535025	37.6	2	104.3	192.4	200	177	887	204.4	225	188	896
										2EH04537525	56.3	2	156.2	218.2	250	237	887	230.2	250	248	896
	230-3-60	41.0	304	41.0	304	2.3	39.6	5.0	8.7	None	-	-	-	151.1	175	162	889	159.8	200	172	897
										2EH04532525	23.0	1	57.7	151.1	175	162	889	159.8	200	172	897
										2EH04535025	45.9	2	115.2	206.0	225	190	889	216.9	225	200	897
										2EH04537525	68.9	2	172.9	234.9	250	256	889	245.8	250	266	897
	460-3-60	19.2	147	19.2	147	1.3	18.7	2.2	4.3	None	-	-	-	71.5	90	77	435	75.8	90	82	439
										2EH04532546	23.0	1	28.8	71.5	90	77	435	75.8	90	82	439
										2EH04535046	45.9	2	57.6	100.9	110	93	435	106.3	110	98	439
										2EH04537546	68.9	2	86.4	115.3	125	126	435	120.7	125	131	439
	575-3-60	16.7	122	16.7	122	1.0	14.2	1.5	3.5	None	-	-	-	58.8	70	63	350	62.3	70	67	354
										2EH04532558	23.0	1	23.0	58.8	70	63	350	62.3	70	67	354
										2EH04535058	45.9	2	46.0	79.0	80	73	350	83.4	90	77	354
										2EH04537558	68.9	2	69.1	90.6	100	99	350	95.0	100	103	354

Table 18: KK15 to KK25 VFD 2 stage high static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	25.0	190	25.0	190	2.1	30.0	6.7	9.6	None	-	-	-	105.1	125	112	533	114.7	125	123	543
										2EH04532525	18.8	1	52.1	119.4	125	112	533	131.4	150	123	543
										2EH04535025	37.6	2	104.3	184.6	200	170	533	196.6	200	181	543
										2EH04537525	56.3	2	156.2	210.5	225	230	533	222.5	225	241	543
	230-3-60	25.0	190	25.0	190	2.1	30.0	6.7	8.7	None	-	-	-	105.1	125	112	533	113.8	125	122	542
										2EH04532525	23.0	1	57.7	126.4	150	116	533	137.3	150	126	542
										2EH04535025	45.9	2	115.2	198.3	200	182	533	209.1	225	192	542
										2EH04537525	68.9	2	172.9	227.2	250	249	533	238.0	250	259	542
	460-3-60	12.2	100	12.2	100	1.1	14.3	3.4	4.3	None	-	-	-	51.3	60	55	277	55.6	60	60	281
										2EH04532546	23.0	1	28.8	62.4	70	57	277	67.8	70	62	281
										2EH04535046	45.9	2	57.6	98.4	100	91	277	103.8	110	95	281
										2EH04537546	68.9	2	86.4	112.8	125	124	277	118.2	125	129	281
	575-3-60	9.3	72	9.3	72	0.9	11.5	2.7	3.5	None	-	-	-	40.2	50	43	202	43.7	50	47	206
										2EH04532558	23.0	1	23.0	49.9	50	46	202	54.3	60	50	206
										2EH04535058	45.9	2	46.0	78.6	80	72	202	83.0	90	76	206
										2EH04537558	68.9	2	69.1	90.2	100	99	202	94.6	100	103	206
18 (17.5)	208-3-60	28.7	207.5	28.5	255	2.0	39.6	6.7	9.6	None	-	-	-	128.1	150	136	674	137.7	175	147	683
										2EH04532525	18.8	1	52.1	131.4	150	136	674	143.4	175	147	683
										2EH04535025	37.6	2	104.3	196.6	200	181	674	208.6	225	192	683
										2EH04537525	56.3	2	156.2	222.5	250	241	674	234.5	250	252	683
	230-3-60	28.7	207.5	28.5	255	2.3	39.6	6.7	8.7	None	-	-	-	129.3	150	137	676	138.0	175	147	684
										2EH04532525	23.0	1	57.7	138.4	150	137	676	149.3	175	147	684
										2EH04535025	45.9	2	115.2	210.3	225	193	676	221.1	225	203	684
										2EH04537525	68.9	2	172.9	239.2	250	260	676	250.0	250	270	684
	460-3-60	12.4	100.2	13.5	123	1.3	18.7	3.4	4.3	None	-	-	-	61.3	80	65	332	65.6	80	70	336
										2EH04532546	23.0	1	28.8	67.9	80	65	332	73.3	80	70	336
										2EH04535046	45.9	2	57.6	103.9	110	96	332	109.3	110	101	336
										2EH04537546	68.9	2	86.4	118.3	125	129	332	123.7	125	134	336
	575-3-60	9.0	78	10.7	93.7	1.0	14.2	2.7	3.5	None	-	-	-	46.9	60	50	258	50.4	60	54	262
										2EH04532558	23.0	1	23.0	53.3	60	50	258	57.6	60	54	262
										2EH04535058	45.9	2	46.0	82.0	90	75	258	86.4	90	79	262
										2EH04537558	68.9	2	69.1	93.6	100	102	258	98.0	110	106	262
20 (20)	208-3-60	28.5	255	33.3	255	2.0	39.6	6.7	9.6	None	-	-	-	132.7	150	141	721	142.3	175	152	731
										2EH04532525	18.8	1	52.1	132.7	150	141	721	143.4	175	152	731
										2EH04535025	37.6	2	104.3	196.6	200	181	721	208.6	225	192	731
										2EH04537525	56.3	2	156.2	222.5	250	241	721	234.5	250	252	731
	230-3-60	28.5	255	33.3	255	2.3	39.6	6.7	8.7	None	-	-	-	133.9	150	143	723	142.6	175	153	732
										2EH04532525	23.0	1	57.7	138.4	150	143	723	149.3	175	153	732
										2EH04535025	45.9	2	115.2	210.3	225	193	723	221.1	225	203	732
										2EH04537525	68.9	2	172.9	239.2	250	260	723	250.0	250	270	732
	460-3-60	13.5	123	15.4	140	1.3	18.7	3.4	4.3	None	-	-	-	64.3	80	69	371	68.6	80	73	376
										2EH04532546	23.0	1	28.8	67.9	80	69	371	73.3	80	73	376
										2EH04535046	45.9	2	57.6	103.9	110	96	371	109.3	110	101	376
										2EH04537546	68.9	2	86.4	118.3	125	129	371	123.7	125	134	376
	575-3-60	10.7	93.7	12.9	107.6	1.0	14.2	2.7	3.5	None	-	-	-	50.8	60	54	288	54.3	60	58	291
										2EH04532558	23.0	1	23.0	53.3	60	54	288	57.6	60	58	291
										2EH04535058	45.9	2	46.0	82.0	90	75	288	86.4	90	79	291
										2EH04537558	68.9	2	69.1	93.6	100	102	288	98.0	110	106	291

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Table 18: KK15 to KK25 VFD 2 stage high static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	41.0	304	41.0	304	2.0	39.6	6.7	9.6	None	-	-	-	153.3	175	164	879	162.9	200	175	889
										2EH04532525	18.8	1	52.1	153.3	175	164	879	162.9	200	175	889
										2EH04535025	37.6	2	104.3	196.6	200	181	879	208.6	225	192	889
										2EH04537525	56.3	2	156.2	222.5	250	241	879	234.5	250	252	889
	230-3-60	41.0	304	41.0	304	2.3	39.6	6.7	8.7	None	-	-	-	154.5	175	166	881	163.2	200	176	890
										2EH04532525	23.0	1	57.7	154.5	175	166	881	163.2	200	176	890
										2EH04535025	45.9	2	115.2	210.3	225	193	881	221.1	225	203	890
										2EH04537525	68.9	2	172.9	239.2	250	260	881	250.0	250	270	890
	460-3-60	19.2	147	19.2	147	1.3	18.7	3.4	4.3	None	-	-	-	73.9	90	79	432	78.2	90	84	437
										2EH04532546	23.0	1	28.8	73.9	90	79	432	78.2	90	84	437
										2EH04535046	45.9	2	57.6	103.9	110	96	432	109.3	110	101	437
										2EH04537546	68.9	2	86.4	118.3	125	129	432	123.7	125	134	437
	575-3-60	16.7	122	16.7	122	1.0	14.2	2.7	3.5	None	-	-	-	61.2	70	66	349	64.7	80	70	353
										2EH04532558	23.0	1	23.0	61.2	70	66	349	64.7	80	70	353
										2EH04535058	45.9	2	46.0	82.0	90	75	349	86.4	90	79	353
										2EH04537558	68.9	2	69.1	93.6	100	102	349	98.0	110	106	353

VFD 4 stage standard static

Table 19: KK15 to KK25 and KS15 to KS25 VFD 4 stage standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.2	9.6	None	-	-	-	75.3	100	79	451	84.9	110	90	461
											2EH04532525	18.8	1	52.1	81.6	100	79	451	93.6	110	90	461
											2EH04535025	37.6	2	104.3	146.9	150	135	451	158.9	175	146	461
											2EH04537525	56.3	2	156.2	172.7	200	195	451	184.7	200	206	461
	230-3-60	26.3	178.5	25.0	190			2.1	13.2	8.7	None	-	-	-	75.3	100	79	459	84.0	110	89	468
											2EH04532525	23.0	1	57.7	88.6	100	82	459	99.5	110	92	468
											2EH04535025	45.9	2	115.2	160.5	175	148	459	171.4	175	158	468
											2EH04537525	68.9	2	172.9	189.4	225	214	459	200.3	225	224	468
	460-3-60	11.0	95.3	12.2	100			1.1	6.1	4.3	None	-	-	-	34.6	45	36	241	38.9	50	41	246
											2EH04532546	23.0	1	28.8	43.6	45	40	241	49.0	50	45	246
											2EH04535046	45.9	2	57.6	79.6	80	73	241	85.0	90	78	246
											2EH04537546	68.9	2	86.4	94.0	110	106	241	99.4	110	111	246
	575-3-60	9.2	65	9.3	72			0.9	4.9	3.5	None	-	-	-	27.5	35	29	181	31.0	40	33	185
											2EH04532558	23.0	1	23.0	34.9	35	32	181	39.3	40	36	185
											2EH04535058	45.9	2	46.0	63.6	70	59	181	68.0	70	63	185
											2EH04537558	68.9	2	69.1	75.2	90	85	181	79.6	90	89	185
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	20.4	9.6	None	-	-	-	90.8	110	96	566	100.4	125	107	576
											2EH04532525	18.8	1	52.1	90.8	110	96	566	102.6	125	107	576
											2EH04535025	37.6	2	104.3	155.9	175	143	566	167.9	175	154	576
											2EH04537525	56.3	2	156.2	181.7	200	203	566	193.7	200	214	576
	230-3-60	26.8	190.7	28.5	255			2.3	20.4	8.7	None	-	-	-	92.0	110	98	567	100.7	125	108	576
											2EH04532525	23.0	1	57.7	97.6	110	98	567	108.5	125	108	576
											2EH04535025	45.9	2	115.2	169.5	175	156	567	180.4	200	166	576
											2EH04537525	68.9	2	172.9	198.4	225	222	567	209.3	225	232	576
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	4.3	None	-	-	-	44.5	50	47	286	48.8	60	52	290
											2EH04532546	23.0	1	28.8	48.4	50	47	286	53.8	60	52	290
											2EH04535046	45.9	2	57.6	84.4	90	78	286	89.8	90	83	290
											2EH04537546	68.9	2	86.4	98.8	110	111	286	104.2	110	116	290
	575-3-60	9.4	65	10.7	93.7			1.0	7.7	3.5	None	-	-	-	34.5	45	37	208	38.0	45	41	211
											2EH04532558	23.0	1	23.0	38.4	45	37	208	42.8	45	41	211
											2EH04535058	45.9	2	46.0	67.1	70	62	208	71.5	80	66	211
											2EH04537558	68.9	2	69.1	78.7	90	88	208	83.1	90	92	211
20 (20)	208-3-60	26.5	255	33.3	255			2.0	20.4	9.6	None	-	-	-	96.5	125	101	630	106.1	125	112	640
											2EH04532525	18.8	1	52.1	96.5	125	101	630	106.1	125	112	640
											2EH04535025	37.6	2	104.3	155.9	175	143	630	167.9	175	154	640
											2EH04537525	56.3	2	156.2	181.7	200	203	630	193.7	200	214	640
	230-3-60	26.5	255	33.3	255			2.3	20.4	8.7	None	-	-	-	97.7	125	103	632	106.4	125	113	640
											2EH04532525	23.0	1	57.7	97.7	125	103	632	108.5	125	113	640
											2EH04535025	45.9	2	115.2	169.5	175	156	632	180.4	200	166	640
											2EH04537525	68.9	2	172.9	198.4	225	222	632	209.3	225	232	640
	460-3-60	14.0	123	15.4	140			1.3	9.9	4.3	None	-	-	-	48.4	60	51	326	52.7	60	56	330
											2EH04532546	23.0	1	28.8	48.4	60	51	326	53.8	60	56	330
											2EH04535046	45.9	2	57.6	84.4	90	78	326	89.8	90	83	330
											2EH04537546	68.9	2	86.4	98.8	110	111	326	104.2	110	116	330
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.7	3.5	None	-	-	-	39.3	50	42	251	42.8	50	46	254
											2EH04532558	23.0	1	23.0	39.3	50	42	251	42.8	50	46	254
											2EH04535058	45.9	2	46.0	67.1	70	62	251	71.5	80	66	254
											2EH04537558	68.9	2	69.1	78.7	90	88	251	83.1	90	92	254

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Table 19: KK15 to KK25 and KS15 to KS25 VFD 4 stage standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.0	9.6	None	-	-	-	134.1	175	142	784	143.7	175	153	793
											2EH04532525	18.8	1	52.1	134.1	175	142	784	143.7	175	153	793
											2EH04535025	37.6	2	104.3	167.9	175	154	784	179.9	200	165	793
											2EH04537525	56.3	2	156.2	193.7	200	214	784	205.7	225	225	793
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.0	8.7	None	-	-	-	135.3	175	144	786	144.0	175	154	794
											2EH04532525	23.0	1	57.7	135.3	175	144	786	144.0	175	154	794
											2EH04535025	45.9	2	115.2	181.5	200	167	786	192.4	200	177	794
											2EH04537525	68.9	2	172.9	210.4	225	233	786	221.3	225	243	794
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	14.3	4.3	None	-	-	-	61.1	80	65	373	65.4	80	70	377
											2EH04532546	23.0	1	28.8	61.1	80	65	373	65.4	80	70	377
											2EH04535046	45.9	2	57.6	89.9	90	83	373	95.3	100	88	377
											2EH04537546	68.9	2	86.4	104.3	110	116	373	109.7	110	121	377
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	11.5	3.5	None	-	-	-	50.8	60	54	288	54.3	70	58	292
											2EH04532558	23.0	1	23.0	50.8	60	54	288	54.3	70	58	292
											2EH04535058	45.9	2	46.0	71.9	80	66	288	76.3	80	70	292
											2EH04537558	68.9	2	69.1	83.5	90	93	288	87.9	90	97	292

Table 20: KK15 to KK25 VFD 4 stage standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.2	5.0	9.6	None	-	-	-	85.3	110	91	472	94.9	110	102	482
												2EH04532525	18.8	1	52.1	94.1	110	91	472	106.1	110	102	482
												2EH04535025	37.6	2	104.3	159.4	175	147	472	171.4	175	158	482
												2EH04537525	56.3	2	156.2	185.2	200	206	472	197.2	200	217	482
	230-3-60	26.3	178.5	25.0	190			2.1	13.2	5.0	8.7	None	-	-	-	85.3	110	91	480	94.0	110	101	489
												2EH04532525	23.0	1	57.7	101.1	110	93	480	112.0	125	103	489
												2EH04535025	45.9	2	115.2	173.0	175	159	480	183.9	200	169	489
												2EH04537525	68.9	2	172.9	201.9	225	226	480	212.8	225	236	489
	460-3-60	11.0	95.3	12.2	100			1.1	6.1	2.2	4.3	None	-	-	-	39.0	50	41	250	43.3	50	46	255
												2EH04532546	23.0	1	28.8	49.1	50	45	250	54.5	60	50	255
												2EH04535046	45.9	2	57.6	85.1	90	78	250	90.5	100	83	255
												2EH04537546	68.9	2	86.4	99.5	110	111	250	104.9	110	116	255
	575-3-60	9.2	65	9.3	72			0.9	4.9	1.5	3.5	None	-	-	-	30.5	35	32	187	34.0	40	36	191
												2EH04532558	23.0	1	23.0	38.6	40	36	187	43.0	45	40	191
												2EH04535058	45.9	2	46.0	67.4	70	62	187	71.8	80	66	191
												2EH04537558	68.9	2	69.1	79.0	90	89	187	83.4	90	93	191
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	20.4	5.0	9.6	None	-	-	-	100.8	125	108	587	110.4	125	119	597
												2EH04532525	18.8	1	52.1	103.1	125	108	587	115.1	125	119	597
												2EH04535025	37.6	2	104.3	168.4	175	155	587	180.4	200	166	597
												2EH04537525	56.3	2	156.2	194.2	200	215	587	206.2	225	226	597
	230-3-60	26.8	190.7	28.5	255			2.3	20.4	5.0	8.7	None	-	-	-	102.0	125	109	588	110.7	125	119	597
												2EH04532525	23.0	1	57.7	110.1	125	109	588	121.0	125	119	597
												2EH04535025	45.9	2	115.2	182.0	200	167	588	192.9	200	177	597
												2EH04537525	68.9	2	172.9	210.9	225	234	588	221.8	225	244	597
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	2.2	4.3	None	-	-	-	48.9	60	52	295	53.2	60	57	299
												2EH04532546	23.0	1	28.8	53.9	60	52	295	59.3	60	57	299
												2EH04535046	45.9	2	57.6	89.9	90	83	295	95.3	100	88	299
												2EH04537546	68.9	2	86.4	104.3	110	116	295	109.7	110	121	299
	575-3-60	9.4	65	10.7	93.7			1.0	7.7	1.5	3.5	None	-	-	-	37.5	45	40	214	41.0	50	44	218
												2EH04532558	23.0	1	23.0	42.1	45	40	214	46.5	50	44	218
												2EH04535058	45.9	2	46.0	70.9	80	65	214	75.3	80	69	218
												2EH04537558	68.9	2	69.1	82.5	90	92	214	86.9	90	96	218
20 (20)	208-3-60	26.5	255	33.3	255			2.0	20.4	5.0	9.6	None	-	-	-	106.5	125	113	651	116.1	125	124	661
												2EH04532525	18.8	1	52.1	106.5	125	113	651	116.1	125	124	661
												2EH04535025	37.6	2	104.3	168.4	175	155	651	180.4	200	166	661
												2EH04537525	56.3	2	156.2	194.2	200	215	651	206.2	225	226	661
	230-3-60	26.5	255	33.3	255			2.3	20.4	5.0	8.7	None	-	-	-	107.7	125	114	653	116.4	125	124	661
												2EH04532525	23.0	1	57.7	110.1	125	114	653	121.0	125	124	661
												2EH04535025	45.9	2	115.2	182.0	200	167	653	192.9	200	177	661
												2EH04537525	68.9	2	172.9	210.9	225	234	653	221.8	225	244	661
	460-3-60	14.0	123	15.4	140			1.3	9.9	2.2	4.3	None	-	-	-	52.8	60	56	335	57.1	70	61	339
												2EH04532546	23.0	1	28.8	53.9	60	56	335	59.3	70	61	339
												2EH04535046	45.9	2	57.6	89.9	90	83	335	95.3	100	88	339
												2EH04537546	68.9	2	86.4	104.3	110	116	335	109.7	110	121	339
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.7	1.5	3.5	None	-	-	-	42.3	50	45	257	45.8	50	49	260
												2EH04532558	23.0	1	23.0	42.3	50	45	257	46.5	50	49	260
												2EH04535058	45.9	2	46.0	70.9	80	65	257	75.3	80	69	260
												2EH04537558	68.9	2	69.1	82.5	90	92	257	86.9	90	96	260

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Table 20: KK15 to KK25 VFD 4 stage standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.0	5.0	9.6	None	-	-	-	144.1	175	154	805	153.7	175	165	814
												2EH04532525	18.8	1	52.1	144.1	175	154	805	153.7	175	165	814
												2EH04535025	37.6	2	104.3	180.4	200	166	805	192.4	200	177	814
												2EH04537525	56.3	2	156.2	206.2	225	226	805	218.2	225	237	814
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.0	5.0	8.7	None	-	-	-	145.3	175	155	807	154.0	175	165	815
												2EH04532525	23.0	1	57.7	145.3	175	155	807	154.0	175	165	815
												2EH04535025	45.9	2	115.2	194.0	200	178	807	204.9	225	188	815
												2EH04537525	68.9	2	172.9	222.9	250	245	807	233.8	250	255	815
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	14.3	2.2	4.3	None	-	-	-	65.5	80	70	382	69.8	80	75	386
												2EH04532546	23.0	1	28.8	65.5	80	70	382	69.8	80	75	386
												2EH04535046	45.9	2	57.6	95.4	100	88	382	100.8	110	93	386
												2EH04537546	68.9	2	86.4	109.8	110	121	382	115.2	125	126	386
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	11.5	1.5	3.5	None	-	-	-	53.8	70	57	294	57.3	70	61	298
												2EH04532558	23.0	1	23.0	53.8	70	57	294	57.3	70	61	298
												2EH04535058	45.9	2	46.0	75.6	80	70	294	80.0	90	74	298
												2EH04537558	68.9	2	69.1	87.2	90	96	294	91.6	100	100	298

Table 21: KK15 to KK25 VFD 4 stage standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.2	6.7	9.6	None	-	-	-	88.7	110	94	464	98.3	110	105	474
												2EH04532525	18.8	1	52.1	98.4	110	94	464	110.4	125	105	474
												2EH04535025	37.6	2	104.3	163.6	175	151	464	175.6	200	162	474
												2EH04537525	56.3	2	156.2	189.5	200	210	464	201.5	225	221	474
	230-3-60	26.3	178.5	25.0	190			2.1	13.2	6.7	8.7	None	-	-	-	88.7	110	94	473	97.4	110	104	481
												2EH04532525	23.0	1	57.7	105.4	110	97	473	116.3	125	107	481
												2EH04535025	45.9	2	115.2	177.3	200	163	473	188.1	200	173	481
												2EH04537525	68.9	2	172.9	206.2	225	229	473	217.0	225	239	481
	460-3-60	11.0	95.3	12.2	100			1.1	6.1	3.4	4.3	None	-	-	-	41.4	50	44	248	45.7	50	49	252
												2EH04532546	23.0	1	28.8	52.1	60	48	248	57.5	60	53	252
												2EH04535046	45.9	2	57.6	88.1	90	81	248	93.5	100	86	252
												2EH04537546	68.9	2	86.4	102.5	110	114	248	107.9	110	119	252
	575-3-60	9.2	65	9.3	72			0.9	4.9	2.7	3.5	None	-	-	-	32.9	40	35	186	36.4	45	39	190
												2EH04532558	23.0	1	23.0	41.6	45	38	186	46.0	50	42	190
												2EH04535058	45.9	2	46.0	70.4	80	65	186	74.8	80	69	190
												2EH04537558	68.9	2	69.1	82.0	90	91	186	86.4	90	95	190
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	20.4	6.7	9.6	None	-	-	-	104.2	125	112	580	113.8	125	123	589
												2EH04532525	18.8	1	52.1	107.4	125	112	580	119.4	125	123	589
												2EH04535025	37.6	2	104.3	172.6	175	159	580	184.6	200	170	589
												2EH04537525	56.3	2	156.2	198.5	200	219	580	210.5	225	230	589
	230-3-60	26.8	190.7	28.5	255			2.3	20.4	6.7	8.7	None	-	-	-	105.4	125	113	581	114.1	125	123	589
												2EH04532525	23.0	1	57.7	114.4	125	113	581	125.3	150	123	589
												2EH04535025	45.9	2	115.2	186.3	200	171	581	197.1	200	181	589
												2EH04537525	68.9	2	172.9	215.2	225	238	581	226.0	250	248	589
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	3.4	4.3	None	-	-	-	51.3	60	55	293	55.6	60	60	297
												2EH04532546	23.0	1	28.8	56.9	60	55	293	62.3	70	60	297
												2EH04535046	45.9	2	57.6	92.9	100	85	293	98.3	100	90	297
												2EH04537546	68.9	2	86.4	107.3	110	119	293	112.7	125	124	297
	575-3-60	9.4	65	10.7	93.7			1.0	7.7	2.7	3.5	None	-	-	-	39.9	50	43	213	43.4	50	47	217
												2EH04532558	23.0	1	23.0	45.1	50	43	213	49.5	50	47	217
												2EH04535058	45.9	2	46.0	73.9	80	68	213	78.3	80	72	217
												2EH04537558	68.9	2	69.1	85.5	90	95	213	89.9	90	99	217
20 (20)	208-3-60	26.5	255	33.3	255			2.0	20.4	6.7	9.6	None	-	-	-	109.9	125	117	644	119.5	150	128	653
												2EH04532525	18.8	1	52.1	109.9	125	117	644	119.5	150	128	653
												2EH04535025	37.6	2	104.3	172.6	175	159	644	184.6	200	170	653
												2EH04537525	56.3	2	156.2	198.5	200	219	644	210.5	225	230	653
	230-3-60	26.5	255	33.3	255			2.3	20.4	6.7	8.7	None	-	-	-	111.1	125	118	645	119.8	150	128	654
												2EH04532525	23.0	1	57.7	114.4	125	118	645	125.3	150	128	654
												2EH04535025	45.9	2	115.2	186.3	200	171	645	197.1	200	181	654
												2EH04537525	68.9	2	172.9	215.2	225	238	645	226.0	250	248	654
	460-3-60	14.0	123	15.4	140			1.3	9.9	3.4	4.3	None	-	-	-	55.2	70	59	332	59.5	70	64	337
												2EH04532546	23.0	1	28.8	56.9	70	59	332	62.3	70	64	337
												2EH04535046	45.9	2	57.6	92.9	100	85	332	98.3	100	90	337
												2EH04537546	68.9	2	86.4	107.3	110	119	332	112.7	125	124	337
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.7	2.7	3.5	None	-	-	-	44.7	50	48	256	48.2	60	52	259
												2EH04532558	23.0	1	23.0	45.1	50	48	256	49.5	60	52	259
												2EH04535058	45.9	2	46.0	73.9	80	68	256	78.3	80	72	259
												2EH04537558	68.9	2	69.1	85.5	90	95	256	89.9	90	99	259

Table 21: KK15 to KK25 VFD 4 stage standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.0	6.7	9.6	None	-	-	-	147.5	175	158	797	157.1	175	169	807
												2EH04532525	18.8	1	52.1	147.5	175	158	797	157.1	175	169	807
												2EH04535025	37.6	2	104.3	184.6	200	170	797	196.6	200	181	807
												2EH04537525	56.3	2	156.2	210.5	225	230	797	222.5	225	241	807
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.0	6.7	8.7	None	-	-	-	148.7	175	159	799	157.4	175	169	808
												2EH04532525	23.0	1	57.7	148.7	175	159	799	157.4	175	169	808
												2EH04535025	45.9	2	115.2	198.3	200	182	799	209.1	225	192	808
												2EH04537525	68.9	2	172.9	227.2	250	249	799	238.0	250	259	808
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	14.3	3.4	4.3	None	-	-	-	67.9	80	73	379	72.2	90	78	384
												2EH04532546	23.0	1	28.8	67.9	80	73	379	72.2	90	78	384
												2EH04535046	45.9	2	57.6	98.4	100	91	379	103.8	110	95	384
												2EH04537546	68.9	2	86.4	112.8	125	124	379	118.2	125	129	384
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	11.5	2.7	3.5	None	-	-	-	56.2	70	60	293	59.7	70	64	297
												2EH04532558	23.0	1	23.0	56.2	70	60	293	59.7	70	64	297
												2EH04535058	45.9	2	46.0	78.6	80	72	293	83.0	90	76	297
												2EH04537558	68.9	2	69.1	90.2	100	99	293	94.6	100	103	297

VFD 4 stage medium static

Table 22: KK15 to KK25 and KS15 to KS25 VFD 4 stage medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	20.4	9.6	None	-	-	-	82.5	100	87	481	92.1	110	98	491
											2EH04532525	18.8	1	52.1	90.6	100	87	481	102.6	110	98	491
											2EH04535025	37.6	2	104.3	155.9	175	143	481	167.9	175	154	491
											2EH04537525	56.3	2	156.2	181.7	200	203	481	193.7	200	214	491
	230-3-60	26.3	178.5	25.0	190			2.1	20.4	8.7	None	-	-	-	82.5	100	87	481	91.2	110	97	489
											2EH04532525	23.0	1	57.7	97.6	100	90	481	108.5	110	100	489
											2EH04535025	45.9	2	115.2	169.5	175	156	481	180.4	200	166	489
											2EH04537525	68.9	2	172.9	198.4	225	222	481	209.3	225	232	489
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	4.3	None	-	-	-	38.4	50	41	252	42.7	50	46	256
											2EH04532546	23.0	1	28.8	48.4	50	45	252	53.8	60	49	256
											2EH04535046	45.9	2	57.6	84.4	90	78	252	89.8	90	83	256
											2EH04537546	68.9	2	86.4	98.8	110	111	252	104.2	110	116	256
	575-3-60	9.2	65	9.3	72			0.9	7.7	3.5	None	-	-	-	30.3	35	32	181	33.8	40	36	185
											2EH04532558	23.0	1	23.0	38.4	40	35	181	42.8	45	39	185
											2EH04535058	45.9	2	46.0	67.1	70	62	181	71.5	80	66	185
											2EH04537558	68.9	2	69.1	78.7	90	88	181	83.1	90	92	185
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	30.0	9.6	None	-	-	-	100.8	125	107	593	110.4	125	118	602
											2EH04532525	18.8	1	52.1	102.6	125	107	593	114.6	125	118	602
											2EH04535025	37.6	2	104.3	167.9	175	154	593	179.9	200	165	602
											2EH04537525	56.3	2	156.2	193.7	200	214	593	205.7	225	225	602
	230-3-60	26.8	190.7	28.5	255			2.3	30.0	8.7	None	-	-	-	102.0	125	109	595	110.7	125	119	604
											2EH04532525	23.0	1	57.7	109.6	125	109	595	120.5	125	119	604
											2EH04535025	45.9	2	115.2	181.5	200	167	595	192.4	200	177	604
											2EH04537525	68.9	2	172.9	210.4	225	233	595	221.3	225	243	604
	460-3-60	12.5	100.2	13.5	123			1.3	14.3	4.3	None	-	-	-	49.1	60	52	300	53.4	60	57	304
											2EH04532546	23.0	1	28.8	53.9	60	52	300	59.3	60	57	304
											2EH04535046	45.9	2	57.6	89.9	90	83	300	95.3	100	88	304
											2EH04537546	68.9	2	86.4	104.3	110	116	300	109.7	110	121	304
	575-3-60	9.4	65	10.7	93.7			1.0	11.5	3.5	None	-	-	-	38.5	50	41	217	42.0	50	45	220
											2EH04532558	23.0	1	23.0	43.1	50	41	217	47.5	50	45	220
											2EH04535058	45.9	2	46.0	71.9	80	66	217	76.3	80	70	220
											2EH04537558	68.9	2	69.1	83.5	90	93	217	87.9	90	97	220
20 (20)	208-3-60	26.5	255	33.3	255			2.0	30.0	9.6	None	-	-	-	106.1	125	112	657	115.7	125	124	667
											2EH04532525	18.8	1	52.1	106.1	125	112	657	115.7	125	124	667
											2EH04535025	37.6	2	104.3	167.9	175	154	657	179.9	200	165	667
											2EH04537525	56.3	2	156.2	193.7	200	214	657	205.7	225	225	667
	230-3-60	26.5	255	33.3	255			2.3	30.0	8.7	None	-	-	-	107.3	125	114	659	116.0	125	124	668
											2EH04532525	23.0	1	57.7	109.6	125	114	659	120.5	125	124	668
											2EH04535025	45.9	2	115.2	181.5	200	167	659	192.4	200	177	668
											2EH04537525	68.9	2	172.9	210.4	225	233	659	221.3	225	243	668
	460-3-60	14.0	123	15.4	140			1.3	14.3	4.3	None	-	-	-	52.8	60	56	339	57.1	70	61	344
											2EH04532546	23.0	1	28.8	53.9	60	56	339	59.3	70	61	344
											2EH04535046	45.9	2	57.6	89.9	90	83	339	95.3	100	88	344
											2EH04537546	68.9	2	86.4	104.3	110	116	339	109.7	110	121	344
	575-3-60	11.5	93.7	12.9	107.6			1.0	11.5	3.5	None	-	-	-	43.1	50	46	259	46.6	50	50	263
											2EH04532558	23.0	1	23.0	43.1	50	46	259	47.5	50	50	263
											2EH04535058	45.9	2	46.0	71.9	80	66	259	76.3	80	70	263
											2EH04537558	68.9	2	69.1	83.5	90	93	259	87.9	90	97	263

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Table 22: KK15 to KK25 and KS15 to KS25 VFD 4 stage medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	9.6	None	-	-	-	143.7	175	153	834	153.3	175	164	844
											2EH04532525	18.8	1	52.1	143.7	175	153	834	153.3	175	164	844
											2EH04535025	37.6	2	104.3	179.9	200	165	834	191.9	200	177	844
											2EH04537525	56.3	2	156.2	205.7	225	225	834	217.7	250	236	844
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	8.7	None	-	-	-	144.9	175	155	836	153.6	175	165	845
											2EH04532525	23.0	1	57.7	144.9	175	155	836	153.6	175	165	845
											2EH04535025	45.9	2	115.2	193.5	200	178	836	204.4	225	188	845
											2EH04537525	68.9	2	172.9	222.4	250	244	836	233.3	250	254	845
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	4.3	None	-	-	-	65.5	80	70	398	69.8	80	75	402
											2EH04532546	23.0	1	28.8	65.5	80	70	398	69.8	80	75	402
											2EH04535046	45.9	2	57.6	95.4	100	88	398	100.8	110	93	402
											2EH04537546	68.9	2	86.4	109.8	125	121	398	115.2	125	126	402
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	3.5	None	-	-	-	53.5	70	57	311	57.0	70	61	314
											2EH04532558	23.0	1	23.0	53.5	70	57	311	57.0	70	61	314
											2EH04535058	45.9	2	46.0	75.3	80	69	311	79.6	80	73	314
											2EH04537558	68.9	2	69.1	86.9	100	96	311	91.2	100	100	314

Table 23: KK15 to KK25 VFD 4 stage medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	20.4	5.0	9.6	None	-	-	-	92.5	110	99	502	102.1	125	110	512
												2EH04532525	18.8	1	52.1	103.1	110	99	502	115.1	125	110	512
												2EH04535025	37.6	2	104.3	168.4	175	155	502	180.4	200	166	512
												2EH04537525	56.3	2	156.2	194.2	200	215	502	206.2	225	226	512
	230-3-60	26.3	178.5	25.0	190			2.1	20.4	5.0	8.7	None	-	-	-	92.5	110	99	502	101.2	125	109	510
												2EH04532525	23.0	1	57.7	110.1	125	101	502	121.0	125	111	510
												2EH04535025	45.9	2	115.2	182.0	200	167	502	192.9	200	177	510
												2EH04537525	68.9	2	172.9	210.9	225	234	502	221.8	225	244	510
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	2.2	4.3	None	-	-	-	42.8	50	46	261	47.1	50	51	265
												2EH04532546	23.0	1	28.8	53.9	60	50	261	59.3	60	55	265
												2EH04535046	45.9	2	57.6	89.9	90	83	261	95.3	100	88	265
												2EH04537546	68.9	2	86.4	104.3	110	116	261	109.7	110	121	265
	575-3-60	9.2	65	9.3	72			0.9	7.7	1.5	3.5	None	-	-	-	33.3	40	36	187	36.8	45	40	191
												2EH04532558	23.0	1	23.0	42.1	45	39	187	46.5	50	43	191
												2EH04535058	45.9	2	46.0	70.9	80	65	187	75.3	80	69	191
												2EH04537558	68.9	2	69.1	82.5	90	92	187	86.9	90	96	191
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	30.0	5.0	9.6	None	-	-	-	110.8	125	119	614	120.4	150	130	623
												2EH04532525	18.8	1	52.1	115.1	125	119	614	127.1	150	130	623
												2EH04535025	37.6	2	104.3	180.4	200	166	614	192.4	200	177	623
												2EH04537525	56.3	2	156.2	206.2	225	226	614	218.2	225	237	623
	230-3-60	26.8	190.7	28.5	255			2.3	30.0	5.0	8.7	None	-	-	-	112.0	125	120	616	120.7	150	130	625
												2EH04532525	23.0	1	57.7	122.1	125	120	616	133.0	150	130	625
												2EH04535025	45.9	2	115.2	194.0	200	178	616	204.9	225	188	625
												2EH04537525	68.9	2	172.9	222.9	250	245	616	233.8	250	255	625
	460-3-60	12.5	100.2	13.5	123			1.3	14.3	2.2	4.3	None	-	-	-	53.5	60	57	309	57.8	70	62	313
												2EH04532546	23.0	1	28.8	59.4	60	57	309	64.8	70	62	313
												2EH04535046	45.9	2	57.6	95.4	100	88	309	100.8	110	93	313
												2EH04537546	68.9	2	86.4	109.8	110	121	309	115.2	125	126	313
	575-3-60	9.4	65	10.7	93.7			1.0	11.5	1.5	3.5	None	-	-	-	41.5	50	44	223	45.0	50	48	227
												2EH04532558	23.0	1	23.0	46.9	50	44	223	51.3	60	48	227
												2EH04535058	45.9	2	46.0	75.6	80	70	223	80.0	90	74	227
												2EH04537558	68.9	2	69.1	87.2	90	96	223	91.6	100	100	227
20 (20)	208-3-60	26.5	255	33.3	255			2.0	30.0	5.0	9.6	None	-	-	-	116.1	125	124	678	125.7	150	135	688
												2EH04532525	18.8	1	52.1	116.1	125	124	678	127.1	150	135	688
												2EH04535025	37.6	2	104.3	180.4	200	166	678	192.4	200	177	688
												2EH04537525	56.3	2	156.2	206.2	225	226	678	218.2	225	237	688
	230-3-60	26.5	255	33.3	255			2.3	30.0	5.0	8.7	None	-	-	-	117.3	150	125	680	126.0	150	135	689
												2EH04532525	23.0	1	57.7	122.1	150	125	680	133.0	150	135	689
												2EH04535025	45.9	2	115.2	194.0	200	178	680	204.9	225	188	689
												2EH04537525	68.9	2	172.9	222.9	250	245	680	233.8	250	255	689
	460-3-60	14.0	123	15.4	140			1.3	14.3	2.2	4.3	None	-	-	-	57.2	70	61	349	61.5	70	66	353
												2EH04532546	23.0	1	28.8	59.4	70	61	349	64.8	70	66	353
												2EH04535046	45.9	2	57.6	95.4	100	88	349	100.8	110	93	353
												2EH04537546	68.9	2	86.4	109.8	110	121	349	115.2	125	126	353
	575-3-60	11.5	93.7	12.9	107.6			1.0	11.5	1.5	3.5	None	-	-	-	46.1	50	49	266	49.6	60	53	269
												2EH04532558	23.0	1	23.0	46.9	50	49	266	51.3	60	53	269
												2EH04535058	45.9	2	46.0	75.6	80	70	266	80.0	90	74	269
												2EH04537558	68.9	2	69.1	87.2	90	96	266	91.6	100	100	269

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Table 23: KK15 to KK25 VFD 4 stage medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	5.0	9.6	None	-	-	-	153.7	175	165	855	163.3	200	176	865
												2EH04532525	18.8	1	52.1	153.7	175	165	855	163.3	200	176	865
												2EH04535025	37.6	2	104.3	192.4	200	177	855	204.4	225	188	865
												2EH04537525	56.3	2	156.2	218.2	250	237	855	230.2	250	248	865
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	5.0	8.7	None	-	-	-	154.9	175	166	857	163.6	200	176	866
												2EH04532525	23.0	1	57.7	154.9	175	166	857	163.6	200	176	866
												2EH04535025	45.9	2	115.2	206.0	225	190	857	216.9	225	200	866
												2EH04537525	68.9	2	172.9	234.9	250	256	857	245.8	250	266	866
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	2.2	4.3	None	-	-	-	69.9	80	75	407	74.2	90	80	411
												2EH04532546	23.0	1	28.8	69.9	80	75	407	74.2	90	80	411
												2EH04535046	45.9	2	57.6	100.9	110	93	407	106.3	110	98	411
												2EH04537546	68.9	2	86.4	115.3	125	126	407	120.7	125	131	411
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	1.5	3.5	None	-	-	-	56.5	70	60	317	60.0	70	64	321
												2EH04532558	23.0	1	23.0	56.5	70	60	317	60.0	70	64	321
												2EH04535058	45.9	2	46.0	79.0	80	73	317	83.4	90	77	321
												2EH04537558	68.9	2	69.1	90.6	100	99	317	95.0	100	103	321

Table 24: KK15 to KK25 VFD 4 stage medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	20.4	6.7	9.6	None	-	-	-	95.9	110	103	495	105.5	125	114	504
												2EH04532525	18.8	1	52.1	107.4	110	103	495	119.4	125	114	504
												2EH04535025	37.6	2	104.3	172.6	175	159	495	184.6	200	170	504
												2EH04537525	56.3	2	156.2	198.5	200	219	495	210.5	225	230	504
	230-3-60	26.3	178.5	25.0	190			2.1	20.4	6.7	8.7	None	-	-	-	95.9	110	103	494	104.6	125	113	503
												2EH04532525	23.0	1	57.7	114.4	125	105	494	125.3	150	115	503
												2EH04535025	45.9	2	115.2	186.3	200	171	494	197.1	200	181	503
												2EH04537525	68.9	2	172.9	215.2	225	238	494	226.0	250	248	503
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	3.4	4.3	None	-	-	-	45.2	50	48	259	49.5	60	53	263
												2EH04532546	23.0	1	28.8	56.9	60	52	259	62.3	70	57	263
												2EH04535046	45.9	2	57.6	92.9	100	85	259	98.3	100	90	263
												2EH04537546	68.9	2	86.4	107.3	110	119	259	112.7	125	124	263
	575-3-60	9.2	65	9.3	72			0.9	7.7	2.7	3.5	None	-	-	-	35.7	45	38	186	39.2	45	42	190
												2EH04532558	23.0	1	23.0	45.1	50	42	186	49.5	50	46	190
												2EH04535058	45.9	2	46.0	73.9	80	68	186	78.3	80	72	190
												2EH04537558	68.9	2	69.1	85.5	90	95	186	89.9	90	99	190
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	30.0	6.7	9.6	None	-	-	-	114.2	125	123	606	123.8	150	134	616
												2EH04532525	18.8	1	52.1	119.4	125	123	606	131.4	150	134	616
												2EH04535025	37.6	2	104.3	184.6	200	170	606	196.6	200	181	616
												2EH04537525	56.3	2	156.2	210.5	225	230	606	222.5	225	241	616
	230-3-60	26.8	190.7	28.5	255			2.3	30.0	6.7	8.7	None	-	-	-	115.4	125	124	608	124.1	150	134	617
												2EH04532525	23.0	1	57.7	126.4	150	124	608	137.3	150	134	617
												2EH04535025	45.9	2	115.2	198.3	200	182	608	209.1	225	192	617
												2EH04537525	68.9	2	172.9	227.2	250	249	608	238.0	250	259	617
	460-3-60	12.5	100.2	13.5	123			1.3	14.3	3.4	4.3	None	-	-	-	55.9	70	60	306	60.2	70	65	311
												2EH04532546	23.0	1	28.8	62.4	70	60	306	67.8	70	65	311
												2EH04535046	45.9	2	57.6	98.4	100	91	306	103.8	110	95	311
												2EH04537546	68.9	2	86.4	112.8	125	124	306	118.2	125	129	311
	575-3-60	9.4	65	10.7	93.7			1.0	11.5	2.7	3.5	None	-	-	-	43.9	50	47	222	47.4	50	51	226
												2EH04532558	23.0	1	23.0	49.9	50	47	222	54.3	60	51	226
												2EH04535058	45.9	2	46.0	78.6	80	72	222	83.0	90	76	226
												2EH04537558	68.9	2	69.1	90.2	100	99	222	94.6	100	103	226
20 (20)	208-3-60	26.5	255	33.3	255			2.0	30.0	6.7	9.6	None	-	-	-	119.5	150	128	671	129.1	150	139	680
												2EH04532525	18.8	1	52.1	119.5	150	128	671	131.4	150	139	680
												2EH04535025	37.6	2	104.3	184.6	200	170	671	196.6	200	181	680
												2EH04537525	56.3	2	156.2	210.5	225	230	671	222.5	225	241	680
	230-3-60	26.5	255	33.3	255			2.3	30.0	6.7	8.7	None	-	-	-	120.7	150	129	673	129.4	150	139	681
												2EH04532525	23.0	1	57.7	126.4	150	129	673	137.3	150	139	681
												2EH04535025	45.9	2	115.2	198.3	200	182	673	209.1	225	192	681
												2EH04537525	68.9	2	172.9	227.2	250	249	673	238.0	250	259	681
	460-3-60	14.0	123	15.4	140			1.3	14.3	3.4	4.3	None	-	-	-	59.6	70	64	346	63.9	70	69	350
												2EH04532546	23.0	1	28.8	62.4	70	64	346	67.8	70	69	350
												2EH04535046	45.9	2	57.6	98.4	100	91	346	103.8	110	95	350
												2EH04537546	68.9	2	86.4	112.8	125	124	346	118.2	125	129	350
	575-3-60	11.5	93.7	12.9	107.6			1.0	11.5	2.7	3.5	None	-	-	-	48.5	60	52	265	52.0	60	56	268
												2EH04532558	23.0	1	23.0	49.9	60	52	265	54.3	60	56	268
												2EH04535058	45.9	2	46.0	78.6	80	72	265	83.0	90	76	268
												2EH04537558	68.9	2	69.1	90.2	100	99	265	94.6	100	103	268

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Table 24: KK15 to KK25 VFD 4 stage medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	6.7	9.6	None	-	-	-	157.1	175	169	847	166.7	200	180	857
												2EH04532525	18.8	1	52.1	157.1	175	169	847	166.7	200	180	857
												2EH04535025	37.6	2	104.3	196.6	200	181	847	208.6	225	192	857
												2EH04537525	56.3	2	156.2	222.5	250	241	847	234.5	250	252	857
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	6.7	8.7	None	-	-	-	158.3	175	170	849	167.0	200	180	858
												2EH04532525	23.0	1	57.7	158.3	175	170	849	167.0	200	180	858
												2EH04535025	45.9	2	115.2	210.3	225	193	849	221.1	225	203	858
												2EH04537525	68.9	2	172.9	239.2	250	260	849	250.0	250	270	858
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	3.4	4.3	None	-	-	-	72.3	90	78	405	76.6	90	83	409
												2EH04532546	23.0	1	28.8	72.3	90	78	405	76.6	90	83	409
												2EH04535046	45.9	2	57.6	103.9	110	96	405	109.3	110	101	409
												2EH04537546	68.9	2	86.4	118.3	125	129	405	123.7	125	134	409
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	2.7	3.5	None	-	-	-	58.9	70	63	316	62.4	70	67	320
												2EH04532558	23.0	1	23.0	58.9	70	63	316	62.4	70	67	320
												2EH04535058	45.9	2	46.0	82.0	90	75	316	86.4	90	79	320
												2EH04537558	68.9	2	69.1	93.6	100	102	316	98.0	110	106	320

VFD 4 stage high static

Table 25: KK15 to KK25 and KS15 to KS25 VFD 4 stage high static without power exhaust (for side and end return)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	30.0	9.6	None	-	-	-	93.0	110	98	508	102.6	125	109	518
											2EH04532525	18.8	1	52.1	102.6	110	98	508	114.6	125	109	518
											2EH04535025	37.6	2	104.3	167.9	175	154	508	179.9	200	165	518
											2EH04537525	56.3	2	156.2	193.7	200	214	508	205.7	225	225	518
	230-3-60	26.3	178.5	25.0	190			2.1	30.0	8.7	None	-	-	-	93.0	110	98	508	101.7	125	108	517
											2EH04532525	23.0	1	57.7	109.6	125	101	508	120.5	125	111	517
											2EH04535025	45.9	2	115.2	181.5	200	167	508	192.4	200	177	517
											2EH04537525	68.9	2	172.9	210.4	225	233	508	221.3	225	243	517
	460-3-60	11.0	95.3	12.2	100			1.1	14.3	4.3	None	-	-	-	43.3	50	46	266	47.6	60	51	270
											2EH04532546	23.0	1	28.8	53.9	60	50	266	59.3	60	55	270
											2EH04535046	45.9	2	57.6	89.9	90	83	266	95.3	100	88	270
											2EH04537546	68.9	2	86.4	104.3	110	116	266	109.7	110	121	270
	575-3-60	9.2	65	9.3	72			0.9	11.5	3.5	None	-	-	-	34.7	45	37	190	38.2	45	41	193
											2EH04532558	23.0	1	23.0	43.1	45	40	190	47.5	50	44	193
											2EH04535058	45.9	2	46.0	71.9	80	66	190	76.3	80	70	193
											2EH04537558	68.9	2	69.1	83.5	90	93	190	87.9	90	97	193
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	39.6	9.6	None	-	-	-	112.8	150	118	643	122.4	150	129	653
											2EH04532525	18.8	1	52.1	114.6	150	118	643	126.6	150	129	653
											2EH04535025	37.6	2	104.3	179.9	200	165	643	191.9	200	177	653
											2EH04537525	56.3	2	156.2	205.7	225	225	643	217.7	250	236	653
	230-3-60	26.8	190.7	28.5	255			2.3	39.6	8.7	None	-	-	-	114.0	150	120	645	122.7	150	130	654
											2EH04532525	23.0	1	57.7	121.6	150	120	645	132.5	150	130	654
											2EH04535025	45.9	2	115.2	193.5	200	178	645	204.4	225	188	654
											2EH04537525	68.9	2	172.9	222.4	250	244	645	233.3	250	254	654
	460-3-60	12.5	100.2	13.5	123			1.3	18.7	4.3	None	-	-	-	54.6	70	57	325	58.9	70	62	329
											2EH04532546	23.0	1	28.8	59.4	70	57	325	64.8	70	62	329
											2EH04535046	45.9	2	57.6	95.4	100	88	325	100.8	110	93	329
											2EH04537546	68.9	2	86.4	109.8	125	121	325	115.2	125	126	329
	575-3-60	9.4	65	10.7	93.7			1.0	14.2	3.5	None	-	-	-	41.9	50	44	240	45.4	50	48	243
											2EH04532558	23.0	1	23.0	46.5	50	44	240	50.9	60	48	243
											2EH04535058	45.9	2	46.0	75.3	80	69	240	79.6	80	73	243
											2EH04537558	68.9	2	69.1	86.9	100	96	240	91.2	100	100	243
20 (20)	208-3-60	26.5	255	33.3	255			2.0	39.6	9.6	None	-	-	-	117.3	150	124	708	126.9	150	135	717
											2EH04532525	18.8	1	52.1	117.3	150	124	708	126.9	150	135	717
											2EH04535025	37.6	2	104.3	179.9	200	165	708	191.9	200	177	717
											2EH04537525	56.3	2	156.2	205.7	225	225	708	217.7	250	236	717
	230-3-60	26.5	255	33.3	255			2.3	39.6	8.7	None	-	-	-	118.5	150	125	710	127.2	150	135	718
											2EH04532525	23.0	1	57.7	121.6	150	125	710	132.5	150	135	718
											2EH04535025	45.9	2	115.2	193.5	200	178	710	204.4	225	188	718
											2EH04537525	68.9	2	172.9	222.4	250	244	710	233.3	250	254	718
	460-3-60	14.0	123	15.4	140			1.3	18.7	4.3	None	-	-	-	58.0	70	61	365	62.3	80	66	369
											2EH04532546	23.0	1	28.8	59.4	70	61	365	64.8	80	66	369
											2EH04535046	45.9	2	57.6	95.4	100	88	365	100.8	110	93	369
											2EH04537546	68.9	2	86.4	109.8	125	121	365	115.2	125	126	369
	575-3-60	11.5	93.7	12.9	107.6			1.0	14.2	3.5	None	-	-	-	46.2	60	49	282	49.7	60	53	286
											2EH04532558	23.0	1	23.0	46.5	60	49	282	50.9	60	53	286
											2EH04535058	45.9	2	46.0	75.3	80	69	282	79.6	80	73	286
											2EH04537558	68.9	2	69.1	86.9	100	96	282	91.2	100	100	286

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Table 25: KK15 to KK25 and KS15 to KS25 VFD 4 stage high static without power exhaust (for side and end return)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	9.6	None	-	-	-	143.7	175	153	894	153.3	175	164	904
											2EH04532525	18.8	1	52.1	143.7	175	153	894	153.3	175	164	904
											2EH04535025	37.6	2	104.3	179.9	200	165	894	191.9	200	177	904
											2EH04537525	56.3	2	156.2	205.7	225	225	894	217.7	250	236	904
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	8.7	None	-	-	-	144.9	175	155	896	153.6	175	165	905
											2EH04532525	23.0	1	57.7	144.9	175	155	896	153.6	175	165	905
											2EH04535025	45.9	2	115.2	193.5	200	178	896	204.4	225	188	905
											2EH04537525	68.9	2	172.9	222.4	250	244	896	233.3	250	254	905
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	4.3	None	-	-	-	65.5	80	70	428	69.8	80	75	432
											2EH04532546	23.0	1	28.8	65.5	80	70	428	69.8	80	75	432
											2EH04535046	45.9	2	57.6	95.4	100	88	428	100.8	110	93	432
											2EH04537546	68.9	2	86.4	109.8	125	121	428	115.2	125	126	432
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	3.5	None	-	-	-	53.5	70	57	330	57.0	70	61	334
											2EH04532558	23.0	1	23.0	53.5	70	57	330	57.0	70	61	334
											2EH04535058	45.9	2	46.0	75.3	80	69	330	79.6	80	73	334
											2EH04537558	68.9	2	69.1	86.9	100	96	330	91.2	100	100	334

Table 26: KK15 to KK25 VFD 4 stage high static with on/off power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	30.0	5.0	9.6	None	-	-	-	103.0	125	110	529	112.6	125	121	539
												2EH04532525	18.8	1	52.1	115.1	125	110	529	127.1	150	121	539
												2EH04535025	37.6	2	104.3	180.4	200	166	529	192.4	200	177	539
												2EH04537525	56.3	2	156.2	206.2	225	226	529	218.2	225	237	539
	230-3-60	26.3	178.5	25.0	190			2.1	30.0	5.0	8.7	None	-	-	-	103.0	125	110	529	111.7	125	120	538
												2EH04532525	23.0	1	57.7	122.1	125	112	529	133.0	150	122	538
												2EH04535025	45.9	2	115.2	194.0	200	178	529	204.9	225	188	538
												2EH04537525	68.9	2	172.9	222.9	250	245	529	233.8	250	255	538
	460-3-60	11.0	95.3	12.2	100			1.1	14.3	2.2	4.3	None	-	-	-	47.7	60	51	275	52.0	60	56	279
												2EH04532546	23.0	1	28.8	59.4	60	55	275	64.8	70	60	279
												2EH04535046	45.9	2	57.6	95.4	100	88	275	100.8	110	93	279
												2EH04537546	68.9	2	86.4	109.8	110	121	275	115.2	125	126	279
	575-3-60	9.2	65	9.3	72			0.9	11.5	1.5	3.5	None	-	-	-	37.7	45	40	196	41.2	50	44	200
												2EH04532558	23.0	1	23.0	46.9	50	43	196	51.3	60	47	200
												2EH04535058	45.9	2	46.0	75.6	80	70	196	80.0	90	74	200
												2EH04537558	68.9	2	69.1	87.2	90	96	196	91.6	100	100	200
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	39.6	5.0	9.6	None	-	-	-	122.8	150	130	664	132.4	150	141	674
												2EH04532525	18.8	1	52.1	127.1	150	130	664	139.1	150	141	674
												2EH04535025	37.6	2	104.3	192.4	200	177	664	204.4	225	188	674
												2EH04537525	56.3	2	156.2	218.2	250	237	664	230.2	250	248	674
	230-3-60	26.8	190.7	28.5	255			2.3	39.6	5.0	8.7	None	-	-	-	124.0	150	131	666	132.7	150	141	675
												2EH04532525	23.0	1	57.7	134.1	150	131	666	145.0	150	141	675
												2EH04535025	45.9	2	115.2	206.0	225	190	666	216.9	225	200	675
												2EH04537525	68.9	2	172.9	234.9	250	256	666	245.8	250	266	675
	460-3-60	12.5	100.2	13.5	123			1.3	18.7	2.2	4.3	None	-	-	-	59.0	70	62	334	63.3	80	67	338
												2EH04532546	23.0	1	28.8	64.9	70	62	334	70.3	80	67	338
												2EH04535046	45.9	2	57.6	100.9	110	93	334	106.3	110	98	338
												2EH04537546	68.9	2	86.4	115.3	125	126	334	120.7	125	131	338
	575-3-60	9.4	65	10.7	93.7			1.0	14.2	1.5	3.5	None	-	-	-	44.9	50	47	246	48.4	60	52	250
												2EH04532558	23.0	1	23.0	50.3	60	47	246	54.6	60	52	250
												2EH04535058	45.9	2	46.0	79.0	80	73	246	83.4	90	77	250
												2EH04537558	68.9	2	69.1	90.6	100	99	246	95.0	100	103	250
20 (20)	208-3-60	26.5	255	33.3	255			2.0	39.6	5.0	9.6	None	-	-	-	127.3	150	135	729	136.9	175	146	738
												2EH04532525	18.8	1	52.1	127.3	150	135	729	139.1	175	146	738
												2EH04535025	37.6	2	104.3	192.4	200	177	729	204.4	225	188	738
												2EH04537525	56.3	2	156.2	218.2	250	237	729	230.2	250	248	738
	230-3-60	26.5	255	33.3	255			2.3	39.6	5.0	8.7	None	-	-	-	128.5	150	136	731	137.2	175	146	739
												2EH04532525	23.0	1	57.7	134.1	150	136	731	145.0	175	146	739
												2EH04535025	45.9	2	115.2	206.0	225	190	731	216.9	225	200	739
												2EH04537525	68.9	2	172.9	234.9	250	256	731	245.8	250	266	739
	460-3-60	14.0	123	15.4	140			1.3	18.7	2.2	4.3	None	-	-	-	62.4	80	66	374	66.7	80	71	378
												2EH04532546	23.0	1	28.8	64.9	80	66	374	70.3	80	71	378
												2EH04535046	45.9	2	57.6	100.9	110	93	374	106.3	110	98	378
												2EH04537546	68.9	2	86.4	115.3	125	126	374	120.7	125	131	378
	575-3-60	11.5	93.7	12.9	107.6			1.0	14.2	1.5	3.5	None	-	-	-	49.2	60	52	289	52.7	60	56	292
												2EH04532558	23.0	1	23.0	50.3	60	52	289	54.6	60	56	292
												2EH04535058	45.9	2	46.0	79.0	80	73	289	83.4	90	77	292
												2EH04537558	68.9	2	69.1	90.6	100	99	289	95.0	100	103	292

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Table 26: KK15 to KK25 VFD 4 stage high static with on/off power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	5.0	9.6	None	-	-	-	153.7	175	165	915	163.3	200	176	925
												2EH04532525	18.8	1	52.1	153.7	175	165	915	163.3	200	176	925
												2EH04535025	37.6	2	104.3	192.4	200	177	915	204.4	225	188	925
												2EH04537525	56.3	2	156.2	218.2	250	237	915	230.2	250	248	925
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	5.0	8.7	None	-	-	-	154.9	175	166	917	163.6	200	176	926
												2EH04532525	23.0	1	57.7	154.9	175	166	917	163.6	200	176	926
												2EH04535025	45.9	2	115.2	206.0	225	190	917	216.9	225	200	926
												2EH04537525	68.9	2	172.9	234.9	250	256	917	245.8	250	266	926
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	2.2	4.3	None	-	-	-	69.9	80	75	437	74.2	90	80	441
												2EH04532546	23.0	1	28.8	69.9	80	75	437	74.2	90	80	441
												2EH04535046	45.9	2	57.6	100.9	110	93	437	106.3	110	98	441
												2EH04537546	68.9	2	86.4	115.3	125	126	437	120.7	125	131	441
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	1.5	3.5	None	-	-	-	56.5	70	60	336	60.0	70	64	340
												2EH04532558	23.0	1	23.0	56.5	70	60	336	60.0	70	64	340
												2EH04535058	45.9	2	46.0	79.0	80	73	336	83.4	90	77	340
												2EH04537558	68.9	2	69.1	90.6	100	99	336	95.0	100	103	340

Table 27: KK15 to KK25 VFD 4 stage high static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	30.0	6.7	9.6	None	-	-	-	106.4	125	114	521	116.0	125	125	531
												2EH04532525	18.8	1	52.1	119.4	125	114	521	131.4	150	125	531
												2EH04535025	37.6	2	104.3	184.6	200	170	521	196.6	200	181	531
												2EH04537525	56.3	2	156.2	210.5	225	230	521	222.5	225	241	531
	230-3-60	26.3	178.5	25.0	190			2.1	30.0	6.7	8.7	None	-	-	-	106.4	125	114	521	115.1	125	124	530
												2EH04532525	23.0	1	57.7	126.4	150	116	521	137.3	150	126	530
												2EH04535025	45.9	2	115.2	198.3	200	182	521	209.1	225	192	530
												2EH04537525	68.9	2	172.9	227.2	250	249	521	238.0	250	259	530
	460-3-60	11.0	95.3	12.2	100			1.1	14.3	3.4	4.3	None	-	-	-	50.1	60	53	272	54.4	60	58	277
												2EH04532546	23.0	1	28.8	62.4	70	57	272	67.8	70	62	277
												2EH04535046	45.9	2	57.6	98.4	100	91	272	103.8	110	95	277
												2EH04537546	68.9	2	86.4	112.8	125	124	272	118.2	125	129	277
	575-3-60	9.2	65	9.3	72			0.9	11.5	2.7	3.5	None	-	-	-	40.1	50	43	195	43.6	50	47	199
												2EH04532558	23.0	1	23.0	49.9	50	46	195	54.3	60	50	199
												2EH04535058	45.9	2	46.0	78.6	80	72	195	83.0	90	76	199
												2EH04537558	68.9	2	69.1	90.2	100	99	195	94.6	100	103	199
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	39.6	6.7	9.6	None	-	-	-	126.2	150	134	657	135.8	175	145	666
												2EH04532525	18.8	1	52.1	131.4	150	134	657	143.4	175	145	666
												2EH04535025	37.6	2	104.3	196.6	200	181	657	208.6	225	192	666
												2EH04537525	56.3	2	156.2	222.5	250	241	657	234.5	250	252	666
	230-3-60	26.8	190.7	28.5	255			2.3	39.6	6.7	8.7	None	-	-	-	127.4	150	135	659	136.1	175	145	667
												2EH04532525	23.0	1	57.7	138.4	150	135	659	149.3	175	145	667
												2EH04535025	45.9	2	115.2	210.3	225	193	659	221.1	225	203	667
												2EH04537525	68.9	2	172.9	239.2	250	260	659	250.0	250	270	667
	460-3-60	12.5	100.2	13.5	123			1.3	18.7	3.4	4.3	None	-	-	-	61.4	80	65	332	65.7	80	70	336
												2EH04532546	23.0	1	28.8	67.9	80	65	332	73.3	80	70	336
												2EH04535046	45.9	2	57.6	103.9	110	96	332	109.3	110	101	336
												2EH04537546	68.9	2	86.4	118.3	125	129	332	123.7	125	134	336
	575-3-60	9.4	65	10.7	93.7			1.0	14.2	2.7	3.5	None	-	-	-	47.3	60	50	245	50.8	60	54	249
												2EH04532558	23.0	1	23.0	53.3	60	50	245	57.6	60	54	249
												2EH04535058	45.9	2	46.0	82.0	90	75	245	86.4	90	79	249
												2EH04537558	68.9	2	69.1	93.6	100	102	245	98.0	110	106	249
20 (20)	208-3-60	26.5	255	33.3	255			2.0	39.6	6.7	9.6	None	-	-	-	130.7	150	139	721	140.3	175	150	731
												2EH04532525	18.8	1	52.1	131.4	150	139	721	143.4	175	150	731
												2EH04535025	37.6	2	104.3	196.6	200	181	721	208.6	225	192	731
												2EH04537525	56.3	2	156.2	222.5	250	241	721	234.5	250	252	731
	230-3-60	26.5	255	33.3	255			2.3	39.6	6.7	8.7	None	-	-	-	131.9	150	140	723	140.6	175	150	732
												2EH04532525	23.0	1	57.7	138.4	150	140	723	149.3	175	150	732
												2EH04535025	45.9	2	115.2	210.3	225	193	723	221.1	225	203	732
												2EH04537525	68.9	2	172.9	239.2	250	260	723	250.0	250	270	732
	460-3-60	14.0	123	15.4	140			1.3	18.7	3.4	4.3	None	-	-	-	64.8	80	69	371	69.1	80	74	376
												2EH04532546	23.0	1	28.8	67.9	80	69	371	73.3	80	74	376
												2EH04535046	45.9	2	57.6	103.9	110	96	371	109.3	110	101	376
												2EH04537546	68.9	2	86.4	118.3	125	129	371	123.7	125	134	376
	575-3-60	11.5	93.7	12.9	107.6			1.0	14.2	2.7	3.5	None	-	-	-	51.6	60	55	288	55.1	60	59	291
												2EH04532558	23.0	1	23.0	53.3	60	55	288	57.6	60	59	291
												2EH04535058	45.9	2	46.0	82.0	90	75	288	86.4	90	79	291
												2EH04537558	68.9	2	69.1	93.6	100	102	288	98.0	110	106	291

Table 27: KK15 to KK25 VFD 4 stage high static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	39.6	6.7	9.6	None	-	-	-	157.1	175	169	907	166.7	200	180	917
												2EH04532525	18.8	1	52.1	157.1	175	169	907	166.7	200	180	917
												2EH04535025	37.6	2	104.3	196.6	200	181	907	208.6	225	192	917
												2EH04537525	56.3	2	156.2	222.5	250	241	907	234.5	250	252	917
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	39.6	6.7	8.7	None	-	-	-	158.3	175	170	909	167.0	200	180	918
												2EH04532525	23.0	1	57.7	158.3	175	170	909	167.0	200	180	918
												2EH04535025	45.9	2	115.2	210.3	225	193	909	221.1	225	203	918
												2EH04537525	68.9	2	172.9	239.2	250	260	909	250.0	250	270	918
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	18.7	3.4	4.3	None	-	-	-	72.3	90	78	435	76.6	90	83	439
												2EH04532546	23.0	1	28.8	72.3	90	78	435	76.6	90	83	439
												2EH04535046	45.9	2	57.6	103.9	110	96	435	109.3	110	101	439
												2EH04537546	68.9	2	86.4	118.3	125	129	435	123.7	125	134	439
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	14.2	2.7	3.5	None	-	-	-	58.9	70	63	335	62.4	70	67	339
												2EH04532558	23.0	1	23.0	58.9	70	63	335	62.4	70	67	339
												2EH04535058	45.9	2	46.0	82.0	90	75	335	86.4	90	79	339
												2EH04537558	68.9	2	69.1	93.6	100	102	335	98.0	110	106	339

VFD customer supplied standard static

Table 28: KK15 to KK25 and KS15 to KS25 VFD customer supplied standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	9.9	9.6	None	-	-	-	72.0	90	75	451	81.6	100	86	461
											2EH04532525	18.8	1	52.1	77.5	90	75	451	89.5	100	86	461
											2EH04535025	37.6	2	104.3	142.8	150	131	451	154.8	175	142	461
											2EH04537525	56.3	2	156.2	168.6	200	191	451	180.6	200	202	461
	230-3-60	26.3	178.5	25.0	190			2.1	9.4	8.7	None	-	-	-	71.5	90	75	459	80.2	100	85	468
											2EH04532525	23.0	1	57.7	83.9	90	77	459	94.8	100	87	468
											2EH04535025	45.9	2	115.2	155.8	175	143	459	166.6	175	153	468
											2EH04537525	68.9	2	172.9	184.7	200	210	459	195.5	225	220	468
	460-3-60	11.0	95.3	12.2	100			1.1	4.7	4.3	None	-	-	-	33.2	45	35	241	37.5	45	40	246
											2EH04532546	23.0	1	28.8	41.9	45	39	241	47.3	50	43	246
											2EH04535046	45.9	2	57.6	77.9	80	72	241	83.3	90	77	246
											2EH04537546	68.9	2	86.4	92.3	100	105	241	97.7	110	110	246
	575-3-60	9.2	65	9.3	72			0.9	4.3	3.5	None	-	-	-	26.9	35	28	181	30.4	35	32	185
											2EH04532558	23.0	1	23.0	34.1	35	31	181	38.5	40	35	185
											2EH04535058	45.9	2	46.0	62.9	70	58	181	67.3	70	62	185
											2EH04537558	68.9	2	69.1	74.5	80	84	181	78.9	90	88	185
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	13.5	9.6	None	-	-	-	83.9	110	88	566	93.5	110	99	576
											2EH04532525	18.8	1	52.1	83.9	110	88	566	94.0	110	99	576
											2EH04535025	37.6	2	104.3	147.3	150	135	566	159.3	175	147	576
											2EH04537525	56.3	2	156.2	173.1	200	195	566	185.1	200	206	576
	230-3-60	26.8	190.7	28.5	255			2.3	13.4	8.7	None	-	-	-	85.0	110	90	567	93.7	110	100	576
											2EH04532525	23.0	1	57.7	88.9	110	90	567	99.8	110	100	576
											2EH04535025	45.9	2	115.2	160.8	175	148	567	171.6	175	158	576
											2EH04537525	68.9	2	172.9	189.7	225	214	567	200.5	225	224	576
	460-3-60	12.5	100.2	13.5	123			1.3	6.7	4.3	None	-	-	-	41.3	50	44	286	45.6	50	49	290
											2EH04532546	23.0	1	28.8	44.4	50	44	286	49.8	50	49	290
											2EH04535046	45.9	2	57.6	80.4	90	74	286	85.8	90	79	290
											2EH04537546	68.9	2	86.4	94.8	110	107	286	100.2	110	112	290
	575-3-60	9.4	65	10.7	93.7			1.0	5.4	3.5	None	-	-	-	32.2	40	34	208	35.7	45	38	211
											2EH04532558	23.0	1	23.0	35.5	40	34	208	39.9	45	38	211
											2EH04535058	45.9	2	46.0	64.3	70	59	208	68.6	70	63	211
											2EH04537558	68.9	2	69.1	75.9	90	86	208	80.2	90	90	211

Table 28: KK15 to KK25 and KS15 to KS25 VFD customer supplied standard static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
20 (20)	208-3-60	26.5	255	33.3	255			2.0	13.5	9.6	None	-	-	-	89.6	110	93	630	99.2	125	105	640
											2EH04532525	18.8	1	52.1	89.6	110	93	630	99.2	125	105	640
											2EH04535025	37.6	2	104.3	147.3	150	135	630	159.3	175	147	640
											2EH04537525	56.3	2	156.2	173.1	200	195	630	185.1	200	206	640
	230-3-60	26.5	255	33.3	255			2.3	13.4	8.7	None	-	-	-	90.7	110	95	632	99.4	125	105	640
											2EH04532525	23.0	1	57.7	90.7	110	95	632	99.8	125	105	640
											2EH04535025	45.9	2	115.2	160.8	175	148	632	171.6	175	158	640
											2EH04537525	68.9	2	172.9	189.7	225	214	632	200.5	225	224	640
	460-3-60	14.0	123	15.4	140			1.3	6.7	4.3	None	-	-	-	45.2	60	47	326	49.5	60	52	330
											2EH04532546	23.0	1	28.8	45.2	60	47	326	49.8	60	52	330
											2EH04535046	45.9	2	57.6	80.4	90	74	326	85.8	90	79	330
											2EH04537546	68.9	2	86.4	94.8	110	107	326	100.2	110	112	330
	575-3-60	11.5	93.7	12.9	107.6			1.0	5.4	3.5	None	-	-	-	37.0	45	39	251	40.5	50	43	254
											2EH04532558	23.0	1	23.0	37.0	45	39	251	40.5	50	43	254
											2EH04535058	45.9	2	46.0	64.3	70	59	251	68.6	70	63	254
											2EH04537558	68.9	2	69.1	75.9	90	86	251	80.2	90	90	254
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	19.8	9.6	None	-	-	-	123.9	150	131	784	133.5	150	142	793
											2EH04532525	18.8	1	52.1	123.9	150	131	784	133.5	150	142	793
											2EH04535025	37.6	2	104.3	155.1	175	143	784	167.1	175	154	793
											2EH04537525	56.3	2	156.2	181.0	200	202	784	193.0	200	213	793
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	19.8	8.7	None	-	-	-	125.1	150	132	786	133.8	150	142	794
											2EH04532525	23.0	1	57.7	125.1	150	132	786	133.8	150	142	794
											2EH04535025	45.9	2	115.2	168.8	175	155	786	179.6	200	165	794
											2EH04537525	68.9	2	172.9	197.7	225	222	786	208.5	225	232	794
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	9.9	4.3	None	-	-	-	56.7	70	60	373	61.0	80	65	377
											2EH04532546	23.0	1	28.8	56.7	70	60	373	61.0	80	65	377
											2EH04535046	45.9	2	57.6	84.4	90	78	373	89.8	90	83	377
											2EH04537546	68.9	2	86.4	98.8	110	111	373	104.2	110	116	377
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	7.9	3.5	None	-	-	-	47.2	60	49	288	50.7	60	53	292
											2EH04532558	23.0	1	23.0	47.2	60	49	288	50.7	60	53	292
											2EH04535058	45.9	2	46.0	67.4	70	62	288	71.8	80	66	292
											2EH04537558	68.9	2	69.1	79.0	90	89	288	83.4	90	93	292

Table 29: KK15 to KK25 VFD customer supplied standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	9.9	5.0	9.6	None	-	-	-	82.0	100	87	472	91.6	110	98	482
												2EH04532525	18.8	1	52.1	90.0	100	87	472	102.0	110	98	482
												2EH04535025	37.6	2	104.3	155.3	175	143	472	167.3	175	154	482
												2EH04537525	56.3	2	156.2	181.1	200	203	472	193.1	200	214	482
	230-3-60	26.3	178.5	25.0	190			2.1	9.4	5.0	8.7	None	-	-	-	81.5	100	86	480	90.2	110	96	489
												2EH04532525	23.0	1	57.7	96.4	100	89	480	107.3	110	99	489
												2EH04535025	45.9	2	115.2	168.3	175	155	480	179.1	200	165	489
												2EH04537525	68.9	2	172.9	197.2	225	221	480	208.0	225	231	489
	460-3-60	11.0	95.3	12.2	100			1.1	4.7	2.2	4.3	None	-	-	-	37.6	45	40	250	41.9	50	45	255
												2EH04532546	23.0	1	28.8	47.4	50	44	250	52.8	60	49	255
												2EH04535046	45.9	2	57.6	83.4	90	77	250	88.8	90	82	255
												2EH04537546	68.9	2	86.4	97.8	110	110	250	103.2	110	115	255
	575-3-60	9.2	65	9.3	72			0.9	4.3	1.5	3.5	None	-	-	-	29.9	35	32	187	33.4	40	36	191
												2EH04532558	23.0	1	23.0	37.9	40	35	187	42.3	45	39	191
												2EH04535058	45.9	2	46.0	66.6	70	61	187	71.0	80	65	191
												2EH04537558	68.9	2	69.1	78.2	90	88	187	82.6	90	92	191
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	13.5	5.0	9.6	None	-	-	-	93.9	110	100	587	103.5	125	111	597
												2EH04532525	18.8	1	52.1	94.5	110	100	587	106.5	125	111	597
												2EH04535025	37.6	2	104.3	159.8	175	147	587	171.8	175	158	597
												2EH04537525	56.3	2	156.2	185.6	200	207	587	197.6	200	218	597
	230-3-60	26.8	190.7	28.5	255			2.3	13.4	5.0	8.7	None	-	-	-	95.0	110	101	588	103.7	125	111	597
												2EH04532525	23.0	1	57.7	101.4	110	101	588	112.3	125	111	597
												2EH04535025	45.9	2	115.2	173.3	175	159	588	184.1	200	169	597
												2EH04537525	68.9	2	172.9	202.2	225	226	588	213.0	225	236	597
	460-3-60	12.5	100.2	13.5	123			1.3	6.7	2.2	4.3	None	-	-	-	45.7	50	49	295	50.0	60	54	299
												2EH04532546	23.0	1	28.8	49.9	50	49	295	55.3	60	54	299
												2EH04535046	45.9	2	57.6	85.9	90	79	295	91.3	100	84	299
												2EH04537546	68.9	2	86.4	100.3	110	112	295	105.7	110	117	299
	575-3-60	9.4	65	10.7	93.7			1.0	5.4	1.5	3.5	None	-	-	-	35.2	45	37	214	38.7	45	41	218
												2EH04532558	23.0	1	23.0	39.3	45	37	214	43.6	45	41	218
												2EH04535058	45.9	2	46.0	68.0	70	63	214	72.4	80	67	218
												2EH04537558	68.9	2	69.1	79.6	90	89	214	84.0	90	93	218
20 (20)	208-3-60	26.5	255	33.3	255			2.0	13.5	5.0	9.6	None	-	-	-	99.6	125	105	651	109.2	125	116	661
												2EH04532525	18.8	1	52.1	99.6	125	105	651	109.2	125	116	661
												2EH04535025	37.6	2	104.3	159.8	175	147	651	171.8	175	158	661
												2EH04537525	56.3	2	156.2	185.6	200	207	651	197.6	200	218	661
	230-3-60	26.5	255	33.3	255			2.3	13.4	5.0	8.7	None	-	-	-	100.7	125	106	653	109.4	125	116	661
												2EH04532525	23.0	1	57.7	101.4	125	106	653	112.3	125	116	661
												2EH04535025	45.9	2	115.2	173.3	175	159	653	184.1	200	169	661
												2EH04537525	68.9	2	172.9	202.2	225	226	653	213.0	225	236	661
	460-3-60	14.0	123	15.4	140			1.3	6.7	2.2	4.3	None	-	-	-	49.6	60	53	335	53.9	60	58	339
												2EH04532546	23.0	1	28.8	49.9	60	53	335	55.3	60	58	339
												2EH04535046	45.9	2	57.6	85.9	90	79	335	91.3	100	84	339
												2EH04537546	68.9	2	86.4	100.3	110	112	335	105.7	110	117	339
	575-3-60	11.5	93.7	12.9	107.6			1.0	5.4	1.5	3.5	None	-	-	-	40.0	50	42	257	43.5	50	46	260
												2EH04532558	23.0	1	23.0	40.0	50	42	257	43.6	50	46	260
												2EH04535058	45.9	2	46.0	68.0	70	63	257	72.4	80	67	260
												2EH04537558	68.9	2	69.1	79.6	90	89	257	84.0	90	93	260

Table 29: KK15 to KK25 VFD customer supplied standard static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	19.8	5.0	9.6	None	-	-	-	133.9	150	142	805	143.5	175	153	814
												2EH04532525	18.8	1	52.1	133.9	150	142	805	143.5	175	153	814
												2EH04535025	37.6	2	104.3	167.6	175	154	805	179.6	200	165	814
												2EH04537525	56.3	2	156.2	193.5	200	214	805	205.5	225	225	814
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	19.8	5.0	8.7	None	-	-	-	135.1	175	144	807	143.8	175	154	815
												2EH04532525	23.0	1	57.7	135.1	175	144	807	143.8	175	154	815
												2EH04535025	45.9	2	115.2	181.3	200	167	807	192.1	200	177	815
												2EH04537525	68.9	2	172.9	210.2	225	233	807	221.0	225	243	815
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	9.9	2.2	4.3	None	-	-	-	61.1	80	65	382	65.4	80	70	386
												2EH04532546	23.0	1	28.8	61.1	80	65	382	65.4	80	70	386
												2EH04535046	45.9	2	57.6	89.9	90	83	382	95.3	100	88	386
												2EH04537546	68.9	2	86.4	104.3	110	116	382	109.7	110	121	386
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	7.9	1.5	3.5	None	-	-	-	50.2	60	53	294	53.7	70	57	298
												2EH04532558	23.0	1	23.0	50.2	60	53	294	53.7	70	57	298
												2EH04535058	45.9	2	46.0	71.1	80	65	294	75.5	80	69	298
												2EH04537558	68.9	2	69.1	82.7	90	92	294	87.1	90	96	298

Table 30: KK15 to KK25 VFD CS standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	9.9	6.7	9.6	None	-	-	-	85.4	110	91	464	95.0	110	102	474
												2EH04532525	18.8	1	52.1	94.3	110	91	464	106.3	110	102	474
												2EH04535025	37.6	2	104.3	159.5	175	147	464	171.5	175	158	474
												2EH04537525	56.3	2	156.2	185.3	200	206	464	197.3	200	217	474
	230-3-60	26.3	178.5	25.0	190			2.1	9.4	6.7	8.7	None	-	-	-	84.9	110	90	473	93.6	110	100	481
												2EH04532525	23.0	1	57.7	100.6	110	93	473	111.5	125	103	481
												2EH04535025	45.9	2	115.2	172.5	175	159	473	183.4	200	169	481
												2EH04537525	68.9	2	172.9	201.4	225	225	473	212.3	225	235	481
	460-3-60	11.0	95.3	12.2	100			1.1	4.7	3.4	4.3	None	-	-	-	40.0	50	42	248	44.3	50	47	252
												2EH04532546	23.0	1	28.8	50.4	60	46	248	55.8	60	51	252
												2EH04535046	45.9	2	57.6	86.4	90	79	248	91.8	100	84	252
												2EH04537546	68.9	2	86.4	100.8	110	113	248	106.2	110	118	252
	575-3-60	9.2	65	9.3	72			0.9	4.3	2.7	3.5	None	-	-	-	32.3	40	35	186	35.8	45	39	190
												2EH04532558	23.0	1	23.0	40.9	45	38	186	45.3	50	42	190
												2EH04535058	45.9	2	46.0	69.6	70	64	186	74.0	80	68	190
												2EH04537558	68.9	2	69.1	81.2	90	91	186	85.6	90	95	190
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	13.5	6.7	9.6	None	-	-	-	97.3	125	104	580	106.9	125	115	589
												2EH04532525	18.8	1	52.1	98.8	125	104	580	110.8	125	115	589
												2EH04535025	37.6	2	104.3	164.0	175	151	580	176.0	200	162	589
												2EH04537525	56.3	2	156.2	189.8	200	211	580	201.8	225	222	589
	230-3-60	26.8	190.7	28.5	255			2.3	13.4	6.7	8.7	None	-	-	-	98.4	125	105	581	107.1	125	115	589
												2EH04532525	23.0	1	57.7	105.6	125	105	581	116.5	125	115	589
												2EH04535025	45.9	2	115.2	177.5	200	163	581	188.4	200	173	589
												2EH04537525	68.9	2	172.9	206.4	225	230	581	217.3	225	240	589
	460-3-60	12.5	100.2	13.5	123			1.3	6.7	3.4	4.3	None	-	-	-	48.1	60	51	293	52.4	60	56	297
												2EH04532546	23.0	1	28.8	52.9	60	51	293	58.3	60	56	297
												2EH04535046	45.9	2	57.6	88.9	90	82	293	94.3	100	87	297
												2EH04537546	68.9	2	86.4	103.3	110	115	293	108.7	110	120	297
	575-3-60	9.4	65	10.7	93.7			1.0	5.4	2.7	3.5	None	-	-	-	37.6	45	40	213	41.1	50	44	217
												2EH04532558	23.0	1	23.0	42.3	45	40	213	46.6	50	44	217
												2EH04535058	45.9	2	46.0	71.0	80	65	213	75.4	80	69	217
												2EH04537558	68.9	2	69.1	82.6	90	92	213	87.0	90	96	217
20 (20)	208-3-60	26.5	255	33.3	255			2.0	13.5	6.7	9.6	None	-	-	-	103.0	125	109	644	112.6	125	120	653
												2EH04532525	18.8	1	52.1	103.0	125	109	644	112.6	125	120	653
												2EH04535025	37.6	2	104.3	164.0	175	151	644	176.0	200	162	653
												2EH04537525	56.3	2	156.2	189.8	200	211	644	201.8	225	222	653
	230-3-60	26.5	255	33.3	255			2.3	13.4	6.7	8.7	None	-	-	-	104.1	125	110	645	112.8	125	120	654
												2EH04532525	23.0	1	57.7	105.6	125	110	645	116.5	125	120	654
												2EH04535025	45.9	2	115.2	177.5	200	163	645	188.4	200	173	654
												2EH04537525	68.9	2	172.9	206.4	225	230	645	217.3	225	240	654
	460-3-60	14.0	123	15.4	140			1.3	6.7	3.4	4.3	None	-	-	-	52.0	60	55	332	56.3	70	60	337
												2EH04532546	23.0	1	28.8	52.9	60	55	332	58.3	70	60	337
												2EH04535046	45.9	2	57.6	88.9	90	82	332	94.3	100	87	337
												2EH04537546	68.9	2	86.4	103.3	110	115	332	108.7	110	120	337
	575-3-60	11.5	93.7	12.9	107.6			1.0	5.4	2.7	3.5	None	-	-	-	42.4	50	45	256	45.9	50	49	259
												2EH04532558	23.0	1	23.0	42.4	50	45	256	46.6	50	49	259
												2EH04535058	45.9	2	46.0	71.0	80	65	256	75.4	80	69	259
												2EH04537558	68.9	2	69.1	82.6	90	92	256	87.0	90	96	259

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Table 30: KK15 to KK25 VFD CS standard static with modulating power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	19.8	6.7	9.6	None	-	-	-	137.3	175	146	797	146.9	175	157	807
												2EH04532525	18.8	1	52.1	137.3	175	146	797	146.9	175	157	807
												2EH04535025	37.6	2	104.3	171.9	175	158	797	183.9	200	169	807
												2EH04537525	56.3	2	156.2	197.7	200	218	797	209.7	225	229	807
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	19.8	6.7	8.7	None	-	-	-	138.5	175	147	799	147.2	175	157	808
												2EH04532525	23.0	1	57.7	138.5	175	147	799	147.2	175	157	808
												2EH04535025	45.9	2	115.2	185.5	200	171	799	196.4	200	181	808
												2EH04537525	68.9	2	172.9	214.4	225	237	799	225.3	250	247	808
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	9.9	3.4	4.3	None	-	-	-	63.5	80	68	379	67.8	80	72	384
												2EH04532546	23.0	1	28.8	63.5	80	68	379	67.8	80	72	384
												2EH04535046	45.9	2	57.6	92.9	100	85	379	98.3	100	90	384
												2EH04537546	68.9	2	86.4	107.3	110	119	379	112.7	125	124	384
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	7.9	2.7	3.5	None	-	-	-	52.6	60	56	293	56.1	70	60	297
												2EH04532558	23.0	1	23.0	52.6	60	56	293	56.1	70	60	297
												2EH04535058	45.9	2	46.0	74.1	80	68	293	78.5	80	72	297
												2EH04537558	68.9	2	69.1	85.7	90	95	293	90.1	100	99	297

VFD customer supplied medium static

Table 31: KK15 to KK25 and KS15 to KS25 VFD customer supplied medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.5	9.6	None	-	-	-	75.6	100	79	481	85.2	110	90	491
											2EH04532525	18.8	1	52.1	82.0	100	79	481	94.0	110	90	491
											2EH04535025	37.6	2	104.3	147.3	150	135	481	159.3	175	147	491
											2EH04537525	56.3	2	156.2	173.1	200	195	481	185.1	200	206	491
	230-3-60	26.3	178.5	25.0	190			2.1	13.4	8.7	None	-	-	-	75.5	100	79	481	84.2	110	89	489
											2EH04532525	23.0	1	57.7	88.9	100	82	481	99.8	110	92	489
											2EH04535025	45.9	2	115.2	160.8	175	148	481	171.6	175	158	489
											2EH04537525	68.9	2	172.9	189.7	225	214	481	200.5	225	224	489
	460-3-60	11.0	95.3	12.2	100			1.1	6.7	4.3	None	-	-	-	35.2	45	37	252	39.5	50	42	256
											2EH04532546	23.0	1	28.8	44.4	45	41	252	49.8	50	46	256
											2EH04535046	45.9	2	57.6	80.4	90	74	252	85.8	90	79	256
											2EH04537546	68.9	2	86.4	94.8	110	107	252	100.2	110	112	256
	575-3-60	9.2	65	9.3	72			0.9	5.4	3.5	None	-	-	-	28.0	35	30	181	31.5	40	34	185
											2EH04532558	23.0	1	23.0	35.5	40	33	181	39.9	40	37	185
											2EH04535058	45.9	2	46.0	64.3	70	59	181	68.6	70	63	185
											2EH04537558	68.9	2	69.1	75.9	90	86	181	80.2	90	90	185
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	19.8	9.6	None	-	-	-	90.2	110	96	593	99.8	125	107	602
											2EH04532525	18.8	1	52.1	90.2	110	96	593	101.9	125	107	602
											2EH04535025	37.6	2	104.3	155.1	175	143	593	167.1	175	154	602
											2EH04537525	56.3	2	156.2	181.0	200	202	593	193.0	200	213	602
	230-3-60	26.8	190.7	28.5	255			2.3	19.8	8.7	None	-	-	-	91.4	110	97	595	100.1	125	107	604
											2EH04532525	23.0	1	57.7	96.9	110	97	595	107.8	125	107	604
											2EH04535025	45.9	2	115.2	168.8	175	155	595	179.6	200	165	604
											2EH04537525	68.9	2	172.9	197.7	225	222	595	208.5	225	232	604
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	4.3	None	-	-	-	44.5	50	47	300	48.8	60	52	304
											2EH04532546	23.0	1	28.8	48.4	50	47	300	53.8	60	52	304
											2EH04535046	45.9	2	57.6	84.4	90	78	300	89.8	90	83	304
											2EH04537546	68.9	2	86.4	98.8	110	111	300	104.2	110	116	304
	575-3-60	9.4	65	10.7	93.7			1.0	7.9	3.5	None	-	-	-	34.7	45	37	217	38.2	45	41	220
											2EH04532558	23.0	1	23.0	38.6	45	37	217	43.0	45	41	220
											2EH04535058	45.9	2	46.0	67.4	70	62	217	71.8	80	66	220
											2EH04537558	68.9	2	69.1	79.0	90	89	217	83.4	90	93	220

Table 31: KK15 to KK25 and KS15 to KS25 VFD customer supplied medium static without power exhaust (for side and end return)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
20 (20)	208-3-60	26.5	255	33.3	255			2.0	19.8	9.6	None	-	-	-	95.9	125	101	657	105.5	125	112	667
											2EH04532525	18.8	1	52.1	95.9	125	101	657	105.5	125	112	667
											2EH04535025	37.6	2	104.3	155.1	175	143	657	167.1	175	154	667
											2EH04537525	56.3	2	156.2	181.0	200	202	657	193.0	200	213	667
	230-3-60	26.5	255	33.3	255			2.3	19.8	8.7	None	-	-	-	97.1	125	102	659	105.8	125	112	668
											2EH04532525	23.0	1	57.7	97.1	125	102	659	107.8	125	112	668
											2EH04535025	45.9	2	115.2	168.8	175	155	659	179.6	200	165	668
											2EH04537525	68.9	2	172.9	197.7	225	222	659	208.5	225	232	668
	460-3-60	14.0	123	15.4	140			1.3	9.9	4.3	None	-	-	-	48.4	60	51	339	52.7	60	56	344
											2EH04532546	23.0	1	28.8	48.4	60	51	339	53.8	60	56	344
											2EH04535046	45.9	2	57.6	84.4	90	78	339	89.8	90	83	344
											2EH04537546	68.9	2	86.4	98.8	110	111	339	104.2	110	116	344
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.9	3.5	None	-	-	-	39.5	50	42	259	43.0	50	46	263
											2EH04532558	23.0	1	23.0	39.5	50	42	259	43.0	50	46	263
											2EH04535058	45.9	2	46.0	67.4	70	62	259	71.8	80	66	263
											2EH04537558	68.9	2	69.1	79.0	90	89	259	83.4	90	93	263
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	25.4	9.6	None	-	-	-	129.5	150	137	834	139.1	175	148	844
											2EH04532525	18.8	1	52.1	129.5	150	137	834	139.1	175	148	844
											2EH04535025	37.6	2	104.3	162.1	175	149	834	174.1	175	160	844
											2EH04537525	56.3	2	156.2	188.0	200	209	834	200.0	200	220	844
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	25.4	8.7	None	-	-	-	130.7	150	138	836	139.4	175	148	845
											2EH04532525	23.0	1	57.7	130.7	150	138	836	139.4	175	148	845
											2EH04535025	45.9	2	115.2	175.8	200	162	836	186.6	200	172	845
											2EH04537525	68.9	2	172.9	204.7	225	228	836	215.5	225	238	845
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	12.7	4.3	None	-	-	-	59.5	70	63	398	63.8	80	68	402
											2EH04532546	23.0	1	28.8	59.5	70	63	398	63.8	80	68	402
											2EH04535046	45.9	2	57.6	87.9	90	81	398	93.3	100	86	402
											2EH04537546	68.9	2	86.4	102.3	110	114	398	107.7	110	119	402
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	10.5	3.5	None	-	-	-	49.8	60	52	311	53.3	70	56	314
											2EH04532558	23.0	1	23.0	49.8	60	52	311	53.3	70	56	314
											2EH04535058	45.9	2	46.0	70.6	80	65	311	75.0	80	69	314
											2EH04537558	68.9	2	69.1	82.2	90	92	311	86.6	90	96	314

Table 32: KK15 to KK25 VFD customer supplied medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.5	5.0	9.6	None	-	-	-	85.6	110	91	502	95.2	110	102	512
												2EH04532525	18.8	1	52.1	94.5	110	91	502	106.5	110	102	512
												2EH04535025	37.6	2	104.3	159.8	175	147	502	171.8	175	158	512
												2EH04537525	56.3	2	156.2	185.6	200	207	502	197.6	200	218	512
	230-3-60	26.3	178.5	25.0	190			2.1	13.4	5.0	8.7	None	-	-	-	85.5	110	91	502	94.2	110	101	510
												2EH04532525	23.0	1	57.7	101.4	110	93	502	112.3	125	103	510
												2EH04535025	45.9	2	115.2	173.3	175	159	502	184.1	200	169	510
												2EH04537525	68.9	2	172.9	202.2	225	226	502	213.0	225	236	510
	460-3-60	11.0	95.3	12.2	100			1.1	6.7	2.2	4.3	None	-	-	-	39.6	50	42	261	43.9	50	47	265
												2EH04532546	23.0	1	28.8	49.9	50	46	261	55.3	60	51	265
												2EH04535046	45.9	2	57.6	85.9	90	79	261	91.3	100	84	265
												2EH04537546	68.9	2	86.4	100.3	110	112	261	105.7	110	117	265
	575-3-60	9.2	65	9.3	72			0.9	5.4	1.5	3.5	None	-	-	-	31.0	40	33	187	34.5	40	37	191
												2EH04532558	23.0	1	23.0	39.3	40	36	187	43.6	45	40	191
												2EH04535058	45.9	2	46.0	68.0	70	63	187	72.4	80	67	191
												2EH04537558	68.9	2	69.1	79.6	90	89	187	84.0	90	93	191
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	19.8	5.0	9.6	None	-	-	-	100.2	125	107	614	109.8	125	118	623
												2EH04532525	18.8	1	52.1	102.4	125	107	614	114.4	125	118	623
												2EH04535025	37.6	2	104.3	167.6	175	154	614	179.6	200	165	623
												2EH04537525	56.3	2	156.2	193.5	200	214	614	205.5	225	225	623
	230-3-60	26.8	190.7	28.5	255			2.3	19.8	5.0	8.7	None	-	-	-	101.4	125	108	616	110.1	125	118	625
												2EH04532525	23.0	1	57.7	109.4	125	108	616	120.3	125	118	625
												2EH04535025	45.9	2	115.2	181.3	200	167	616	192.1	200	177	625
												2EH04537525	68.9	2	172.9	210.2	225	233	616	221.0	225	243	625
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	2.2	4.3	None	-	-	-	48.9	60	52	309	53.2	60	57	313
												2EH04532546	23.0	1	28.8	53.9	60	52	309	59.3	60	57	313
												2EH04535046	45.9	2	57.6	89.9	90	83	309	95.3	100	88	313
												2EH04537546	68.9	2	86.4	104.3	110	116	309	109.7	110	121	313
	575-3-60	9.4	65	10.7	93.7			1.0	7.9	1.5	3.5	None	-	-	-	37.7	45	40	223	41.2	50	44	227
												2EH04532558	23.0	1	23.0	42.4	45	40	223	46.8	50	44	227
												2EH04535058	45.9	2	46.0	71.1	80	65	223	75.5	80	69	227
												2EH04537558	68.9	2	69.1	82.7	90	92	223	87.1	90	96	227
20 (20)	208-3-60	26.5	255	33.3	255			2.0	19.8	5.0	9.6	None	-	-	-	105.9	125	112	678	115.5	125	123	688
												2EH04532525	18.8	1	52.1	105.9	125	112	678	115.5	125	123	688
												2EH04535025	37.6	2	104.3	167.6	175	154	678	179.6	200	165	688
												2EH04537525	56.3	2	156.2	193.5	200	214	678	205.5	225	225	688
	230-3-60	26.5	255	33.3	255			2.3	19.8	5.0	8.7	None	-	-	-	107.1	125	114	680	115.8	125	124	689
												2EH04532525	23.0	1	57.7	109.4	125	114	680	120.3	125	124	689
												2EH04535025	45.9	2	115.2	181.3	200	167	680	192.1	200	177	689
												2EH04537525	68.9	2	172.9	210.2	225	233	680	221.0	225	243	689
	460-3-60	14.0	123	15.4	140			1.3	9.9	2.2	4.3	None	-	-	-	52.8	60	56	349	57.1	70	61	353
												2EH04532546	23.0	1	28.8	53.9	60	56	349	59.3	70	61	353
												2EH04535046	45.9	2	57.6	89.9	90	83	349	95.3	100	88	353
												2EH04537546	68.9	2	86.4	104.3	110	116	349	109.7	110	121	353
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.9	1.5	3.5	None	-	-	-	42.5	50	45	266	46.0	50	49	269
												2EH04532558	23.0	1	23.0	42.5	50	45	266	46.8	50	49	269
												2EH04535058	45.9	2	46.0	71.1	80	65	266	75.5	80	69	269
												2EH04537558	68.9	2	69.1	82.7	90	92	266	87.1	90	96	269

Table 32: KK15 to KK25 VFD customer supplied medium static with on/off power exhaust (for end return only)

Size (ton)	Nominal Unit Voltage	Comp. 1		Comp. 2		Comp. 3		OD Fan Motors (each) FLA	Supply Blower Motor FLA	Pwr Exh Motor FLA	120V trans FLA	Electric Heat Option Field Installed Kit				MCA (A)	Max f/b Size (A)	Min Disconnect Rating		MCA w/ 120V trans (A)	Max f/b Size w/ 120V trans (A)	Min Disconnect Rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	25.4	5.0	9.6	None	-	-	-	139.5	175	149	855	149.1	175	160	865
												2EH04532525	18.8	1	52.1	139.5	175	149	855	149.1	175	160	865
												2EH04535025	37.6	2	104.3	174.6	175	161	855	186.6	200	172	865
												2EH04537525	56.3	2	156.2	200.5	225	220	855	212.5	225	231	865
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	25.4	5.0	8.7	None	-	-	-	140.7	175	150	857	149.4	175	160	866
												2EH04532525	23.0	1	57.7	140.7	175	150	857	149.4	175	160	866
												2EH04535025	45.9	2	115.2	188.3	200	173	857	199.1	200	183	866
												2EH04537525	68.9	2	172.9	217.2	225	240	857	228.0	250	250	866
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	12.7	2.2	4.3	None	-	-	-	63.9	80	68	407	68.2	80	73	411
												2EH04532546	23.0	1	28.8	63.9	80	68	407	68.2	80	73	411
												2EH04535046	45.9	2	57.6	93.4	100	86	407	98.8	100	91	411
												2EH04537546	68.9	2	86.4	107.8	110	119	407	113.2	125	124	411
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	10.5	1.5	3.5	None	-	-	-	52.8	60	56	317	56.3	70	60	321
												2EH04532558	23.0	1	23.0	52.8	60	56	317	56.3	70	60	321
												2EH04535058	45.9	2	46.0	74.4	80	68	317	78.8	80	72	321
												2EH04537558	68.9	2	69.1	86.0	90	95	317	90.4	100	99	321

Table 33: KK15 to KK25 VFD customer supplied medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	13.5	6.7	9.6	None	-	-	-	89.0	110	95	495	98.6	110	106	504
												2EH04532525	18.8	1	52.1	98.8	110	95	495	110.8	125	106	504
												2EH04535025	37.6	2	104.3	164.0	175	151	495	176.0	200	162	504
												2EH04537525	56.3	2	156.2	189.8	200	211	495	201.8	225	222	504
	230-3-60	26.3	178.5	25.0	190			2.1	13.4	6.7	8.7	None	-	-	-	88.9	110	95	494	97.6	110	105	503
												2EH04532525	23.0	1	57.7	105.6	110	97	494	116.5	125	107	503
												2EH04535025	45.9	2	115.2	177.5	200	163	494	188.4	200	173	503
												2EH04537525	68.9	2	172.9	206.4	225	230	494	217.3	225	240	503
	460-3-60	11.0	95.3	12.2	100			1.1	6.7	3.4	4.3	None	-	-	-	42.0	50	45	259	46.3	50	50	263
												2EH04532546	23.0	1	28.8	52.9	60	49	259	58.3	60	54	263
												2EH04535046	45.9	2	57.6	88.9	90	82	259	94.3	100	87	263
												2EH04537546	68.9	2	86.4	103.3	110	115	259	108.7	110	120	263
	575-3-60	9.2	65	9.3	72			0.9	5.4	2.7	3.5	None	-	-	-	33.4	40	36	186	36.9	45	40	190
												2EH04532558	23.0	1	23.0	42.3	45	39	186	46.6	50	43	190
												2EH04535058	45.9	2	46.0	71.0	80	65	186	75.4	80	69	190
												2EH04537558	68.9	2	69.1	82.6	90	92	186	87.0	90	96	190
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	19.8	6.7	9.6	None	-	-	-	103.6	125	111	606	113.2	125	122	616
												2EH04532525	18.8	1	52.1	106.6	125	111	606	118.6	125	122	616
												2EH04535025	37.6	2	104.3	171.9	175	158	606	183.9	200	169	616
												2EH04537525	56.3	2	156.2	197.7	200	218	606	209.7	225	229	616
	230-3-60	26.8	190.7	28.5	255			2.3	19.8	6.7	8.7	None	-	-	-	104.8	125	112	608	113.5	125	122	617
												2EH04532525	23.0	1	57.7	113.6	125	112	608	124.5	125	122	617
												2EH04535025	45.9	2	115.2	185.5	200	171	608	196.4	200	181	617
												2EH04537525	68.9	2	172.9	214.4	225	237	608	225.3	250	247	617
	460-3-60	12.5	100.2	13.5	123			1.3	9.9	3.4	4.3	None	-	-	-	51.3	60	55	306	55.6	60	60	311
												2EH04532546	23.0	1	28.8	56.9	60	55	306	62.3	70	60	311
												2EH04535046	45.9	2	57.6	92.9	100	85	306	98.3	100	90	311
												2EH04537546	68.9	2	86.4	107.3	110	119	306	112.7	125	124	311
	575-3-60	9.4	65	10.7	93.7			1.0	7.9	2.7	3.5	None	-	-	-	40.1	50	43	222	43.6	50	47	226
												2EH04532558	23.0	1	23.0	45.4	50	43	222	49.8	50	47	226
												2EH04535058	45.9	2	46.0	74.1	80	68	222	78.5	80	72	226
												2EH04537558	68.9	2	69.1	85.7	90	95	222	90.1	100	99	226
20 (20)	208-3-60	26.5	255	33.3	255			2.0	19.8	6.7	9.6	None	-	-	-	109.3	125	116	671	118.9	150	127	680
												2EH04532525	18.8	1	52.1	109.3	125	116	671	118.9	150	127	680
												2EH04535025	37.6	2	104.3	171.9	175	158	671	183.9	200	169	680
												2EH04537525	56.3	2	156.2	197.7	200	218	671	209.7	225	229	680
	230-3-60	26.5	255	33.3	255			2.3	19.8	6.7	8.7	None	-	-	-	110.5	125	118	673	119.2	150	128	681
												2EH04532525	23.0	1	57.7	113.6	125	118	673	124.5	150	128	681
												2EH04535025	45.9	2	115.2	185.5	200	171	673	196.4	200	181	681
												2EH04537525	68.9	2	172.9	214.4	225	237	673	225.3	250	247	681
	460-3-60	14.0	123	15.4	140			1.3	9.9	3.4	4.3	None	-	-	-	55.2	70	59	346	59.5	70	64	350
												2EH04532546	23.0	1	28.8	56.9	70	59	346	62.3	70	64	350
												2EH04535046	45.9	2	57.6	92.9	100	85	346	98.3	100	90	350
												2EH04537546	68.9	2	86.4	107.3	110	119	346	112.7	125	124	350
	575-3-60	11.5	93.7	12.9	107.6			1.0	7.9	2.7	3.5	None	-	-	-	44.9	50	48	265	48.4	60	52	268
												2EH04532558	23.0	1	23.0	45.4	50	48	265	49.8	60	52	268
												2EH04535058	45.9	2	46.0	74.1	80	68	265	78.5	80	72	268
												2EH04537558	68.9	2	69.1	85.7	90	95	265	90.1	100	99	268

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Table 33: KK15 to KK25 VFD customer supplied medium static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	25.4	6.7	9.6	None	-	-	-	142.9	175	152	847	152.5	175	164	857
												2EH04532525	18.8	1	52.1	142.9	175	152	847	152.5	175	164	857
												2EH04535025	37.6	2	104.3	178.9	200	165	847	190.9	200	176	857
												2EH04537525	56.3	2	156.2	204.7	225	224	847	216.7	225	235	857
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	25.4	6.7	8.7	None	-	-	-	144.1	175	154	849	152.8	175	164	858
												2EH04532525	23.0	1	57.7	144.1	175	154	849	152.8	175	164	858
												2EH04535025	45.9	2	115.2	192.5	200	177	849	203.4	225	187	858
												2EH04537525	68.9	2	172.9	221.4	225	243	849	232.3	250	253	858
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	12.7	3.4	4.3	None	-	-	-	66.3	80	71	405	70.6	80	76	409
												2EH04532546	23.0	1	28.8	66.3	80	71	405	70.6	80	76	409
												2EH04535046	45.9	2	57.6	96.4	100	89	405	101.8	110	94	409
												2EH04537546	68.9	2	86.4	110.8	125	122	405	116.2	125	127	409
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	10.5	2.7	3.5	None	-	-	-	55.2	70	59	316	58.7	70	63	320
												2EH04532558	23.0	1	23.0	55.2	70	59	316	58.7	70	63	320
												2EH04535058	45.9	2	46.0	77.4	80	71	316	81.8	90	75	320
												2EH04537558	68.9	2	69.1	89.0	90	98	316	93.4	100	102	320

VFD customer supplied high static

Table 34: KK15 to KK25 and KS15 to KS25 VFD customer supplied high static without power exhaust (for side and end return)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	19.8	9.6	None	-	-	-	81.9	100	87	508	91.5	110	98	518
											2EH04532525	18.8	1	52.1	89.9	100	87	508	101.9	110	98	518
											2EH04535025	37.6	2	104.3	155.1	175	143	508	167.1	175	154	518
											2EH04537525	56.3	2	156.2	181.0	200	202	508	193.0	200	213	518
	230-3-60	26.3	178.5	25.0	190			2.1	19.8	8.7	None	-	-	-	81.9	100	87	508	90.6	110	97	517
											2EH04532525	23.0	1	57.7	96.9	100	89	508	107.8	110	99	517
											2EH04535025	45.9	2	115.2	168.8	175	155	508	179.6	200	165	517
											2EH04537525	68.9	2	172.9	197.7	225	222	508	208.5	225	232	517
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	4.3	None	-	-	-	38.4	50	41	266	42.7	50	46	270
											2EH04532546	23.0	1	28.8	48.4	50	45	266	53.8	60	49	270
											2EH04535046	45.9	2	57.6	84.4	90	78	266	89.8	90	83	270
											2EH04537546	68.9	2	86.4	98.8	110	111	266	104.2	110	116	270
	575-3-60	9.2	65	9.3	72			0.9	7.9	3.5	None	-	-	-	30.5	35	32	190	34.0	40	36	193
											2EH04532558	23.0	1	23.0	38.6	40	36	190	43.0	45	40	193
											2EH04535058	45.9	2	46.0	67.4	70	62	190	71.8	80	66	193
											2EH04537558	68.9	2	69.1	79.0	90	89	190	83.4	90	93	193
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	25.4	9.6	None	-	-	-	95.8	110	102	643	105.4	125	113	653
											2EH04532525	18.8	1	52.1	96.9	110	102	643	108.9	125	113	653
											2EH04535025	37.6	2	104.3	162.1	175	149	643	174.1	175	160	653
											2EH04537525	56.3	2	156.2	188.0	200	209	643	200.0	200	220	653
	230-3-60	26.8	190.7	28.5	255			2.3	25.4	8.7	None	-	-	-	97.0	125	103	645	105.7	125	113	654
											2EH04532525	23.0	1	57.7	103.9	125	103	645	114.8	125	113	654
											2EH04535025	45.9	2	115.2	175.8	200	162	645	186.6	200	172	654
											2EH04537525	68.9	2	172.9	204.7	225	228	645	215.5	225	238	654
	460-3-60	12.5	100.2	13.5	123			1.3	12.7	4.3	None	-	-	-	47.3	60	50	325	51.6	60	55	329
											2EH04532546	23.0	1	28.8	51.9	60	50	325	57.3	60	55	329
											2EH04535046	45.9	2	57.6	87.9	90	81	325	93.3	100	86	329
											2EH04537546	68.9	2	86.4	102.3	110	114	325	107.7	110	119	329
	575-3-60	9.4	65	10.7	93.7			1.0	10.5	3.5	None	-	-	-	37.3	45	40	240	40.8	50	44	243
											2EH04532558	23.0	1	23.0	41.9	45	40	240	46.3	50	44	243
											2EH04535058	45.9	2	46.0	70.6	80	65	240	75.0	80	69	243
											2EH04537558	68.9	2	69.1	82.2	90	92	240	86.6	90	96	243

Table 34: KK15 to KK25 and KS15 to KS25 VFD customer supplied high static without power exhaust (for side and end return)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA				Model	kW	Stages	A			FLA	LRA			FLA	LRA
20 (20)	208-3-60	26.5	255	33.3	255			2.0	25.4	9.6	None	-	-	-	101.5	125	107	708	111.1	125	118	717
											2EH04532525	18.8	1	52.1	101.5	125	107	708	111.1	125	118	717
											2EH04535025	37.6	2	104.3	162.1	175	149	708	174.1	175	160	717
											2EH04537525	56.3	2	156.2	188.0	200	209	708	200.0	200	220	717
	230-3-60	26.5	255	33.3	255			2.3	25.4	8.7	None	-	-	-	102.7	125	109	710	111.4	125	119	718
											2EH04532525	23.0	1	57.7	103.9	125	109	710	114.8	125	119	718
											2EH04535025	45.9	2	115.2	175.8	200	162	710	186.6	200	172	718
											2EH04537525	68.9	2	172.9	204.7	225	228	710	215.5	225	238	718
	460-3-60	14.0	123	15.4	140			1.3	12.7	4.3	None	-	-	-	51.2	60	54	365	55.5	70	59	369
											2EH04532546	23.0	1	28.8	51.9	60	54	365	57.3	70	59	369
											2EH04535046	45.9	2	57.6	87.9	90	81	365	93.3	100	86	369
											2EH04537546	68.9	2	86.4	102.3	110	114	365	107.7	110	119	369
	575-3-60	11.5	93.7	12.9	107.6			1.0	10.5	3.5	None	-	-	-	42.1	50	45	282	45.6	50	49	286
											2EH04532558	23.0	1	23.0	42.1	50	45	282	46.3	50	49	286
											2EH04535058	45.9	2	46.0	70.6	80	65	282	75.0	80	69	286
											2EH04537558	68.9	2	69.1	82.2	90	92	282	86.6	90	96	286
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.2	9.6	None	-	-	-	134.3	175	143	894	143.9	175	154	904
											2EH04532525	18.8	1	52.1	134.3	175	143	894	143.9	175	154	904
											2EH04535025	37.6	2	104.3	168.1	175	155	894	180.1	200	166	904
											2EH04537525	56.3	2	156.2	194.0	200	214	894	206.0	225	225	904
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.2	8.7	None	-	-	-	135.5	175	144	896	144.2	175	154	905
											2EH04532525	23.0	1	57.7	135.5	175	144	896	144.2	175	154	905
											2EH04535025	45.9	2	115.2	181.8	200	167	896	192.6	200	177	905
											2EH04537525	68.9	2	172.9	210.7	225	234	896	221.5	225	244	905
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	15.1	4.3	None	-	-	-	61.9	80	66	428	66.2	80	71	432
											2EH04532546	23.0	1	28.8	61.9	80	66	428	66.2	80	71	432
											2EH04535046	45.9	2	57.6	90.9	100	84	428	96.3	100	89	432
											2EH04537546	68.9	2	86.4	105.3	110	117	428	110.7	125	122	432
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	12.0	3.5	None	-	-	-	51.3	60	54	330	54.8	70	58	334
											2EH04532558	23.0	1	23.0	51.3	60	54	330	54.8	70	58	334
											2EH04535058	45.9	2	46.0	72.5	80	67	330	76.9	80	71	334
											2EH04537558	68.9	2	69.1	84.1	90	93	330	88.5	90	97	334

Table 35: KK15 to KK25 VFD customer supplied high static with on/off power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	19.8	5.0	9.6	None	-	-	-	91.9	110	98	529	101.5	125	109	539
												2EH04532525	18.8	1	52.1	102.4	110	98	529	114.4	125	109	539
												2EH04535025	37.6	2	104.3	167.6	175	154	529	179.6	200	165	539
												2EH04537525	56.3	2	156.2	193.5	200	214	529	205.5	225	225	539
	230-3-60	26.3	178.5	25.0	190			2.1	19.8	5.0	8.7	None	-	-	-	91.9	110	98	529	100.6	125	108	538
												2EH04532525	23.0	1	57.7	109.4	110	101	529	120.3	125	111	538
												2EH04535025	45.9	2	115.2	181.3	200	167	529	192.1	200	177	538
												2EH04537525	68.9	2	172.9	210.2	225	233	529	221.0	225	243	538
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	2.2	4.3	None	-	-	-	42.8	50	46	275	47.1	50	51	279
												2EH04532546	23.0	1	28.8	53.9	60	50	275	59.3	60	55	279
												2EH04535046	45.9	2	57.6	89.9	90	83	275	95.3	100	88	279
												2EH04537546	68.9	2	86.4	104.3	110	116	275	109.7	110	121	279
	575-3-60	9.2	65	9.3	72			0.9	7.9	1.5	3.5	None	-	-	-	33.5	40	36	196	37.0	45	40	200
												2EH04532558	23.0	1	23.0	42.4	45	39	196	46.8	50	43	200
												2EH04535058	45.9	2	46.0	71.1	80	65	196	75.5	80	69	200
												2EH04537558	68.9	2	69.1	82.7	90	92	196	87.1	90	96	200
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	25.4	5.0	9.6	None	-	-	-	105.8	125	114	664	115.4	125	125	674
												2EH04532525	18.8	1	52.1	109.4	125	114	664	121.4	125	125	674
												2EH04535025	37.6	2	104.3	174.6	175	161	664	186.6	200	172	674
												2EH04537525	56.3	2	156.2	200.5	225	220	664	212.5	225	231	674
	230-3-60	26.8	190.7	28.5	255			2.3	25.4	5.0	8.7	None	-	-	-	107.0	125	115	666	115.7	125	125	675
												2EH04532525	23.0	1	57.7	116.4	125	115	666	127.3	150	125	675
												2EH04535025	45.9	2	115.2	188.3	200	173	666	199.1	200	183	675
												2EH04537525	68.9	2	172.9	217.2	225	240	666	228.0	250	250	675
	460-3-60	12.5	100.2	13.5	123			1.3	12.7	2.2	4.3	None	-	-	-	51.7	60	56	334	56.0	60	60	338
												2EH04532546	23.0	1	28.8	57.4	60	56	334	62.8	70	60	338
												2EH04535046	45.9	2	57.6	93.4	100	86	334	98.8	100	91	338
												2EH04537546	68.9	2	86.4	107.8	110	119	334	113.2	125	124	338
	575-3-60	9.4	65	10.7	93.7			1.0	10.5	1.5	3.5	None	-	-	-	40.3	50	43	246	43.8	50	47	250
												2EH04532558	23.0	1	23.0	45.6	50	43	246	50.0	50	47	250
												2EH04535058	45.9	2	46.0	74.4	80	68	246	78.8	80	72	250
												2EH04537558	68.9	2	69.1	86.0	90	95	246	90.4	100	99	250
20 (20)	208-3-60	26.5	255	33.3	255			2.0	25.4	5.0	9.6	None	-	-	-	111.5	125	119	729	121.1	150	130	738
												2EH04532525	18.8	1	52.1	111.5	125	119	729	121.4	150	130	738
												2EH04535025	37.6	2	104.3	174.6	175	161	729	186.6	200	172	738
												2EH04537525	56.3	2	156.2	200.5	225	220	729	212.5	225	231	738
	230-3-60	26.5	255	33.3	255			2.3	25.4	5.0	8.7	None	-	-	-	112.7	125	120	731	121.4	150	130	739
												2EH04532525	23.0	1	57.7	116.4	125	120	731	127.3	150	130	739
												2EH04535025	45.9	2	115.2	188.3	200	173	731	199.1	200	183	739
												2EH04537525	68.9	2	172.9	217.2	225	240	731	228.0	250	250	739
	460-3-60	14.0	123	15.4	140			1.3	12.7	2.2	4.3	None	-	-	-	55.6	70	59	374	59.9	70	64	378
												2EH04532546	23.0	1	28.8	57.4	70	59	374	62.8	70	64	378
												2EH04535046	45.9	2	57.6	93.4	100	86	374	98.8	100	91	378
												2EH04537546	68.9	2	86.4	107.8	110	119	374	113.2	125	124	378
	575-3-60	11.5	93.7	12.9	107.6			1.0	10.5	1.5	3.5	None	-	-	-	45.1	50	48	289	48.6	60	52	292
												2EH04532558	23.0	1	23.0	45.6	50	48	289	50.0	60	52	292
												2EH04535058	45.9	2	46.0	74.4	80	68	289	78.8	80	72	292
												2EH04537558	68.9	2	69.1	86.0	90	95	289	90.4	100	99	292

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Table 35: KK15 to KK25 VFD customer supplied high static with on/off power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.2	5.0	9.6	None	-	-	-	144.3	175	154	915	153.9	175	165	925
												2EH04532525	18.8	1	52.1	144.3	175	154	915	153.9	175	165	925
												2EH04535025	37.6	2	104.3	180.6	200	166	915	192.6	200	177	925
												2EH04537525	56.3	2	156.2	206.5	225	226	915	218.5	225	237	925
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.2	5.0	8.7	None	-	-	-	145.5	175	155	917	154.2	175	165	926
												2EH04532525	23.0	1	57.7	145.5	175	155	917	154.2	175	165	926
												2EH04535025	45.9	2	115.2	194.3	200	179	917	205.1	225	189	926
												2EH04537525	68.9	2	172.9	223.2	250	245	917	234.0	250	255	926
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	15.1	2.2	4.3	None	-	-	-	66.3	80	71	437	70.6	80	76	441
												2EH04532546	23.0	1	28.8	66.3	80	71	437	70.6	80	76	441
												2EH04535046	45.9	2	57.6	96.4	100	89	437	101.8	110	94	441
												2EH04537546	68.9	2	86.4	110.8	125	122	437	116.2	125	127	441
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	12.0	1.5	3.5	None	-	-	-	54.3	70	58	336	57.8	70	62	340
												2EH04532558	23.0	1	23.0	54.3	70	58	336	57.8	70	62	340
												2EH04535058	45.9	2	46.0	76.3	80	70	336	80.6	90	74	340
												2EH04537558	68.9	2	69.1	87.9	90	97	336	92.2	100	101	340

Table 36: KK15 to KK25 VFD customer supplied high static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
15 (15)	208-3-60	26.3	178.5	25.0	190			2.1	19.8	6.7	9.6	None	-	-	-	95.3	110	102	521	104.9	125	113	531
												2EH04532525	18.8	1	52.1	106.6	110	102	521	118.6	125	113	531
												2EH04535025	37.6	2	104.3	171.9	175	158	521	183.9	200	169	531
												2EH04537525	56.3	2	156.2	197.7	200	218	521	209.7	225	229	531
	230-3-60	26.3	178.5	25.0	190			2.1	19.8	6.7	8.7	None	-	-	-	95.3	110	102	521	104.0	125	112	530
												2EH04532525	23.0	1	57.7	113.6	125	105	521	124.5	125	115	530
												2EH04535025	45.9	2	115.2	185.5	200	171	521	196.4	200	181	530
												2EH04537525	68.9	2	172.9	214.4	225	237	521	225.3	250	247	530
	460-3-60	11.0	95.3	12.2	100			1.1	9.9	3.4	4.3	None	-	-	-	45.2	50	48	272	49.5	60	53	277
												2EH04532546	23.0	1	28.8	56.9	60	52	272	62.3	70	57	277
												2EH04535046	45.9	2	57.6	92.9	100	85	272	98.3	100	90	277
												2EH04537546	68.9	2	86.4	107.3	110	119	272	112.7	125	124	277
	575-3-60	9.2	65	9.3	72			0.9	7.9	2.7	3.5	None	-	-	-	35.9	45	39	195	39.4	45	43	199
												2EH04532558	23.0	1	23.0	45.4	50	42	195	49.8	50	46	199
												2EH04535058	45.9	2	46.0	74.1	80	68	195	78.5	80	72	199
												2EH04537558	68.9	2	69.1	85.7	90	95	195	90.1	100	99	199
18 (17.5)	208-3-60	26.8	190.7	28.5	255			2.0	25.4	6.7	9.6	None	-	-	-	109.2	125	117	657	118.8	125	128	666
												2EH04532525	18.8	1	52.1	113.6	125	117	657	125.6	150	128	666
												2EH04535025	37.6	2	104.3	178.9	200	165	657	190.9	200	176	666
												2EH04537525	56.3	2	156.2	204.7	225	224	657	216.7	225	235	666
	230-3-60	26.8	190.7	28.5	255			2.3	25.4	6.7	8.7	None	-	-	-	110.4	125	119	659	119.1	125	129	667
												2EH04532525	23.0	1	57.7	120.6	125	119	659	131.5	150	129	667
												2EH04535025	45.9	2	115.2	192.5	200	177	659	203.4	225	187	667
												2EH04537525	68.9	2	172.9	221.4	225	243	659	232.3	250	253	667
	460-3-60	12.5	100.2	13.5	123			1.3	12.7	3.4	4.3	None	-	-	-	54.1	60	58	332	58.4	70	63	336
												2EH04532546	23.0	1	28.8	60.4	70	58	332	65.8	70	63	336
												2EH04535046	45.9	2	57.6	96.4	100	89	332	101.8	110	94	336
												2EH04537546	68.9	2	86.4	110.8	125	122	332	116.2	125	127	336
	575-3-60	9.4	65	10.7	93.7			1.0	10.5	2.7	3.5	None	-	-	-	42.7	50	46	245	46.2	50	50	249
												2EH04532558	23.0	1	23.0	48.6	50	46	245	53.0	60	50	249
												2EH04535058	45.9	2	46.0	77.4	80	71	245	81.8	90	75	249
												2EH04537558	68.9	2	69.1	89.0	90	98	245	93.4	100	102	249
20 (20)	208-3-60	26.5	255	33.3	255			2.0	25.4	6.7	9.6	None	-	-	-	114.9	125	123	721	124.5	150	134	731
												2EH04532525	18.8	1	52.1	114.9	125	123	721	125.6	150	134	731
												2EH04535025	37.6	2	104.3	178.9	200	165	721	190.9	200	176	731
												2EH04537525	56.3	2	156.2	204.7	225	224	721	216.7	225	235	731
	230-3-60	26.5	255	33.3	255			2.3	25.4	6.7	8.7	None	-	-	-	116.1	125	124	723	124.8	150	134	732
												2EH04532525	23.0	1	57.7	120.6	125	124	723	131.5	150	134	732
												2EH04535025	45.9	2	115.2	192.5	200	177	723	203.4	225	187	732
												2EH04537525	68.9	2	172.9	221.4	225	243	723	232.3	250	253	732
	460-3-60	14.0	123	15.4	140			1.3	12.7	3.4	4.3	None	-	-	-	58.0	70	62	371	62.3	70	67	376
												2EH04532546	23.0	1	28.8	60.4	70	62	371	65.8	70	67	376
												2EH04535046	45.9	2	57.6	96.4	100	89	371	101.8	110	94	376
												2EH04537546	68.9	2	86.4	110.8	125	122	371	116.2	125	127	376
	575-3-60	11.5	93.7	12.9	107.6			1.0	10.5	2.7	3.5	None	-	-	-	47.5	60	51	288	51.0	60	55	291
												2EH04532558	23.0	1	23.0	48.6	60	51	288	53.0	60	55	291
												2EH04535058	45.9	2	46.0	77.4	80	71	288	81.8	90	75	291
												2EH04537558	68.9	2	69.1	89.0	90	98	288	93.4	100	102	291

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Table 36: KK15 to KK25 VFD customer supplied high static with modulating power exhaust (for end return only)

Size (ton)	Nominal unit voltage	Comp. 1		Comp. 2		Comp. 3		OD fan motors each FLA	Supply blower motor FLA	Pwr exh motor FLA	120V trans FLA	Electric heat option field installed kit				MCA (A)	Max f/b Size A	Min disconnect rating		MCA w/ 120V trans (A)	Max f/b size w/ 120V trans (A)	Min disconnect rating/ 120V trans	
		RLA	LRA	RLA	LRA	RLA	LRA					Model	kW	Stages	A			FLA	LRA			FLA	LRA
25 (25)	208-3-60	22.4	166.2	41.0	304	22.4	166.2	2.0	30.2	6.7	9.6	None	-	-	-	147.7	175	158	907	157.3	175	169	917
												2EH04532525	18.8	1	52.1	147.7	175	158	907	157.3	175	169	917
												2EH04535025	37.6	2	104.3	184.9	200	170	907	196.9	200	181	917
												2EH04537525	56.3	2	156.2	210.7	225	230	907	222.7	225	241	917
	230-3-60	22.4	166.2	41.0	304	22.4	166.2	2.3	30.2	6.7	8.7	None	-	-	-	148.9	175	159	909	157.6	175	169	918
												2EH04532525	23.0	1	57.7	148.9	175	159	909	157.6	175	169	918
												2EH04535025	45.9	2	115.2	198.5	200	183	909	209.4	225	193	918
												2EH04537525	68.9	2	172.9	227.4	250	249	909	238.3	250	259	918
	460-3-60	8.8	74.6	19.2	147	8.8	74.6	1.3	15.1	3.4	4.3	None	-	-	-	68.7	80	73	435	73.0	90	78	439
												2EH04532546	23.0	1	28.8	68.7	80	73	435	73.0	90	78	439
												2EH04535046	45.9	2	57.6	99.4	100	91	435	104.8	110	96	439
												2EH04537546	68.9	2	86.4	113.8	125	125	435	119.2	125	129	439
	575-3-60	7.2	54	16.7	122	7.2	54	1.0	12.0	2.7	3.5	None	-	-	-	56.7	70	60	335	60.2	70	64	339
												2EH04532558	23.0	1	23.0	56.7	70	60	335	60.2	70	64	339
												2EH04535058	45.9	2	46.0	79.3	80	73	335	83.6	90	77	339
												2EH04537558	68.9	2	69.1	90.9	100	99	335	95.2	100	104	339

Physical data

Table 37: KS15 to KS18 and KK15 to KK18 physical data

Component	Models					
	KS15 and KK15			KS18 and KK18		
Nominal Tonnage	**15**			**17.5**		
ARI cooling performance	2 Stage	4 Stage		2 Stage	4 Stage	
Gross Capacity @ ARI A point (Btu)	180,000	180,000		210,000	214,000	
ARI net capacity (Btu)	174,000	174,000		202,000	206,000	
EER	11.1[1] / 11.0[2]	11.0[1] / 10.8[2]		11.0[1] / 10.8[2]	11.0[1] / 10.8[2]	
IEER with Intellispeed	14.2[1] / 14.0[2]	14.8[1] / 14.6[2]		14.2[1] / 14.0[2]	14.4[1] / 14.2[2]	
IEER with VAV	NA	14.6[1] / 14.4[2]		NA	14.2[1] / 14.0[2]	
CFM	4860	4870		5670	5680	
System power (KW)	15.5	15.9		18.6	19.0	
Refrigerant type	R-454B	R-454B		R-454B	R-454B	
Refrigerant charge (lb-oz)						
System 1	8-12	8-6		9-8	9-8	
System 2	8-14	8-4		9-8	9-8	
ARI heating performance						
Heating model	S1	S3	T3	S1	S3	T3
Heating type	Stg. Low	Stg. High	Mod. High	Stg. Low	Stg. High	Mod. High
1st. stage heat input (kBtu)	150	262	123	150	262	123
2nd. stage heat input (kBtu)	200	350	350	200	350	350
1st. stage heat output (kBtu)	122	213	100	122	213	100
2nd. stage heat output (kBtu)	162	284	284	162	284	284
Steady state efficiency (%)	81	81	81	81	81	81
No. burners	5	9	9	5	9	9
No. stages / turn down	2	2	2.85 to 1	2	2	2.85 to 1
Temperature rise range (°F)	10-40	25-55	25-55	10-40	25-55	25-55
Gas limit setting (°F)	140	140	140	140	140	140
Gas piping connection (in.)	3/4	3/4	3/4	3/4	3/4	3/4
Dimensions (in.)						
Length	129-3/4			143-13/16		
Width	88-3/4			88-3/4		
Height	49-1/4			49-1/4		
Operating weight (lbs.)	2035			2230		
Compressors	2 Stage	4 Stage		2 Stage	4 Stage	
Type	Scroll	Scroll		Scroll	Scroll	
Quantity	2	2		2	2	
Unit capacity steps (%)	50/100	34/50/84/100		46/100	31/46/85/100	
Condenser coil data						
Face area (sq ft)	22.1			25.1		
Type	MCHX			MCHX		
Thickness	25mm			25mm		
FPI	23			23		
Circuitry Type	2-Pass			2-Pass		
Evaporator coil data						
Face area (sq ft)	22.0			22.0		

Table 37: KS15 to KS18 and KK15 to KK18 physical data

Component	Models					
	KS15 and KK15			KS18 and KK18		
Nominal Tonnage	**15**			**17.5**		
Rows	4			4		
Fins per inch	15			15		
Tube diameter	3/8			3/8		
Circuitry type	Intertwined			Intertwined		
Refrigerant control	TXV			TXV		
Condenser fan data						
Quantity	2			4		
Fan diameter (in.)	30			24		
Type	Prop			Prop		
Drive type	Direct			Direct		
Number of motors	2			4		
Motor HP each	1/2			1/2		
RPM	850			1085		
Nominal total CFM	10,700			15,800		
Belt drive evaporator fan data						
Quantity	2			2		
Fan Size (in.)	15x15			15x15		
Type	Centrifugal			Centrifugal		
Static Range	Std	Med	High	Std	Med	High
Motor Sheave	1VP40	1VM50	1VP60	1VP56	1VP60	1VP65
Blower Sheave	1B5V68	1B5V70	1B5V80	1B5V86	1B5V80	1B5V80
Belt	BX40	BX40	BX43	BX43	BX43	5VX450
Motor HP each	3.0	5.0	7.5	5.0	7.5	10.0
RPM	1749	1726	1766	1726	1766	1768
Frame size	56	145T	213T	145T	213T	215T
Filters						
Quantity - size	6 - (20 x 25 x 2)[3,4,5]			6 - (20 x 25 x 2)[3,4,5]		
	6 - (20 x 25 x 4)[6]			6 - (20 x 25 x 4)[6]		

ⓘ **Note:**

1. Cooling only unit or cooling unit with electric heat.
2. Cooling unit with gas heat.
3. 2 in. throwaway, standard, MERV (Minimum Efficiency Reporting Value)
4. Optional 2 in. pleated, MERV 8
5. Optional 2 in. pleated, MERV 13
6. Optional 4 in. pleated, MERV 13

Table 38: KS20 to KS25 and KK20 to KK25 physical data

Component	Models					
	KS20 and KK20			KS25 and KK25		
Nominal Tonnage	**20**			**25**		
ARI cooling performance	2 Stage	4 Stage		2 Stage	4 Stage	
Gross Capacity @ ARI A point (Btu)	244,000	248,000		302,000	296,000	
ARI net capacity (Btu)	234,000	238,000		286,000	280,000	
EER	11.0[1] / 10.8[2]	11.0[1] / 10.8[2]		10.2[1] / 10.0[2]	10.0[1] / 9.8[2]	
IEER with Intellispeed	14.2[1] / 14.0[2]	14.4[1] / 14.2[2]		14.0[1] / 13.8[2]	14.4[1] / 14.2[2]	
IEER with VAV	NA	14.2[1] / 14.0[2]		NA	14.2[1] / 14.0[2]	
CFM	6580	6560		8190	8320	
System power (kW)	21.5	22.0		28.5	28.5	
Refrigerant type	R-454B	R-454B		R-454B	R-454B	
Refrigerant charge (lb-oz)						
System 1	11-14	11-14		13-4	12-14	
System 2	11-12	11-12		14-8	14-0	
ARI heating performance						
Heating model	S1	S3	T3	S1	S3	T3
Heating type	Stg. Low	Stg. High	Mod. High	Stg. Low	Stg. High	Mod. High
1st. Stage heat input (kBtu)	150	262	123	150	262	123
2nd. Stage heat input (kBtu)	200	350	350	200	350	350
1st. Stage heat output (kBtu)	122	213	100	122	213	100
2nd. Stage heat output (kBtu)	162	284	284	162	284	284
Steady state efficiency (%)	81	81	81	81	81	81
Number of burners	5	9	9	5	9	9
No. stages / Turn Down	2	2	2.85 to 1	2	2	2.85 to 1
Temperature rise range (°F)	05-35	15-45	15-45	05-35	15-45	15-45
Gas limit setting (°F)	140	140	140	140	140	140
Gas piping connection (in.)	3/4	3/4	3/4	3/4	3/4	3/4
Dimensions (in.)						
Length	143-13/16			143-13/16		
Width	88-3/4			88-3/4		
Height	57-1/4			57-1/4		
Operating weight (lb)	2255			2377		
Compressors	2 Stage	4 Stage		2 Stage	4 Stage	
Type	Scroll	Scroll		Scroll	Scroll	
Quantity	2	2		2	3	
Unit capacity steps (%)	47/100	31/47/85/100		50/100	25/50/75/100	
Condenser coil data						
Face area (sq ft)	30.8			30.8		
Type	MCHX			MCHX		
Thickness	25mm			25mm		
FPI	23			23		
Circuitry Type	2-Pass			2-Pass		
Evaporator coil data						
Face area (sq ft)	26.0			26.0		
Rows	4			4		
Fins per in.	15			15		

Table 38: KS20 to KS25 and KK20 to KK25 physical data

Component	Models					
	KS20 and KK20			KS25 and KK25		
Nominal Tonnage	**20**			**25**		
Tube diameter	3/8			3/8		
Circuitry Type	Intertwined			Intertwined		
Refrigerant control	TXV			TXV		
Condenser fan data						
Quantity	4			4		
Fan diameter (in.)	24			24		
Type	Prop			Prop		
Drive type	Direct			Direct		
Number of motors	4			4		
Motor HP each	1/2			1/2		
RPM	1085			1085		
Nominal total CFM	16,900			16,900		
Belt drive evaporator fan data						
Quantity	2			2		
Fan Size (in.)	15x15			15x15		
Type	Centrifugal			Centrifugal		
Static range	Std	Med	High	Std	Med	High
Motor sheave	1VP60	1VP65	1VP60	1VP65	1VP60	1VP71
Blower sheave	1B5V90	1B5V86	1B5V70	1B5V90	1B5V70	1B5V80
Belt	BX43	BX43	5VX450	5VX450	5VX450	BX43
Motor HP each	5.0	7.5	10.0	7.5	10.0	12.0
RPM	1726	1766	1768	1766	1768	1760
Frame size	145T	213T	215T	213T	215T	215T
Filters						
Quantity - size	9 - (16 x 25 x 2)[3,4,5]			9 - (16 x 25 x 2)[3,4,5]		
	9 - (16 x 25 x 4)[6]			9 - (16 x 25 x 4)[6]		

Note:

1. Cooling only unit or cooling unit with electric heat.
2. Cooling unit with gas heat.
3. 2 in. throwaway, standard, MERV (Minimum Efficiency Reporting Value)
4. Optional 2 in. pleated, MERV 8
5. Optional 2 in. pleated, MERV 13
6. Optional 4 in. pleated, MERV 13

Optional electric heat

The factory-installed heaters are wired for single point power supply. You only need to bring the power supply into the single point terminal block.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending in to the supply air chamber.

Fuses are supplied, where required, by the factory. See Table 39 for the minimum CFM limitations. See the Electrical data tables tables for electrical data.

Table 39: Minimum Airflow Requirements

Minimum Airflow Requirements (up to 2 in. external static)			
Unit Tons	Heater kW		
	25	50	75
15	4,500	4,500	4,500
17.5	5,250	5,250	5,250
20	6,000	6,000	6,000
25	7,500	7,500	7,500

All electric heat units are shipped from the factory equipped with an RDS sensor to protect the unit from any damage caused by the leakage of refrigerant.

Note: An RDS must be installed on all field-installed electric heat units before unit operation.

Optional gas heat

The optional gas-fired heaters have aluminized-steel or optional stainless steel, tubular heat exchangers with spark ignition with proven pilot.

This unit is shipped from the factory for use with natural gas at elevations up to 2000 ft (610 m) above sea level. The unit may be field-converted for use with propane gas and/or elevations above 2000 ft with a listed conversion kit.

Note: Modulating furnaces, gas model T3, are **not certified** for use with propane and cannot be converted.

Note: Installation of this furnace at altitudes above 2000 ft (610 m) shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.

Table 40: Gas application data

Unit		Input (MBH)	Output (MBH)	Temp. rise (°F) [1]
Size (tons)	Heat size			
KS15 and KK15 (15)	S1	200	162	10-40
	S3	350	284	25-55
	T3	350	284	25-55
KS18 and KK18 (17.5)	S1	200	162	10-40
	S3	350	284	25-55
	T3	350	284	25-55
KS20 and KK20 (20)	S1	200	162	05-35
	S3	350	284	15-45
	T3	350	284	15-45

Table 40: Gas application data

Unit		Input (MBH)	Output (MBH)	Temp. rise (°F) [1]
Size (tons)	Heat size			
KS25 and KK (25)	S1	200	162	05-35
	S3	350	284	15-45
	T3	350	284	15-45

1 On VAV units with a non-modulating furnace, individual VAV boxes must be full open in heating mode to ensure airflow falls within the temperature rise range.

Table 41: Gas heat allowable air flow

Unit		Supply	
Size (ton)	Heat size	Min	Max
KS15 and KK15 (15)	S1	3750	7500
	S3	4770	7500
	T3	4500	7500
KS18 and KK18 (17.5)	S1	3750	8750
	S3	4770	8750
	T3	4500	8750
KS20 and KK20 (20)	S1	4290	10000
	S3	5830	10000
	T3	5000	10000
KS25 and KK (25)	S1	4290	11500
	S3	5830	11500
	T3	5000	11500

Gas piping

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas, and the length of run.

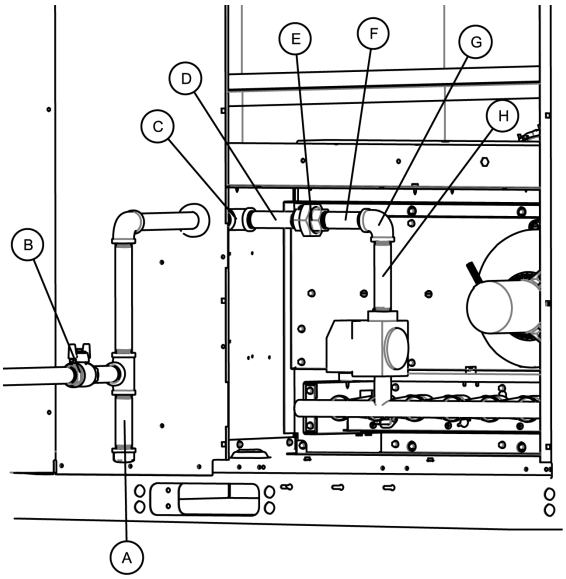
Follow the *National Fuel Gas Code Z223.1 (in U.S.A.)* or the current *Gas Installation Codes CSA-B149.1 (in Canada)* in all cases unless they are superseded by local codes or gas utility requirements.

See Table 42. The heating value of the gas may vary by locality. You must check the value with the local gas utility.

Note: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 3/4 in. pipe connection at the entrance fitting. The supply line should not be sized smaller than the entrance fitting size.

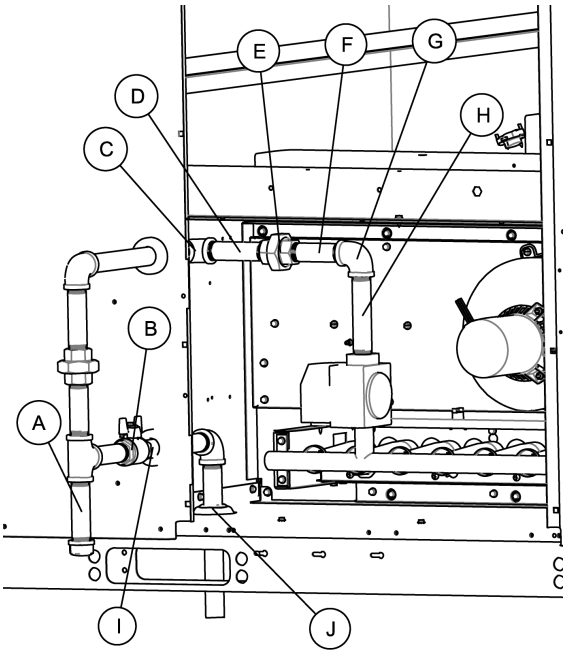
The following figures show the gas piping.

Figure 68: Side entry gas piping



Item	Description
A	Sediment trap
B	Manual shut-off valve
C	90° elbow
D	4 ½ in. long nipple
E	Union
F	4 in. long nipple
G	90° elbow
H	5 ½ in. long nipple

Figure 69: Bottom entry gas piping



Item	Description
A	Sediment trap
B	Manual shut-off valve
C	90° elbow
D	4 ½ in. long nipple
E	Union
F	4 in. long nipple
G	90° elbow
H	5 ½ in. long nipple
I	Extra piping grommet (included)
J	Caulk between pipe and base pan hole to provide watertight seal

Table 42: Gas pipe sizing - capacity of pipe

Length of pipe (ft.)	Nominal iron pipe size		
	3/4 in.	1 in.	1-1/4 in.
10	278	520	1050
20	190	350	730
30	152	285	590
40	130	245	500
50	115	215	440
60	105	195	400
70	96	180	370
80	90	170	350
90	84	160	320
100	79	150	305

Note: Maximum capacity of pipe in cubic feet of gas per hour based upon a pressure drop of 0.3 in. W.C. and 0.6 specific gravity gas.

Gas connection

The gas supply line can be routed within the space and roof curb with the exit through the unit's basepan. See the Physical dimensions for the gas piping inlet location. Typical supply piping arrangements are shown in the Gas piping section. All pipe nipples, fittings, and the gas cock are field supplied.

Apply the following gas piping recommendations.

- You must install a drip leg or sediment trap and a ground joint union in the gas piping.
- When required by local codes, install a manual shut-off valve outside of the unit.
- Use wrought iron or steel pipe for all gas lines. Apply pipe dope sparingly to male threads only.
- If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance.

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⚠ WARNING

Natural gas may contain some propane. Propane is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe. Shellac based compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clydes's, or John Crane may be used.

- Clean all piping of dirt and scale. Hammer on the outside of the pipe and blow out loose particles. Before initial start-up, make sure that all gas lines external to the unit are purged of air.
- The gas supply must be a separate line and installed in accordance with all safety codes as prescribed under Limitations.
- You must install a 1/8 in. NPT plugged tapping, accessible for test gage connection, immediately upstream of the gas supply connection to the unit.
- After the gas connections are complete, open the main shut-off valve admitting normal gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. Never use a flame.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death, or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

⚠ CAUTION

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures greater than 1/2 psig (3.5 kPa). Pressures greater than 1/2 psig (3.5 kPa) cause gas valve damage resulting in a hazardous condition. If the gas valve is subjected to a pressure greater than 1/2 psig (3.5 kPa), it must be replaced. The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.5 kPa).

⚠ WARNING

Threaded joints must be coated with a sealing compound that is resistant to the action of liquefied petroleum gases. Do not use Teflon tape.

Propane units, tanks, and piping

All gas heat units are shipped from the factory equipped for natural gas use only. The unit can be converted in the field for use with propane gas with an accessory kit.

ⓘ **Note:** Modulating gas furnaces, gas model T3, are **not certified** for use with propane and cannot be converted.

All propane gas equipment must conform to the safety standards of the National Fire Protection Association.

For satisfactory operation, propane gas pressure must be at the correct inlet pressure at the unit under full load. Refer to the conversion kit instructions for the minimum and maximum supply inlet pressure. Maintaining proper gas pressure depends on three main factors:

- The vaporization rate which depends on the temperature of the liquid and the wetted surface area of the containers.
- The proper pressure regulation. Two-stage regulation is recommended.
- The pressure drop in the lines between regulators and between the second stage regulator and the appliance. The pipe size required depends on the length of the pipe run and the total load of all appliances.

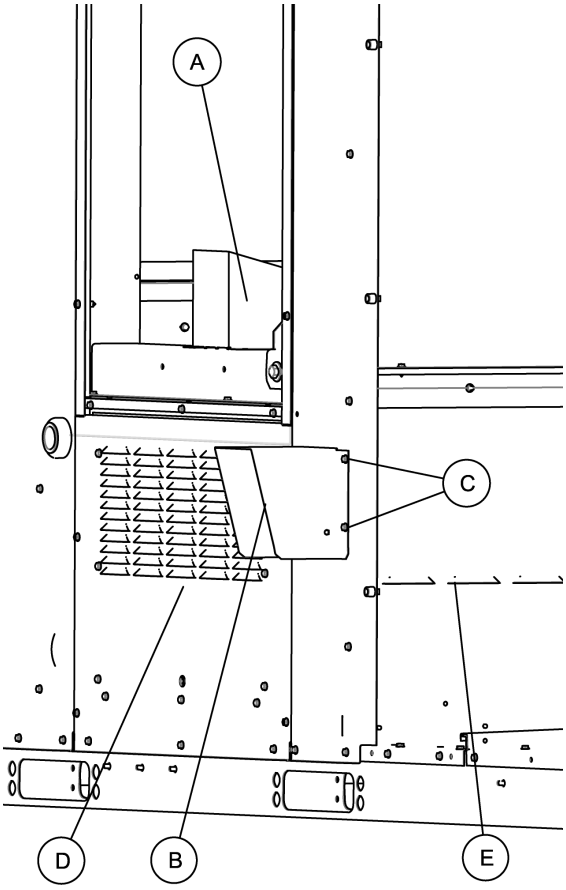
Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available

from most regulator manufacturers and propane gas suppliers.

Combustion air intake and flue exhaust

Combustion air intake louvers are incorporated into the heating compartment right outside wall and access panel. The flue exhaust is discharged out the front of the unit. Remove the factory shipping label and the four screws that cover the exhaust opening. The flue exhaust hood is shipped in the blower compartment and must be installed over the discharge opening, as shown in Figure 70, using these four screws. If necessary, you can install a flue exhaust extension accessory in place of the hood.

Figure 70: Flue exhaust hood detail



Item	Description
A	Flue exhaust hood (shipping location)
B	Flue exhaust hood (field-installed location)
C	Mounting screws, 4 x (included)
D	Combustion air intake louvers
E	Combustion air intake louvers

Options and accessories

The following sections describe options and accessories.

Electric heat

Electric heaters are available as factory-installed options or field-installed accessories. These heaters mount in the heat compartment with the heating elements extending into the supply air chamber. All electric heaters are fused and intended for use with a single point power supply and refrigerant detection system.

Motorized outdoor damper

The motorized outdoor damper can be a factory-installed option or a field-installed accessory. Field-installed motorized outdoor damper accessories include complete instructions for installation.

Economizer sequences

Several functions can drive the economizer, including: minimum position, free cooling, economizer loading, and minimum outdoor air supply.

Economizer minimum position

The economizer minimum position is set during occupied mode when outside air is not suitable for free cooling. The position of the damper is set proportionally between the economizer minimum position and the economizer minimum position low speed fan setpoints, in relationship to the VFD output percentage. On a constant volume single speed supply fan system, set both setpoints to the same value.

Free cooling

Four types of free cooling options are available: dry bulb changeover, single enthalpy, dual enthalpy changeover, and auto.

Dry bulb changeover

For dry bulb economizer operation, the outside air is suitable for free cooling if the outside air temperature is 1°F below the economizer OAT enable setpoint and 1°F below the return air temperature (RAT).

Free cooling is no longer available if the outside air temperature rises above either the economizer OAT enable setpoint or the return air temperature.

Single enthalpy changeover

For single enthalpy economizer operation, the outside air is suitable for free cooling if the outside air enthalpy is at least 1 Btu/lb below the economizer outside air enthalpy setpoint and the outside air temperature is no greater than the RAT plus 9°F.

If the outside air temperature rises above the RAT plus 10°F, free cooling is no longer available. The outside air temperature must drop to no greater than RAT plus 9°F to enter free cooling again.

Free cooling is no longer available if the outside air enthalpy rises above the economizer outside air enthalpy setpoint.

Dual enthalpy changeover

For dual enthalpy economizer operation, the outside air enthalpy must be lower than the return air enthalpy by 1 Btu/lb and the outside air temperature is no greater than the RAT plus 9°F.

Auto

The control determines the type of free cooling changeover based on which sensors are present and reliable. Conditions include the following:

- Return and outside air dry bulb = dry bulb changeover
- Return and outside air dry bulb and outside air humidity = single enthalpy
- Return and outside air dry bulb and return and outside air humidity = dual enthalpy
- If either the return or outside air dry bulb sensors are unreliable, free cooling is not available

Free cooling operation

When the control determines that the outside air is suitable, the first stage of cooling is always free cooling.

Thermostat

In free cooling, with a thermostat input to Y1, the dampers modulate to control the supply air temperature to the economizer setpoint +/- 1°F (default 55°F).

If the thermostat provides an input to Y2 and the parameter COMPRESSORS OFF IN FREE COOLING is turned OFF, a compressor output energizes. The economizer dampers continue to modulate to control the supply air temperature to the economizer setpoint.

If the supply air temperature cannot be maintained within 5°F of the economizer setpoint, the first stage compressor (C1) is turned on. The second stage compressor (C2) is added as needed to keep the supply air temperature within the 5°F of the economizer setpoint.

Sensor

In free cooling, with a demand from the zone/return sensor for the first stage of cooling, the dampers modulate to control the supply air temperature to the economizer setpoint +/- 1°F.

If the economizer output is at 100% and the SAT is greater than the economizer setpoint + 1°F, the control starts a 12 minute timer to energize a compressor output.

If at any time the economizer output drops below 100%, the timer stops and resets when the economizer output returns to 100%.

When a compressor output is turned ON, the economizer dampers continue to modulate to control the supply air temperature to the economizer setpoint.

At no time is a compressor output turned ON if the economizer output is less than 100%, even if the differential between zone (or return) temperature and the current cooling setpoint is great enough to demand more than one stage of cooling.

If the economizer output goes to minimum position and the SAT is less than economizer setpoint -1°F, the control starts a 12 minute timer to de-energize a compressor output.

If at any time the economizer output goes above the minimum position, the timer stops and resets when the economizer output returns to minimum position.

If the demand for cooling from the space/return is satisfied, the economizer output modulates to minimum position and the compressor outputs are de-energized as long as their minimum run timers have expired.

Power exhaust

Setpoints

- Economizer enable: ON
- Power exhaust enable: ON
- Modulating power exhaust: OFF
- Exhaust VFD installed: OFF
- Building pressure sensor enabled: OFF
- Econo damper position for exh fan: ON Percent
- Econo damper position for exh fan: OFF Percent

Inputs

No inputs are present for non-modulating power exhaust.

Outputs

- 2-10 VDC from ECON on the economizer expansion module
- 24 VAC from EX-FAN to energize the exhaust fan on the economizer expansion module

Operation

Operation details include the following items:

- Compares the economizer output to the economizer damper position for exhaust fan on and off
- Energizes the exhaust fan when the economizer output is above the economizer damper position for exhaust fan on
- De-energizes the exhaust fan when the economizer output is below the economizer damper position for exhaust fan off

Modulating power exhaust

Set points and related data

The set points and related data include the following items:

- Power exhaust fan type (ExFType) variable frequency fan
- Building pressure setpoint (Bldg-Sp)
- Building pressure reading (Bldg-Pres)

Inputs

The input for modulating power exhaust is: 0 to 5 VDC from building pressure sensor to terminal Bldg-Pres.

Outputs

The outputs include the following items:

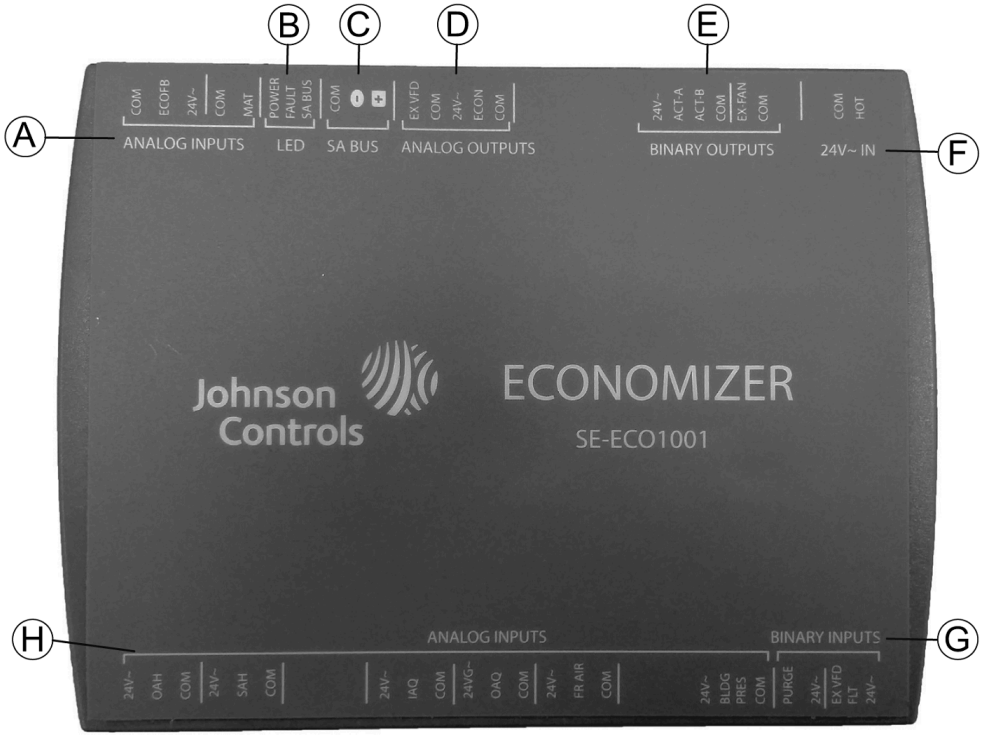
- 2 to 10 VDC from EX VFD for exhaust discharge damper modulation.
- 24 VAC from EX-FAN to energize exhaust fan.

Operation

If the building pressure is above the building pressure setpoint, the exhaust output (EX VFD) increases. If the building pressure is below the building pressure set point, the exhaust output (EX VFD) decreases. The EX-FAN binary output energizes when the EX VFD analog output is greater than 2.16 VDC. The EX-FAN binary output de-energizes when the EX VFD analog output is less than or equal to 2.16 VDC. The rate of change of the analog output is determined by the deviation from the set point and the length of time away from set point.

Smart Equipment economizer board

Figure 71: SE-ECO1001 economizer controller



The following tables describe the details of the economizer board. See Figure 71 for connection locations.

Table 43: Smart Equipment economizer board - analog inputs

Location	Board label	Cover label	Description	Function and comments
A	C	COM	24 VAC common/0-10 VDC negative for economizer actuator position feedback	Connects through circuit trace to 24V~ IN pin COM
	IN2	ECOFB	0-10 VDC positive input from economizer actuator position feedback	The EconDampPos parameter reports input status (0-100%). Used to meet California Title 24 requirements for economizer actuator position feedback.
	R	24V~	24 VAC hot supplied for economizer actuator position feedback	Connects through circuit trace to 24V~ IN pin HOT
	C	COM	Mixed air temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	The MAT parameter reports input status (°F/°C), 3.65 VDC reading MAT (+) to COM (–) with open circuit. Read-only use in current control revision.
	IN1	MAT		

Table 43: Smart Equipment economizer board - analog inputs

Location	Board label	Cover label	Description	Function and comments
H	R	24V~	24 VAC hot supplied for the outdoor air humidity sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN3	OAH	0-10 VDC positive input from the Outdoor Air Humidity sensor	OAH parameter reports input status (0-100%H). Used in outdoor air enthalpy calculation for dual enthalpy economizer free cooling changeover.
	C	COM	24 VAC common/0-10 VDC negative for the outdoor air humidity sensor	Connects through circuit trace to 24V~ IN pin COM
	R	24V~	24 VAC hot supplied for the supply air humidity sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN4	SAH	0-10 VDC positive input from the Supply Air Humidity sensor	SAH parameter reports input status (0-100%H). Unused in current control revision.
	C	COM	24 VAC common/0-10 VDC negative for the supply air humidity sensor	Connects through circuit trace to 24V~ IN pin COM
	R	24V~	24 VAC hot supplied for the indoor air quality sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN5	IAQ	0-10 VDC positive input from the Indoor Air Quality sensor	IAQRange parameter sets the CO2 parts per million measured by the indoor air quality sensor when it outputs 10 VDC; IAQ parameter reports input status (0-5000ppm). Used for demand ventilation functions if the NetIAQ parameter indicates ?Unrel.
	C	COM	24 VAC common/0-10 VDC negative for the indoor air quality sensor	Connects through circuit trace to 24V~ IN pin COM
	R	24V~	24 VAC hot supplied for the outdoor air quality sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN6	OAQ	0-10 VDC positive input from the Outdoor Air Quality sensor	OAQRange parameter sets the CO2 parts per million measured by the outdoor air quality sensor when it outputs 10 VDC; OAQ parameter reports input status (0-5000ppm). Used for demand ventilation function when DVent-Mode selection is Diff between IAQ and OAQ and the NetOAQ parameter indicates ?Unrel.
	C	COM	24 VAC common/0-10 VDC negative for the outdoor air quality sensor	Connects through circuit trace to 24V~ IN pin COM
	R	24V~	24 VAC hot supplied for the air monitoring station sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN7	FR AIR	0-10 VDC positive input from the air monitoring station sensor	MOA-Range parameter sets the cubic feet per minute/liters per second measured by the air monitoring station sensor when it outputs 10 VDC; Fr Air parameter reports input status (0-50000CFM/23595lps). Used for economizer minimum position reset in speed-controlled indoor blower applications.
	C	COM	24 VAC common/0-10 VDC negative for the air monitoring station sensor	Connects through circuit trace to 24V~ IN pin COM
	R	24V~	24 VAC hot supplied for the building pressure sensor	Connects through circuit trace to 24V~ IN pin HOT
	IN8	BLDG PRES	0-5 VDC positive input from the Building Pressure sensor	BldgPres parameter reports input status (-.250-.250”/w/-.062-.062kPa). Used for modulating power exhaust functions when ExFType selection is Modulating Damper or Variable Frequency Fan.
	C	COM	24 VAC common/0-5 VDC negative for the building pressure sensor	Connects through circuit trace to 24V~ IN pin COM

Table 44: Smart Equipment economizer board - LED details

Location	Board label	Cover label	Description	Function and comments
B	POWER	POWER	Green UCB power indicator	Lit indicates 24 VAC is present at 24V~ IN COM and HOT pins
	FAULT	FAULT	Red networking error and firmware error indicator	1/10th second on/off flashing indicates a networking error (polarity, addressing) or a firmware error (likely correctable with re-loading from USB flash drive)
	SA BUS	SA BUS	Green UCB SA bus communication transmission indicator	Lit/flickering indicates UCB-to-economizer board SA bus communication is currently active, off indicates the economizer board is awaiting SA bus communication

Table 45: Smart Equipment economizer board - SA bus details

Location	Board label	Cover label	Description	Function and comments
[1]C[1]	C	COM	Common for SA BUS power and communication circuits	EconCtrlr parameter reports UCB-to-economizer board SA bus communication status. Negative of the SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection and diagnostics board
	–	–	Communication for SA BUS devices	EconCtrlr parameter reports UCB-to-economizer board SA BUS communication status. Positive of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V lower than +) SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection and diagnostics board
	+	+	Communication for SA BUS devices	EconCtrlr parameter reports UCB-to-economizer board SA BUS communication status. Positive of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V higher than –) SA BUS communication circuit to the UCB. Through the unit wiring harness, may continue on to the 4-stage board and/or fault detection and diagnostics board

1 When wiring the unit and other devices using the SA Bus and FC Bus, see Smart Equipment Control Board.

Table 46: Smart Equipment economizer board - analog outputs

Location	Board label	Cover label	Description	Function and comments
D	J4	EX VFD	2-10 VDC positive output for the modulating power Exhaust fan Variable Frequency Drive/discharge damper modulating power exhaust actuator	ExFanVFD parameter reports output status (0-100%) when ExFType selection is Variable Frequency Fan; EAD-O parameter reports output status (0-100%) when ExFType selection is Modulating Damper. Used to ramp the power exhaust fan VFD/ position the discharge damper actuator.
		COM	24 VAC common/0-10 VDC negative for the power exhaust variable frequency drive/discharge damper modulating power exhaust actuator	Connects through circuit trace to 24V~ IN pin COM
		24V~	24 VAC hot supplied for the discharge damper modulating power exhaust actuator and economizer actuator	Connects through circuit trace to 24V~ IN pin HOT
		ECON	2-10 VDC output for the Economizer actuator	Econ parameter reports output status (0-100%). Used to position the economizer actuator for minimum position, free cooling, demand ventilation, cooling economizer loading and purge functions
		COM	24 VAC common/0-10 VDC negative for economizer actuator	Connects through circuit trace to 24V~ IN pin COM

Table 47: Smart Equipment economizer board - binary outputs

Location	Board label	Cover label	Description	Function and comments
E	J3	24V~	24 VAC hot supplied for an incremental (floating control) economizer actuator	Connects through circuit trace to 24V~ IN pin HOT
		ACT-A	24 VAC hot outputs to position an incremental (floating control) economizer actuator	Unused in current control revision
		ACT-B	24 VAC return	Unused in current control revision
		COM	24 VAC common for an incremental (floating control) economizer actuator	Connects through circuit trace to 24V~ IN pin COM
		EX-FAN	24 VAC hot output to energize power exhaust fan contactor coil/VFD enable relay coil	ExFan parameter reports output status (Off-On) when ExFType selection is Non-Modulating, Modulating Damper or Variable Frequency Fan. Used to turn on/enable the power exhaust fan motor.
		COM	24 VAC common/0-10 VDC negative for economizer actuator	Connects through circuit trace to 24V~ IN pin COM

Table 48: Smart Equipment economizer board - 24 V~ IN connections

Location	Board label	Cover label	Description	Function and comments
F	C	COM	24 VAC transformer Common referenced to cabinet ground	24 VAC common connection to power the economizer board. Connects through circuit traces to C/COM terminals and pins distributed on the economizer board.
	R	HOT	24 VAC transformer HOT	24 VAC hot connection to power the economizer board. Connects through circuit traces to R/24V~ terminals and pins distributed on the economizer board.

Table 49: Smart Equipment economizer board - binary inputs

Location	Board label	Cover label	Description	Function and comments
G	IN9	PURGE	24 VAC hot input from the PURGE dry contact	Purge parameter reports input status (False with 0 VAC input-True with 24 VAC input). When Purge status is True, heating and cooling operation is prevented, the indoor blower and power exhaust fan operate, and the economizer actuator is positioned to 100%.
		24 V~	24 VAC hot supplied for the purge dry contact	Connects through circuit trace to 24V~ IN pin HOT
	IN10	EX VFD FLT	24 VAC hot input from the power Exhaust Variable Frequency Drive Fault contact	ExFanVFDFlt parameter reports input status (Normal with 0 VAC input-Alarm with 24 VAC input) when ExFType selection is Variable Frequency Fan. When ExFanVFDFlt status is Alarm, EX-FAN fan output is prevented.
		24 V~	24 VAC hot supplied for the power exhaust variable frequency drive fault contact	Connects through circuit trace to 24V~ IN pin HOT

Indoor air quality

Indoor air quality (IAQ) is regulated by an indoor sensor input. The IAQ sensor is connected to the economizer board through the IAQ analog input terminal and the associated COM and 24V~ inputs on the economizer board. Terminal IAQ accepts a 0 to +10 VDC signal with respect to the IAQ terminal. When the signal is below its setpoint, the actuator can modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the IAQ signal exceeds its setpoint setting and there is no call for free cooling, the actuator is proportionately modulated from the 0 to 10 VDC signal, with 0 VDC corresponding to full closed and 10 VDC corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ maximum damper position setting. When the signal exceeds its setpoint (demand control ventilation setpoint) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the IAQ voltage input.

- Optional CO_2 space sensor kit (wall mount) - part no. 2AQ04700724
- Optional CO_2 sensor kit (unit mount) - part no. 2AQ04700624

Phasing

All units are properly phased at the factory. Check for proper compressor rotation. If the blower or compressors rotate in the incorrect direction at start-up, the electrical connection to the unit is misphased. Change the phasing of the field line connection at the factory or field supplied disconnect to obtain proper rotation. Scroll compressors operate in only one direction. The scroll is misphased if it is drawing low amperage, has similar suction and discharge pressures, or it produces a high noise level.

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans or compressor rotate correctly.

Blower rotation

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased. See Phasing.

Adjusting the belt tension

To adjust the belt tension complete the following steps.

1. Loosen the four sled bolts (A).

Figure 72: Top View

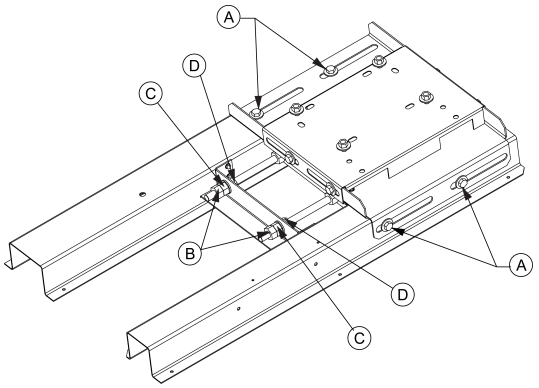
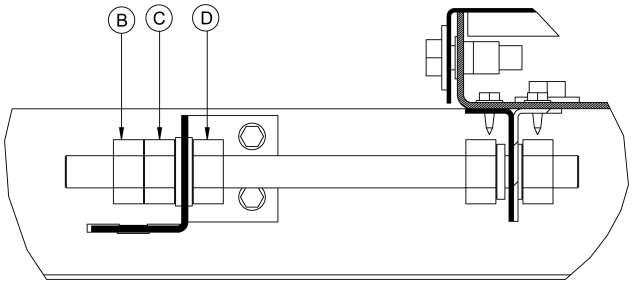


Figure 73: Side View



2. Break the lock between nuts (B) and (C).
3. Adjust the belt tension using the adjustment nuts:
   a. Clear the nuts (C) away from bracket and turn the adjustment nuts (D) against the bracket to increase the belt tension.
   b. Clear the nuts (D) away from the bracket and turn the adjustment nuts (C) against the bracket to decrease the belt tension.

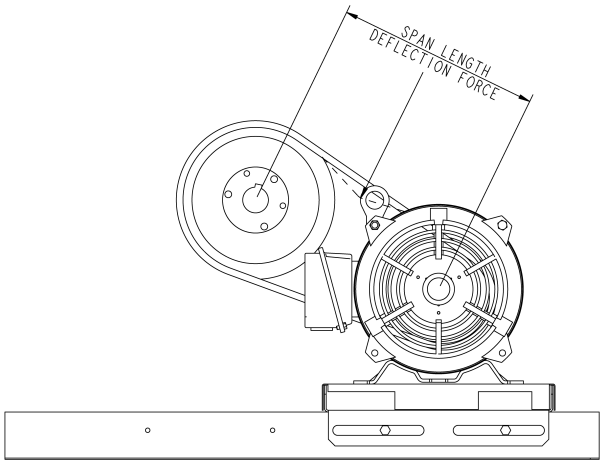
Note: For two-belt applications, adjust the two nut/bolt assemblies so that equal tension is obtained for both belts.

Note: New belts should be tensioned to the maximum deflection force recommended for the belt section. Table 50 contains the values to be used after break-in of new belts.

CAUTION

Check the belt tension at least two times during the first 24 hours of operation. After 24 hours of operation, retension to the recommended values in Table 50.

Figure 74: Measuring Belt Tension



4. To measure the belt tension complete the following steps:
   a. Use a belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown in the following figure. To determine the deflection distance from normal position, reference the adjacent belt (if applicable) or use a straight edge from sheave to sheave as a reference line.
   b. Increase applied force until a deflection distance of 0.2 in. is obtained and compare the measured deflection force against the recommended deflection force in Table 50.
   c. Adjust the belt tension until the recommended deflection force is measured.
5. After the belts are correctly tensioned, move all the nuts (B, C, and D) against the bracket and the lock nut (B) against the nut (C).
6. Tighten the four sled bolts (A).

Table 50: Belt tension

Belt Tension		
Application (Tons and Static)	**Deflection Force (lb)**	**Deflection Distance (in.)**
15T Std	4.14	0.19
15T Med	5.09	0.18
15T High	5.81	0.19
17.5T Std	4.82	0.19
17.5T Med	6.02	0.19
17.5T High	6.87	0.19
20T Std	4.39	0.18
20T Med	5.95	0.2
20T High	7.17	0.19
25T Std	5.6	0.19
25T Med	7.17	0.19
25T High	7.41	0.2

CFM static pressure and power-altitude and temperature corrections

Use the following information to assist in the application of the product at altitudes at or exceeding 1,000 ft above sea level.

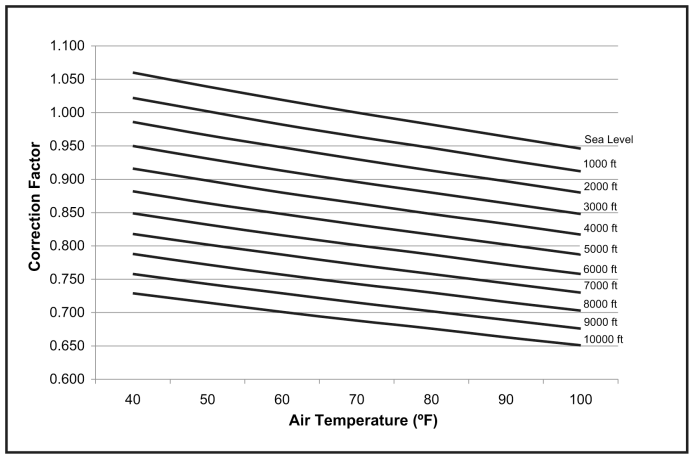
The air flow rates listed in the standard blower performance tables are based on standard air at sea level. As the altitude or temperature increases, the density of air decreases. In order to use the indoor blower tables for high altitude applications, certain corrections are necessary.

A centrifugal fan is a constant volume device. This means that, if the rpm remains constant, the CFM delivered is the same regardless of the density of the air. However, since the air at high altitude is less dense, less static pressure is generated and less power is required than a similar application at sea level. Air density correction factors are shown in the following table and figure.

Table 51: Altitude or temperature correction factors

Air temp.	Altitude, ft										
	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
40	1.060	1.022	0.986	0.950	0.916	0.882	0.849	0.818	0.788	0.758	0.729
50	1.039	1.002	0.966	0.931	0.898	0.864	0.832	0.802	0.772	0.743	0.715
60	1.019	0.982	0.948	0.913	0.880	0.848	0.816	0.787	0.757	0.729	0.701
70	1.000	0.964	0.930	0.896	0.864	0.832	0.801	0.772	0.743	0.715	0.688
80	0.982	0.947	0.913	0.880	0.848	0.817	0.787	0.758	0.730	0.702	0.676
90	0.964	0.929	0.897	0.864	0.833	0.802	0.772	0.744	0.716	0.689	0.663
100	0.946	0.912	0.880	0.848	0.817	0.787	0.758	0.730	0.703	0.676	0.651

Figure 75: Altitude/temperature correction factors



Use the following examples to assist in determining the airflow performance of the product at altitude.

Example 1

What are the corrected CFM, static pressure, and bhp at an elevation of 5,000 ft. if the blower performance data is 6,000 CFM, 1.5 IWC and 4.0 bhp?

Solution 1

At an elevation of 5,000 ft. the indoor blower will still deliver 6,000 CFM if the rpm is unchanged. However, you must use the supply air limitations table to determine the static pressure and bhp. Since no temperature data is given, we will assume an air temperature of 70°F. The airflow performance table shows the correction factor to be 0.832.

Corrected static pressure = 1.5 x 0.832 = 1.248 IWC

Corrected bhp = 4.0 x 0.832 = 3.328

Example 2

A system, located at 5,000 feet of elevation, is to deliver 6,000 CFM at a static pressure of 1.5 in. Use the unit blower tables to select the blower speed and the bhp requirement.

Solution 2

As in the previous example, no temperature information is given so 70°F is assumed.

The 1.5 in. static pressure given is at an elevation of 5,000 ft. The first step is to convert this static pressure to equivalent sea level conditions.

Sea level static pressure = 1.5 / .832 = 1.80 in.

Enter the blower table at 6,000 CFM and static pressure of 1.8 in. The rpm listed will be the same rpm needed at 5,000 ft.

Suppose that the corresponding bhp listed in the table is 3.2. You need to correct this value for elevation.

Bhp at 5,000 ft. = 3.2 x .832 = 2.66

Selecting the drive

1. Determine the required airflow.
2. Calculate or measure the amount of external static pressure.
3. With the operating point determined from the previous steps, locate this point on the appropriate supply air blower performance table. Linear interpolation may be necessary.
4. Note the rpm and bhp from the previous step and locate the appropriate motor or drive.
5. Review the bhp compared to the motor options available. Select the appropriate motor and/or drive.
6. Review the rpm range for the motor options available. Select the appropriate drive if multiple drives are available for the chosen motor.
7. Determine the turns open to obtain the required operation point.

Example:

1. 5100 CFM
2. 0.8 iwg
3. Using the supply air blower performance table below, the following data point was located: 953 rpm and 3.01 bhp.
4. Using the rpm selection table below, Size X and Model Y are found.
5. 3.01 bhp does not exceed the maximum continuous bhp rating of any of the three motor options, so all three motors are still eligible for selection.
6. 953 rpm falls within the range of the 5 hp drive.
7. Using the 5 hp motor, 4.9 turns open achieves 953 rpm.

Table 52: Example supply air blower performance

Air flow (CFM)	Available external static pressure - IWG [1]																		
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8	2.0	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	bhp	rpm	bhp
	Standard 3 HP and drive								Medium static 5 HP and drive								High static 7.5 HP and drive		
4500	690	1.40	775	1.73	847	2.09	910	2.45	967	2.83	1021	3.2	1072	3.57	1122	3.93	4.278	1224	4.6
4890	718	1.66	800	1.99	869	2.35	931	271	978	3.09	1040	3.46	1090	3.83	1140	4.19	4.537	1240	4.86
5100	747	1.95	826	2.29	893	2.64	953	3.01	1008	3.38	1060	3.76	1109	4.13	1158	4.49	4.83	1256	5.15
5400	776	2.28	852	2.61	918	2.97	977	3.33	1031	3.71	1081	4.08	1130	4.45	1177	4.81	5.157	1274	5.48
															High static 7.5 HP and field supplied drive				

1 Blower performance includes gas heat exchangers and 2-inch filters. See the Static resistance table for additional applications. See the RPM selection table to determine the required motor sheave setting and to determine the maximum continuous BHP. kW = BHP x 0.833

Table 53: Example RPM selection

Size (ton)	Model	HP	Max BHP	Motor sheave	Blower sheave	6 turns open	5 turns open	4 turns open	3 turns open	2 turns open	1 turn open	Fully closed
15	KS/ KK	3	2.3	1VP40	1B5V68	690	731	772	814	855	896	937
		5	3.45	1VP40	1B5V70	911	951	991	1031	1071	1111	1151
		7.5	5.75	1VP60	1B5V80	1015	1058	1102	1145	1188	1232	1275

Airflow performance tables

Table 54: KS15 and KK15 (15 ton) side duct

Air flow (CFM)	Available external static pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
	Standard 3 HP and drive										Medium static 5 HP and drive								High static 7.5 HP and drive	
3,900	638	0.98	729	1.31	805	1.67	871	2.03	931	2.41	986	2.78	1,039	3.15	1,091	3.51	1143	3.86	1,195	4.18
4,200	663	1.17	751	1.51	825	1.86	890	2.23	948	2.60	1,003	2.98	1,055	3.35	1,106	3.71	1,157	4.05	1,209	4.37
4,500	690	1.40	775	1.73	847	2.09	910	2.45	967	2.83	1,021	3.2	1,072	3.57	1,122	3.93	1,173	4.28	1,224	4.60
4,800	718	1.66	800	1.99	869	2.35	931	2.71	987	3.09	1,040	3.46	1,090	3.83	1,140	4.19	1,189	4.54	1,240	4.86
5,100	747	1.95	826	2.29	893	2.64	953	3.01	1,008	3.38	1,060	3.76	1,109	4.13	1,158	4.49	1,207	4.83	1,256	5.15
5,400	776	2.28	852	2.61	918	2.97	977	3.33	1,031	3.71	1,081	4.08	1,130	4.45	1,177	4.81	1,225	5.16	1,274	5.48
5,700	807	2.64	880	2.98	944	3.33	1,001	3.70	1,054	4.07	1,103	4.45	1,151	4.82	1,198	5.18	1,245	5.52	1,293	5.84
6,000	838	3.04	909	3.37	971	3.73	1,026	4.09	1,078	4.47	1,126	4.84	1,173	5.21	1,219	5.57	1,265	5.92	1,313	6.24
6,300	869	3.47	938	3.81	998	4.16	1,052	4.53	1,102	4.9	1,150	5.28	1,196	5.65	1,241	6.01	1,286	6.35	1,333	6.67
6,600	901	3.95	968	4.28	1,026	4.63	1,079	5.00	1,128	5.38	1,174	5.75	1,219	6.12	1,263	6.48	1,308	6.82	1,354	7.15
6,900	934	4.46	998	4.79	1,055	5.15	1,106	5.51	1,154	5.89	1,199	6.26	1,243	6.63	1,287	6.99	1,331	7.34	1,376	7.66
7,200	966	5.01	1,028	5.34	1,084	5.70	1,134	6.06	1,180	6.44	1,225	6.81	1,268	7.18	1,310	7.54	1,354	7.89	1,398	8.21
7,500	999	5.60	1,059	5.93	1,113	6.29	1,162	6.65	1,207	7.03	1,250	7.40	1,293	7.77	1,335	8.13	1,377	8.48	1,421	8.80
													High Static 10 HP and Field Supplied Drive							

Note:

- Blower performance includes gas heat exchangers and 2 in. filters. See the static resistance table for additional applications.
- See RPM selection table to determine desired motor sheave setting and to determine the maximum continuous bhp.
- kW = bhp x 0.833

Table 55: KS18 and KK18 (17.5 ton) side duct

Air flow (CFM)	Available external static pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
	Standard static 5 HP and drive												Med static 7.5 HP and drive						High static 10 HP and drive	
4,680	707	1.55	790	1.89	860	2.24	922	2.61	979	2.98	1,032	3.36	1,083	3.73	1,133	4.09	1,182	4.43	1,233	4.75
5,040	741	1.89	820	2.23	888	2.58	949	2.95	1,004	3.32	1,056	3.69	1,106	4.07	1,154	4.43	1,203	4.77	1,253	5.09
5,400	776	2.28	852	2.61	918	2.97	977	3.33	1,031	3.71	1,081	4.08	1,130	4.45	1,177	4.81	1,225	5.16	1,274	5.48
5,760	813	2.72	886	3.05	949	3.41	1,006	3.77	1,058	4.15	1,108	4.52	1,155	4.89	1,202	5.25	1,249	5.6	1,297	5.92
6,120	850	3.21	920	3.54	982	3.9	1,037	4.26	1,087	4.64	1,135	5.01	1,182	5.38	1,228	5.74	1,274	6.09	1,321	6.41
6,480	889	3.75	956	4.09	1,015	4.44	1,068	4.81	1,118	5.18	1,164	5.56	1,210	5.93	1,254	6.29	1,299	6.63	1,346	6.95
6,840	927	4.35	992	4.69	1,049	5.04	1,101	5.41	1,149	5.78	1,194	6.16	1,238	6.53	1,282	6.89	1,326	7.23	1,371	7.55
7,200	966	5.01	1,028	5.34	1,084	5.7	1,134	6.06	1,180	6.44	1,225	6.81	1,268	7.18	1,310	7.54	1,354	7.89	1,398	8.21
7,560	1,005	5.72	1,065	6.05	1,119	6.41	1,167	6.78	1,212	7.15	1,256	7.52	1,298	7.89	1,340	8.25	1,382	8.6	1,425	8.92
7,920	1,044	6.49	1,102	6.83	1,154	7.18	1,201	7.55	1,245	7.92	1,287	8.3	1,328	8.67	1,369	9.03	1,410	9.37	1,453	9.69
8,280	1,083	7.32	1,139	7.66	1,189	8.01	1,235	8.38	1,278	8.75	1,319	9.13	1,359	9.5	1,399	9.86	1,439	10.2	1,481	10.5
8,640	1,122	8.22	1,176	8.55	1,224	8.91	1,269	9.27	1,310	9.65	1,350	10	1,390	10.4	1,429	10.8	1,469	11.1	-	-
9,000	1,160	9.18	1,212	9.51	1,259	9.87	1,302	10.2	1,343	10.6	1,382	11	-	-	-	-	-	-	-	-
							High Static 12 HP and Field Supplied Drive													

Note:

- Blower performance includes gas heat exchangers and 2 in. filters. See static resistance table for additional applications.
- See RPM selection table to determine the necessary motor sheave setting and to determine the maximum continuous bhp.
- kW = bhp x 0.833

Table 56: KS20 and KK20 (20 ton) side duct

Air Flow (CFM)	Available external static pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
	Standard Static 5 HP and Drive												Medium Static 7.5 HP and Drive						High Static 10 HP and Drive	
5,200	739	1.33	835	2.02	916	2.62	987	3.15	1,050	3.63	1,109	4.09	1,164	4.54	1,217	5	1,269	5.5	1,321	6.06
5,600	779	1.72	871	2.42	949	3.02	1,017	3.55	1,079	4.03	1,136	4.48	1,190	4.93	1,242	5.4	1,293	5.9	1,344	6.46
6,000	818	2.14	906	2.84	981	3.44	1,047	3.97	1,107	4.45	1,163	4.9	1,216	5.35	1,267	5.82	1,317	6.32	1,367	6.88
6,400	857	2.59	941	3.28	1,013	3.88	1,077	4.41	1,136	4.89	1,190	5.35	1,242	5.79	1,292	6.26	1,341	6.76	1,390	7.32
6,800	895	3.05	975	3.75	1,045	4.35	1,108	4.88	1,165	5.36	1,218	5.81	1,268	6.26	1,317	6.72	1,365	7.23	1,414	7.79
7,200	932	3.55	1,009	4.24	1,077	4.84	1,138	5.37	1,194	5.85	1,245	6.31	1,295	6.76	1,343	7.22	1,390	7.72	1,438	8.28
7,600	969	4.07	1,044	4.77	1,109	5.37	1,168	5.9	1,223	6.38	1,273	6.83	1,322	7.28	1,369	7.75	1,415	8.25	1,462	8.81
8,000	1,006	4.64	1,078	5.33	1,142	5.93	1,199	6.46	1,252	6.94	1,301	7.4	1,349	7.85	1,395	8.31	1,441	8.81	1,487	9.37
8,400	1,042	5.24	1,112	5.93	1,174	6.53	1,230	7.06	1,282	7.55	1,330	8.00	1,376	8.45	1,422	8.91	1,466	9.41	-	-
8,800	1,079	5.89	1,147	6.58	1,207	7.18	1,262	7.71	1,312	8.19	1,359	8.65	1,405	9.09	1,449	9.56	1,493	10.1	-	-
9,200	1,116	6.58	1,182	7.28	1,240	7.88	1,293	8.41	1,342	8.89	1,389	9.34	1,433	9.79	1,477	10.3	-	-	-	-
9,600	1,154	7.34	1,217	8.03	1,274	8.63	1,326	9.16	1,374	9.64	1,419	10.1	1,463	10.5	-	-	-	-	-	-
10,000	1,192	8.15	1,253	8.84	1,308	9.44	1,359	9.97	1,406	10.5	1,450	10.9	-	-	-	-	-	-	-	-
					High Static 12 HP and Field Supplied Drive															

Note:

- Blower performance includes gas heat exchangers and 2 in. filters. See static resistance table for additional applications.
- See rpm selection table to determine the necessary motor sheave setting and to determine the maximum continuous bhp.
- kW = bhp x 0.833

Table 57: KS25 and KK25 (25 ton) side duct

Air flow (CFM)	Available external static pressure - IWG																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
	Standard Static 7.5 HP and Drive												Medium Static 10 HP and Drive						High Static 12 HP and Drive	
6,500	866	2.74	949	3.45	1,021	4.06	1,085	4.6	1,143	5.09	1,197	5.55	1,248	6	1,298	6.47	1,347	6.98	1,396	7.55
7,000	913	3.35	992	4.05	1,061	4.66	1,123	5.2	1,179	5.69	1,231	6.15	1,281	6.61	1,330	7.08	1,378	7.59	1,426	8.16
7,500	960	4.00	1,035	4.71	1,101	5.32	1,161	5.86	1,215	6.34	1,266	6.81	1,315	7.26	1,362	7.73	1,409	8.24	1,456	8.81
8,000	1,006	4.71	1,078	5.41	1,142	6.03	1,199	6.56	1,252	7.05	1,301	7.51	1,349	7.97	1,395	8.44	1,441	8.95	1,487	9.52
8,500	1,052	5.48	1,121	6.19	1,182	6.8	1,238	7.34	1,289	7.83	1,337	8.29	1,383	8.74	1,428	9.21	1,473	9.72	-	-
9,000	1,098	6.33	1,164	7.03	1,224	7.64	1,277	8.18	1,327	8.67	1,374	9.13	1,419	9.59	1,463	10.1	1,506	10.6	-	-
9,500	1,144	7.26	1,208	7.96	1,266	8.57	1,318	9.11	1,366	9.6	1,411	10.1	1,455	10.5	1,498	11	-	-	-	-
10,000	1,192	8.28	1,253	8.98	1,308	9.59	1,359	10.1	1,406	10.6	1,450	11.1	1,493	11.5	-	-	-	-	-	-
10,500	1,240	9.40	1,299	10.1	1,352	10.7	1,401	11.3	1,447	11.7	-	-	-	-	-	-	-	-	-	-
11,000	1,289	10.60	1,346	11.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11,500	1,339	12.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note:

- Blower performance includes gas heat exchangers and 2 in. filters. See the static resistance table for additional applications.
- See rpm selection table to determine necessary motor sheave setting and to determine the maximum continuous bhp.
- kW = bhp x 0.820

Air balance

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

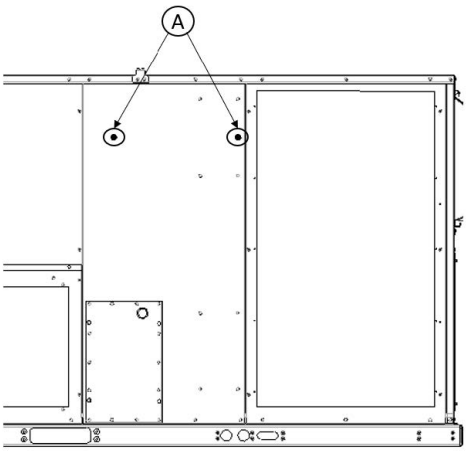
CAUTION

On VAV units verify that the VFD drive is set to maximum output, exhaust dampers are closed, and individual space damper boxes are full open. VFD units with bypass must not be in bypass mode (LINE position) unless all individual space dampers are full open.

Checking air quantity

1. Remove the dot plugs from the supply and return air access panels on the back side of the unit. See Figure 76.

Figure 76: Dot plug location



Item	Description
A	Dot plug location

2. Insert at least 8 in. of 1/4 in. tubing into each of these holes for sufficient penetration into the air flow on both sides of the indoor coil.

   Note: You must insert the tubes and hold them in a position perpendicular to the air flow so that velocity pressure does not affect the static pressure readings.

3. Use an inclined manometer to determine the pressure drop across the dry evaporator coil and filters. The moisture on an evaporator coil may vary greatly, measuring the pressure drop across a wet coil under field conditions could be inaccurate. To ensure that the coil is dry, deactivate the compressors while the test is running.

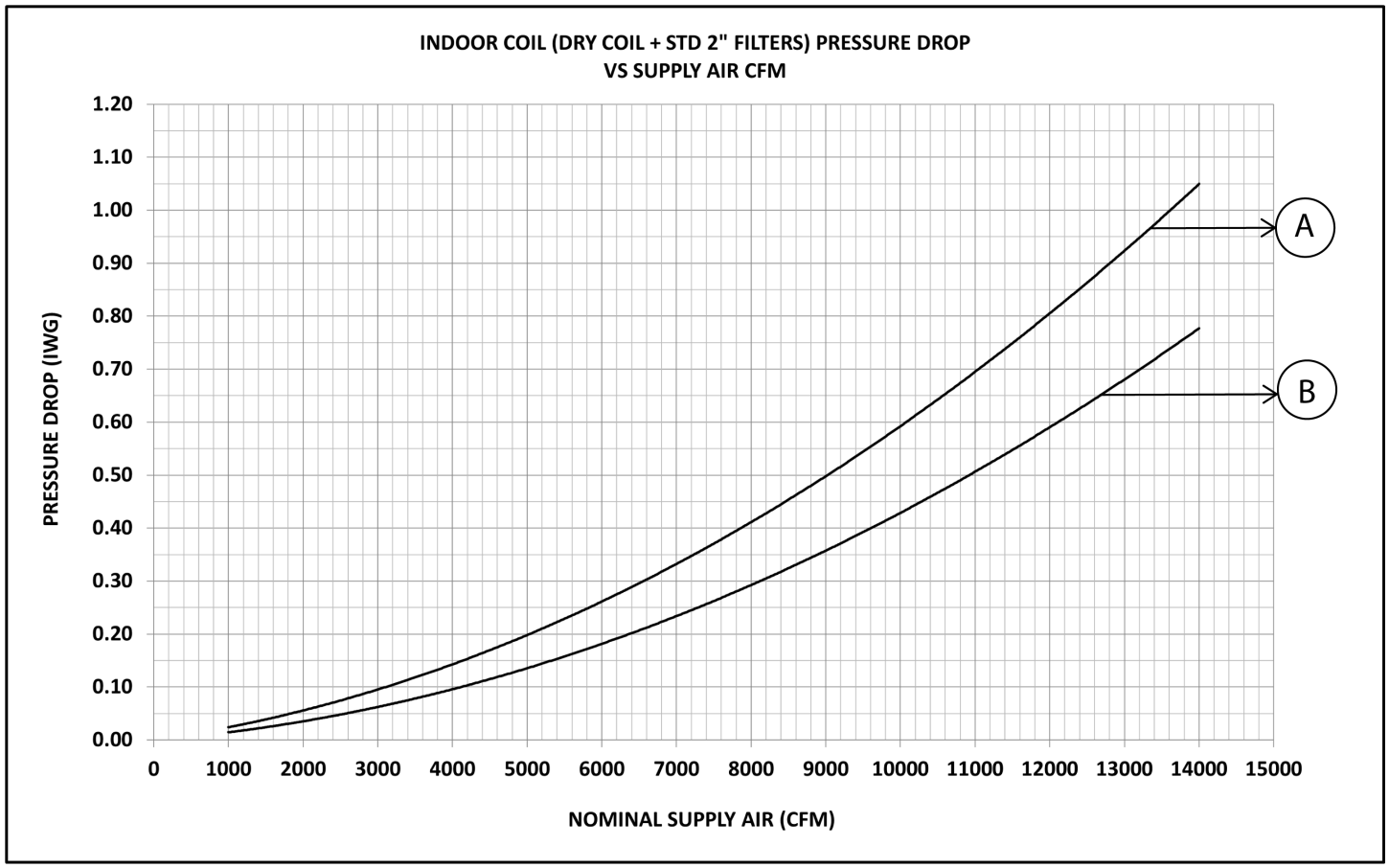
   Note: De-energize the compressors before taking any test measurements to ensure that the indoor coil is dry.

4. Use the pressure drop across a dry coil, to determine the actual CFM through the unit from the curve in the following figure.

WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

Figure 77: Pressure drop



Item	Description
A	15 tons to 18 tons
B	20 tons to 25 tons

Supply air drive adjustment

The rpm of the supply air blower depends on the required CFM, the unit accessories or options, and the static resistances of both the supply and the return air duct systems. Use the blower performance data tables to determine the rpm for the supply air blower and the motor pulley adjustment.

CAUTION

You must adjust the belt drive blower systems to the specific static and CFM requirements for the application. The belt drive blowers are not set at the factory for any specific static or CFM. You must adjust the blower speed and belt tension. Verify proper sheave alignment. Tighten the blower pulley and motor sheave set screws after these adjustments. Re-check the set screws after 10 to 12 hours of run time.

See the blower motor and drive data table.

Note the following:

- The supply air CFM must be within the limitations shown in the blower performance tables.
- You can adjust pulleys in half turn increments.
- Adjust the belt tension.
- Tighten the blower pulley and motor sheave set screws after any adjustments. Re-check the set screws after 10 to 12 hours run time.

Note:

- For cooling only models, add the cooling only value to the available static resistance in the respective blower performance tables.
- For models with electric heat, add the electric heat value for your heater size to the available static resistance in the respective blower performance tables.
- If the unit contains a reheat coil or economizer, deduct the corresponding value from the available external static pressure shown in the respective blower performance tables.
- The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit delivers less CFM during full economizer operation.

Table 58: Additional static resistance

Model	CFM	Cooling only [1]	Reheat coil [2]	Economizer[3]	Electric heat kW			4 in. MERV 13	2 in. MERV 8	2 in. MERV 13
					25	50	75			
KS15 and KK15 KS18 and KK18	4000	0.09	0.03	0.01	0.00	0.01	0.02	0.05	0.05	0.05
	5000	0.11	0.05	0.02	0.03	0.03	0.04	0.06	0.05	0.06
	6000	0.15	0.06	0.07	0.04	0.04	0.05	0.07	0.06	0.07
	7000	0.20	0.07	0.11	0.05	0.06	0.07	0.09	0.07	0.09
	8000	0.28	0.09	0.14	0.07	0.08	0.09	0.12	0.09	0.12
	9000	0.38	0.10	0.15	0.09	0.10	0.11	0.14	0.11	0.14
	10000	0.49	0.11	0.16	0.12	0.13	0.14	0.18	0.13	0.18
KS20 and KS20 KS25 and KK25	7000	0.20	0.04	0.11	0.05	0.06	0.07	0.07	0.06	0.07
	8000	0.28	0.06	0.13	0.07	0.08	0.09	0.09	0.07	0.09
	9000	0.38	0.07	0.16	0.09	0.10	0.11	0.10	0.08	0.10
	10000	0.49	0.08	0.19	0.12	0.13	0.14	0.13	0.09	0.13
	11000	0.60	0.10	0.23	0.18	0.20	0.22	0.15	0.11	0.15
	12000	0.70	0.11	0.28	0.26	0.29	0.32	0.18	0.13	0.18
	13000	0.76	0.13	0.34	0.38	0.41	0.45	0.21	0.14	0.21
	14000	0.80	0.14	0.43	0.51	0.56	0.60	0.24	0.17	0.24

1 Add these values to the available static resistance in the respective blower performance tables.
2 Deduct these values from the available external static pressure shown in the respective blower performance tables.
3 The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

Operation

The following sections describe the sequences of operation for the units.

Cooling sequence of operation

Compressor Operation

this section describes the compressor operation of the unit.

2 Stage Cooling

This section assumes Free Cooling is not available.

1. Compressors are controlled by the Y1 through Y2 thermostat inputs. If the Lead/Lag function is turned OFF, a Y1 input energizes the C1 output. Thermostat Input into Y2 energizes the C2 output respectively.
2. The FAN output for indoor fan operation energizes with any cooling output after the Fan On Delay for Cool expires.
3. CN-FAN output energizes when either C1 or C2 is energized

   ⓘ **Note:** When C1 is energized, System 1 condenser fan is also energized. When C2 is energized, System 2 condenser fan is also energized.
4. A 30 second interstage delay occurs when multiple stages are requested. When the thermostat cooling inputs are lost and the minimum runtime expires, the compressor outputs stage off.

   ⓘ **Note:** A Y2 input without a Y1 input energizes C1 first and then C2 30 seconds later.

4 Stage Cooling

This section assumes Free Cooling is not available.

1. Compressors are controlled by the Y1 through Y4 thermostat inputs. Y1 input energizes the C1 output. A Y2 input energizes the C3 output. A Y3 input de-energizes the C3 output and energizes the C2 output. A Y4 input energizes the C3 output.

   ⓘ **Note:** For 15 to 20 ton models, the C1 output energizes the first stage on the 2 stage compressor and the C3 output energizes the second stage on the 2 stage compressor. For 25 ton models, the C1 output energizes the first of the tandem compressors and the C3 output energizes the second of the tandem compressors.
2. The FAN output for indoor fan operation energizes with any cooling output after the Fan On Delay for Cool expires.
3. Both the CF1 and CF2 outputs energize when any compressor stage is energized.
   - For 15 ton to 20 ton, when C1 is energized, System 1 condenser fan is also energized. When C2 is energized, System 2 condenser fan is also energized.
   - For 25T, when C1 energized, System 1 condenser fan is also energized. When C2 or C3 is energized, System 2 condenser fan is also energized.
4. A 30-second interstage delay occurs when multiple stages are requested. Compressor minimum off times are enforced while staging up and down. When the thermostat cooling inputs are lost and the minimum runtime expires, the compressor outputs stage off.
5. Staging down sequence:
   - Y1, Y2, Y3, Y4 – C1, C2, C3
   - Y1, Y2, Y3 (Y4 off) – C1, C2 (C3 off)
   - Y1, Y2 (Y3 off) – C2 (C1 off)
   - Y1 (Y2 off) – C1 on (C2 off)
   - All thermostat signals off – all stages off

Continuous blower

When the room thermostat fan switch is set to ON, the supply air blower operates continuously.

Intermittent blower

With the room thermostat fan switch set to AUTO and the system switch set to either the AUTO or HEAT settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds minimum off.

Optional VAV startup and control

⚠ CAUTION

If the unit is operated with the manual bypass switch in the LINE (BYPASS) position and there are VAV boxes present in the duct system, then boxes must be driven to the full-open position using a customer-supplied power source to prevent over-pressurizing and possible damage to the ductwork.

For units with VFD and VAV control, you must put the unit into the occupied mode to start operation. The default setting for all VAV units is unoccupied. The installer must either keep the jumper wire between terminals R - OCC or use a network command from a BAS control system to switch between the unoccupied and occupied modes.

When placed into the occupied mode, the speed of the indoor blower motor is controlled by duct static pressure. The duct static setpoint (default = 1.5 in.WC) is the pressure that the VFD drive maintains when operating the unit in VAV mode. If the duct static pressure reaches or exceeds the high-limit setpoint (default = 4.5 in.WC), then the supply fan motor is shutdown.

The supply air temperature (SAT) is controlled by staging compressors on and off to satisfy the Operating Cooling Supply Air Temperature Setpoint. There are three factors that determine the resulting Operating Cooling Supply Air Temperature Setpoint:

1. VAV cooling supply air temp upper setpoint (default 60°F)
2. VAV cooling supply air temp lower setpoint (default 55°F)
3. VAV supply air temp reset setpoint (default 72°F)

When the return air temperature (RAT) is above the VAV supply air temperature reset setpoint the SAT is maintained at +/- 5 degrees of the VAV cooling supply air temperature lower setpoint.

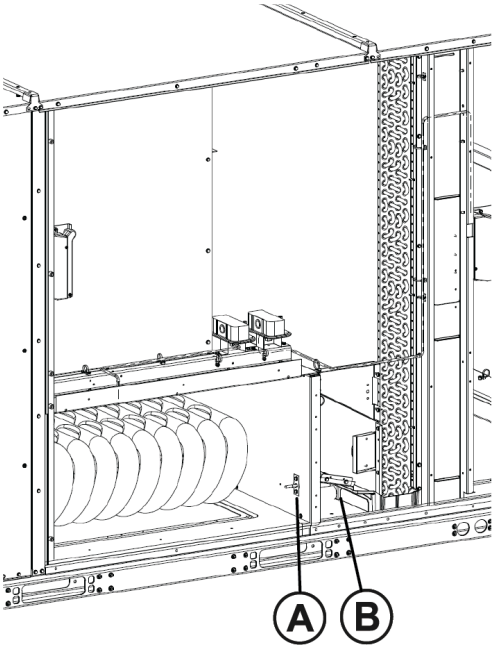
When the return air temperature (RAT) is below the VAV supply air temperature reset setpoint the SAT is maintained at +/- 5 degrees of the VAV cooling supply air temperature upper setpoint.

When the outdoor air condition is sufficient for free cooling, the economizer modulates to control the SAT to +/- 1 degrees of the operational setpoint.

Supply air temperature sensor

The SAT sensor is mounted inside the discharge section as shown in Figure 78. The sensor is connected to UCB with harness 306" long. This length is intentionally provided so the sensor can be easily positioned further in the supply duct as needed. The extra length of the harness is bundled and can be accessed from location shown in Figure 78.

Figure 78: SAT location



Callout	Description
A	SAT sensor
B	Extra wire bundle

Cooling operation errors

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

Note: The following components are needed to access the control points in the Smart Equipment control.

- Local LCD on the unit control board.

or

- Mobile Access Portal (MAP) Gateway (Portable).
  - Source 1 P/N S1-JC-MAP1810-OP
  - MAP Gateway Quick Start Guide P/N 24-10737-16
  - MAP Gateway Instruction P/N 24-10737-8

High-pressure limit switch

During cooling operation, if a high-pressure limit switch opens, the UCB de-energizes the associated compressor, initiates the ASCD (anti-short cycle delay), and stops the condenser fans. If the call for cooling is still present and the HPS is closed at the conclusion of the ASCD, the UCB re-energizes the halted compressor.

If a high-pressure switch opens three times within two hours of operation, the UCB locks out the associated compressor and the condenser fan(s) are de-energized

Low-pressure limit switch

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30s, the UCB monitors the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30s monitoring phase, the UCB de-energizes the associated compressor, initiates the ASCD, and stops the associated condenser fans. If the LPS is still open after the ASCD, the compressor is not energized for 30s.

The second and third times that the UCB sees an open LPS counts towards the three occurrences that cause a UCB lock-out.

When the low-pressure switch is proven (closed during the 30s monitor period described above), the UCB monitors the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5s, the UCB de-energizes the associated compressor, initiates the ASCD, and, stops the associated condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB re-energizes the halted compressor.

Evaporator low limit

The evaporator low limit sensor is located on the suction line at the evaporator coil.

During cooling operation, if the evaporator low limit sensor (EC1, 2) detects a temperature below 26°F (default), the UCB de-energizes the associated compressor, initiates the ASCD, and stops the associated condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the

UCB re-energizes the halted compressor. If the UCB detects the evaporator low limit sensor (EC1, 2) falling below 26°F (default) three times in two hours of operation, the UCB locks out the associated compressor and the condenser fans are de-energized.

Low ambient cooling

To determine when to operate in low ambient mode, the UCB has an outdoor air temperature sensor (OAT) with a low ambient setpoint at 45°F (default).

The high efficiency units have a user adjustable cooling OAT cutout setpoint at 0°F per circuit (45°F is default).

If Cooling OAT Cutout Enable is set to yes, the compressor operation is not permitted if the OAT is less than the Cooling OAT Cutout. High efficiency units should have the Cooling OAT Cutout Enable set to Yes, and the Cooing OAT Cutout setpoint set to 0°F. The upper range of this adjustable limit is 100°F.

If Cooling OAT Cutout Enable is set to no, the compressors cycle 10 minutes on and 5 minutes off. If the OAT is less than the low ambient 10 on 5 off setpoint (LowAmb10On5OffSp) setpoint. This option is available, but not necessary with units having modulating condenser fans (high efficiency models).

All condenser fans on Choice Ultra-High Efficiency units are equipped with ECM motors as standard, allowing them to modulate based on the saturated discharge temperature. This helps to keep the unit running during low ambient conditions.

If the circuit's saturated discharge temperature is not stable and a modulating condenser fan is installed on that circuit, then the effective OAT Cooling Enable setpoint for that circuit will be the maximum of the user setpoint and 60°F. Effectively that means that the OAT Cooling Enable setpoint will be at least 60°F when the saturated discharge temperature is unreliable, and a modulating condenser fan is installed.

When operating in this mode, if the variable speed compressor operates outside of operating envelope limits, the compressor is operated and protected as described in the envelope control section.

When operating in this mode, an evaporator low limit sensor (EC1, EC2) temperature below 26ºF, the UCB de-energizes the associated compressor. If the call for cooling is still present at the end of the ASCD and the evaporator temperature sensor (EC1, EC2) temperature is above 26°F, the unit resumes operation.

Safety controls

The unit control board monitors the following inputs for each cooling system:

1. An evaporator low limit sensor (EC1, EC2) to protect against low evaporator temperatures due to a low airflow or a low return air temperature, set at 26°F. The sensor is located on the suction line at the evaporator coil.
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure. The switch opens at 625 ± 10 psig.
3. A low-pressure switch to protect against loss of refrigerant charge. The switch opens at 50 ± 5 psig.

The above pressure switches are hard soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system is affected by any safety/preventive action. The other refrigerant system continues in operation unless it is affected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

Compressor protection

In addition to the external pressure switches, the compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector opens to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An anti-short cycle delay (ASCD) is used to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

Reset

Remove the call for cooling by raising thermostat setting higher than the conditioned space temperature.

Reheat sequence of operation

Dehumidification (hot gas reheat)

The rooftop unit can have an optional hot gas reheat (HGRH) system factory installed. HGRH is utilized to help dehumidify the interior space.

- This is accomplished by controlling the compressors to the evaporator leaving air setpoint, which is typically set lower than the active DAT cooling setpoint
- The colder air allows for more moisture removal from the discharge air
- The discharge air then passes through the HGRH coil, which adds heat to the discharge air
- Reheating the air allows dehumidification of the space while preventing over-cooling, which keeps building personnel comfortable

The HGRH system is always on refrigeration circuit #2. The HGRH system uses a 3-way modulating valve controlled by a stepper motor.

The HGRH coil is located after the evaporator coil in the airstream.

There is a solenoid installed on the outlet of the HGRH coil. This HGRH bleed solenoid valve allows excess refrigerant and oil to bleed back into the suction line when HGRH operation is not needed.

Dehumidification sequence

The unit controller continuously monitors a %RH value. This value can be either from the space or return air.

When the current humidity level rises above the dehumidification setpoint, the unit enables the HGRH system.

Setpoints for the dehumidification sequence can be found under the ***Details*** > ***Humidity Control*** > ***Setup*** menu.

There are two different operating sequences for HGRH.

Unit in Active Cooling Mode

When the unit is in an active cooling mode and there is a demand for dehumidification, the HGRH valve is controlled to the active DAT cooling setpoint.

The compressors are controlled to the active evaporator air temperature (EAT) setpoint.

Typically the active EAT setpoint is lower than the active DAT cooling setpoint. This allows for additional humidity to be removed while still providing sensible cooling.

Unit in Idle Mode

When the unit is not in an active cooling mode and there is a demand for dehumidification, the HGRH valve is controlled to an active DAT setpoint based on a reset schedule utilizing the effective cooling DAT setpoint and the current RAT. See .

The compressors are controlled to the active EAT setpoint. This allows for humidity to be removed from the air while not over-cooling the space.

The unit controller uses the current humidity level as the basis for the active EAT setpoint.

- When the humidity level first increases above the active humidity setpoint, the active EAT setpoint is equal to the low cooling DAT setpoint
- When the humidity level continues to increase, the active EAT setpoint resets lower to allow for moisture removal

If at any time during an active dehumidification sequence the changeover sensor sees a demand for heat, HGRH operation is terminated regardless of the current humidity level.

Figure 79: Active DAT Setpoint when Unit Is In Idle Mode

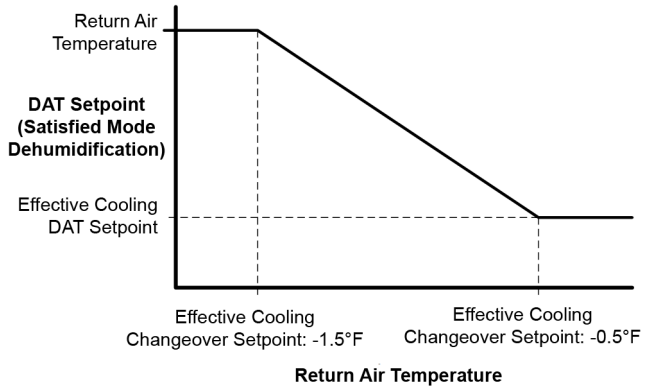
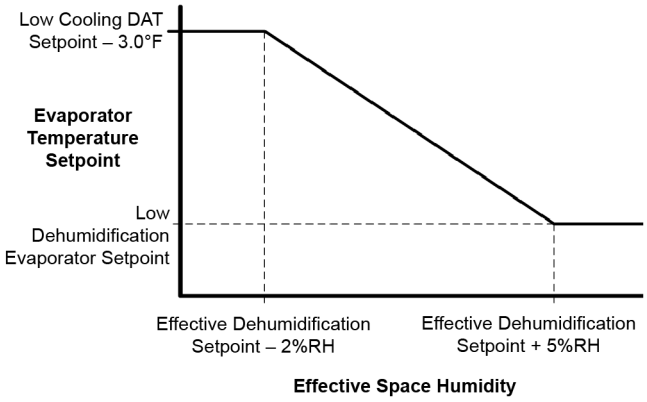
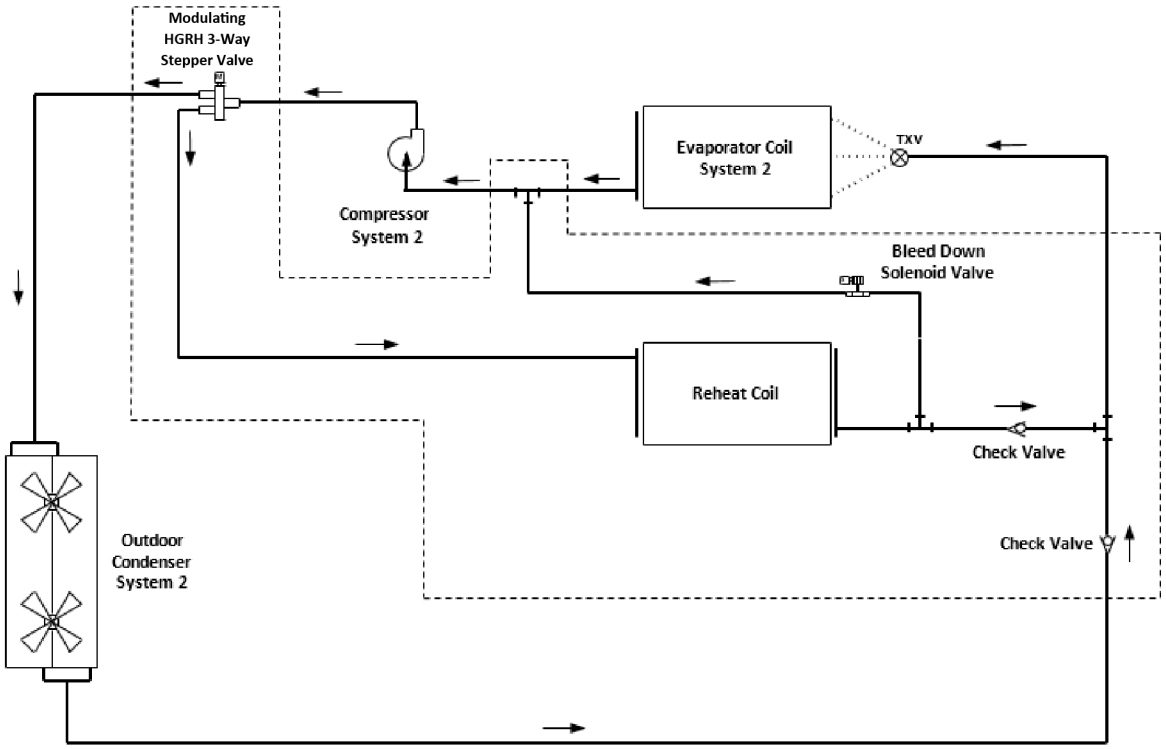


Figure 80: Active EAT Setpoint Based on Humidity Level



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Figure 81: HGRH Schematic



Modulating HGRH 3-way stepper valve

The refrigerant flow is modulated using a 3-way modulating valve. This valve is closed when there is no demand for HGRH. Once a demand for HGRH exists, the 3-way valve opens. In HGRH mode, the 3-way valve has a minimum position of 40% and a maximum position of 100% for 15T, 17.5T, 20T, and 25T models.

Condenser fan control

In HGRH mode, System 2 condenser fans are off when OAT drops to 55.0°F or below, and/or when the 3-way vale opens more than equal to 65% for 15T, 17.5T, 20T, and 25T models.

Hot gas reheat valve

The HGRH bleed valve is a normally open valve that is piped between the HGRH coil and the compressor system 2 suction line. The HGRH bleed valve prevents refrigerant and oil from being trapped in the HGRH coils when HGRH is inactive.

The HGRH valve is open when there is no demand for HGRH. Once a demand for HGRH exists, the HGRH bleed valve closes.

After the demand for HGRH is satisfied, the unit controller starts a 5 minute timer. When the 5 minute timer expires, the HGRH bleed valve opens.

Electric heating sequence of operations

The following sequence describes the operation of the electric heat section.

CAUTION

For units with VFD and electric heat, the speed of the indoor blower motor continues to be controlled by duct static pressure via the VAV control board. If there are VAV boxes present in the duct system, the boxes must be driven to the full-open position using a customer-supplied power source to ensure adequate airflow across the heating elements.

Electric heat operation errors

Temperature limit

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized.

The limit is monitored at all times when the unit is in an operational mode where the electric heaters may be turned on.

If the temperature limit opens three times within one hour, it locks on the indoor blower.

Electric heat safety controls

The UCB monitors the temperature limit switch of electric heat units.

The control circuit includes the following safety controls:

Temperature limit switch

Temperature limit switch (LS1A, LS1B)

This control is located inside the heater compartment and is set to open at 120° F. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, this shuts down the heater and energizes the blower.

Temperature limit switch (LS2A, LS2B)

This control is located inside the heater compartment and is set to open at 160° F. It is a single use limit. These limit switches de-energize the heaters if the primary limit fails to open or the contactors fail to open in a failure mode. When the backup limit trips it needs to be replaced for the heater to be operational again.

Reset

Removes the call for heating by lowering the thermostat setting lower than the conditioned space temperature.

Gas heat sequence of operation

1. When the thermostat calls for the first stage of heating, the low-voltage control circuit from R to W1 is complete. If the outdoor air temperature is above the adjustable balance point (default 40°F) the unit operates in heat pump heating (compressors). If the outdoor air temperature is below the balance point the unit operates in gas heating. For gas heat, a call for heat passes through the UCB to the Ignition Control Board (ICB).
2. When the pre-ignition process is complete the ignition module energizes the gas valve and provides a 24 V input to the MV terminal on the UCB.
3. The FAN ON HEAT DELAY timer starts as soon as 24 V is present on MV terminal. When the timer expires the FAN output for the indoor fan operation energizes. If 24 V is not received on the MV terminal within 6 minutes, an alarm appears and the fan output energizes immediately and remains On until the alarm clears.
4. When the thermostat heat inputs are lost and the 120 second Minimum Heat Run Timers have expired, heating outputs stage off. The FAN OFF HEAT DELAY timer starts when 24 V is removed from the MV terminal. When the timer expires, the FAN output for the indoor fan operation de-energizes.

   ⓘ **Note:** If 24 V is lost on the MV terminal during the same heat cycle, an alarm appears and the fan output energizes and remains on until 24 V is present again on the MV terminal.

   ⓘ **Note:** If 24 V is present on the MV terminal without a call for heat, an alarm triggers and the fan output energizes. If this condition occurs for 6 minutes an alarm triggers, and remains, until the alarm condition is cleared.

5. At any time, if 24 V is lost on the LIMIT terminal, the FAN output for indoor fan operation is energized. If 24 V is lost on the LIMIT input 3 times in 1 hour, an alarm appears and the FAN output is energized. The heating H2 outputs are de-energized until the alarm is cleared.

Additional heating operation for modulating furnaces

Normal heating

The modulating furnace control (MFC) is circuited between the UCB and ignition control board (ICB). The MFC determines the appropriate heat level demand to send to the ICB. When the MFC receives a W1 input (H2 output from the UCB), the MFC maintains the added value of W1 SAT plus W2 SAT ADDED VALUE pin selections. The MFC sends heat level demands to the ICB through a serial communication signal.

Air tempering mode

In air tempering mode, the MFC tries to maintain neutral supply air temperature to the conditioned air space when it senses cold incoming mixed air. This condition is typically created when there is a fresh outside air demand in cold ambient conditions.

If the air tempering pin jumper is set to any value other than OFF, the MFC initiates furnace operation if the mixed air temperature (MAT) sensor input reading is 3°F below the selected value. The MFC then adjusts the heat demand level to control the supply air temperature (SAT) to the selected value.

To operate Air Tempering, air proving switch (APS) input must be on, W1/W2 heat call from the UCB must be off, and all compressor inputs must have been off for 10 minutes. If the MFC has been in tempering mode (heating) for 10 minutes and the SAT reading is 5°F or more above the air tempering selected value, heating is ended. If all conditions for Air Tempering are still met, it re-initiates after a 10 minute minimum off delay.

Two-stage gas heat ignition control board function

Ignition control board on standby

The Ignition Control Board (ICB) has all outputs de-energized and monitors the thermostat and flame sense. The ICB resets ignition trial and flame loss counters. The ICB begins a call for heat when W1 is energized at the Unit Control Board (UCB).

Pressure switch proving

The ICB energizes the induced draft motor and waits for the low pressure switch to close. When the low pressure switch closes, the control begins a Pre-purge period. If the call for heat is lost, the control de-energizes the inducer without post-purge and returns to standby.

If the low pressure switch does not close within 10 seconds of inducer energizing, the control flashes 2 on the LED. If the

pressure switch does not close within 5 minutes of inducer energizing, the control shuts off the inducer for 30 seconds, then energizes the inducer for another 5 minutes try to close the pressure switch. This cycle continues indefinitely until either the pressure switch is proved closed, or the call for heat ends.

Pre-purge

The ICB monitors the low pressure switch and ensures it remains closed during pre-purge. If the pressure switch opens, the control returns to pressure switch proving mode. The control waits for a 15 seconds pre-purge period, and then begins the ignition trial.

Ignition trial period

When the ICB energizes the main gas valve, the second stage gas valve and the spark outputs for a 10 second ignition trial. The control de-energizes the spark when a flame is sensed and enters a flame stabilization period.

If a flame is not established within the ignition trial period, the control de-energizes the spark and gas valve and checks for the maximum number of ignition trials. The ICB has a maximum number of three ignition trials. If the control has attempted the maximum number of ignition trials in the same call for heat without flame, the control locks out flashing 4 on the LED. If the control has attempted less than maximum ignition trials, it begins an inter-purge period before attempting another ignition trial.

If the call for heat is lost during an ignition trial period, the control immediately de-energizes spark and gas. The control runs the inducer motor through a post purge period before de-energizing.

If the pressure switch is lost during an ignition trial period, the control immediately de-energizes spark and gas. The control begins pressure switch proving before an inter-purge and re-ignition attempt.

Flame stabilization period

If a flame is detected during the Ignition Trial Period, the ICB then enters the flame stabilization period. If a flame is not detected in 2 seconds, the main valve is de-energized and a retry operation begins. The flame stabilization period lasts 10 seconds. A flame detection must be lost for 2 seconds during flame stabilization for the main valve to be de-energized. When the flame stabilization period has ended, a loss of flame detection for 3/4 seconds results in the main valve being de-energized.

If a flame is lost during the flame stabilization period, the control counts it as a flame loss and retries ignition or locks out as described in Low heat section.

Main burner operation

High heat warm-up

Upon receiving W1 (H2 from the UCB board), the gas heat ignition control turns on high heat for the normal 1 minute warmup and flame stabilization period.

High heat

After the high heat warm-up, the gas heat ignition control remains in high heat until the heat call ends. The ICB keeps the main gas valve and induced draft motor energized while continuously monitoring the call for heat, low pressure switch and flame status.

If the call for heat (W1) is lost, the control de-energizes the gas valve and begins post purge.

If the low pressure switch opens, the control deenergizes the gas valve and begins pressure switch proving mode.

If the flame is lost, the control de-energizes the gas valve within 2 seconds and counts the flame loss. If a flame is lost more than five times within the same call for heat, the control locks out flashing 5 on the LED. If the flame is lost less than five times, the control attempts reignition after a 30 second inter-purge period

Post purge

The ICB runs the induced draft motor for a 5 second post-purge period, then de-energizes the inducer. If a call for heat occurs during post-purge, the control finishes the post-purge, drops inducer out to re-prove open pressure switch before continuing with the heat cycle.

Lockout

While in lockout, the ICB keeps the main gas valve and induced draft motor de-energized.

Lockouts due to failed ignition or flame losses may be reset by removing the call for heat (W1) for more than 1 seconds, but less than 20 seconds, or by removing power from the control for over 1/4 seconds. The control automatically resets lockout after 60 minutes.

Lockouts due to detected internal control faults reset after 60 minutes or power interruption.

High temperature limit switch

If the high temperature limit switch is open the control runs the inducer, de-energizes the gas valve, and flashes 6 on the LED. When the high temperature switch closes, the control restarts the ignition sequence beginning with pre-purge.

If the high temperature limit is open for more than 6 minutes continuously during a call for heat, it is assumed that the main blower has failed and the control enters a hard lockout and flashes a 9 on the LED. During the hard lockout, the control continues to run the inducer as long as the limit switch is open. If the limit switch closes again in this hard lockout condition, the inducer runs a post-purge and then shuts off. The control remains locked out until power is removed and does not reset automatically.

Roll-out switch

If the roll-out switch opens for more than 1/4 seconds, the ICB runs the inducer for a post-purge period, immediately de-energizes the gas valve, and flashes 7 on the LED.

If the roll-out switch closes, the control remains locked out until power is removed or W is removed. Roll-out switch lockout does not reset automatically.

Power interruptions

Power interruptions less than 0.80 seconds do not cause the ICB to interrupt the heat sequence. Power interruptions over 1/4 seconds cause the control reset lockout and ignition trial counters. Power interruptions of any duration do not cause lockout or any operation requiring manual intervention.

Flame present with gas off

If a flame is sensed for longer than 2 seconds during a period when the gas valve should be closed, the ICB enters lockout. The control turns on the inducer blower while the flame is present.

Welded gas valve relay response

If either or both Main and Second Stage Gas valve outputs are sensed to be off for more than 1 second when commanded to be **ON**, the ICB shuts off all outputs and enters lockout.

If the Main valve output is sensed to be energized for more than 1 second when commanded to be off, the control de-energizes the induced draft motor (if flame is not present) to attempt to open the pressure switch to de-energize the gas valve. If the main gas valve is still sensed as energized after the inducer has been off for 15 seconds, the control re-energizes the inducer to attempt to vent the unburned gas. In either case, the control locks out.

Modulating gas heat ignition control board function

Ignition control board on standby

The ignition control board (ICB) has all outputs de-energized and monitors the communications port and flame sense. The ICB resets ignition trial and flame loss counters. The ICB begins a call for heat when a communicated demand level is requested from the modulating furnace control (MFC) on the RS485 port.

Call for heat

The ICB checks to see if the pressure switch is open and the RPM sensor input indicates that the inducer motor is not currently active. If the pressure switch is closed or the RPM sensor detects that the inducer is active, the ICB flashes 3 on the LED and waits indefinitely for it to become inactive. When the inducer is sensed as inactive, the ICB begins an air flow proving period. If the call for heat is lost, the ICB goes back to Standby.

Air flow proving

The ICB energizes the induced draft motor and waits for the low pressure switch to close and for the RPM sensor to provide a feedback signal of at least a level of 500 RPM. When the low pressure switch closes and the RPM sensor indicates at least 500 RPM, the control begins a pre-purge period. If the call for heat is lost, the control de-energizes the inducer without post-purge and returns to standby. If the low pressure switch does not close and the RPM sensor does not reach 500 RPM within 10 seconds of the inducer energizing, the control flashes 2 on the LED. If the pressure switch does not close and the RPM sensor does not indicate at least 500 RPM within 5 minutes of inducer energizing, the control shuts off the inducer for 30 seconds, then energizes the inducer for another 5 minutes to try to close the pressure switch and reach 500 RPM. This cycle continues indefinitely until either the airflow is proven, or the call for heat ends.

Pre-purge

The ICB monitors the low pressure switch and RPM sensor to ensure air flow remains present during pre-purge. If the pressure switch opens or the RPM sensor drops under 500 RPM, the control goes back to pressure switch proving mode. The control waits for a 30 second pre-purge period, then begins the ignition trial.

Ignition trial period

The ICB energizes the main gas valve and spark outputs for a 10 second ignition trial. The control de-energizes the spark when flame is sensed and enters a flame stabilization period. If a flame is not established within the ignition trial period, the control de-energizes the spark and gas valves and checks for maximum number of ignition trials.

The ICB has a maximum number of 3 ignition trials. If the control has attempted the maximum number of ignition trials within the same call for heat without flame, the control locks out flashing 4 on the LED. If the control has attempted less than the maximum ignition trials, it begins an inter-purge period before attempting another ignition trial.

If the call for heat is lost during an ignition trial period, the control immediately de-energizes the spark and gas. The control runs the inducer motor through a post purge period before de-energizing.

If the pressure switch is lost during an ignition trial period, the control immediately de-energizes the spark and gas. The control begins pressure switch proving before an inter-purge and re-ignition attempt.

If the rpm sensor indicates a loss of air flow during an ignition trial period, the control de-energizes the spark and gas after the 10 second ignition period. The control begins air flow proving before an inter-purge and re-ignition attempt.

Flame stabilization period

If a flame is detected during the ignition trial period, the ICB then enters the flame stabilization period. If a flame is not detected in 3 seconds (+/-1 second), the main valve is de-energized and a retry operation begins. The flame stabilization period lasts 10 seconds. Flame detection must be lost for 3 seconds (+/-1 second) during flame stabilization for the main valve to be de-energized. When the flame stabilization period has ended, a loss of flame detection

within 1 seconds to 2 seconds results in the main valve being de-energized. If flame is lost during the flame stabilization period, the control counts it as a flame loss and retries ignition, or locks out as described in the Steady heat section.

Main burner operation

High heat warm-up

The ICB runs high heat for the first 30 seconds following flame stabilization period regardless of demand. If high heat is not requested at the end of this 30 second period the control reduces the high gas output and steps the inducer to a lower speed requested by the demand level. If high heat is requested the control remains on high heat.

Steady heat

The ICB keeps the main gas valve and induced draft motor energized while continuously monitoring the call for heat, low pressure switch, RPM sensor, and flame status. If the call for heat demand is lost, the control de-energizes the gas valve and begins post purge. If the low pressure switch opens or the inducer motor RPM sensor drops below 500 RPM, the control de-energizes the gas valve and begins pressure switch proving mode. If the flame is lost, the control de-energizes the gas valve within 2 seconds and counts the flame loss. If the flame is lost more than 5 times within the same call for heat, the control locks out flashing 5 on the LED. If the flame is lost less than 5 times, the control attempts re-ignition after a 30 second inter-purge period.

Post purge

The ICB runs the induced draft motor for a 5 second post-purge period, then de-energizes the inducer. If a call for heat occurs during post-purge, the control finishes the post-purge, drops inducer out to re-prove air flow before continuing with the heat cycle.

Lockout

While in lockout, the ICB keeps the main gas valve and induced draft motor de-energized. Lockouts due to failed ignition or flame losses can be reset by removing the call for heat (communicated demand) for more than 1 second, but less than 20 seconds, or by removing power from the control for over 1/4 seconds. The control automatically resets lockout after 60 minutes. Lockouts due to detected internal control faults resets after 60 minutes or power interruption.

High temperature limit switch

Any time the high temperature limit switch is open the ICB runs the inducer, de-energize the gas valve, and flash 6 on the LED. When the high temperature switch closes, the control restarts the ignition sequence beginning with pre-purge. If the high temperature limit is open for more than 6 minutes continuously during a call for heat, it is assumed that the main blower has failed and the control enters a hard lockout and flash a 9 on the LED. During the hard lockout, the control continues to run the inducer as long as the limit switch is open. If the limit switch recloses in this hard lockout condition, the inducer runs a post purge and then shutoff. The control remains locked out until power is removed and does not reset automatically.

Roll-out switch

If the roll-out switch opens for more than 1/4 seconds, the ICB runs the inducer for a post-purge period, immediately de-energizes the gas valve, and flashes 7 on the LED. If the roll-out switch closes, the control remains locked out until the power is removed or the demand is removed. The roll-out switch lockout does not reset automatically.

Power interruptions

Power interruptions less than 80mS do not cause a change in operating mode. Power interruptions more than 100 mS may cause the ICB to interrupt its current operational mode and re-start the operational sequence. Power interruptions of any duration are not to cause lockout or any operation requiring manual intervention to recover.

Flame present with gas off

If a flame is sensed for longer than 2 seconds during a period when the gas valve should be closed, the ICB enters lockout. The control turns on the inducer blower while the flame is present.

Welded gas valve relay response

If the main gas valve output is sensed to be off for more than 1 second when commanded to be on, the ICB shuts off all outputs and enters lockout. If the main valve output is sensed to be energized for more than 1 second when commanded to be off, the control de-energizes the induced draft motor (if flame is not present) to attempt to open the pressure switch to de-energize the gas valve. If the main gas valve is still sensed as energized after the inducer has been off for 10 seconds, the control re-energizes the inducer to attempt to vent the unburned gas. In either case, the control locks out.

Cooling start-up

The following sections describe the cooling start-up procedures.

Cooling pre-start checklist

When the installation is complete, perform the following checks:

1. Check the electrical supply voltage being supplied. Verify that it is the same as the voltage listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn on the electrical power to the unit.
4. Set the room thermostat fan switch to on.
5. Check the indoor blower rotation.

   If the blower rotation is in the wrong direction, see Phasing section.

   a. Check the blower drive belt tension.
6. Check the unit supply air (CFM).

7. Measure the evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn off electrical power to the unit.

Operating the unit

1. Turn on the electrical power to the unit.
2. Set the room thermostat setting lower than the room temperature.

   First stage compressors energize after the built-in time delay of 5 minutes.

   Additional stages of cooling will be energized by the thermostat if needed.

Post-start checklist

1. Verify proper system pressures for both circuits.
2. Measure the temperature drop across the evaporator coil.
3. Measure the system amperage draw across all legs of the three-phase power wires.
4. Measure the condenser fan amperage draw.

Gas heat start-up

The following sections describe the gas heat start-up procedures.

Gas heat pre-start checklist

When the installation is complete, perform the following checks.

1. Check the type of gas supply. Verify that it is the same as the gas supply listed on the unit nameplate.
2. Verify that the combustion air intake and flue exhaust are free of any debris or obstruction.
3. Verify that the hood is installed over the flue exhaust discharge opening.
4. For modulating furnaces, set the System Selection bottom pin jumper to COMMISSION on the Modulating Furnace Control to properly check the input rate and manifold pressure.

Operating instructions

⚠ CAUTION

This furnace is equipped with an automatic re-ignition system. DO NOT attempt to manually light the burners.

Lighting the main burners

1. Turn off the electrical power to unit.
2. Set the room thermostat to the lowest setting.
3. Turn the gas valve switch to the ON position.
4. Turn on the electrical power to the unit.
5. Set the room thermostat to the required temperature.

   If the set temperature on the thermostat is above room temperature, the main burners ignite.

Gas heat post-start checklist

After the entire control circuit has been energized and the heating section is operating, perform the following checks:

1. Check for gas leaks in the unit piping and the supply piping.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death, or property damage. Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

2. Check for the correct manifold gas pressures, input rates, and air temperature rise. See the Checking gas heat input section.
3. Check the supply gas pressure. It must be within the limits shown on the rating nameplate.

   ⓘ **Note:** You must check the supply pressure with all gas appliances in the building at full fire. The standby gas pressure must never exceed 13 in. or the operating pressure drop below the minimum as specified on the unit rating plate. If the gas pressure is outside these limits, contact the local gas utility or propane supplier for corrective action.

Table 59: Natural gas inputs and pressures

Gas Model	Gas Input (MBH)		Manifold Pressure (in. w.c.)		Supply Pressure (in. w.c.)	
	Normal	Reduced	Normal	Reduced	Min	Max
S1	200	150	3.5	2.5	5.8	10.5
S3	350	262	3.5	2.5	6	10.5
T3	350	123	3.5	2.5	6	10.5

ⓘ **Note:** Propane inputs and pressures are provided in the listed conversion kit instructions.

ⓘ **Note:** Modulating furnaces, gas model T3, are **not certified** for use with propane and cannot be converted.

Shutting down the unit

1. Set the thermostat to the lowest temperature setting.
2. Turn off all electrical power to unit.
3. Open the gas heat access panel.
4. Turn the gas valve switch to the OFF position.
5. For modulating furnaces, when commissioning is complete return the System Selection bottom pin jumper to NORM OPERATION on the Modulating Furnace Control.

Checking gas heat input

For two stage and modulating furnaces, you must check the input rate at full input and minimum input. The intended input for each furnace is shown in and on the unit rating plate. The table applies to units operating on 60 Hz power only.

Important: If this is a modulating furnace, the Modulating Furnace Control board must be in COMMISSION mode on the System Selection pin jumper when checking input rate. Otherwise, the furnace input will fluctuate automatically and not maintain a steady rate. In COMMISSION mode, a second stage thermostat call will run the furnace at full input and a first stage call will run at minimum input.

To determine the rate of gas flow at second stage (full input)

To determine the rate of gas flow at second stage (full input):

1. Turn off all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for Second stage (100% input) heat.
3. Measure the time needed for one revolution of the hand on the lowest increment dial on the meter. A typical gas meter has a 1/2 ft^3 or a 1 ft^3 test dial.
4. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour.
5. If necessary, adjust the high pressure regulator as discussed in the section Manifold gas pressure adjustment. **Be sure not to over-fire the furnace on second stage.** If in doubt, it is better to leave the second stage of the furnace slightly under-fired. Repeat Step 1 to Step 5.

To determine the rate of gas flow at first stage (minimum input)

1. Turn off all other gas appliances connected to the gas meter.
2. Turn on the furnace and make sure the thermostat is calling for first stage (minimum input) heat.
3. Even when the thermostat is calling for first stage heat, the unit will light on second stage and will run on second stage for 1 minute. Allow this one-minute time period to expire and be certain the unit is running on first stage.
4. Measure the time taken for one revolution of the hand on the lowest increment dial on the meter. A typical gas meter has a 1/2 or a 1 ft^3 test dial.
5. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour (See example below).
6. If necessary, adjust the low pressure regulator as discussed in the section Manifold Gas Pressure Adjustment. **Be sure not to under-fire the furnace on first stage.** If in doubt, it is better to leave the first stage of the furnace slightly over-fired. Repeat Steps 1 to 6.

Manifold gas pressure adjustment

Two stage

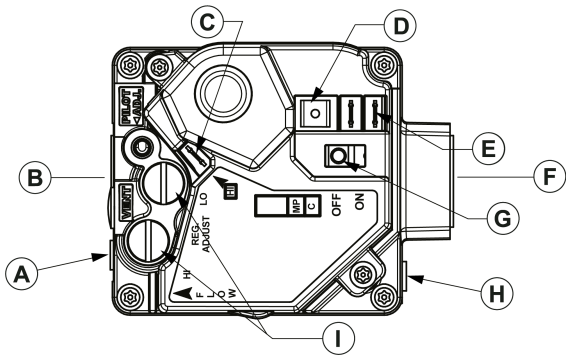
This gas furnace has two heat stages. Therefore, the gas valve has two adjustment screws located under two cover screws. The second stage adjustment screw is adjacent to the HI marking on the valve and the first stage adjustment screw is located adjacent to the LO marking on the valve.

Manifold pressure adjustment procedure.

Adjust the second stage first, then adjust the first stage pressure. See the in the physical data tables or the unit rating plate.

1. Turn off all power to the unit.
2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.
3. Remove the cover screws covering the HI and LO pressure adjustment screws.
4. Turn on the power to the unit.
5. Set the thermostat to call for second stage heat and start the furnace.
6. If necessary, using a screwdriver, turn the second stage adjustment screw (adjacent to the HI marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.
7. After the high manifold pressure has been checked, you can adjust the thermostat to call for first stage heat.
8. If necessary, using a screwdriver, turn the first stage adjustment screw (adjacent to the LO marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.
9. After you have checked the pressure, replace the cover screws covering the HI and LO pressure adjustment screws.

Figure 82: Two Stage Gas Valve



Item	Description
A	Outlet pressure tap 1/8 in. - 27 NPT
B	Outlet
C	3/16 in. x .032 in. thk. male spade terminal - 2nd stage coil
D	External jumper
E	1/4 in. x .032 in. thk. male spade terminals (2) - common
F	Inlet
G	On/Off switch
H	Inlet pressure tap 1/8 in. - 27 NPT
I	Regulator cover screws (reg. adj. beneath these screws)

Modulating gas furnace

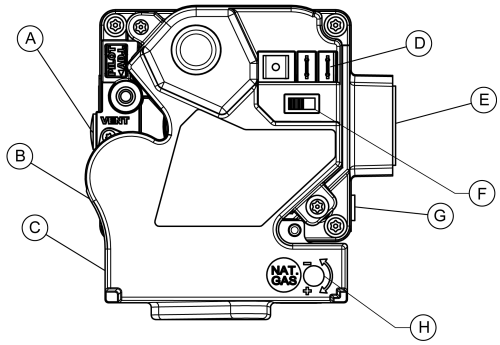
This gas furnace is a fully modulating system. The modulating furnace requires manifold pressure adjustment at both the highest setting (100%, full input) and lowest setting (35%, minimum input) of the gas valve to ensure it regulates correctly across the full range. Both settings are adjusted by a single Rotary DIP Switch on the valve. See Figure 83).

Important: The Modulating Furnace Control (MFC) board must be in COMMISSION mode on the System Selection pin jumper when checking input rate. Otherwise, the manifold pressure fluctuates automatically and does not maintain a steady rate. In COMMISSION mode, the MFC maintains a 100% (full input) heat demand with a second stage thermostat call and a 35% (minimum input) heat demand with a first stage call.

1. Turn off all power to the unit.
2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.
3. Remove the plastic cap covering the pressure adjustment rotary DIP switch.
4. Turn on power to the unit.
5. Set thermostat to call for second stage heat and start furnace.
6. If necessary, using a small flat-head screwdriver, turn the rotary DIP switch clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure.

   Note: When adjusting the rotary DIP switch, wait 1 second between steps to allow the software to register the change. If a change is not registered, the offset returns to its original setting.
7. After you have checked the manifold pressure at its highest setting, adjust the thermostat to call for the first stage heat to set the manifold pressure at its lowest setting.
8. Wait at least one minute for the furnace to step down to its lowest setting and adjust the manifold pressure, if necessary, using the same procedure in Step 6.
9. After you have checked the pressure, replace the plastic cap covering the rotary DIP switch.

Figure 83: Gas valve



Item	Description
A	Outlet
B	Outlet pressure tap, 1/8 in. – 27 NPT
C	5 pin plug (modulator)
D	1/4 in. x 0.032 in. thk male spade terminals (2) – main and common
E	Inlet
F	On/Off switch
G	Inlet pressure tap, 1/8 in. – 27 NPT
H	Regulator cap (regulator adjustment rotary dip switch beneath)

Adjustment of temperature rise

The temperature rise (the difference of temperature between the mixed air entering the furnace and the heated air leaving the furnace) must lie within the range shown on the unit rating plate and the data in the physical data tables when the unit is operating as full input.

Air temperature rise should be determined when the furnace is firing at full input. Two stage furnaces require a second stage thermostat call. Modulating furnaces require a second

stage thermostat call and the Modulating Furnace Control must be in COMMISSION mode to maintain full input.

After the temperature rise has been determined, you can calculate the CFM using the following formula:

$$CFM = \text{Btu Input} \cdot \frac{0.8}{(1.08 \cdot \Delta°F)}$$

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts (about 6 feet from the furnace) where they will not be affected by radiant heat. Increase the blower CFM to decrease the temperature rise; decrease the blower CFM to increase the rise (See supply air drive adjustment).

Note: Each gas heat exchanger size has a minimum allowable CFM. Below this CFM, the limit will open.

Burners, orifices inspection, and servicing

Before checking or changing burners or orifices, **close main manual shut-off valve and shut off all power to the unit**.

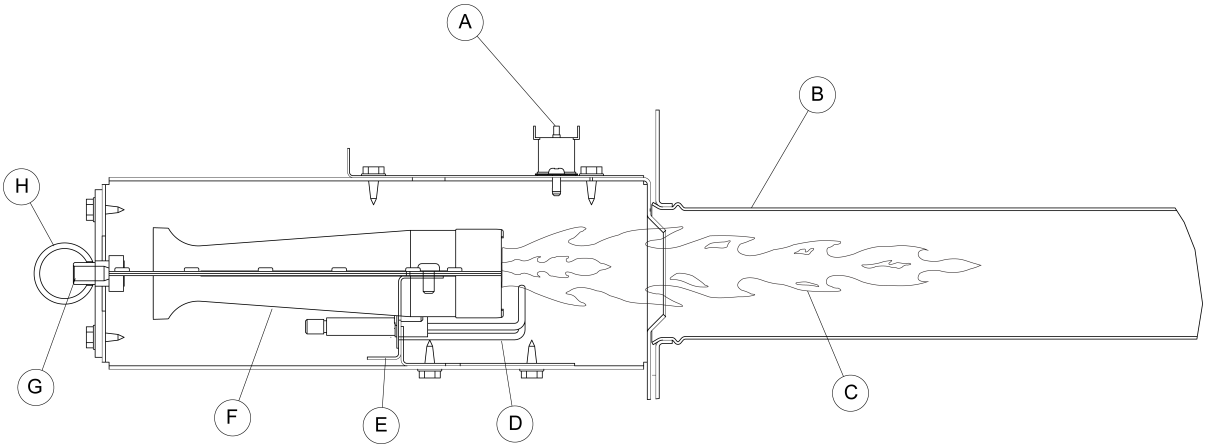
1. Open the union fitting just upstream of the unit gas valve and downstream from the main manual shut-off valve in the gas supply line.
2. Remove the screws holding each end of the manifold to the manifold supports.
3. Disconnect the wiring to the gas valve. Remove the manifold and gas valve assembly. The orifices can now be inspected or replaced.

   To service burners, complete step 4.
4. Remove the heat shield on top of the manifold supports. Burners are now accessible for inspection or replacement.

   Note: Reverse the previous procedure to replace the assemblies.

When reassembling, ensure that the burners are level and sit at the rear of the gas orifice.

Figure 84: Typical Flame



Item	Description
A	Roll out switch
B	Heat exchanger tube
C	Burner flame (blue only)
D	Ignitor
E	Burner bracket
F	Burner
G	Orifice
H	Manifold

Charging the unit

Table 61: KS15/KK15 charging table - system 1

Air flow indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	112	55	278	81	30
	85	114	56	321	90	29
	95	116	57	366	100	28
300 Cfm/Ton 80/67	75	123	60	284	83	26
	85	125	61	327	92	24
	95	127	62	373	101	23
300 Cfm/Ton 80/72	75	135	65	289	85	21
	85	137	66	333	93	20
	95	139	67	380	102	19
300 Cfm/Ton 75/62	75	112	55	279	80	26
	85	114	56	322	90	24
	95	116	57	368	99	23
400 Cfm/Ton 80/62	75	119	58	282	82	26
	85	121	59	325	92	25
	95	123	60	370	100	24
400 Cfm/Ton 80/67	75	131	63	288	84	21
	85	133	64	332	92	21
	95	134	65	378	101	20
400 Cfm/Ton 80/72	75	143	68	294	85	17
	85	145	69	339	94	16
	95	146	70	387	103	15
400 Cfm/Ton 75/62	75	119	58	284	81	22
	85	121	59	327	91	21
	95	123	60	372	100	20

Table 62: KS15/KK15 charging table - system 2

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	116	58	279	82	30
	85	118	59	321	91	29
	95	120	60	368	100	28
300 Cfm/Ton 80/67	75	128	62	285	84	26
	85	129	63	328	93	24
	95	131	64	375	101	23
300 Cfm/Ton 80/72	75	139	67	290	85	21
	85	141	68	335	94	20
	95	143	69	382	103	19
300 Cfm/Ton 75/62	75	116	57	280	81	26
	85	118	58	324	90	24
	95	120	59	370	99	23
400 Cfm/Ton 80/62	75	123	61	281	84	26
	85	125	61	324	93	25
	95	127	63	371	102	24
400 Cfm/Ton 80/67	75	134	65	289	84	21
	85	136	66	333	92	21
	95	137	67	381	101	20
400 Cfm/Ton 80/72	75	146	70	295	86	17
	85	148	70	340	94	16
	95	149	71	389	103	15
400 Cfm/Ton 75/62	75	122	60	284	82	22
	85	124	61	328	91	21
	95	125	62	374	100	20

Table 63: KS18/KK18 charging table - system 1

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	114	56	262	76	33
	85	116	57	303	86	31
	95	117	58	349	94	30
300 Cfm/Ton 80/67	75	125	60	265	78	28
	85	126	61	307	86	26
	95	128	62	353	95	25
300 Cfm/Ton 80/72	75	136	65	269	79	23
	85	138	66	312	88	21
	95	140	67	358	97	20
300 Cfm/Ton 75/62	75	113	55	262	76	28
	85	115	56	305	85	26
	95	117	57	350	94	25
400 Cfm/Ton 80/62	75	121	59	264	77	28
	85	122	60	306	86	27
	95	124	60	351	95	26
400 Cfm/Ton 80/67	75	132	63	268	78	23
	85	134	64	311	87	22
	95	136	65	357	96	21
400 Cfm/Ton 80/72	75	144	68	272	80	18
	85	146	69	315	88	17
	95	148	70	362	97	16
400 Cfm/Ton 75/62	75	120	58	265	77	23
	85	122	59	308	85	22
	95	124	60	353	94	21

Table 64: KS18/KK18 charging table - system 2

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	114	55	271	77	33
	85	115	56	313	86	31
	95	117	57	359	96	30
300 Cfm/Ton 80/67	75	125	60	274	79	28
	85	127	61	318	88	26
	95	128	62	364	97	25
300 Cfm/Ton 80/72	75	137	65	278	82	23
	85	138	66	323	90	21
	95	140	66	370	99	20
300 Cfm/Ton 75/62	75	113	55	271	77	28
	85	115	56	314	86	26
	95	117	57	360	95	25
400 Cfm/Ton 80/62	75	121	58	273	78	28
	85	122	59	316	88	27
	95	124	60	361	97	26
400 Cfm/Ton 80/67	75	132	63	278	80	23
	85	133	64	322	89	22
	95	135	64	369	98	21
400 Cfm/Ton 80/72	75	144	67	282	82	18
	85	146	68	327	90	17
	95	147	69	375	99	16
400 Cfm/Ton 75/62	75	120	58	275	78	23
	85	122	59	318	86	22
	95	123	59	365	95	21

Table 65: KS20/KK20 charging table - system 1

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	117	57	266	81	33
	85	119	58	307	91	32
	95	121	59	353	100	30
300 Cfm/Ton 80/67	75	129	61	269	83	28
	85	130	62	312	92	26
	95	132	63	358	101	25
300 Cfm/Ton 80/72	75	141	66	274	85	23
	85	143	67	317	94	21
	95	144	68	364	102	20
300 Cfm/Ton 75/62	75	117	56	266	81	28
	85	118	57	309	89	27
	95	120	58	355	99	25
400 Cfm/Ton 80/62	75	124	60	268	83	28
	85	126	61	309	93	27
	95	128	62	355	101	26
400 Cfm/Ton 80/67	75	136	64	273	84	23
	85	137	65	315	92	22
	95	139	66	361	101	21
400 Cfm/Ton 80/72	75	148	69	277	85	18
	85	149	70	321	93	17
	95	151	70	368	102	16
400 Cfm/Ton 75/62	75	123	59	269	81	23
	85	125	60	312	90	22
	95	126	61	357	98	21

Table 66: KS20/KK20 charging table - system 2

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	111	53	275	82	33
	85	112	54	317	90	32
	95	114	55	364	100	30
300 Cfm/Ton 80/67	75	122	58	279	84	28
	85	123	59	323	93	26
	95	126	60	369	102	25
300 Cfm/Ton 80/72	75	134	63	284	86	23
	85	136	64	328	95	21
	95	138	65	376	104	20
300 Cfm/Ton 75/62	75	110	53	275	81	28
	85	112	54	318	90	27
	95	114	55	365	99	25
400 Cfm/Ton 80/62	75	118	56	278	82	28
	85	119	57	321	91	27
	95	121	58	367	101	26
400 Cfm/Ton 80/67	75	129	61	283	84	23
	85	131	62	327	94	22
	95	133	63	374	103	21
400 Cfm/Ton 80/72	75	142	66	288	87	18
	85	143	67	333	95	17
	95	145	68	381	104	16
400 Cfm/Ton 75/62	75	118	56	279	81	23
	85	119	57	322	90	22
	95	121	58	369	100	21

Table 67: KS25/KK25 charging table - system 1

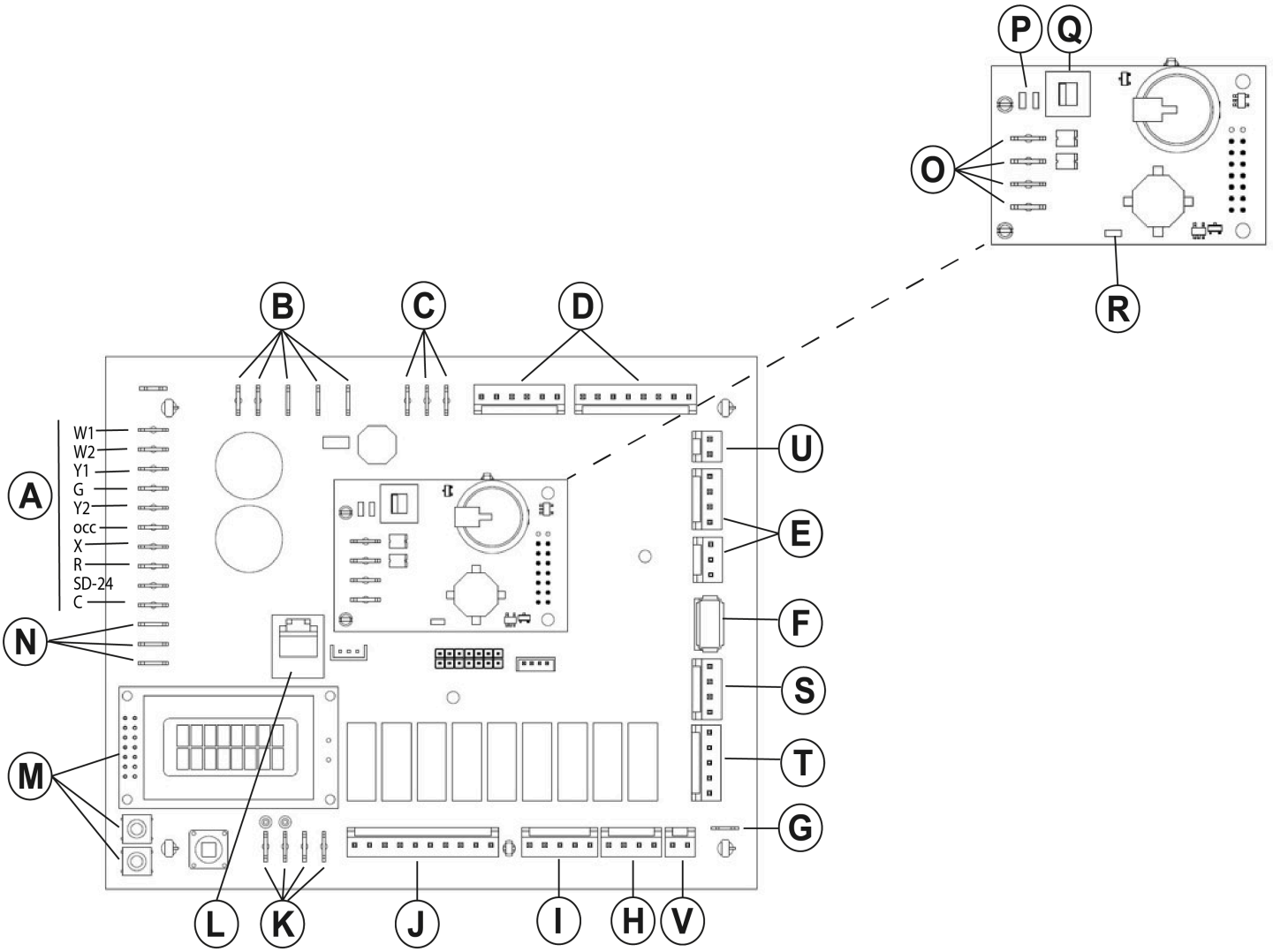
Air flow Indoor DB/WB	Outdoor dry bulb °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	114	53	282	81	31
	85	116	54	326	91	30
	95	118	55	372	100	29
300 Cfm/Ton 80/67	75	125	58	287	83	26
	85	127	59	332	92	25
	95	129	60	379	102	24
300 Cfm/Ton 80/72	75	137	63	293	85	21
	85	139	64	338	94	20
	95	141	65	387	104	19
300 Cfm/Ton 75/62	75	114	53	283	80	26
	85	116	54	327	90	25
	95	118	55	374	99	24
400 Cfm/Ton 80/62	75	121	57	285	83	25
	85	123	57	329	92	24
	95	125	58	375	102	24
400 Cfm/Ton 80/67	75	132	61	291	84	21
	85	134	62	336	93	20
	95	135	63	384	102	19
400 Cfm/Ton 80/72	75	144	66	297	86	16
	85	146	67	343	95	15
	95	148	67	392	104	14
400 Cfm/Ton 75/62	75	120	56	287	81	21
	85	122	57	331	90	20
	95	124	58	378	100	19

Table 68: KS25/KK25 charging table - system 2

Air flow Indoor DB/WB	Outdoor DB °F	Suction pressure psig	Suction temp °F	Liquid pressure psig	Liquid temp °F	Delta T indoor DB °F
300 Cfm/Ton 80/62	75	112	52	282	81	31
	85	114	53	325	90	30
	95	116	54	371	100	29
300 Cfm/Ton 80/67	75	123	57	287	83	26
	85	125	58	331	92	25
	95	127	59	378	102	24
300 Cfm/Ton 80/72	75	135	62	292	85	21
	85	137	63	338	94	20
	95	139	64	385	104	19
300 Cfm/Ton 75/62	75	112	52	282	80	26
	85	113	53	326	90	25
	95	115	54	373	99	24
400 Cfm/Ton 80/62	75	118	55	286	82	25
	85	120	56	329	91	24
	95	122	57	375	101	24
400 Cfm/Ton 80/67	75	130	60	291	84	21
	85	132	61	336	93	20
	95	134	62	383	102	19
400 Cfm/Ton 80/72	75	142	65	297	86	16
	85	144	66	343	95	15
	95	146	66	391	104	14
400 Cfm/Ton 75/62	75	118	55	287	81	21
	85	120	56	330	91	20
	95	122	57	377	100	19

Smart Equipment unit control board

Figure 85: Unit control board



The following tables describe the details of the UCB, see the previous figure for the connection locations.

Table 69: Smart Equipment UCB - thermostat connection strip

Location	Label	Description	Function and comments
A	W1	1st stage heating request, 24 VAC input switched from R	Not effective for cooling-only units
	W2	2nd stage heating request, 24 VAC input switched from R	Not effective for cooling-only units or units with single-stage heat sections
	Y1	1st stage cooling request, 24 VAC input switched from R	
	Y2	2nd stage cooling request, 24 VAC input switched from R	Visible in the display menu when the #ClgStgs parameter is set for 2 or more, also effective for economizer free cooling supply air temperature reset when the #ClgStgs parameter is set for one or more
	G	Continuous indoor blower request, 24 VAC input switched from R	
	OCC	Occupancy request, 24 VAC input switched from R	Must have the OccMode parameter set for external to be effective
	X	Hard lockout indicator, 24 volt output to a light thermostat LED	
	R	24 VAC hot for thermostat switching and power	If field-added external accessories for unit shutdown are used, 24 VAC hot return from smoke detector, condensate overflow or user shutdown relay switching in series
	SD-24	If field-added external accessories for unit shutdown are used, 24 VAC hot out for smoke detector, condensate overflow, or user shutdown relay switching in series.	Unit wiring harness jumper plug for factory shutdown accessories must be removed if the switching of field-added external accessories for unit shutdown are wired between the thermostat connection strip SD-24 and R.
	C	24 VAC common for thermostat power	
	+	MOD BUS	Future
	-	MOD BUS	Future
	C	MOD BUS	Future

Table 70: Smart Equipment UCB - limit, 24 VAC power, and shutdown connections

Location	Label	Description	Function and comments
B	LIMIT	Monitored 24 VAC input through heat section limit switch(es)	If voltage is absent, indicating the heat section is over-temperature, the UCB turns on the indoor blower.
	C	24 VAC, 75 VA transformer Common referenced to cabinet ground	Connects through circuit traces to thermostat connection strip C and indoor blower VFD pin C.
	24V	24 VAC, 75 VA transformer hot	Powers the UCB microprocessor, that connects through circuit trace to the SD 24 terminal.
	SD 24	24 VAC hot out for factory accessory smoke detector, condensate overflow and/or user shutdown relay switching in series	Connects through the circuit trace to the thermostat connection strip SD-24. A wiring harness jumper plug connecting SD 24 to SD R is in place if the factory accessories for unit shutdown are not used - this jumper plug must be removed if the switching of field-added external accessories for unit shutdown are wired between the thermostat connection strip SD-24 and R.
	SD R	24 VAC hot return from factory accessory smoke detector, condensate overflow and user shutdown relay switching in series	Connects through the circuit trace to the R terminal on the upper left of the board.
	R	24 VAC hot for switched inputs to the UCB	Connects through the circuit trace to the thermostat connection strip R terminal, right FAN OVR pin, right HPS1 pin, right HPS2 pin, lower DFS pin and lower APS pin.

Table 71: Smart Equipment UCB - space temperature sensor connections

Location	Label	Description	Function and comments
C	ST	Space Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor.	Positive of VDC circuit, 3.625 VDC reading to COM with open circuit, is effective if the thermostat only control parameter is set to OFF, space sensor override momentary shorts ST to COM to initiate and terminate temporary occupancy.
	COM	Common for ST and SSO inputs	Negative of VDC circuit for ST and SSO inputs.
	SSO	Space Sensor Offset input from 0 to 20KΩ potentiometer	Positive of VDC circuit (3.625 VDC reading to COM with open circuit), 10KΩ/2.5 VDC is 0°F offset, 0Ω/0 VDC is maximum above offset and 20KΩ/3.4 VDC is maximum below offset from active space temperature setpoint

Table 72: Smart Equipment UCB - temperature sensor connections

Location	Label	Description	Function and comments
D	SAT+	Supply Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading SAT+ to SAT– with open circuit. Used in heat/cool staging cutouts, free cooling operation, demand ventilation operation, comfort ventilation operation, economizer loading operation, VAV cooling operation, hydronic heat operation.
	RAT+	Return Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading RAT+ to RAT– with open circuit. Used in return air enthalpy calculation. Substitutes for space temperature if no other space temperature input is present.
	OAT+	Outside Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation but may be a communicated value; 3.625 VDC reading OAT+ to OAT– with open circuit. Used in heat/cool cutouts, low ambient cooling determination, dry bulb free cooling changeover, outside air enthalpy calculation, economizer loading operation, heat pump demand defrost calculation.
	CC1+	#1 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for heat pump units, not required for A/C units; 3.625 VDC reading CC1+ to CC1– with open circuit. Used in heat pump demand defrost calculation.
	EC1+	#1 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading EC1+ to EC1– with open circuit. Used in suction line temperature safety.
	CC2+	#2 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for 2-compressor heat pump units, not required for 2-compressor A/C units, not active for 1-compressor units; 3.625 VDC reading CC2+ to CC2– with open circuit. Used in heat pump demand defrost calculation.
	EC2+	#2 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation of 2-compressor units, not active for 1-compressor units; 3.625 VDC reading EC2+ to EC2– with open circuit. Used in suction line temperature safety.

Table 73: Smart Equipment UCB - pinned connections

Location	Label	Description	Function and comments
E	RAH+	Return Air Humidity input from 0-10 VDC @ 0-100% RH sensor	Input required for reheat units, optional in all other units, may be a communicated value. Used in return air enthalpy calculation, temperature/humidity setpoint reset, reheat operation.
	DCT PRS+	Supply Duct Pressure input from 0-5 VDC @ 0-5" w.c. sensor	Input required for variable air volume units. Used in VAV indoor blower operation.
	C	Common for the VFD output	Negative of the VDC circuit for the VFD output
	VFD	2-10 VDC (0-100%) output for the indoor blower Variable Frequency Drive	Output is active with indoor blower operation. For CV units: this output provides stepped IntelliSpeed control of the indoor blower VFD based on fan-only, cooling stage and heating stage outputs. For VAV units: this output provides control of the indoor blower VFD based on supply duct static pressure input and setpoint.
	VFDFLT	24 VAC hot input from the normally open VFD alarm contact	The VFD alarm contact switches from R within the unit wiring harness. 24 VAC input results in unit shutdown and a "VFD fault" alarm

Table 74: Smart Equipment UCB - USB connector

Location	Label	Description	Function and comments
F	J10	Type A female Universal Serial Bus connector	Used for backup, restoration, and copying of board parameters as well as board software updating through a flash drive
	J15	Factory wired SA Bus connector	

Table 75: Smart Equipment UCB - 24 V terminal

Location	Label	Description	Function and comments
G	24V FOR OUTPUTS	24 VAC hot for H1, H2, CN-FAN, AUX HGR, FAN C1 and C2 output relay contact switching	Output relay circuitry is isolated from other UCB components and the 24 VAC hot source may be from a second transformer in the unit

Table 76: Smart Equipment UCB - heat section connections

Location	Label	Description	Function and comments
H	H1	24 VAC hot output for heat section stage 1	Not effective for cooling-only units. Output if demand is present and permissions allow one stage or two stages of heat section operation
	H2	24 VAC hot output for heat section stage 2	Not effective for cooling-only units or units with single-stage heat sections. Output if demand is present and permissions allow two stages of heat section operation
	MV	24 VAC hot input confirming heat section operation	Sourced from gas valve in gas heat units or first stage heat contactor in electric heat units. Input within 5 minutes from initiation of H1 output initiates the "Heat On Fan Delay" timer, loss of input following the termination of H1 output initiates the "Heat On Fan Delay" timer, no input within 5 minutes from initiation of H1 output initiates an "Ignition Failure" alarm, input for longer than 5 minutes without H1 output initiates a "Gas Valve Mis-wire" alarm

Table 77: Smart Equipment UCB - pin cooling and fan output

Location	Label	Description	Function and comments
I	CN-FAN	24 VAC hot output for the condenser fan contactor coil	Output with either C1 or C2 output; interrupted during defrost cycle for heat pump units
	AUX HGR	24 VAC hot output for hot gas reheat components	Effective only for reheat units, output with reheat operation
	FAN	24 VAC hot output for indoor blower contactor coil/indoor blower VFD enable relay coil	Output with heat/cool operation, G input or schedule demand
	C1	24 VAC hot output for compressor 1	If demand is present and permissions allow compressor 1 operation; output with compressor cooling, comfort ventilation cooling, reheat or heat pump heating demands
	C2	24 VAC hot output for compressor 2	Not effective for one stage compressor UCBs. If demand is present and permissions allow compressor 2 operation; output with compressor cooling, comfort ventilation cooling or heat pump heating demands

Table 78: Smart Equipment UCB - refrigerant circuit safety switch and indoor blower overload connections

Location	Label	Description	Function and comments
J	HPS1 (right pin)	24 VAC hot out for refrigerant circuit 1 High Pressure Switch	Connects through circuit trace to the R terminal
	HPS1 (left pin)	24 VAC hot return from refrigerant circuit 1 High Pressure Switch	Input is only considered if C1 output is needed; input must be present to allow C1 output. Three HPS1 trips in a two hour period cause a “High Pressure Switch 1 Lockout” and C1 output is then prevented until alarm reset. Connects through circuit trace to the right LPS1 pin.
	LPS1 (right pin)	24 VAC hot out for refrigerant circuit 1 Low Pressure Switch	Connects through circuit trace to the left HSP1 pin
	LPS1 (left pin)	24 VAC hot return from refrigerant circuit 1 Low Pressure Switch	Input is only considered after 30 seconds of C1 output; afterwards, input must be present to allow C1 output. Three LPS1 trips in a one hour period cause a “Low Pressure Switch 1 Lockout” and C1 output is then prevented until alarm reset.
	HPS2 (right pin)	24 VAC hot out for refrigerant circuit 2 High Pressure Switch	Not effective for one stage compressor UCBs. Connects through circuit trace to the R terminal
	HPS2 (left pin)	24 VAC hot return from refrigerant circuit 2 High Pressure Switch	Not effective for one stage compressor UCBs. Input is only considered if C2 output is needed; input must be present to allow C1 output. Three HPS2 trips in a two hour period cause a “High Pressure Switch 1 Lockout” and C2 output is then prevented until alarm reset. Connects through circuit trace to the right LPS2 pin.
	LPS2 (right pin)	24 VAC hot out for refrigerant circuit 2 Low Pressure Switch	Not effective for one stage compressor UCBs. Connects through circuit trace to the left HSP2 pin
	LPS2 (left pin)	24 VAC hot return from refrigerant circuit 2 Low Pressure Switch	Not effective for one stage compressor UCBs. Input is only considered after 30 seconds of C2 output; afterwards, input must be present to allow C2 output. Three LPS2 trips in a one hour period cause a “Low Pressure Switch 2 Lockout” and C2 output is then prevented until alarm reset.
	FAN OVR (right pin)	24 VAC hot out for indoor blower FAN Overload relay contact/ motor protector switch	Connects through circuit trace to the R terminal
	FAN OVR (left pin)	24 VAC hot return from indoor blower FAN Overload relay contact/motor protector switch	Input is only considered if FAN output is needed; input must be present to allow FAN output and unit operation. One FAN OVR trip lasting longer than 5 minutes or three FAN OVR trips in a two hour period cause a “Fan Overload Lockout” and unit operation is then prevented until alarm reset.

Table 79: Smart Equipment UCB - SA BUS connections

Location	Label	Description	[1]Function and comments
K	PWR	Power for SA (“Sensor-Actuator”) BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the 15 VDC (reading to C) circuit for powering an optional netstat and/or Multi Touch gateway
	C	Common for SA BUS power and communication circuits	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Negative of the SA BUS circuits
	–	Communication for SA BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts lower than +) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection and diagnostics board, netstat and/or Multi Touch gateway
	+	Communication for SA BUS devices	Also incorporated in the J8 6-pin phone jack connector at the left-center of the board. Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts higher than –) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection and diagnostics board, netstat and/or Multi Touch gateway
L	J8	6-pin phone jack connector	Incorporates the SA BUS terminals for convenience/alternate connection of SA BUS devices, primarily used for temporary service connection of the Multi Touch gateway

1 When wiring unit and other devices using the SA Bus and FC Bus, see Cable type for FC buses and SA buses in order of preference.

Table 80: Smart Equipment UCB - user interface

Location	Label	Description	Function and comments
M	Display	On-board, 2-line x 8-character back-lit display	On-board display, buttons and joystick allow access to UCB, economizer, 4-stage and FDD board parameters
	ENTER	Button for display menu acknowledgment and navigation	
	CANCEL	Button for display menu navigation and zeroing of active compressor ASCD timer	
	JOY	4-way Joystick for display menu navigation	

Table 81: Smart Equipment UCB - LEDs

Location	Label	Description	Function and comments
N	POWER	Green UCB power indicator	Lit indicates 24 VAC is present at C and 24V terminals
	FAULT	Red hard lockout, networking error and firmware error indicator	1/2 second on/off flashing indicates one or more alarm is currently active, 1/10th second on/off flashing indicates a networking error (polarity, addressing) or a firmware error (likely correctable with re-loading from USB flash drive)
	SA BUS	Green UCB SA bus communication transmission indicator	Lit/flickering indicates UCB SA bus communication is currently active, off indicates the UCB is awaiting SA bus communication

Table 82: Smart Equipment UCB - optional communication sub-board

Location	Label	Description	Function and comments
O Terminal FC BUS connections	FC+	FC (“Field Connected”) BUS BACnet MSTP communication	Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts higher than –) FC bus BACnet MSTP communication circuit
	FC–	FC (“Field Connected”) BUS BACnet MSTP communication	Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to COM; at least 0.25 volts lower than +) FC bus BACnet MSTP communication circuit
	COM	Common for the FC (“Field Connected”) BUS BACnet MSTP communication circuit	Negative of the VDC FC bus BACnet MSTP communication circuit
	SHLD	Shield for the FC (“Field Connected”) BUS BACnet MSTP communication circuit	Earth ground reference of the cable to prevent interference on the FC bus BACnet MSTP communication circuit
Q	EOL switch	End Of Line selector switch for the FC BUS BACnet MSTP communication circuit	ON selected only for the UCB that is the terminus of the FC bus BACnet MSTP communication cable to prevent signal “bounce-back”
P	EOL	Green End Of Line indicator	Lit indicates the EOL switch is selected ON
	FC BUS	Green FC bus communication transmission indicator	Lit/flickering indicates outgoing UCB FC bus communication is currently active, off indicates the UCB is awaiting incoming FC bus communication
R	ISO PWR	Green communication board Isolated Power indicator	Lit indicates the UCB is supplying power to the communication sub-board

Table 83: Smart Equipment UCB - pinned connections

Location	Label	Description	Function and comments
S	COS	Condensate Overflow Switch	COS is 24V input that senses the switch is closed if 24V is present. Binary Input – just senses 24V on/off. If COS opens, the compressor outputs are disabled. When COS is closed, compressors run normally. COS can be enabled/disabled by a menu option on the control board.
	R	R pin is 24V supply to the switch	Connects through circuit trace to the R terminal
	RDS	Refrigerant Detection System or Switch	If the switch opens, the control shuts off all outputs, except the indoor blower. Energizes the indoor blower, if it was off at the time. If the switch re-closes, there will be a five minute delay, then return to normal operation. For products without an RDS, these pins must be jumpered. There are no menu options to turn this function off.
	R	R pin is 24V supply to the Sensor	Connects through circuit trace to the R terminal

Table 84: Smart Equipment UCB - pinned connections

Location	Label	Description	Function and comments
T	DFS (upper pin)	24 VAC hot return from Dirty Filter Switch	Optional input; switch closure for greater than 15 seconds during indoor blower operation initiates a notification alarm
	DFS (lower pin)	24 VAC hot out for Dirty Filter Switch	Connects through circuit trace to the R terminal
	APS (upper pin)	24 VAC hot return from Air Proving Switch	When this optional input is enabled: the air proving switch must close within 30 seconds of initiation of indoor blower operation and not open for greater than 10 seconds during indoor blower operation to allow heat/cool operation and prevent an “APS open” alarm; the air proving switch must open within 30 seconds of termination of indoor blower operation to prevent an “APS stuck closed” notification alarm
	APS (lower pin)	24 VAC hot out for Air Proving Switch	Connects through circuit trace to the R terminal

Table 85: Smart Equipment UCB - pinned connections

Location	Label	Description	Function and comments
U	AI1 +	Not used	Not used
	AI1 -	Not used	Not used

Table 86: Smart Equipment UCB - pinned connections

Location	Label	Description	Function and comments
V	BO1	Not used	Not used
	BO2	Not used	Not used

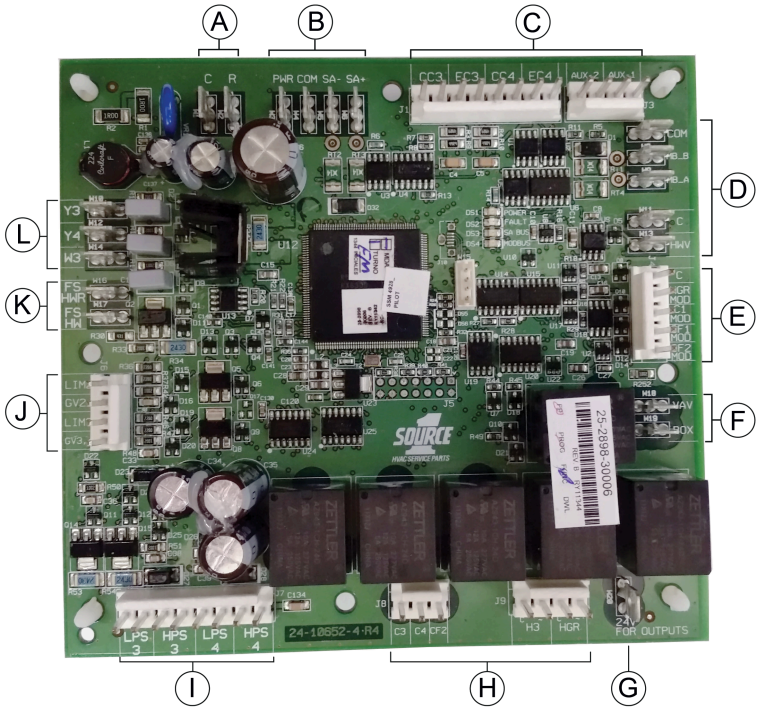
Table 87: Smart Equipment UCB - Unique Equipment Identifier (UEI) settings

Unique Equipment Identifier							
Model	Tonnage	2-stage compressor layout		UEI*	4-stage compressor layout		UEI*
		Circuit 1	Circuit 2		Circuit 1	Circuit 2	
KH/KS/LH/LS KL/LK/KK/LL	15	1	1	0	2	1	3
	18	1	1	0	2	1	3
	20	1	1	0	2	1	3
	25	1	1	0	Tandem	1	4

Enum Member	Configuration description in SSE
UEI=0	Standard
UEI=3	2-stage Cir 1, Single Cir 2
UEI=4	Tandem Cir 1, Single Cir 2
UEI=6	Single ModCir with 2-stage Cir 2
UEI=7	Single ModCir with Single Cir 2

Four-stage board

Figure 86: Four-stage board



The following tables describe the details of the four-stage board, see the previous figure for the connection locations.

Table 88: Four-stage board - power and communication terminals

Location	Label	Description	Function and comments
A	C	24VAC common for 4-stage board power	
	R	24VAC hot for 4-stage board power	
B	PWR	Sensor Actuator (SA) Bus Power for SA bus devices	Not used on 4-stage board
	COM	Common for SA BUS power and communication circuits	Negative of the SA BUS circuits
	SA-	Communication for SA BUS devices	Negative of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts lower than +) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection and diagnostics board, netstat and/or MAP Gateway
	SA+	Communication for SA BUS devices	Positive of the VDC (typically, a fluctuating 1.5 to 3.5 volts reading to C; at least 0.25 volts higher than –) SA BUS communication circuit to optional economizer board, 4-stage board, fault detection and diagnostics board, netstat and/or MAP Gateway

Table 89: Four-stage board - temperature sensor connections

Location	Label	Description	Function and comments
C	CC3+	#3 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for heat pump units, not required for A/C units; 3.625 VDC reading CC3+ to CC3– with open circuit. Used in heat pump demand defrost calculation.
	EC3+	#3 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading EC3+ to EC3– with open circuit. Used in suction line temperature safety.
	CC4+	#4 refrigerant circuit Condenser Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for heat pump units, not required for A/C units; 3.625 VDC reading CC4+ to CC4– with open circuit. Used in heat pump demand defrost calculation.
C	EC4+	#4 refrigerant circuit Evaporator Coil temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Input required for operation; 3.625 VDC reading EC4+ to EC4– with open circuit. Used in suction line temperature safety.
	AUX-2+	Not used	Not used
	AUX-1+	Not used	Not used

Table 90: Four-stage board - quick connect

Location	Label	Description	Function and comments
D	COM	Common for Modbus connection to staged heat board	Future
	MB_B	Terminal B for Modbus connection to staged heat board	Future
	MB_A	Terminal A for Modbus connection to staged heat board	Future
	C	Common for HW Valve connection	0-10VDC
	HWV	Analog out for HW Valve	0-10VDC
F	VAV	VAV box Common relay contact	Used to interlock the VAV boxes with RTU morning warm-up
	BOX	VAV box normally open relay contact	Used to interlock the VAV boxes with RTU morning warm-up

Table 91: Four-stage board - harness connectors

Location	Label	Description	Function and comments
E	C	Common for analog outputs	Future
	HGR MOD	0-10VDC analog output for hot gas reheat	Future
	C1 MOD	0-10VDC analog output for C1 modulation	Future
	CF1 MOD	0-10VDC analog output for Condenser Fan 1 modulation	Future
	CF2 MOD	0-10VDC analog output for Condenser Fan 2 modulation	Future

Table 92: Four-stage board - outputs and cool and heat section connections

Location	Label	Description	Function and comments
G	24V FOR OUTPUTS	24 VAC hot for C3, C4, CF2, H3, and HGR	Output relay circuitry is isolated from other 4-stage components and the 24 VAC hot source may be from a second transformer in the unit
H	C3	24 VAC hot output for compressor 3	If demand is present and permissions allow compressor 3 operation
	C4	24 VAC hot output for compressor 4	If demand is present and permissions allow compressor 4 operation
	CF2	24 VAC hot output for the condenser fan contactor coil	Output with either C3 or C4 output.
	H3	24 VAC hot output for heat section stage 3	Not effective for cooling-only units. Output if demand is present and permissions allow heat section operation
	HGR	24 VAC hot output for hot gas reheat	Future

Table 93: Four-stage board - refrigerant circuit safety switches

Location	Label	Description	Function and comments
I	LPS3 (right pin)	24 VAC hot out for refrigerant circuit 3 Low Pressure Switch	Connects through circuit trace to the left HSP3 pin
	LPS3 (left pin)	24 VAC hot return from refrigerant circuit 3 Low Pressure Switch	Input is only considered after 30 seconds of C3 output; afterwards, input must be present to allow C3 output. Three LPS3 trips in a one hour period cause a “Low Pressure Switch 3 Lockout” and C3 output is then prevented until alarm reset.
	HPS3 (right pin)	24 VAC hot out for refrigerant circuit 3 High Pressure Switch	Connects through circuit trace to the R terminal
	HPS3 (left pin)	24 VAC hot return from refrigerant circuit 3 High Pressure Switch	Input is only considered if C3 output is needed; input must be present to allow C3 output. Three HPS3 trips in a two hour period cause a “High Pressure Switch 3 Lockout” and C3 output is then prevented until alarm reset. Connects through circuit trace to the right LPS3 pin.
	LPS4 (right pin)	24 VAC hot out for refrigerant circuit 4 Low Pressure Switch	Connects through circuit trace to the left HSP4 pin
	LPS4 (left pin)	24 VAC hot return from refrigerant circuit 4 Low Pressure Switch	Input is only considered after 30 seconds of C4 output; afterwards, input must be present to allow C4 output. Three LPS4 trips in a one hour period cause a “Low Pressure Switch 4 Lockout” and C4 output is then prevented until alarm reset.
	HPS4 (right pin)	24 VAC hot out for refrigerant circuit 4 High Pressure Switch	Connects through circuit trace to the R terminal
	HPS4 (left pin)	24 VAC hot return from refrigerant circuit 4 High Pressure Switch	Input is only considered if C4 output is needed; input must be present to allow C4 output. Three HPS4 trips in a two hour period cause a “High Pressure Switch 4 Lockout” and C4 output is then prevented until alarm reset. Connects through circuit trace to the right LPS4 pin.

Table 94: Four-stage board - heat safety circuit

Location	Label	Description	Function and comments
J	LIM2	Monitored 24 VAC input through heat section limit switches	If voltage is absent, indicating the heat section is over temperature, the UCB turns on the indoor blower
	GV2	24 VAC hot input confirming heat section operation	Sourced from gas valve 2 in gas heat units or second stage heat contactor in electric heat units. Input within 5 minutes from initiation of H2 output initiates the Heat On Fan Delay timer, loss of input following the termination of H2 output initiates the Heat On Fan Delay timer, no input within 5 minutes from initiation of H2 output initiates an Ignition Failure alarm, input for longer than 5 minutes without H2 output initiates a Gas Valve Mis-wire alarm
	LIM3	Monitored 24 VAC input through heat section limit switches	If voltage is absent, indicating the heat section is over temperature, the UCB turns on the indoor blower
	GV3,4	24 VAC hot input confirming heat section operation	

Table 95: Four-stage board - hot water safety quick connects and thermostat inputs

Location	Label	Description	Function and comments
K	FS HWR	Flow switch for Hydronic heat – 24VAC hot output	Flow switch interlock for hot water coil
	FS HW	Flow switch for Hydronic heat – 24VAC hot return	Flow switch interlock for hot water coil
L	Y3	3rd stage cooling request, 24 VAC input switched from R	Visible in the display menu when the #ClgStgs parameter is set to 4, also effective for economizer free cooling supply air temperature reset when the #ClgStgs parameter is set to 4
	Y4	4th stage cooling request, 24 VAC input switched from R	Visible in the display menu when the #ClgStgs parameter is set to 4, also effective for economizer free cooling supply air temperature reset when the #ClgStgs parameter is set to 4
	W3	3rd stage heating request, 24 VAC input switched from R	Not effective for cooling-only units

Cable specifications

Table 96: Cable type for FC buses and SA buses in order of preference

Bus and cable type	Non-plenum applications		Plenum applications	
	Part number	O.D.	Part number	O.D.
[1]FC Bus: 22 AWG stranded, 3-wire twisted shielded cable[1]	Anixter: CBL-22/3-FC-PVC Belden®: B5501FE	0.138 in.	Anixter: CBL-22/3-FC-PLN Belden: B6501FE	0.140 in.
SA Bus (Terminal Block): 22 AWG stranded, 4-wire, 2 twisted-pair shielded cable	Anixter: CBL-22/2P-SA-PVC Belden: B5541FE	0.209 in.	Anixter: CBL-22/2P-SA-PLN Belden: B6541FE	0.206 in.
SA Bus (Modular Jack): [2]26 AWG solid 6-wire, 3 twisted-pair cable[2]	—	—	Anixter preassembled: CBL-NETWORK25 CBL-NETWORK50 CBL-NETWORK75 CBL-NETWORK100	0.15 in.
FC Bus: 22 AWG stranded, 3-wire twisted non-shielded cable	Belden: B5501UE	0.135 in.	Belden: B6501UE	0.131 in.
SA Bus (Terminal Block): 22 AWG stranded, 4-wire, 2 twisted-pair non-shielded cable	Belden: B5541UE	0.206 in.	Belden: B6541UE	0.199 in.

1 Use 3-wire for FC bus and 4-wire, 2 twisted-pair for SA bus, 22 AWG stranded, shielded cable. A 22 gauge cable offers the best performance for various baud rates, cable distances, and number of trunk devices primarily due to lower conductor-to-conductor capacitance. Shielded cable offers better overall electrical noise immunity than non-shielded cable. Observe the shield grounding requirements.

2 Use 26 AWG solid, 6-wire (3 twisted pairs) cable as the best fit for fabricating modular cables with the modular jack housing assembly. Be sure the cable you use fits the modular jack housing. The preassembled cables that are available from Anixter (Part No. CBL-NETWORKxxx) use 24 gauge wire.

Modulating furnace control

Figure 87: Modulating furnace control board

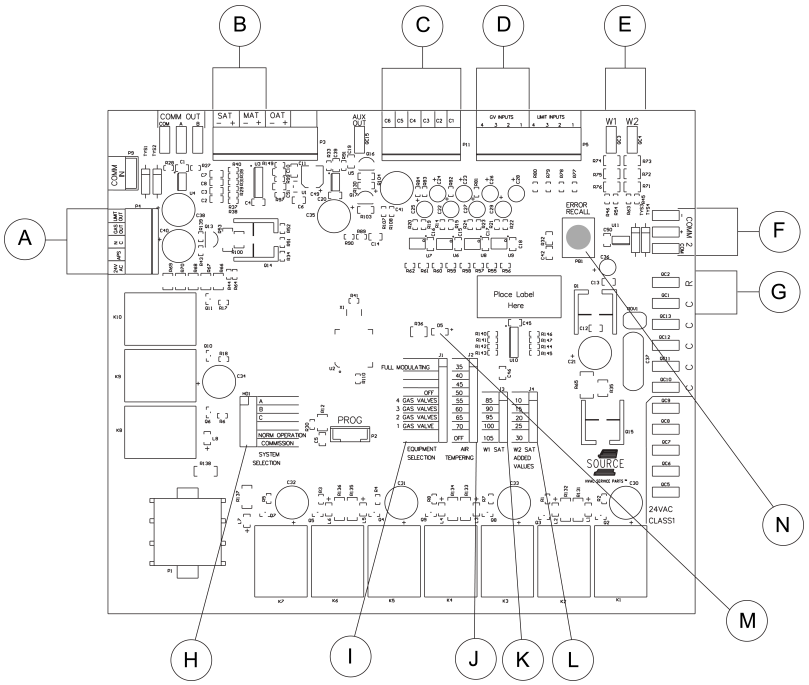


Table 97: Modulating furnace control board details

	Description		Function and comments
A	APS	24 VAC hot return from Air Proving Switch	Air Proving Switch input verifies indoor airflow operation. During Normal Heating, if APS input (closed switch) is not received within 2 min of heat call, LED alarm flashes **5** but does not interrupt heat demand output. APS input is required to operate Air Tempering.
	NC	Not used	Not used
	GAS OUT	24 VAC output confirming heat section operation	Sends gas valve operation signal to UCB. During Normal Heating, when GV INPUT is received the MFC immediately outputs gas signal to UCB. In Air Tempering, the MFC does not output gas signal to the UCB; this is to avoid UCB alarm (Air Tempering operates without thermostat heating call from UCB).
B	SAT+	Supply Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Senses temperature of air leaving heat section. Input required for normal operation; 5.0 VDC reading SAT+ to SAT– with open circuit. Used in Normal Heating and Air Tempering to adjust heat demand output to maintain target supply air temperature. If MFC receives invalid SAT input (indicating bad thermistor) during Normal Heating, heat demand defaults to 35% heat output (lowest level). MFC will not operate Air Tempering with invalid SAT input. LED alarm flashes **3** with invalid SAT.
	MAT+	Mixed Air Temperature sensor input from 10KΩ @ 77°F, Type III negative temperature coefficient thermistor	Senses temperature of air entering heat section. 5.0 VDC reading SAT+ to SAT– with open circuit. Used in Normal Heating to limit air temperature rise (SAT minus MAT) to a maximum of 65°F. Used in Air Tempering to determine if MAT is below value on **AIR TEMPERING** pin selection. The MFC does not operate Air Tempering with invalid MAT input. LED alarm flashes **4** with invalid MAT.
C	C1 through C6	Compressor signals, 24 VAC inputs (not all used)	Sourced from compressor control voltage signals. Monitors all compressors in the unit. If any compressors are on, the LED flashes 6 (non-fault condition) and the MFC does not operate Air Tempering.
D	GV INPUTS, 1	24 VAC input confirming heat section operation	Sourced from main gas valve ON signal. Used in MFC logic for **GAS OUT** output. If GV INPUT is not received within 5 min of heat demand output, LED alarm flashes **2** but does not interrupt heat demand output.

Table 97: Modulating furnace control board details

	Description		Function and comments
E	W1	1st stage heating request, 24 VAC input from H1 on UCB	With W1 input only from the UCB, the MFC adjusts heat demand level to maintain supply air temperature value on **W1 SAT** pin selection.
	W2	2nd stage heating request, 24 VAC input from H2 on UCB	With W2 input (plus W1) from the UCB, the MFC adjusts heat demand level to maintain supply air temperature of the added value of **W1 SAT** plus **W2 SAT ADDED VALUE** pin selections.
F	COMM 2, -	Communication for ignition control	Heat call and demand level to ignition control. Negative of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V lower than +).
	COMM 2, +	Communication for ignition control	Heat call and demand level to ignition control. Positive of the VDC (typically, a fluctuating 1.5 V to 3.5 V reading to C; at least 0.25 V lower than -).
	COMM, COM	Common for ignition control communication circuit	
G	R	24 VAC hot for MFC board power	
	C	24 VAC common for MFC board power	
H	SYSTEM SELECTION (2 jumper pins)	System and operating mode pin selections	There are 2 jumpers for this pin bank. **A** and **NORM OPERATION** yields normal operation. **A** and **COMMISSION** is for rating the furnace and adjusting manifold pressure; automated modulation is bypassed, W1 input outputs a steady 35% (lowest) heat demand, W1 and W2 input outputs a steady 100% (highest) heat demand. **(BLANK)** and **COMMISSION** step through an auto-sequence routine with a W1 or W1 and W2 input.
I	EQUIPMENT SELECTION (2 jumper pins)	Equipment type pin selections	There are 2 jumpers for this pin bank. **FULL MODULATING** and **1 GAS VALVE** should always be selected for this system.
J	AIR TEMPERING (1 jumper pin)	Air Tempering pin selection.	Used to select whether the Air Tempering function is allowed to operate. If jumper is set to any value other than **OFF**, the MFC initiates furnace operation if the MAT sensor input reading is 3°F below the selected value. To operate Air Tempering, APS input must be on, W1/W2 heat call from UCB must be off, and all compressor inputs must have been off for 10 min. If MFC has been in tempering mode (heating) for 10 min and SAT reading is 5°F or more above the Air Tempering selected value, heating is ended. If all conditions for Air Tempering are still met, it is re-initiated after a 10 min minimum off delay.
K	W1 SAT (1 jumper pin)	W1 SAT setpoint pin selection.	With W1 input only from the UCB, the MFC adjusts heat demand level to maintain supply air temperature value on **W1 SAT** pin selection.
L	W2 SAT ADDED VALUE (1 jumper pin)	W2 SAT Added Value setpoint pin selection.	With W2 input (plus W1) from the UCB, the MFC adjusts heat demand level to maintain supply air temperature of the added value of **W1 SAT** plus **W2 SAT ADDED VALUE** pin selections.
M	LED Light	LED status or alarm code	Flash count corresponds to status or fault condition.
N	ERROR RECALL (Button)	Error recall button	When pushed, the last 5 alarms are flashed by the LED. The most recent is flashed first, followed by the next most recent, and continuing until all the alarms stored (5 maximum) are flashed.

Start-up & Service Data Instruction

Commercial Package Units

3.0 To 50.0 tons

Start-up Checklist

Date: _____

Job Name: _____

Customer Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Model Number: _____ Serial Number: _____

Qualified Start-up Technician: _____ Signature: _____

HVAC Contractor: _____ Phone: _____

Address: _____

Contractor's E-mail Address: _____

Electrical Contractor: _____ Phone: _____

Distributor Name: _____ Phone: _____

Warranty Statement

BHC Residential & Light Commercial LLC is confident that this equipment will operate to the owner's satisfaction if the proper procedures are followed and checks are made at initial start-up. This confidence is supported by the 30 day dealer protection coverage portion of our standard warranty policy which states that BHC Residential & Light Commercial LLC will cover parts and labor on new equipment start-up failures that are caused by a defect in factory workmanship or material, for a period of 30 days from installation. Refer to the current standard warranty policy and warranty manual for details.

In the event that communication with BHC Residential & Light Commercial LLC is required regarding technical and/or warranty concerns, all parties to the discussion should have a copy of the equipment start-up sheet for reference. A copy of the original start-up sheet should be filed with the Technical Services Department.

The packaged unit is available in constant or variable air volume versions with a large variety of custom options and accessories available. Therefore, some variation in the startup procedure will exist depending upon the products capacity, control system, options and accessories installed.

This start-up sheet covers all startup check points common to all package equipment. In addition it covers essential startup check points for a number of common installation options. Depending upon the particular unit being started not all sections of this startup sheet will apply. Complete those sections applicable and use the notes section to record any additional information pertinent to your particular installation.

Warranty claims are to be made through the distributor from whom the equipment was purchased.

Equipment Startup

Use the local LCD or GoTemp Pro mobile application to complete the start-up.

A copy of the completed start-up sheet should be kept on file by the distributor providing the equipment and a copy sent to:

BHC Residential & Light Commercial LLC
Technical Services Department
5005 York Drive
Norman, OK 73069

1034349-UCL-L-0426

Safety Warnings

The inspections and recording of data outlined in this procedure are required for start-up of BHC Residential & Light Commercial LLC' packaged products. Industry recognized safety standards and practices must be observed at all times. General industry knowledge and experience are required to assure technician safety. It is the responsibility of the technician to assess all potential dangers and take all steps warranted to perform the work in a safe manner. By addressing those potential dangers, prior to beginning any work, the technician can perform the work in a safe manner with minimal risk of injury.

⚠WARNING

Lethal voltages are present during some start-up checks. Extreme caution must be used at all times.

⚠WARNING

Moving parts may be exposed during some startup checks. Extreme caution must be used at all times.

NOTE: Read and review this entire document before beginning any of the startup procedures.

Design Application Information

This information will be available from the specifying engineer who selected the equipment. If the system is a VAV system the CFM will be the airflow when the remote VAV boxes are in the full open position and the frequency drive is operating at 60 HZ. **Do not proceed with the equipment start-up without the design CFM information.**

Design Supply Air CFM: _____ Design Return Air CFM:_____

Design Outdoor Air CFM At Minimum Position: _____

Total External Static Pressure: _____

Supply Static Pressure: _____

Return Static Pressure: _____

Design Building Static Pressure: _____

Outside Air Dilution: Economizer Position Percentage: _____ CFM: _____

Supply Gas Pressure After Regulator W/o Heat Active _____ Inches_____

ADDITIONAL APPLICATION NOTES FROM SPECIFYING ENGINEER:

Reference

General Inspection	Completed	See Notes
Unit inspected for shipping, storage, or rigging damage	☐	☐
Unit installed with proper clearances	☐	☐
Unit installed within slope limitations	☐	☐
Refrigeration system checked for gross leaks (presence of oil)	☐	☐
Terminal screws and wiring connections checked for tightness	☐	☐
Filters installed correctly and clean	☐	☐
Economizer hoods installed in operating position	☐	☐
Condensate drain trapped properly, refer to Installation Manual	☐	☐
Economizer damper linkage tight	☐	☐
Gas Heat vent hood installed	☐	☐
All field wiring (power and control) complete	☐	☐

Air Moving Inspection	Completed	See Notes
Alignment of drive components	☐	☐
Belt tension adjusted properly	☐	☐
Blower pulleys tight on shaft, bearing set screws tight, wheel tight to shaft	☐	☐
Pressure switch or transducer tubing installed properly	☐	☐

Exhaust Inspection Powered ☐ Barometric Relief ☐	Completed	See Notes
Check hub for tightness	☐	☐
Check fan blade for clearance	☐	☐
Check for proper rotation	☐	☐
Check for proper mounting (screen faces towards unit)	☐	☐
Prove operation by increasing minimum setting on economizer	☐	☐

Economizer Inspection Standard ☐ BAS ☐	Completed	See Notes
CO_2 sensor installed Yes ☐ No ☐	☐	☐
Check economizer setting (Reference Smart Equipment Control Board LCD menu location)	☐	☐
Prove economizer open/close through Smart Equipment Board Setting	☐	☐

Reheat Mode Normal ☐ or Alternate ☐ Not Applicable ☐
Humidity Sensor (2SH0401) _____

Operating Measurements - Air Flow

Fan operates with proper rotation (All VFD equipped units with the optional Manual Bypass must be phased for correct blower rotation with the Bypass switch set in the LINE position) ID Fans ☐ Exh. Fans ☐ Cond. Fans ☐	
Pressure drop across dry evaporator coil (At maximum design CFM) [1]	IWC
External Static Pressure	IWC
Return Static Pressure	IWC
Supply Static Pressure	IWC
Supply Air CFM Using Dry Coil Chart	CFM
Final Adjusted Supply Air CFM[2]	CFM

1. Consult the proper airflow to pressure drop table to obtain the actual airflow at the measured pressure differential.
2. Was a motor pulley adjustment or change required to obtain the correct airflow?
   Was it necessary to increase of decrease the airflow to meet the design conditions?
   If the motor pulley size was changed, measure the outside diameters of the motor and blower pulleys and record those diameters here;

Blower Motor HP _____ FLA_____ RPM_____

Pulley Pitch Diameter _____Turns Out_____ Final Turns Out_____

Blower Pulley Pitch Diameter _____ Fixed Sheave_____

Electrical Data

T1 - T2 _____ Volts T2 - T3 _____ Volts

Control Voltage _____ Volts T1 - T3 _____ Volts

Device	Nameplate	Measured List All Three Amperages
Supply Fan Motor[1, 2]	AMPS	AMPS
Exhaust Motor (Dampers 100%)	AMPS	AMPS
Condenser Fan #1	AMPS	AMPS
Condenser Fan #2 (if equipped)	AMPS	AMPS
Condenser Fan #3 (if equipped)	AMPS	AMPS
Condenser Fan #4 (if equipped)	AMPS	AMPS
Compressor #1	AMPS	AMPS
Compressor #2 (if equipped)	AMPS	AMPS
Compressor #3 (if equipped)	AMPS	AMPS
Compressor #4 (if equipped)	AMPS	AMPS

1. VAV units with heat section - simulate heat call to drive VAV boxes and VFD/IGV to maximum design airflow position.
2. VAV units without heat section - VAV boxes must be set to maximum design airflow position.

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Refrigerant Safeties

Action	Completed	See Notes
Prove Compressor Rotation (3 phase only) by gauge pressure	☐	☐
Prove High Pressure Safety, All Systems	☐	☐
Prove Low Pressure Safety, All Systems	☐	☐

Refrigerant Detection System (RDS) Safety Test

Action	Completed	See Notes
Does the System have a Refrigerant Detection System (RDS) installed for R-454B?	☐	☐
Does Control Board Show any RDS alarms?	☐	☐
Are all available RDS Sensors pulsing with a green light?	☐	☐
Caution do not continue until any RDS alarms are resolved		
Prove Refrigerant Detection System Alarm Mitigation (Heating Units) – Shuts Down Active Heat Call[1]	☐	☐
Prove Refrigerant Detection System Alarm Mitigation (Cooling Mode) – Shuts Down Active Cooling Call[1]	☐	☐

1. Complete the above steps by pulling the J1 harness off the UCB during an active call for heat/cooling

Operating Measurements - Cooling

Stage	Discharge Pressure	Discharge Temp.	Liquid Line Temp.[1]	Subcooling[2]	Suction Pressure	Suction Temp.	Superheat
First	#	°	°	°	#	°	°
Second (if equipped)	#	°	°	°	#	°	°
Third (if equipped)	#	°	°	°	#	°	°
Fourth (if equipped)	#	°	°	°	#	°	°
Reheat 1st Stage	#	°	°	°	#	°	°

1. Liquid temperature should be taken before filter/drier.
2. Subtract 10 psi from discharge pressure for estimated liquid line pressure

Outside air temperature	_____	°F db	_____	°F wb	_____ %RH
Return Air Temperature	_____	°F db	_____	°F wb	_____ %RH
Mixed Air Temperature	_____	°F db	_____	°F wb	_____ %RH
Supply Air Temperature	_____	°F db	_____	°F wb	_____ %RH

Operating Measurements - Gas Heating

Fuel Type: ☐ Natural Gas ☐ LP Gas

Action		Completed	See Notes
Check for gas leaks		☐	☐
Prove Ventor Motor Operation		☐	☐
Prove Primary Safety Operation		☐	☐
Prove Auxiliary Safety Operation		☐	☐
Prove Rollout Switch Operation		☐	☐
Prove Smoke Detector Operation		☐	☐
Manifold Pressure	Stage 1	IWC	☐
	Stage 2 (If Equipped)	IWC	☐
	Stage 3 (If Equipped)	IWC	☐
Supply gas pressure at full fire		IWC	☐
Check temperature rise[1]	☐ measured at full fire	°F	☐

1. Input X Eff. (BTU output)
   1.08 X Temp. Rise

Operating Measurements Electric Heating

Heater kW _____kW Heater Voltage, Nameplate _____ Volts

Heater Model Number: _____

Serial Number: _____

Heater	Nameplate	Measured List All Three Amperages		
Stage 1	_____AMPS	_____AMPS	_____AMPS	_____AMPS
Stage 2	_____AMPS	_____AMPS	_____AMPS	_____AMPS
Stage 3	_____AMPS	_____AMPS	_____AMPS	_____AMPS
Stage 4	_____AMPS	_____AMPS	_____AMPS	_____AMPS
Checked Heater Limit		Yes ☐	No ☐	
Air Moving Switch Installed?		Yes ☐	No ☐	

Operating Measurements - Staging Controls

Verify Proper Operation of Heating/Cooling Staging Controls	
Create a cooling demand at the Thermostat, BAS System or Smart Equipment Verify that cooling/economizer stages are energized.	☐
Create a heating demand at the Thermostat, BAS System or Smart Equipment Verify that heating stages are energized.	☐
Verify Proper Operation of the Variable Frequency Drive (If Required)	
Verify that motor speed modulates with duct pressure change.	☐

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Final - Inspection

Verify that all operational control set points have been set to desired value Scroll through all setpoints and change as may be necessary to suit the occupant requirements.	☐
Verify that all option parameters are correct Scroll through all option parameters and ensure that all installed options are enabled in the software and all others are disabled in the software. (Factory software settings should match the installed options)	☐
Verify that all access panels have been closed and secured	☐
Save a backup file from the unit control board onto a USB flash drive.	☐

Observed Product Deficiencies & Concerns:

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