INSTALLATION INSTRUCTIONS

PACKAGE GAS ELECTRIC FEATURING NEW INDUSTRY STANDARD R-410A REFRIGERANT *R-410A*

RKNL-G SERIES 15, 20 & 25 TON [52.8, 70.3 & 87.9 kW]

COMPLIES WITH ASHRAE 90.1-2007



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠ WARNING

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

AHRI CERTIFIED™ www.ahridirectory.org
Unitary Large AC
AHRI Standard 340/360
Certification applies only when the complete system is listed with AHRI.

25 TON IS OUTSIDE THE SCOPE OF ARI STANDARD 340/360

c UL us LISTED

Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANAB ACCREDITED

ISO 9001:2008
Certificate Number: 30164

DO NOT DESTROY THIS MANUAL

PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN

[ ] INDICATES METRIC CONVERSIONS

TABLE OF CONTENTS

I. SPECIFICATIONS 3
General 3
Major Components 3
R410A Refrigerant 3
Safety Information 5
Unit Dimensions 6-8
General Data 9-14
II. INSTALLATION 15
General 15
Location Considerations 15
Outside Installation 16
Exhaust & Combustion Hoods 16
Cover Panel Installation 17
Filter Replacement 17
Clearances 18
Rooftop Installation 19
Ducting 19
Return Air 20
III. GAS SUPPLY, CONDENSATE DRAIN AND PIPING 21
Gas Connection 21
LP Conversion 22
Adjusting or Checking Furnace Input 23
Condensate Drain 24
IV. WIRING 24
Power Supply 24
Hook-up 26
Internal Wiring 27
Thermostat 27
V. FURNACE SECTION CONTROLS AND IGNITION SYSTEM 27
Normal Furnace Operating Sequence 27
Operating Instructions 29
Burners 29
Manual Reset Overtemperature Control 30
Pressure Switch 30
Limit Control 30
VI. COOLING SECTION OPERATION 30
Cooling Mode 30
Continuous Fan Mode 31
VII. HUMIDIDRY SYSTEM 31
Humidity Sensor 31
Refrigerant Solenoid Valves 31
Operation 32
VIII. VARIABLE FREQUENCY DRIVE (VFD) 32
VFD Model 32
Replacement 32
Operation 32
XIX. OUTDOOR FAN MOTOR CONTROLLER (OFMC) 32
XX. SYSTEM OPERATING INFORMATION 33
Advise the Customer 33
Furnace Section Maintenance 33
Lubrication 34
Cooling Section Maintenance 34
Replacement Parts 35
Troubleshooting 35
Wiring Diagrams 35
Charging 35
XXI. AIRFLOW PERFORMANCE 36-38
XXII. ELECTRICAL DATA 39-40
XIII. TROUBLESHOOTING CHART 41-43
XIV. WIRING DIAGRAMS 44-45
XV. CHARGE CHARTS 46-48

⚠ Recognize this symbol as an indication of Important Safety Information!

⚠ WARNING

THE MANUFACTURER'S WARRANTY DOES NOT COVER ANY DAMAGE OR DEFECT TO THE AIR CONDITIONER CAUSED BY THE ATTACHMENT OR USE OF ANY COMPONENTS, ACCESSORIES OR DEVICES (OTHER THAN THOSE AUTHORIZED BY THE MANUFACTURER) INTO, ONTO OR IN CONJUNCTION WITH THE AIR CONDITIONER. YOU SHOULD BE AWARE THAT THE USE OF UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES MAY ADVERSELY AFFECT THE OPERATION OF THE AIR CONDITIONER AND MAY ALSO ENDANGER LIFE AND PROPERTY. THE MANUFACTURER DISCLAIMS ANY RESPONSIBILITY FOR SUCH LOSS OR INJURY RESULTING FROM THE USE OF SUCH UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES.

⚠ WARNING

UNITS ARE NOT DESIGN CERTIFIED TO BE INSTALLED INSIDE THE STRUCTURE. DOING SO CAN CAUSE INADEQUATE UNIT PERFORMANCE AS WELL AS PROPERTY DAMAGE AND CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.

CHECKING PRODUCT RECEIVED

This booklet contains the installation and operating instructions for your combination gas heating/electric cooling unit. There are some precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions.

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

EQUIPMENT PROTECTION FROM THE ENVIRONMENT

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

I. SPECIFICATIONS

A. GENERAL

The Combination Gas Heating/Electric Cooling Rooftop is available in 250,000 AND 350,000 BTUH heating input with nominal cooling capacity of 15, 20 & 25 tons. 300,000 and 400,000 BTUH heating inputs are available in nominal cooling capacity of 20 & 25 tons. Units are convertible from bottom supply and return to side supply and return by relocation of supply and return air cover panels. See cover installation detail and Figures 10 &11.

The units are weatherized for mounting outside of the building.

B. MAJOR COMPONENTS

The unit includes a hermetically-sealed refrigerating system (consisting of a scroll compressor, condenser coil, evaporator coil with capillary tube assembly or TXV, microchannel reheat coil, solenoiod valves), a circulation air blower, condenser fans, variable frequency drive (VFD), outdoor fan motor controller (OFMC), a heat exchanger assembly, gas burner and control assembly, combustion air motors and fan, and all necessary internal electrical wiring. The cooling system of these units is factory-evacuated, charged and performance tested. Refrigerant amount and type are indicated on rating plate.

C. R410A REFRIGERANT

All units are factory charged with R-410A refrigerant.

1. Specification of R-410A:

Application: R-410A is not a drop-in replacement for R-22; equipment designs must accommodate its higher pressures. It cannot be retrofitted into R-22 units.

Pressure: The pressure of R-410A is approximately 60% (1.6 times) greater than R-22. Recovery and recycle equipment, pumps, hoses, and the like need to have design pressure ratings appropriate for R-410A. *Manifold sets need to range up to 800 psig high-side and 250 psig low-side with a 550 psig low-side retard. Hoses need to have a service pressure rating of 800 psig. Recovery cylinders need to have a 400 psig service pressure rating.* DOT 4BA400 or DOT BW400.

Combustibility: At pressures above 1 atmosphere, mixture of R-410A and air can become combustible. **R-410A and air should never be mixed in tanks or supply lines, or be allowed to accumulate in storage tanks. Leak checking should never be done with a mixture of R-410A and air.** Leak checking can be performed safely with nitrogen or a mixture of R-410A and nitrogen.

2. Quick Reference Guide For R-410A

- R-410A refrigerant operates at approximately 60% higher pressure (1.6 times) than R-22. Ensure that servicing equipment is designed to operate with R-410A.
- R-410A refrigerant cylinders are pink.
- R-410A, as with other HFC's is only compatible with POE oils.

- Vacuum pumps will not remove moisture from POE oil.
- R-410A systems are to be charged with liquid refrigerants. Prior to March 1999, R-410A refrigerant cylinders had a dip tube. These cylinders should be kept upright for equipment charging. Post March 1999 cylinders do not have a dip tube and should be inverted to ensure liquid charging of the equipment.
- Do not install a suction line filter drier in the liquid line.
- A liquid line filter drier is standard on every unit.
- Desiccant (drying agent) must be compatible for POE oils and R-410A.

3. Evaporator Coil/ TXV

The thermostatic expansion valve is specifically designed to operate with R-410A. **DO NOT use an R-22 TXV. The existing evaporator must be replaced with the factory specified TXV evaporator specifically designed for R-410A.**

4. Tools Required For Installing & Servicing R-410A Models

Manifold Sets:
-Up to 800 PSIG High Side
-Up to 250 PSIG Low Side
-550 PSIG Low Side Retard

Manifold Hoses:
-Service Pressure Rating of 800 PSIG

Recovery Cylinders:
-400 PSIG Pressure Rating
-Dept. of Transportation 4BA400 or BW400

⚠ CAUTION

R-410A systems operate at higher pressures than R-22 systems. Do not use R-22 service equipment or components on R-410A equipment.

SAFETY INFORMATION

⚠ WARNING

USE ONLY WITH TYPE OF GAS APPROVED FOR THIS UNIT. REFER TO THE UNIT RATING PLATE.

⚠ WARNING

INSTALL THIS UNIT ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THIS UNIT TO AN APPROVED VENT SYSTEM ONLY, AS SPECIFIED IN VENT PIPE INSTALLATION SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

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, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

ALWAYS INSTALL UNIT TO OPERATE WITHIN THE UNIT'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO UNIT RATING PLATE.

⚠ WARNING

WHEN A UNIT IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE UNIT TO AREAS OUTSIDE THE SPACE CONTAINING THE UNIT, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE UNIT CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE UNIT.

⚠ WARNING

THIS UNIT MAY BE USED TO HEAT THE BUILDING OR STRUCTURE DURING CONSTRUCTION IF THE FOLLOWING INSTALLATION REQUIREMENTS ARE MET. INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

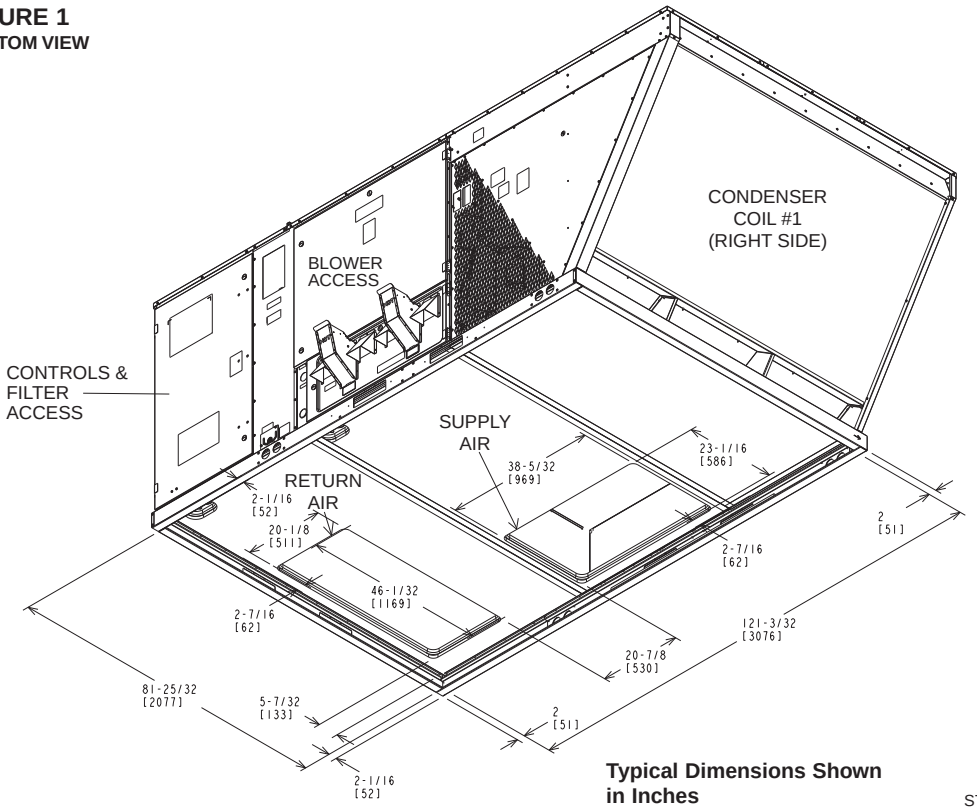
- PROPER VENT INSTALLATION;
- FURNACE OPERATING UNDER THERMOSTATIC CONTROL;
- RETURN AIR DUCT SEALED TO THE FURNACE;
- AIR FILTERS IN PLACE;
- SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;
- MEANS OF PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;
- RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND
- INSTALLATION OF EXHAUST AND COMBUSTION AIR INLET HOODS COMPLETED;
- CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING ACCORDING TO THE INSTRUCTIONS.

Unit Dimensions

FOR CLEARANCES SEE PAGE 12, FIGURE 12.

IMPORTANT: THIS UNIT MUST BE MOUNTED LEVEL IN BOTH DIRECTIONS TO ALLOW WATER TO DRAIN FROM THE CONDENSER SECTION AND CONDENSATE PAN.

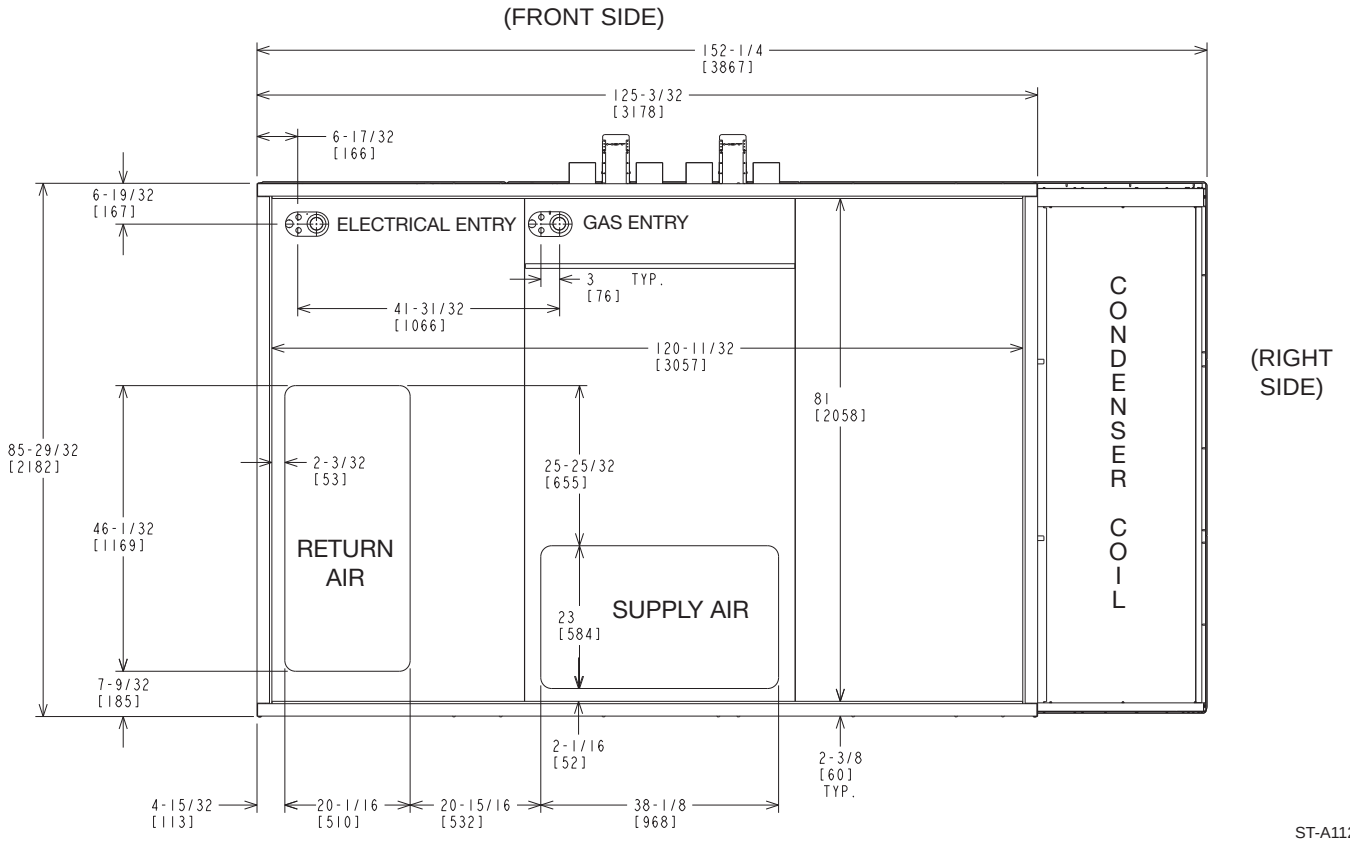
FIGURE 1
BOTTOM VIEW



Typical Dimensions Shown in Inches

ST-A1125-02A

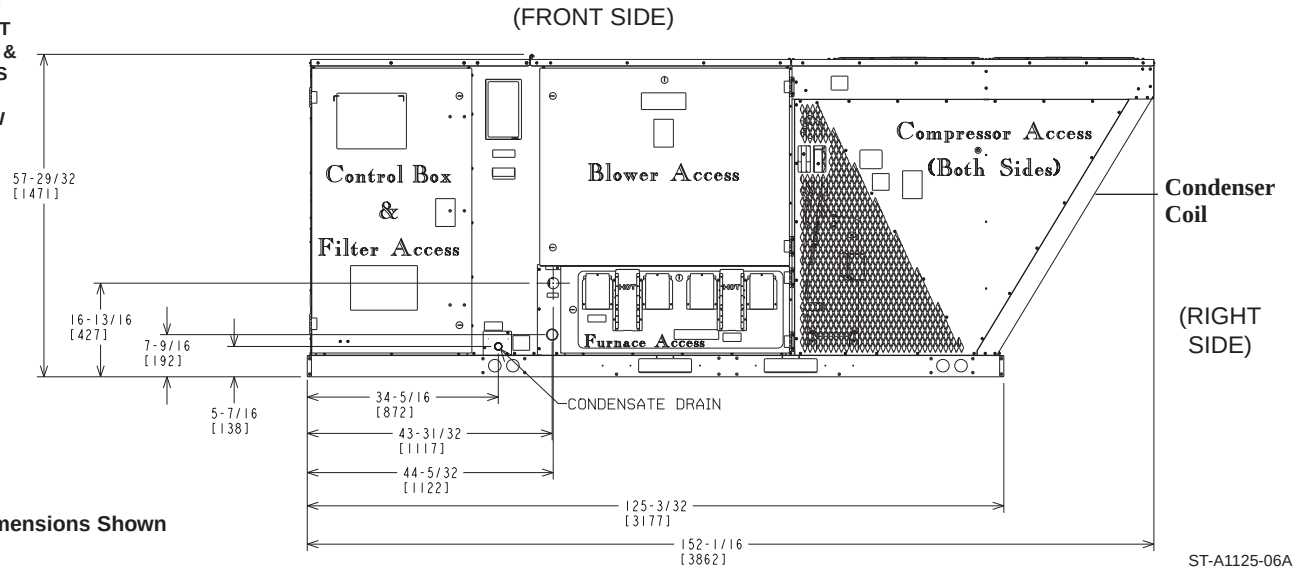
FIGURE 2
SUPPLY AND RETURN DIMENSIONS FOR DOWNFLOW APPLICATIONS – BOTTOM VIEW



ST-A1125-09A

FIGURE 3
COMPONENT LOCATIONS & DIMENSIONS

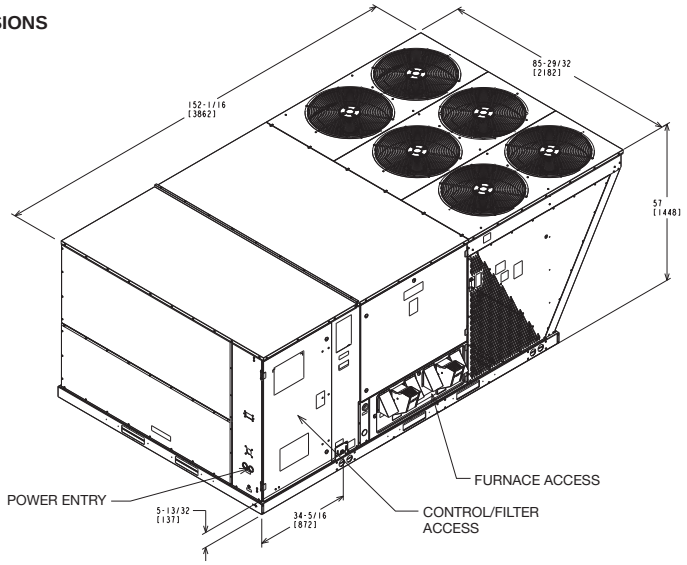
FRONT VIEW



Typical Dimensions Shown in Inches

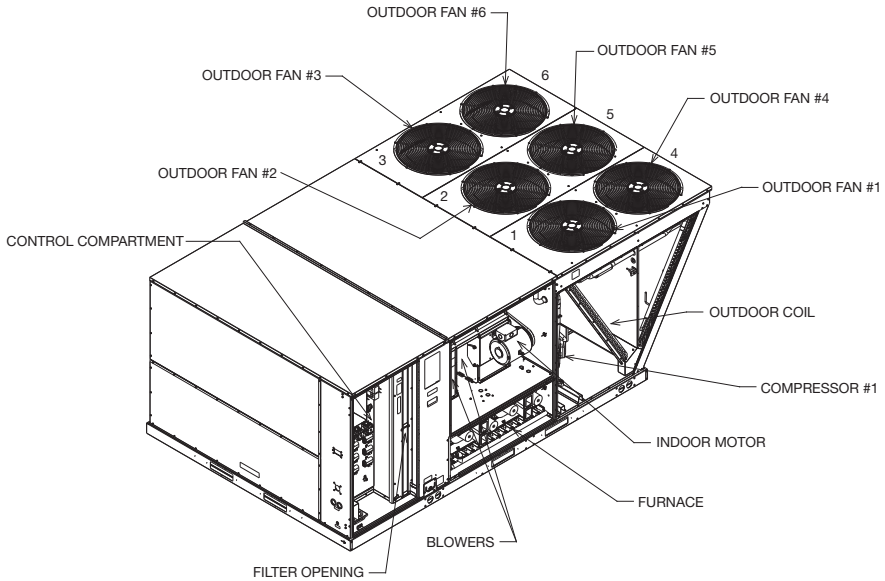
ST-A1125-06A

FIGURE 4
COMPONENT LOCATIONS & DIMENSIONS



ST-A1125-01A

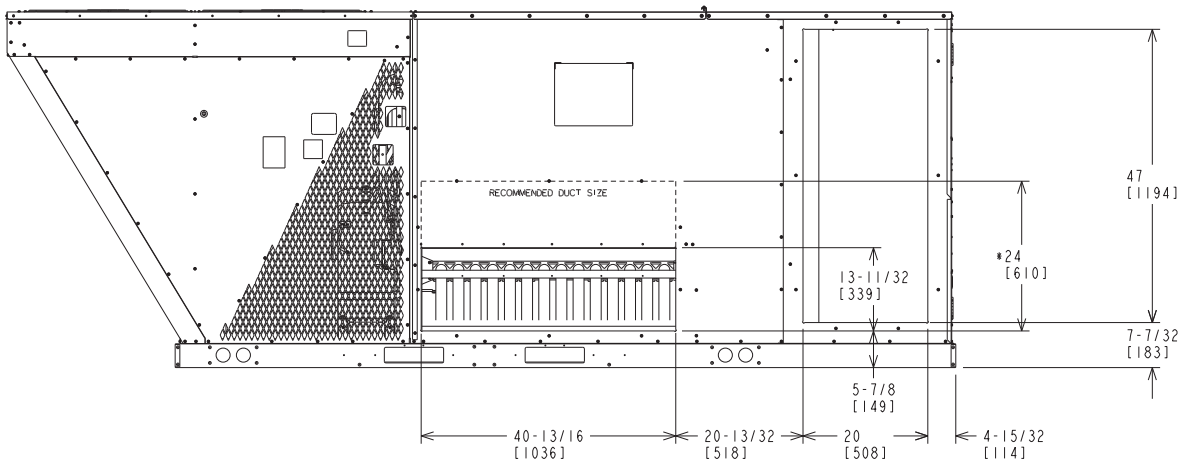
FIGURE 5
COMPONENT LOCATIONS



ST-A1125-04

FIGURE 6
DIMENSIONS

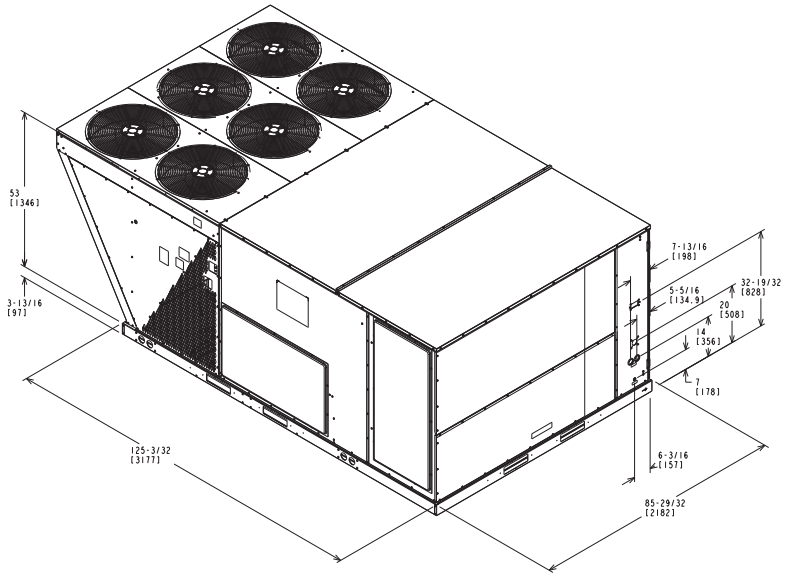
(REAR SIDE)



*RECOMMENDED DUCT CONNECTION SIZE
SUPPLY: 24 x 40.8 INCHES
RETURN: 47 x 20 INCHES

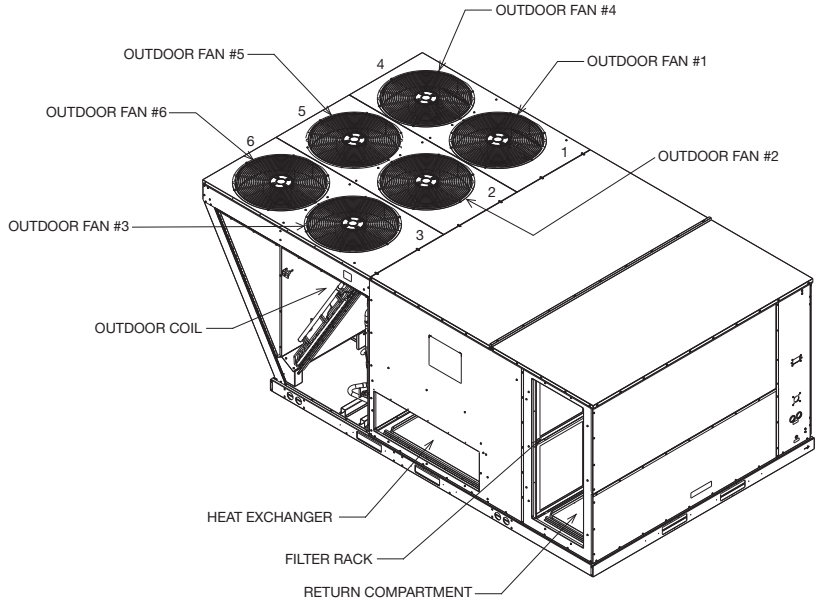
ST-A1125-08A

FIGURE 7
COMPONENT ACCESS
LOCATIONS & DIMENSIONS



ST-A1125-03

FIGURE 8
COMPONENT
LOCATIONS



ST-A1125-05

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G180CR25E	G180CR35E	G180CS25E	G180CS35E
Cooling Performance[1]				CONTINUED →
Gross Cooling Capacity Btu [kW]	188,000 [55.08]	188,000 [55.08]	188,000 [55.08]	188,000 [55.08]
EER/SEER[2]	11.1/NA	11.1/NA	11.1/NA	11.1/NA
Nominal CFM/AHRI Rated CFM [L/s]	6000/5900 [2831/2784]	6000/5900 [2831/2784]	6000/5900 [2831/2784]	6000/5900 [2831/2784]
AHRI Net Cooling Capacity Btu [kW]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]
Net Sensible Capacity Btu [kW]	135,700 [39.76]	135,700 [39.76]	135,700 [39.76]	135,700 [39.76]
Net Latent Capacity Btu [kW]	46,300 [13.57]	46,300 [13.57]	46,300 [13.57]	46,300 [13.57]
IEER[3]	14.6	14.6	14.6	14.6
Net System Power kW	16.35	16.35	16.35	16.35
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	125,000/250,000 [36.62/73.25]	175,000/350,000 [51.27/102.55]	125,000/250,000 [36.62/73.25]	175,000/350,000 [51.27/102.55]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	102,250/202,500 [29.67/59.33]	141,750/283,500 [41.53/83.06]	101,250/202,500 [29.67/59.33]	141,750/283,500 [41.53/83.06]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	30-60 [16.7/33.3] / 30-60 [16.7-33.3]	15-45 [8.3-25]/15-45 [8.3-25]	30-60 [16.7/33.3] / 30-60 [16.7-33.3]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	10	14	10	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	1 / 22 [9]	1 / 22 [9]	1 / 22 [9]	1 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	2 / 18 [7]	2 / 18 [7]	2 / 18 [7]	2 / 18 [7]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	4/24 [609.6]	4/24 [609.6]	4/24 [609.6]	4/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	16000 [7550]	16000 [7550]	16000 [7550]	16000 [7550]
No. Motors/HP	4 at 1/3 HP	4 at 1/3 HP	4 at 1/3 HP	4 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	3	3	5	5
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	184	184
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	299/211 [8477/5982]	299/211 [8477/5982]	299/211 [8477/5982]	299/211 [8477/5982]
Weights				
Net Weights lbs. [kg]	2038 [924]	2051 [930]	2067 [938]	2080 [943]
Ship Weights lbs. [kg]	2164 [982]	2177 [987]	2193 [995]	2206 [1001]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G180DR25E	G180DR35E	G180DS25E	G180DS35E
Cooling Performance[1]				CONTINUED →
Gross Cooling Capacity Btu [kW]	188,000 [55.08]	188,000 [55.08]	188,000 [55.08]	188,000 [55.08]
EER/SEER[2]	11.1/NA	11.1/NA	11.1/NA	11.1/NA
Nominal CFM/AHRI Rated CFM [L/s]	6000/5900 [2831/2784]	6000/5900 [2831/2784]	6000/5900 [2831/2784]	6000/5900 [2831/2784]
AHRI Net Cooling Capacity Btu [kW]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]
Net Sensible Capacity Btu [kW]	135,700 [39.76]	135,700 [39.76]	135,700 [39.76]	135,700 [39.76]
Net Latent Capacity Btu [kW]	46,300 [13.57]	46,300 [13.57]	46,300 [13.57]	46,300 [13.57]
IEER[3]	14.6	14.6	14.6	14.6
Net System Power kW	16.35	16.35	16.35	16.35
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	125,000/250,000 [36.62/73.25]	175,000/350,000 [51.27/102.55]	125,000/250,000 [36.62/73.25]	175,000/350,000 [51.27/102.55]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	102,250/202,500 [29.67/59.33]	141,750/283,500 [41.53/83.06]	101,500/203,000 [29.74/59.48]	143,250/286,500 [41.97/83.94]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	30-60 [16.7/33.3] / 30-60 [16.7-33.3]	15-45 [8.3-25]/15-45 [8.3-25]	30-60 [16.7/33.3] / 30-60 [16.7-33.3]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	10	14	10	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	1 / 22 [9]	1 / 22 [9]	1 / 22 [9]	1 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	2 / 18 [7]	2 / 18 [7]	2 / 18 [7]	2 / 18 [7]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	4/24 [609.6]	4/24 [609.6]	4/24 [609.6]	4/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	16000 [7550]	16000 [7550]	16000 [7550]	16000 [7550]
No. Motors/HP	4 at 1/3 HP	4 at 1/3 HP	4 at 1/3 HP	4 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	3	3	5	5
Motor RPM	1725	1725	1725	1725
Motor Frame Size	56	56	184	184
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	299/211 [8477/5982]	299/211 [8477/5982]	299/211 [8477/5982]	299/211 [8477/5982]
Weights				
Net Weights lbs. [kg]	2038 [924]	2051 [930]	2067 [938]	2080 [943]
Ship Weights lbs. [kg]	2164 [982]	2177 [987]	2193 [995	2206 [1001]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G240CR30E	G240CR40E	G240CS30E	G240CS40E
Cooling Performance[1]				CONTINUED →
Gross Cooling Capacity Btu [kW]	244,000 [71.49]	244,000 [71.49]	244,000 [71.49]	244,000 [71.49]
EER/SEER[2]	11.1/NA	11.1/NA	11.1/NA	11.1/NA
Nominal CFM/AHRI Rated CFM [L/s]	8000/7725 [3775/3645]	8000/7725 [3775/3645]	8000/7725 [3775/3645]	8000/7725 [3775/3645]
AHRI Net Cooling Capacity Btu [kW]	234,000 [68.56]	234,000 [68.56]	234,000 [68.56]	234,000 [68.56]
Net Sensible Capacity Btu [kW]	171,600 [50.28]	171,600 [50.28]	171,600 [50.28]	171,600 [50.28]
Net Latent Capacity Btu [kW]	62,400 [18.28]	62,400 [18.28]	62,400 [18.28]	62,400 [18.28]
IEER[3]	14.8	14.8	14.8	14.8
Net System Power kW	21.04	21.04	21.04	21.04
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9-30.6]/25-55 [13.9-30.6]	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9-30.6]/25-55 [13.9-30.6]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	12	14	12	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	3 / 13 [5]	3 / 13 [5]	3 / 13 [5]	3 / 13 [5]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	19800 [9344]	19800 [9344]	19800 [9344]	19800 [9344]
No. Motors/HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	5	5	7 1/2	7 1/2
Motor RPM	1725	1725	1725	1725
Motor Frame Size	184	184	213	213
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	430/331 [12190/9384]	430/331 [12190/9384]	430/331 [12190/9384]	430/331 [12190/9384]
Weights				
Net Weights lbs. [kg]	2359 [1070]	2383 [1081]	2407 [1092]	2421 [1098]
Ship Weights lbs. [kg]	2495 [1132]	2509 [1138]	2533 [1149]	2547 [1155]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G240DR30E	G240DR40E	G240DS30E	G240DS40E
Cooling Performance[1]				CONTINUED →
Gross Cooling Capacity Btu [kW]	244,000 [71.49]	244,000 [71.49]	244,000 [71.49]	244,000 [71.49]
EER/SEER[2]	11.1/NA	11.1/NA	11.1/NA	11.1/NA
Nominal CFM/AHRI Rated CFM [L/s]	8000/7725 [3775/3645]	8000/7725 [3775/3645]	8000/7725 [3775/3645]	8000/7725 [3775/3645]
AHRI Net Cooling Capacity Btu [kW]	234,000 [68.56]	234,000 [68.56]	234,000 [68.56]	234,000 [68.56]
Net Sensible Capacity Btu [kW]	171,600 [50.28]	171,600 [50.28]	171,600 [50.28]	171,600 [50.28]
Net Latent Capacity Btu [kW]	62,400 [18.28]	62,400 [18.28]	62,400 [18.28]	62,400 [18.28]
IEER[3]	14.8	14.8	14.8	14.8
Net System Power kW	21.04	21.04	21.04	21.04
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9-30.6]/25-55 [13.9-30.6]	15-45 [8.3-25]/15-45 [8.3-25]	25-55 [13.9-30.6]/25-55 [13.9-30.6]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	12	14	12	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	3 / 13 [5]	3 / 13 [5]	3 / 13 [5]	3 / 13 [5]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	19800 [9344]	19800 [9344]	19800 [9344]	19800 [9344]
No. Motors/HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	5	5	7 1/2	7 1/2
Motor RPM	1725	1725	1725	1725
Motor Frame Size	184	184	184	213
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	430/331 [12190/9384]	430/331 [12190/9384]	430/331 [12190/9384]	430/331 [12190/9384]
Weights				
Net Weights lbs. [kg]	2369 [1075]	2389 [1084]	2407 [1092]	2421 [1098]
Ship Weights lbs. [kg]	2495 [1132]	2515 [1141]	2533 [1149]	2547 [1155]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G300CR30E	G300CR40E	G300CS30E	G300CS40E
Cooling Performance[1]				CONTINUED →
Gross Cooling Capacity Btu [kW]	304,000 [89.07]	304,000 [89.07]	304,000 [89.07]	304,000 [89.07]
EER/SEER[2]	10/NA	10/NA	10/NA	10/NA
Nominal CFM/AHRI Rated CFM [L/s]	10000/9575 [4719/4518]	10000/9575 [4719/4518]	10000/9575 [4719/4518]	10000/9575 [4719/4518]
AHRI Net Cooling Capacity Btu [kW]	288,000 [84.38]	288,000 [84.38]	288,000 [84.38]	288,000 [84.38]
Net Sensible Capacity Btu [kW]	210,000 [61.53]	210,000 [61.53]	210,000 [61.53]	210,000 [61.53]
Net Latent Capacity Btu [kW]	78,000 [22.85]	78,000 [22.85]	78,000 [22.85]	78,000 [22.85]
IEER[3]	14.1	14.1	14.1	14.1
Net System Power kW	28.87	28.87	28.87	28.87
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	10-40 [5.6-22.2]/10-40 [5.6-22.2]	15-45 [8.3-25]/15-45 [8.3-25]	10-40 [5.6-22.2]/10-40 [5.6-22.2]	25-45 [13.9-25]/15-45 [8.3-25]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	12	14	12	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	4 / 15 [6]	4 / 15 [6]	4 / 15 [6]	4 / 15 [6]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	19800 [9344]	19800 [9344]	19800 [9344]	19800 [9344]
No. Motors/HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	7 1/2	7 1/2	10	10
Motor RPM	1725	1725	1725	1725
Motor Frame Size	213	213	215	215
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	464/357 [13154/10121]	464/357 [13154/10121]	464/357 [13154/10121]	464/357 [13154/10121]
Weights				
Net Weights lbs. [kg]	2468 [1119]	2482 [1126]	2479 [1124]	2493 [1131]
Ship Weights lbs. [kg]	2594 [1177]	2608 [1183]	2605 [1182]	2619 [1188]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

GENERAL DATA - RKNL
NOM. SIZES 15, 20 & 25 TONS [52.8-87.9 kW]

Model RKNL-Series	G300DR30E	G300DR40E	G300DS30E	G300DS40E
Cooling Performance[1]				
Gross Cooling Capacity Btu [kW]	304,000 [89.07]	304,000 [89.07]	304,000 [89.07]	304,000 [89.07]
EER/SEER[2]	10/NA	10/NA	10/NA	10/NA
Nominal CFM/AHRI Rated CFM [L/s]	10000/9575 [4719/4518]	10000/9575 [4719/4518]	10000/9575 [4719/4518]	10000/9575 [4719/4518]
AHRI Net Cooling Capacity Btu [kW]	288,000 [84.38]	288,000 [84.38]	288,000 [84.38]	288,000 [84.38]
Net Sensible Capacity Btu [kW]	210,000 [61.53]	210,000 [61.53]	210,000 [61.53]	210,000 [61.53]
Net Latent Capacity Btu [kW]	78,000 [22.85]	78,000 [22.85]	78,000 [22.85]	78,000 [22.85]
IEER[3]	14.1	14.1	14.1	14.1
Net System Power kW	28.87	28.87	28.87	28.87
Heating Performance (Gas)[4]				
Heating Input Btu [kW] (1st Stage / 2nd Stage)	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]	150,000/300,000 [43.95/87.9]	200,000/400,000 [58.6/117.2]
Heating Output Btu [kW] (1st Stage / 2nd Stage)	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]	121,500/243,000 [35.6/71.2]	162,000/324,000 [47.47/94.93]
Temperature Rise Range °F [°C] (1st Stage / 2nd Stage)	10-40 [5.6-22.2]/10-40 [5.6-22.2]	15-45 [8.3-25]/15-45 [8.3-25]	10-40 [5.6-22.2]/10-40 [5.6-22.2]	15-45 [8.3-25]/15-45 [8.3-25]
Steady Stage Efficiency (%)	81	81	81	81
No. Burners	12	14	12	14
No. Stages	2	2	2	2
Gas Connection Pipe Size in. [mm]	0.75 [19]	0.75 [19]	0.75 [19]	0.75 [19]
Compressor				
No./Type	2/Scroll	2/Scroll	2/Scroll	2/Scroll
Outdoor Sound Rating (dB)[5]	91	91	91	91
Outdoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm] OD	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]	53.3 [4.95]
Rows / FPI [FPcm]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]	2 / 22 [9]
Indoor Coil—Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	Rifled	Rifled	Rifled	Rifled
Tube Size in. [mm]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]	0.375 [9.5]
Face Area sq. ft. [sq. m]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]	26.67 [2.48]
Rows / FPI [FPcm]	4 / 15 [6]	4 / 15 [6]	4 / 15 [6]	4 / 15 [6]
Refrigerant Control	TX Valves	TX Valves	TX Valves	TX Valves
Drain Connection No./Size in. [mm]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]	1/1 [25.4]
Re-Heat Coil - Fin Type	Louvered	Louvered	Louvered	Louvered
Tube Type	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	0.709 [18]	0.709 [18]	0.709 [18]	0.709 [18]
Face Area sq. ft. [sq. m]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]	19.9 [1.85]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Outdoor Fan—Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]	6/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	19800 [9344]	19800 [9344]	19800 [9344]	19800 [9344]
No. Motors/HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP	6 at 1/3 HP
Motor RPM	1075	1075	1075	1075
Indoor Fan—Type	FC Centrifugal	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used/Diameter in. [mm]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]	2/18x9 [457x229]
Drive Type	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)	Belt (Adjustable)
No. Speeds	Multiple	Multiple	Multiple	Multiple
No. Motors	1	1	1	1
Motor HP	7 1/2	7 1/2	10	10
Motor RPM	1725	1725	1725	1725
Motor Frame Size	213	213	215	215
Filter—Type	Disposable	Disposable	Disposable	Disposable
Furnished	Yes	Yes	Yes	Yes
(No.) Size Recommended in. [mm x mm x mm]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]	(8)2x25x20 [51x635x508]
Refrigerant Charge Oz. (Sys. 1/Sys. 2) [g]	464/357 [13154/10121]	464/357 [13154/10121]	464/357 [13154/10121]	464/357 [13154/10121]
Weights				
Net Weights lbs. [kg]	2468 [1119]	2482 [1126]	2479 [1124]	2493 [1131]
Ship Weights lbs. [kg]	2594 [1177]	2608 [1183]	2605 [1182]	2619 [1188]

NOTES:

1. Cooling Performance is rated at 95° F ambient, 80° F entering dry bulb, 67° F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to 20% of nominal cfm. Units are certified in accordance with the Unitary Air Conditioner Equipment certification program, which is based on AHRI Standard 210/240 or 360.
2. EER and/or SEER are rated at AHRI conditions and in accordance with DOE test procedures.
3. Integrated Energy Efficiency Ratio is rated in accordance with AHRI Standard 210/240 or 340/360.
4. Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standard Institute standards. Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.
5. Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270.

II. INSTALLATION

A. GENERAL

1. INSTALLATION — Install this unit in accordance with The American National Standard Z223.1-latest edition booklet entitled “National Fuel Gas Code,” and the requirements or codes of the local utility or other authority having jurisdiction.

   Additional helpful publications available from the “National Fire Protection Association” are: NFPA-90A - Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B - Warm Air Heating and Air Conditioning Systems 1984.

   These publications are available from:

   National Fire Protection
   Association, Inc.
   1 Batterymarch Park
   Quincy, MA 02269-7471
   www.nfpa.org

2. PRE-INSTALLATION CHECK-POINTS — Before attempting any installation, carefully consider the following points:

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

IMPORTANT: Before operating unit, remove compressor shipping supports from the compressor base. Failure to remove supports will cause noise and vibration.

LOCATION CONSIDERATIONS

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

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

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

Several different types of protective coatings are offered in some areas. These coatings may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer.

The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

⚠ WARNING

DISCONNECT ALL POWER TO UNIT BEFORE STARTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH. REGULAR MAINTENANCE WILL REDUCE THE BUILDUP OF CONTAMINANTS AND HELP TO PROTECT THE UNIT’S FINISH.

⚠ WARNING

THESE UNITS ARE DESIGNED CERTIFIED FOR OUTDOOR INSTALLATION ONLY. INSTALLATION INSIDE ANY PART OF A STRUCTURE CAN RESULT IN INADEQUATE UNIT PERFORMANCE AS WELL AS PROPERTY DAMAGE. INSTALLATION INSIDE CAN ALSO CAUSE RECIRCULATION OF FLUE PRODUCTS INTO THE CONDITIONED SPACE RESULTING IN PERSONAL INJURY OR DEATH.

B. OUTSIDE INSTALLATION

(Typical outdoor slab installation is shown in Figure 9.)

1. Select a location where external water drainage cannot collect around unit.
2. Provide a level slab sufficiently high enough above grade to prevent surface water from entering the unit
3. Locate the unit to provide proper access for inspection and servicing as shown in Figure 12.
4. Locate unit where operating sounds will not disturb owner or neighbors.
5. Locate unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Do not locate unit in an area where excessive snow drifting may occur or accumulate.
6. Where snowfall is anticipated, the height of the unit above the ground level must be considered. Mount unit high enough to be above anticipated maximum area snowfall and to allow combustion air to enter the combustion air inlet.
7. Select an area which will keep the areas of the vent, air intake, and A/C condenser fins free and clear of obstructions such as weeds, shrubs, vines, snow, etc. Inform the user accordingly.

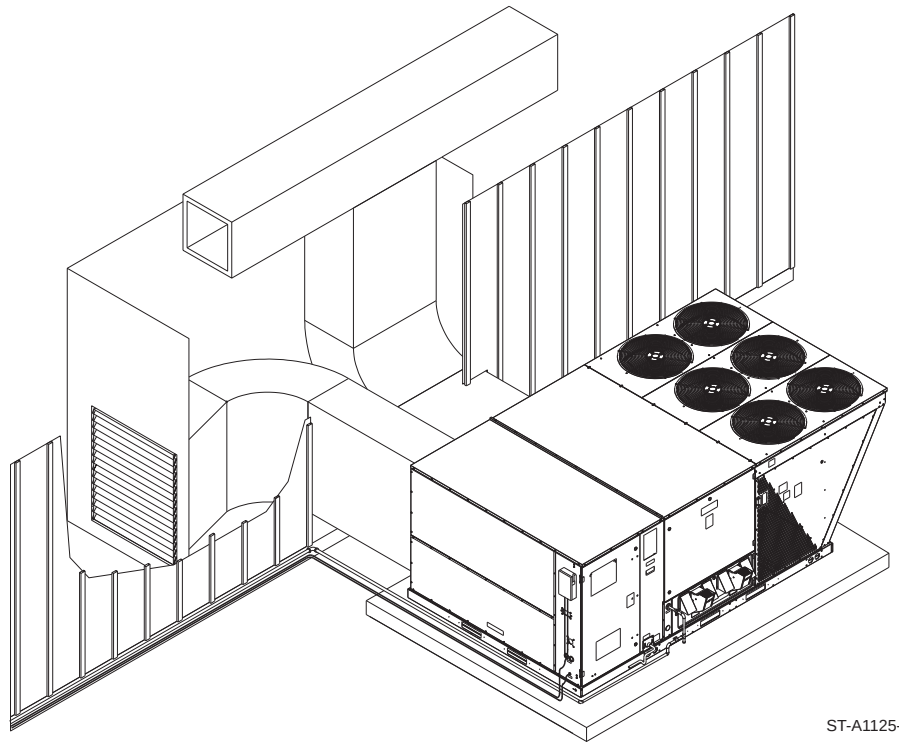
C. ATTACHING EXHAUST AND COMBUSTION AIR INLET HOODS

IMPORTANT: Do not operate this unit without the exhaust/combustion air inlet hood properly installed. These hoods are shipped in cartons in the blower compartment inside the unit and must be attached when the unit is installed. See Figure 4.

To attach exhaust/combustion air inlet hood:

1. Open blower access panel. For location of blower access panel, see Figure 3.
2. Remove exhaust/combustion air inlet hoods from the cartons, located inside the blower compartment.
3. Attach blower access panel.
4. Attach the combustion air inlet/exhaust hoods with screws. Reference Figure 4 for proper location. Screws are in carton with the hood.
5. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration or addition.

FIGURE 9
OUTSIDE SLAB INSTALLATION. CLOSET DISTRIBUTION SYSTEM. SLAB FLOOR CONSTRUCTION



D. COVER PANEL INSTALLATION / CONVERSION PROCEDURE

DOWNFLOW TO HORIZONTAL

1. Remove the screws and covers from the outside of the supply and return sections. See Figure 7.
2. Install the covers over the bottom supply and return openings, painted side up, inserting the ***leading flange under the bracket provided.*** Place the ***back flange to top of the front bracket provided.*** See Figures 10 and 11.
3. Secure the return and supply cover to front bracket with two (2) screws.

E. FILTER REPLACEMENT

This unit is provided with 8 – 20” X 25” x 2” disposable filters. When replacing filters, ensure they are inserted fully to the back to prevent bypass. See Figure 5.

Recommended supplier of this filter is Glassfloss Industries, Inc. or

AAF International
215 Central Avenue
P.O. Box 35690
Louisville, KY 40232
Phone: 1-800-501-3146
Part #: 54-42541-04 (20" x 25" x 2")

FIGURE 10
HORIZONTAL CONVERSION DETAIL

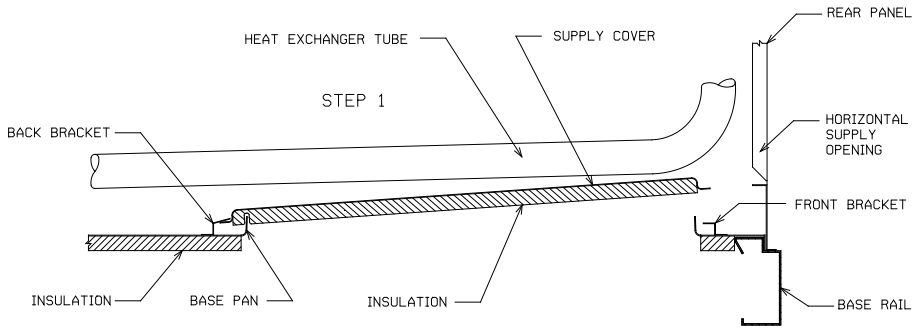
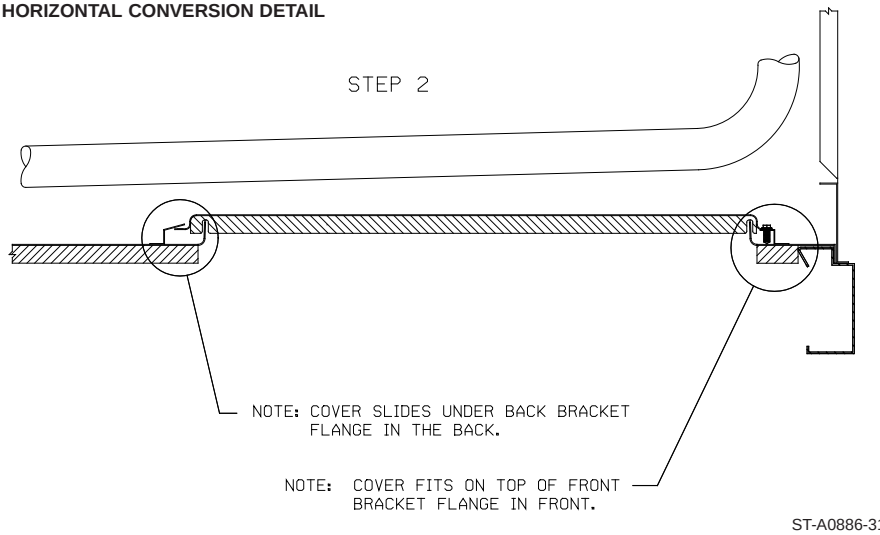


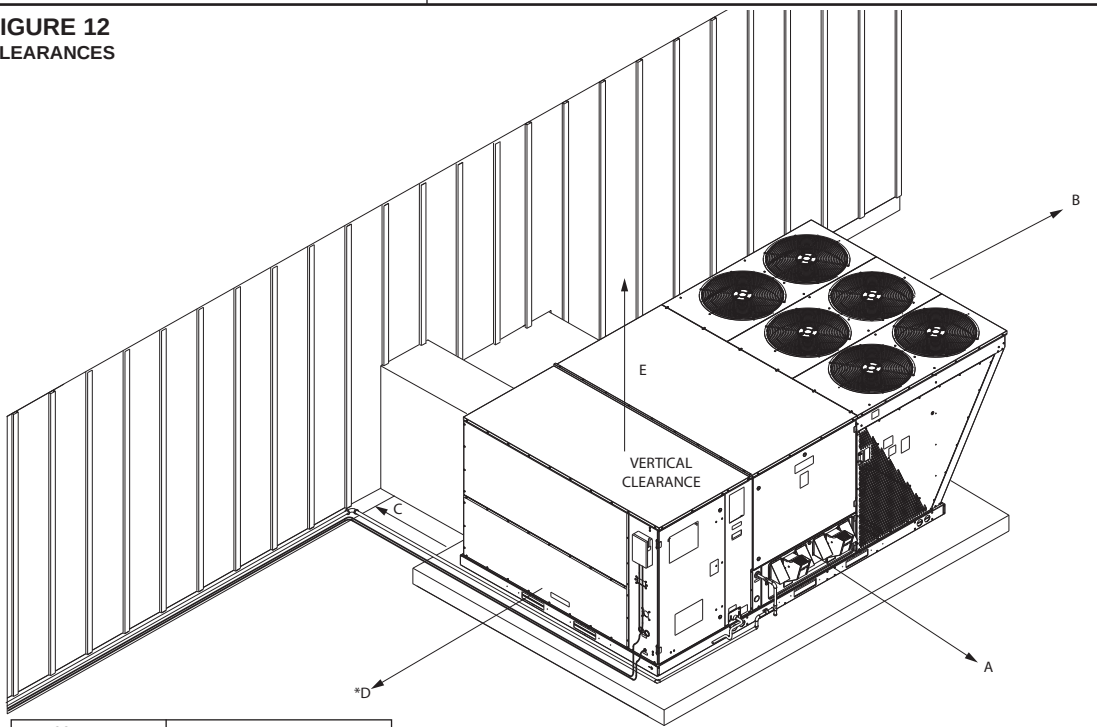
FIGURE 11
HORIZONTAL CONVERSION DETAIL



E. CLEARANCES

The following minimum clearances must be observed for proper unit performance and serviceability. Reference Figure 12.

FIGURE 12
CLEARANCES

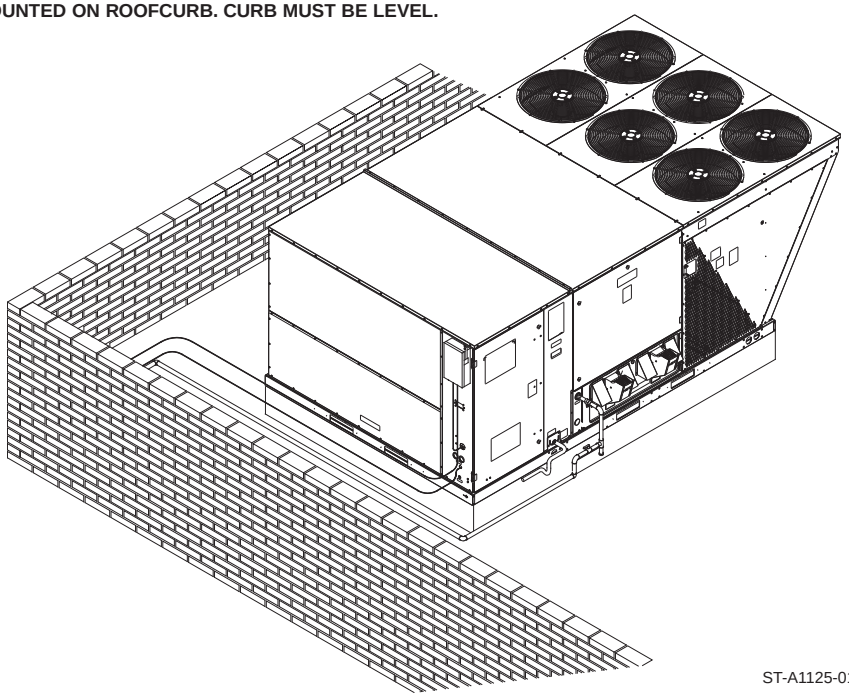


RECOMMENDED CLEARANCE	LOCATION
80"	A – FRONT
18"	B – CONDENSER COIL
18"/42"	+C – DUCT SIDE
18"/48"	*D – EVAPORATOR END
18"	E – ABOVE
* WITHOUT ECONOMIZER/48" WITH ECONOMIZER	

ST-A1125-28

+ WITHOUT HORIZONTAL ECONOMIZER/42" WITH HORIZONTAL ECONOMIZER

FIGURE 13A
FLAT ROOFTOP INSTALLATION, ATTIC OR DROP CEILING DISTRIBUTING SYSTEM. MOUNTED ON ROOFCURB. CURB MUST BE LEVEL.



ST-A1125-01

G. ROOFTOP INSTALLATION

1. Before locating the unit on the roof, make sure that the roof structure is adequate to support the weight involved. (See Electrical & Physical Tables in this manual.) **THIS IS VERY IMPORTANT AND THE INSTALLER'S RESPONSIBILITY.**
2. For rigging and roofcurb details, see Figures 14, 15 and 16.
3. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

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

H. DUCTING

The installing contractor should fabricate ductwork in accordance with local codes. Use industry manuals as a guide when sizing and designing the duct system. Contact Air Conditioning Contractors of America, 2800 Shirlington Road, Suite 300, Arlington, VA 22206, http:/www.acca.org.

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

On ductwork exposed to outside temperature and humidity, use a minimum of 2" of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2" of insulation. ½" to 1" thick insulation is usually sufficient for ductwork inside the air conditioned space.

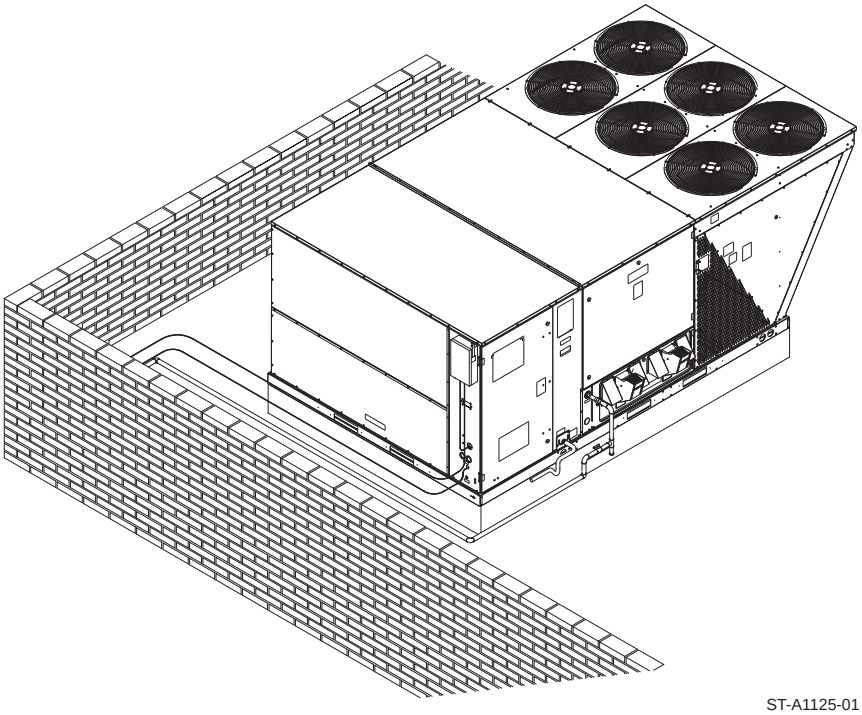
Provide balancing dampers for each branch duct in the supply system. Properly support ductwork from the structure.

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

⚠ WARNING

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN DUCTWORK TO ANY OTHER HEAT PRODUCING DEVICE SUCH AS FIREPLACE INSERT, STOVE, ETC. UNAUTHORIZED USE OF SUCH DEVICES MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

FIGURE 13B
FLAT ROOFTOP INSTALLATION, ATTIC OR DROP CEILING DISTRIBUTING SYSTEM. MOUNTED ON ROOFCURB. CURB MUST BE LEVEL.



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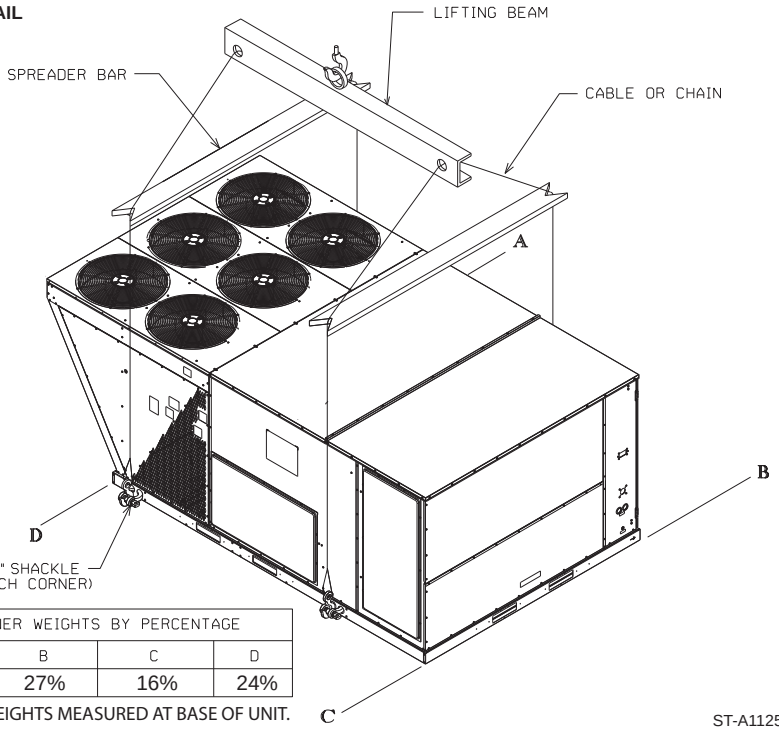
RETURN AIR

⚠ WARNING

NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. ALL OTHER DUCT JOINTS MUST BE SECURED WITH APPROVED CONNECTIONS AND SEALED AIRTIGHT.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

FIGURE 14
LIFTING DETAIL

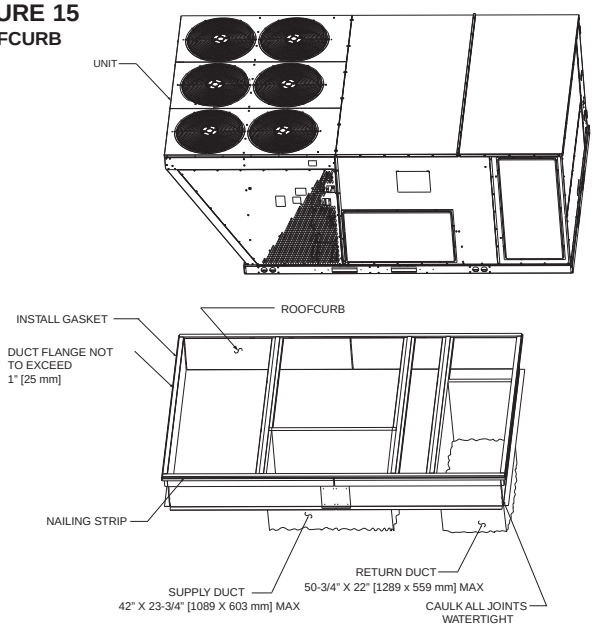


CORNER WEIGHTS BY PERCENTAGE			
A	B	C	D
32%	27%	16%	24%

CORNER WEIGHTS MEASURED AT BASE OF UNIT.

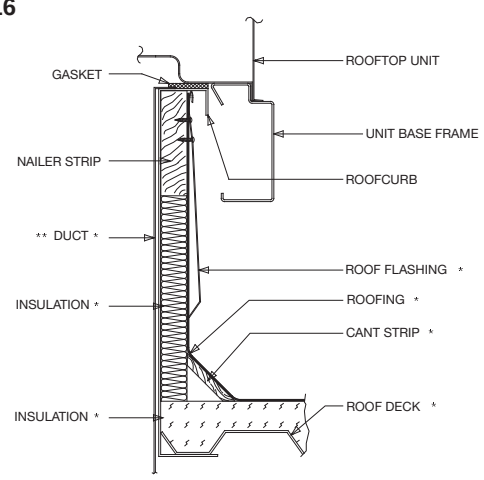
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FIGURE 15
ROOFCURB



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FIGURE 16
ROOFCURB



* BY CONTRACTOR

** FOR INSTALLATION OF DUCT AS SHOWN, USE RECOMMENDED DUCT SIZES FROM ROOFCURB INSTALLATION INSTRUCTIONS. FOR DUCT FLANGE ATTACHMENT TO UNIT, SEE UNIT INSTALLATION INSTRUCTIONS FOR RECOMMENDED DUCT SIZES.

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III. GAS SUPPLY, CONDENSATE DRAIN AND PIPING

A. GAS CONNECTION

IMPORTANT: Connect this unit only to gas supplied by a commercial utility.

1. Install gas piping in accordance with local codes and regulations of the local utility company. In the absence of local codes, the installation must conform to the specifications of the National Fuel Gas Code, ANSI Z223.1 - latest edition.

   NOTE: The use of flexible gas connectors is not permitted.

2. Connect the gas line to the gas valve supplied with unit. Routing can be through the gas pipe opening shown in Figures 9 or through the base as shown in Figure 21.
3. Size the gas line to the furnace adequate enough to prevent undue pressure drop. Do not use less than 1/2" pipes.
4. Install a drip leg or sediment trap in the gas supply line as close to the unit as possible.
5. Install an outside ground joint union to connect the gas supply to the control assembly at the burner tray.
6. Gas valves have been factory installed. Install a manual gas valve where local codes specify a shut-off valve outside the unit casing. (See Figure 17 and Figure 21.)
7. Make sure piping is tight. **A pipe compound resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.**
8. IMPORTANT: any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

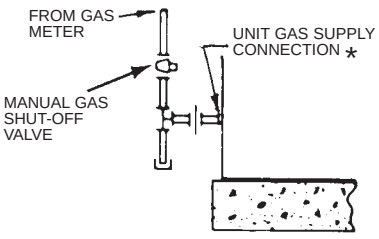
TABLE 1
GAS PIPE CAPACITY TABLE (CU. FT./HR. NATURAL GAS @ 0.30 IWC [INCHES OF WATER COLUMN] PRESSURE DROP)

Nominal Iron Pipe Size, Inches	Equivalent Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
1/2	132	92	73	63	56	50	46	43
3/4	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1 1/4	1,050	730	590	500	440	400	370	350
1 1/2	1,600	1,100	890	760	670	610	560	530

IMPORTANT: *Disconnect the furnace and its individual shutoff valve from the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 pound per square inch gauge or isolate the system from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of this gas supply system at pressures equal to or less than 1/2 PSIG.*

FIGURE 17
SUGGESTED GAS PIPING

ROOF OR GROUND LEVEL INSTALLATION



*Factory supplied grommet must be utilized.

⚠ WARNING

DO NOT USE AN OPEN FLAME TO CHECK FOR LEAKS. THE USE OF AN OPEN FLAME CAN RESULT IN FIRE, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

TO CHECK FOR GAS LEAKS, USE A SOAP AND WATER SOLUTION OR OTHER APPROVED METHOD. DO NOT USE AN OPEN FLAME.

IMPORTANT: *Check the rating plate to make certain the appliance is equipped to burn the type of gas supplied. Care should be taken after installation of this equipment that the gas control valve not be subjected to high gas supply line pressure.*

In making gas connections, avoid strains as they may damage the gas controls. A backup wrench is required to be used on the valve to avoid damage. Do not overtighten the connection.

The capacities of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas) are shown in Table 1.

After determining the pipe length, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT^3) may be determined by consulting the local natural gas utility or the L.P. gas supplier.

B. LP CONVERSION

⚠ WARNING

THIS UNIT IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

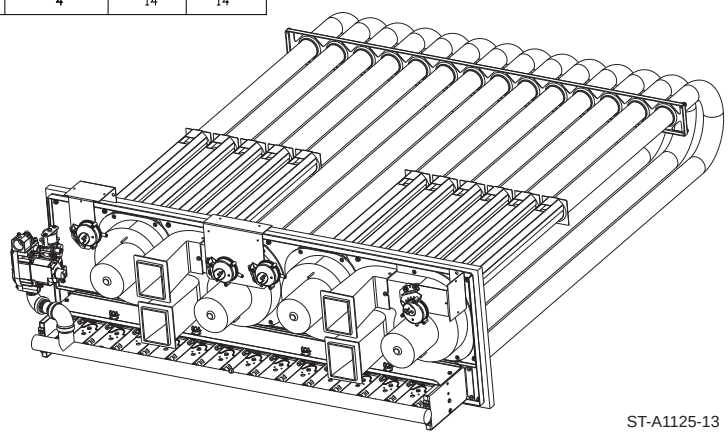
Convert the unit to use liquefied petroleum (LP) gas by replacing with the stem/spring assembly supplied in the conversion kit. The LP gas valve maintains the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit.

See Figure 18A for component locations.

NOTE: Order the correct LP conversion kit from the furnace manufacturer. ***See Conversion Kit Index shipped with unit for proper LP kit number. Furnace conversion to LP gas must be performed by a qualified technician.***

FIGURE 18A
HEAT EXCHANGER COMPONENT IDENTIFICATION

BTUH	NO. OF INDUCERS	NO. OF PRESSURE SWTICHES	NO. OF TUBES	NO. OF BURNERS
250,000	2	2	10	10
300,000	3	3	12	12
350,000	3	3	14	14
400,000	4	4	14	14



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FIGURE 18B
HONEYWELL VR8305Q4120 TWO STAGE GAS VALVE

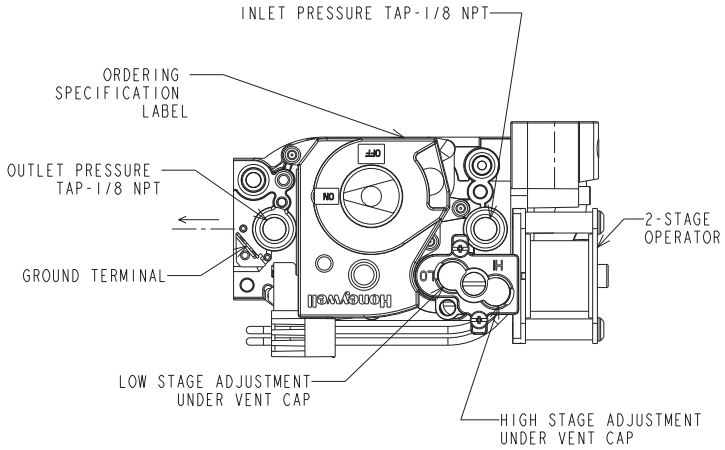


TABLE 2
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	393	315	267	237	217	196	182	173	162	146	132
1	1,071	732	590	504	448	409	378	346	322	307	275	252
1-1/4	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511
1-1/2	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787
2	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4" IPS required.

C. ADJUSTING OR CHECKING FURNACE INPUT

– Natural Gas Line Pressure 5" - 10.5" W.C.
– LP Gas Line Pressure 11" - 13" W.C.

– Natural Gas Manifold Pressure 3.5" W.C
– LP Gas Manifold Pressure - 10" W.C.

Supply and manifold pressure taps are located on the gas valve body 1/8" N.P.T. and on the manifold. See Figure 18B.

Use a properly calibrated manometer gauge for accurate gas pressure readings.

Only small variations in the gas flow should be made by means of the pressure regulator adjustment. Furnaces functioning on LP gas must be set by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the gas control valve.

To adjust the pressure regulator, remove the regulator vent cover and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. See Figure 18B. **Then replace the regulator vent cover securely.**

Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off the manual main gas valve and remove the gas manifold.

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), see conversion kit index 92-21519-XX for derating and orifice spud sizes.

Check of input is important to prevent over-firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following table or formula to determine input rate.

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Heating Value of Gas (BTU/Cu. Ft.) x 3600}}{\text{Time in Seconds (for 1 Cu. Ft.) of Gas}}$$

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.

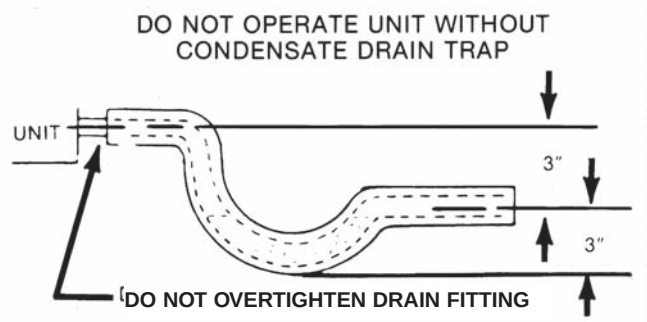
IMPORTANT NOTE FOR ALTITUDES ABOVE 2,000 FEET (610 METERS): The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2,000 feet in the USA or Canada, or for elevations of 2,000 - 4,500 feet (610 -1,373 meters) in Canada if the unit has been derated at the factory. For elevations above 2,000 feet (610 meters) **IN THE USA ONLY** (see ANSI-Z223.1), the burner orifices must be sized to reduce the input 4% for each 1,000 feet (305 meters) above sea level.

NOTICE: DERATING OF THE HEATING INPUT FOR HIGH ALTITUDE IN THE FIELD IS UNLAWFUL IN CANADA (REFER TO CAN/CGA 2.17). UNITS INSTALLED IN ALTITUDES GREATER THAN 2,000 FEET (610 METERS) MUST BE SHIPPED FROM THE FACTORY OR FROM A FACTORY AUTHORIZED CONVERSION STATION WITH THE HEATING INPUT DERATED BY 10% SO AS TO OPERATE PROPERLY IN ALTITUDES FROM 2,000 - 4,500 FEET (610 - 1,373 METERS).

TABLE 3

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS											
INPUT BTU/HR	METER SIZE CU. FT.	HEATING VALUE OF GAS BTU PER CU. FT.									
		900		1000		1040		1100		2500	
		MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.
250,000	ONE		13.0		14.4		15.0		15.8		36.0
	TEN	2	10	2	24	2	30	2	38	6	0
300,000	ONE		10.8		12.0		12.5		13.2		30.0
	TEN	1	48	2	0	2	5	2	12	5	0
350,000	ONE		9.3		10.3		10.7		11.3		25.7
	TEN	1	33	1	43	1	47	1	53	4	17
400,000	ONE		8.1		9.0		9.36		9.9		22.5
	TEN	1	21	1	30	1	36	1	39	3	45

FIGURE 19
CONDENSATE DRAIN



D. CONDENSATE DRAIN

IMPORTANT: Install a condensate trap to ensure proper condensate drainage. See Figure 19.

The condensate drain pan has a threaded female 1 inch NPT (11.5 TPI) connection. Consult local codes or ordinances for specific requirements of condensate drain piping and disposal.

- To use the removable drain pan feature of this unit, some of the condensate line joints should assembled for easy removal and cleaning.
- Use a thin layer of Teflon tape or paste on drain pan connections and install only hand tight.
- Do not over tighten drain pan connections as damage to the drain pan may occur.
- Drain line MUST NOT block service access panels.
- Drain line must be no smaller than drain pan outlet and adequately sized to accommodate the condensate discharge from the unit.
- Drain line should slope away from unit a minimum of 1/8” per foot to ensure proper drainage.
- Drain line must be routed to an acceptable drain or outdoors in accordance with local codes.
- Do not connect condensate drain line to a closed sewer pipe.
- Drain line may need insulation or freeze protection in certain applications.

⚠ WARNING

TURN OFF THE MAIN ELECTRICAL POWER AT THE BRANCH CIRCUIT DISCONNECT CLOSEST TO THE UNIT BEFORE ATTEMPTING ANY WIRING. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

IV. WIRING

A. POWER SUPPLY

1. **All wiring should be made in accordance with the National Electrical Code.** Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to

the unit's RATED VOLTAGE REQUIREMENT. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C., C.E.C. or local codes.

2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On three phase units, phases must be balanced within 3%.
3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 3 using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable from the unit disconnect to unit.
4. For through the base wiring entry reference **Figure 21.** All fittings and conduit are field supplied for this application. Reference the chart with **Figure 21** for proper hole and conduit size.

TABLE 4

AWG Copper Wire Size	AWG Aluminum Wire Size	Connector Type and Size (or equivalent)	
#12	#10	T & B Wire Nut	PT2
#10	# 8	T & B Wire Nut	PT3
# 8	# 6	Sherman Split Bolt	TSP6
# 6	# 4	Sherman Split Bolt	TSP4
# 4	# 2	Sherman Split Bolt	TSP2

NOTES:

1. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from this table using the circuit ampacity found on the unit rating plate. From the unit disconnect to unit, the smallest wire size allowable in Table 4 may be used, as the disconnect must be in sight of the unit.
2. Wire size based on 75°C rated wire insulation for 1% voltage drop.
3. For more than 3 conductors in a raceway or cable, see the N.E.C. (C.E.C. in Canada) for derating the ampacity of each conductor.

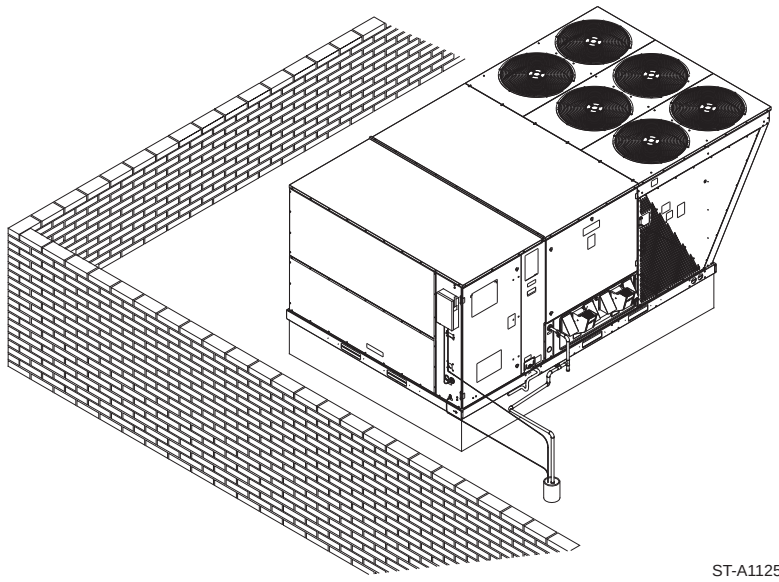
IMPORTANT: THIS UNIT IS APPROVED FOR USE WITH COPPER CONDUCTORS <u>ONLY</u> CONNECTED TO UNIT CONTACTOR.

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

Special instructions apply for power wiring with aluminum conductors: Warranty is void if connections are not made per instructions.

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

FIGURE 20
RECOMMENDED BRANCH CIRCUIT DISCONNECT LOCATION



Select the equivalent aluminum wire size from the tabulation below:

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

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

B. HOOK-UP

To wire unit, refer to the following hook-up diagram.

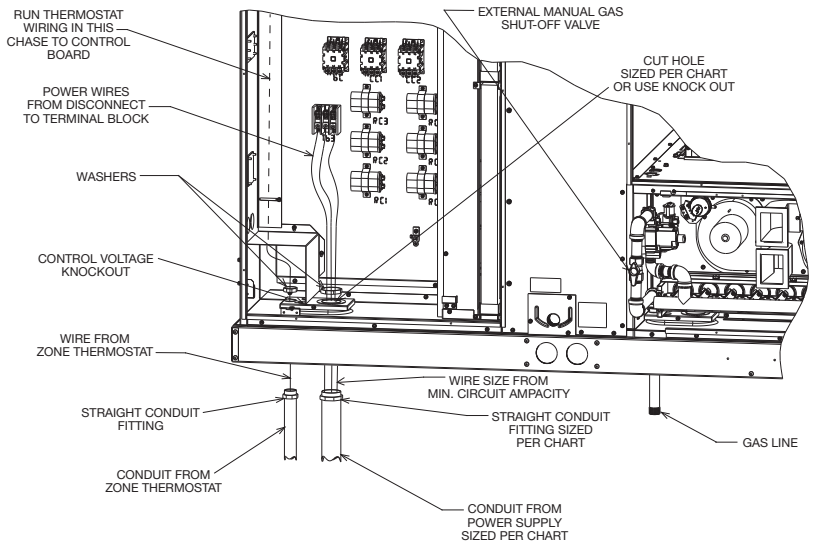
Refer to Figures 2, 7 and 21 for location of wiring entrances.

Wiring to be done in the field between the unit and devices not attached to the unit, or

TABLE 5

UNIT MCA	COPPER WIRE SIZE—AWG					
	SUPPLY WIRE LENGTH—FEET					
	50	100	150	200	250	300
20	10	8	6	4	4	4
25	10	8	6	4	4	3
30	8	6	4	4	3	2
35	8	6	4	3	2	1
40	8	6	4	3	2	1
45	8	4	3	2	1	1/0
50	6	4	3	2	1	1/0
60	6	4	2	1	1/0	2/0
70	4	3	2	1/0	2/0	3/0
80	4	3	1	1/0	2/0	3/0
90	3	2	1/0	2/0	3/0	4/0
100	3	2	1/0	2/0	3/0	4/0
110	2	1	2/0	3/0	4/0	250
125	1	1	2/0	3/0	4/0	250
150	1/0	1/0	3/0	4/0	250	300
175	2/0	2/0	4/0	250	300	350

FIGURE 21
BASE ENTRY LOCATIONS

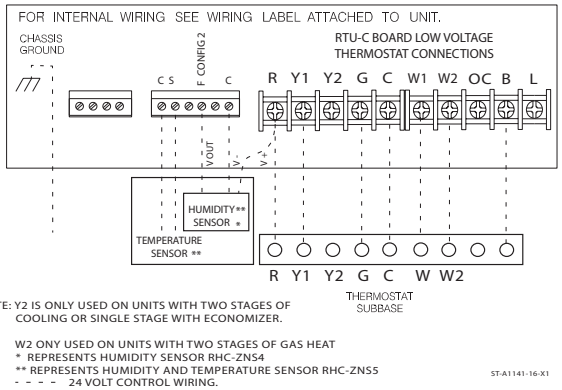


ST-A1125-10

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

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

FIGURE 22
TYPICAL THERMOSTAT WIRING



between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise (35°C)] when installed in accordance with the manufacturer's instructions.

C. INTERNAL WIRING

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

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

D. THERMOSTAT/HUMIDITY SENSOR

The Humididry™ System requires both a thermostat (or temperature sensor) and a humidity sensor. The room thermostat must be compatible with the spark ignition control on the unit. Generally, all thermostats that are not of the "current robbing" type are compatible with the integrated furnace control. The low voltage wiring should be sized as shown in Table 6.

Install the room thermostat and humidity sensor in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires through control entry opening through the thermostat wiring chase on the unit (Figure 2 or Figure 21) and connect to the low voltage thermostat connections (see wiring diagram). Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for "heater" selection or adjustment.

See Thermostat Specification Sheet for recommended thermostats. See Section VII for humidity sensor information.

TABLE 6

FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS							
		SOLID COPPER WIRE - AWG.					
Thermostat Load - Amps	3.0	16	14	12	10	10	10
	2.5	16	14	12	12	12	10
	2.0	18	16	14	12	12	10
		50	100	150	200	250	300
		Length of Run – Feet (1)					

(1) The total wire length is the distance from the unit to the thermostat and back to the unit.

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

V. FURNACE SECTION CONTROLS AND IGNITION SYSTEM

NORMAL FURNACE OPERATING SEQUENCE

This unit is equipped with a two stage integrated direct spark ignition control.

NORMAL HEAT MODE

A. Call For First Stage (low fire) Only:

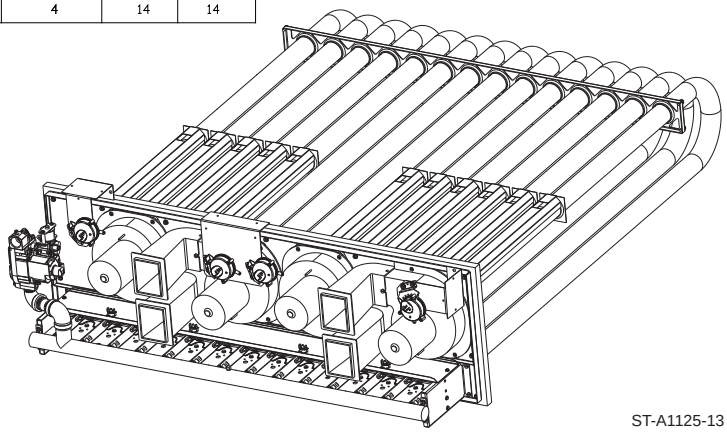
1. Zone thermostat contacts close, a call for first stage (low fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.
5. Control checks each low-fire pressure switch for closure.
6. If each low-fire pressure switch is closed, the control starts a 30 second prepurge. If either low-fire pressure switch is still open after 180 seconds, the high-fire inducers will be energized until closure.
7. After prepurge timeout, control initiates spark for 2 seconds minimum, 7 second maximum ignition trial, initiates 45 second, second stage (high fire) warm up timing.
8. Control detects flame, de-energizes spark and initiates 45 second delay on blower timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After the 45 second second stage warmup period control checks thermostat input. If only W1 is called for, W2 is de-energized and the control starts a 5 second off delay on the W2 inducer.
11. After fixed 5 seconds the W2 inducer is de-energized.
12. Control enters normal operating loop where all inputs are continuously checked.

B. Call For Second Stage, After First Stage Established; Starting from A.11:

1. If a call for second stage (high fire) is initiated after a call for first stage heat is established, the control energizes the W2 inducer assures the high-fire pressure

FIGURE 23

BTUH	NO. OF INDUCERS	NO. OF PRESSURE SWTICHES	NO. OF TUBES	NO. OF BURNERS
250,000	2	2	10	10
300,000	3	3	12	12
350,000	3	3	14	14
400,000	4	4	14	14



ST-A1125-13

switch is closed and energizes the second stage of the gas valve.
2. Control enters normal operating loop where all inputs are continuously checked.

C. Second Stage Satisfied; First Stage Still Called For; Starting From B.2:

1. Once the call for second stage is satisfied, the control starts a 30 second off delay on W2 inducer and reduces the gas valve to first stage.
2. Control enters normal operating loop where all inputs are continuously checked.

D. First Stage Satisfied:

1. Zone thermostat is satisfied.
2. Control de-energizes gas valve.
3. Control senses loss of flame.
4. Control initiates 5 second inducer postpurge and 90 second indoor blower delay off.
5. Control de-energizes inducer blower.
6. Control de-energizes indoor blower.
7. Control in the stand by mode with solid red LED.

E. First Stage and Second Stage Called Simultaneously:

1. Zone thermostat contacts close, a call for first stage (low fire) and second stage (high fire) heat is initiated.
2. Control runs self check.
3. Control checks the high-limit switch for normally closed contacts, each pressure switch for normally open contacts, and all flame rollout switches for continuity.
4. Control energizes each low-fire inducer.
5. Control checks each pressure switch for closure.
6. If each low-fire pressure switch is closed, the control starts a 30 second prepurge. If either switch is still open after 180 seconds, the high-fire inducers will be energized until closure.
7. After prepurge timeout, control initiates spark for 2 seconds minimum, 7 second maximum ignition trial, and initiates 45 second second stage warm up timing.
8. Control detects flame, de-energizes spark and starts a 45 second indoor blower delay on timing.
9. After a fixed 45 seconds indoor blower delay on, the control energizes the indoor blower.
10. After the 45 seconds second stage warmup period control checks the thermostat input. If W1 and W2 is present control enters normal operating loop where all inputs are continuously checked.

F. First Stage and Second Stage Removed Simultaneously:

1. Upon a loss of W1 and W2 the gas valve is de-energized.
2. Upon a loss of flame, each inducer will complete a 5 second postpurge and the indoor blower will complete a 90 second delay off.
3. Control in the stand by mode with solid red LED.

The integrated control is a four-ignition system.

After a total of four cycles without sensing main burner flame, the system goes into a 100% lockout mode. After one hour, the ignition control repeats the prepurge and ignition cycles for 4 tries and then go into 100% lockout mode again. It continues this sequence of cycles and lockout each hour until ignition is successful or power is interrupted. During the lockout mode, neither the ignitor or gas valve will be energized until the system is reset by turning the thermostat to the “OFF” position or interrupting the electrical power to the unit for 3 seconds or longer. The induced draft blower and main burner will shut off when the thermostat is satisfied.

The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the “ON” position.

The integrated furnace control is equipped with diagnostic LED. The LED is lit continuously when there is power to the control, with or without a call for heat. If the LED is not lit, there is either no power to the control or there is an internal component failure within the control, and the control should be replaced.

If the control detects the following failures, the LED will flash on for approximately 1/4 second, then off for 3/4 second for designated failure detections.

1 Flash: Failed to detect flame within the four tries for ignition.

2 Flash: Pressure switch or induced draft blower problem detected.

⚠ WARNING

DO NOT ATTEMPT TO MANUALLY LIGHT THIS FURNACE WITH A MATCH OR ANY OPEN FLAME. ATTEMPTING TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

3 Flash: High limit or auxiliary limit open.

4 Flash: Flame sensed and gas valve not energized or flame sensed with no “W” signal.

5 Flash: Overtemperature switch open.

OPERATING INSTRUCTIONS

This appliance is equipped with integrated furnace control. This device lights the main burners each time the room thermostat (closes) calls for heat. See operating instructions on the back of the furnace/controls access panel.

TO START THE FURNACE

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the appliance.
3. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Remove control door.
5. Move control knob to the “OFF” position. Turn the knob by hand only, do not use any kind of tool.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow B in the safety information on the Operating Instructions located on the back of the controls/access panel. If you don’t smell gas, go to the next step.
7. Move the gas control knob from “OFF” position to “ON” position. Operate this appliance with the gas control knob in the “ON” position only. Do not use the gas control knob as a means for throttling the burner input rate.
8. Replace the control door.
9. Turn on all electric power to the appliance.
10. Set the thermostat to the desired setting.
11. If the appliance will not operate, follow the instructions below on how to shut down the furnace.

⚠ WARNING

THE SPARK IGNITOR AND IGNITION LEAD FROM THE IGNITION CONTROL ARE HIGH VOLTAGE. KEEP HANDS OR TOOLS AWAY TO PREVENT ELECTRICAL SHOCK. SHUT OFF ELECTRICAL POWER BEFORE SERVICING ANY OF THE CONTROLS. FAILURE TO ADHERE TO THIS WARNING CAN RESULT IN PERSONAL INJURY OR DEATH.

The initial start-up on a new installation may require the control system to be energized for some time until air has bled through the system and fuel gas is available at the burners.

TO SHUT DOWN FURNACE

1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control door.
4. Move control knob to the “OFF” position.
5. Replace control door.

BURNERS

Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

⚠ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN RESULT IN AN EXPLOSION OR FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH!

MANUAL RESET OVERTEMPERATURE CONTROL

Four manual reset overtemperature controls are located on the burner shield. These devices senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

⚠ WARNING

DO NOT JUMPER THIS DEVICE! DO NOT RESET THE OVERTEMPERATURE CONTROL WITHOUT TAKING CORRECTIVE ACTION TO ASSURE THAT AN ADEQUATE SUPPLY OF COMBUSTION AIR IS MAINTAINED UNDER ALL CONDITIONS OF OPERATION. FAILURE TO DO SO CAN RESULT IN CARBON MONOXIDE POISONING OR DEATH. REPLACE THIS CONTROL ONLY WITH THE IDENTICAL REPLACEMENT PART.

PRESSURE SWITCH

This furnace has two sets of pressure switches for sensing a blocked exhaust or a failed induced draft blower. They are normally open and close when the induced draft blower starts, indicating air flow through the combustion chamber.

LIMIT CONTROL

The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature.

⚠ WARNING

DO NOT JUMPER THIS DEVICE! DOING SO CAN CAUSE A FIRE OR EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IMPORTANT: *Replace this control only with the identical replacement part.*

VI. COOLING SECTION OPERATION

COOLING MODE

A. **Call for first stage cooling**

1. Zone thermostat contacts close and a call for cooling is initiated.
2. Inputs ‘Y1’ and ‘G’ to the control are energized.
3. Control senses ‘Y1’ and ‘G’. After 1 sec. delay, control energizes indoor blower and first stage compressor.
4. Control enters normal operating loop where all inputs are continuously checked.
5. Zone thermostat is satisfied.
6. Control de-energizes indoor blower relay after 80 second indoor blower delay off.
7. Control in the stand by mode with solid red LED.

B. **Call for second stage cooling. After first stage cooling established: starting from A4.**

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

C. **Second stage satisfied: first stage still called for: starting from B2.**

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

D. **First stage and second stage called simultaneously.**

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

E. **First stage and second stage removed simultaneously.**

1. Upon a loss of Y1 and Y2 each compressor is de-energized. Control de-energizes indoor blower relay after 80 second indoor blower delay off.
2. Control in the stand by mode with solid red LED.

CONTINUOUS FAN MODE

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

VII. HUMIDIDRY™ SYSTEM

The HumidiDry™ system controls both cooling and humidity loads. In addition to two stages of cooling, the unit includes two stages of reheat. A temperature sensor or thermostat relates a low cooling demand (Y1) or high cooling demand (Y2) to the RTU-C. A separate humidity sensor sends the actual indoor relative humidity to the RTU-C via a 0-10 VDC signal. The RTU-C considers a relative humidity level 2%-5% above the humidity setpoint as a "low humidity demand" (H1). The RTU-C considers a relative humidity level greater than 5% above the humidity setpoint as a "high humidity demand" (H2). The RTU-C determines the unit mode of operation based on the Y1, Y2, H1 and H2 (Table A). Low reheat is only initiated when there is a humidity call (H1 or H2) and no cooling call (Y1 or Y2). In this mode the unit provides essentially "neutral air" (supply air is within +1°F and -5°F of return air temperature). High reheat is only used when there is a high humidity demand (H2) with a low cooling demand (Y1).

See RTU-C I&O manual for reheat unit setup and for thermostat/sensor combinations.

HUMIDITY SENSOR

An indoor relative humidity sensor (not included with the unit) is required for reheat operation. Available accessory Humidity sensor models are: RHC-ZNS4 (Room Relative Humidity Sensor – for use with a standard thermostat) and RHC-ZNS5 (Room Temperature and Relative Humidity Sensor – for use with a BAS system). Mount sensor per thermostat/humidity sensor section requirements. See wiring diagram (Figure 22).

REFRIGERANT SOLENOID VALVES

The reheat refrigerant system is part of System 1 only. Three refrigerant solenoid valves (discharge, liquid and reheat) are used to change operation from Cooling Mode to Reheat Mode. The Discharge Solenoid Valve (DSV) is located in the outdoor section (front side of unit) and is a Normally Closed (N.C.) valve. The Liquid Solenoid Valve (LSV) is located in the liquid line in the blower section and is a Normally Open (N.O.) valve. The Reheat Solenoid Valve (RSV) is near the bottom of the reheat coil (between the evaporator coil and the blower) and is normally open.

TABLE A

Two Stage HumidiDry™ – Modes of Operation				
Mode	**Compressor 1**	**Compressor 2**	**Fan**	**Notes**
High Cool	Cool	Cool	High	Operates with (Y2) call, ignores (H1/H2)
High Reheat	Reheat	Cool	High	Operates with (Y1 & Y2)
Low Reheat	Reheat	Off	Low	Operates with (H1 only) or (H2 only)
Low Cool	Cool	Off	Low	Operates with (Y1) or (Y1 & H1), Factory set point
Notes Definitions:				
Y1	Single stage cooling operation			
Y2	Two stage cooling operation			
H1	Space is above humidity set point by more than 2% and less than or equal to 5%.			
H2	Space is above humidity set point by more than 5%.			

OPERATION

During the Cooling mode the RSV is the only valve energized (closed position), LSV is open, DSV is closed. The refrigeration cycle is standard cooling, reheat coil is bypassed.

System 2 operates during High Cooling or High Reheat modes but is not part of the reheat circuit (always operates in standard cooling).

During Low Reheat or High Reheat modes the LSV is energized (closed position), DSV is energized (open position), RHV is open. Some hot gas bypasses the condenser coil and creates a warm two phase mix that enters the reheat coil. See Table A for Modes of Operation including compressor operation, fan speed, thermostat / humidistat calls for each mode. See Blower VFD section (above) for VFD operation.

VIII. VARIABLE FREQUENCY DRIVE (VFD)

No adjustments of the VFD are required for installation or operation of this unit.

Location: Control Section (front left) of the unit.

VFD MODEL

Schneider Altivar 212 (factory programmed).

REPLACEMENT

The VFD is horsepower and voltage specific therefore; replacement must be the same model as the existing. A preprogrammed VFD is recommended and available from ProStock. A non-programmed Schneider Altivar 212 may be used but must be programmed exactly per the included VFD programming guide for safe and proper function.

OPERATION

The purpose of the VFD is to allow low airflow in Fan Only (G), Low Reheat and First Stage Cooling (Y1) operation of a two stage unit. Unit air balancing should be performed at High Airflow (100% at RTU-C, 60Hz at VFD) by adjusting the blower motor sheave. High Airflow always occurs during a W1, W2, or Y2 call. For air balancing, without heating or cooling, the fan only speed can be temporarily increased to 100% by adjustment through the RTU-C keypad. To meet ASHRAE 90.1-2010 and for best performance, First Stage Cool and Fan Only speeds are factory set at 50% airflow (30 Hz at VFD). Both of these speeds are independently adjustable at the RTU-C. The VFD display will indicate an equivalent value in Hz (i.e. Low Cool adjusted to 60% at RTU-C will display as 36Hz at the VFD). A 20 second (adjustable at the VFD) ramp-up or ramp-down is used whenever the blower speed is increased or decreased. Low speed blower operation first ramps to 75%, to close fan proving switch, before ramping to the desired speed. Since the VFD operates on 24VDC control voltage, a blower relay (with 24VAC across the coil) is used to turn the VFD on. Blower speeds are changed via Modbus communication from the RTU-C.

XIX. OUTDOOR FAN MOTOR CONTROLLER (OFMC)

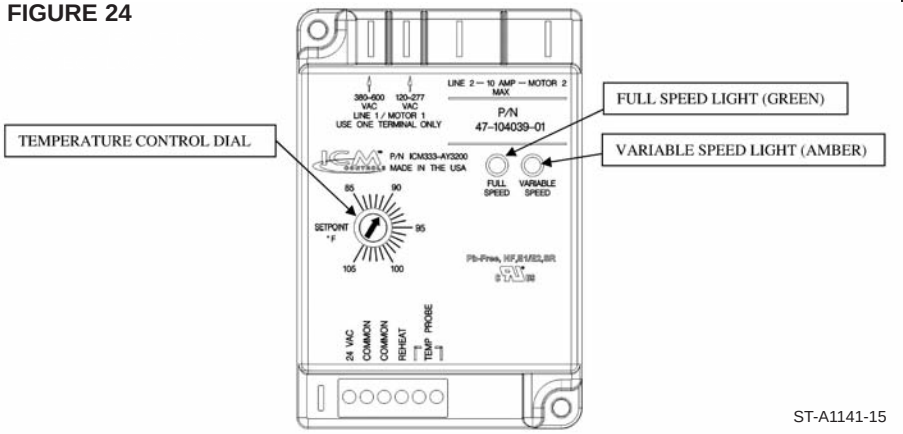
Location: Control Section (front left) of the unit.

During Low Reheat Mode the OFMC slows the outdoor fans to increase the discharge pressure/temperature to maintain an optimized amount of reheat required to provide neutral air to the occupied space. The OFMC is located in the control box section. On 15-25 ton units the OFMC slows fans during both Low and High Reheat Modes (circuit 1 fans only). The factory setting for the outdoor fan motor controller is unit specific (Table B). The setpoint temperature will provide neutral air +1 to-5°F from the entering air temperature (example if the entering or return air temperature is 75° F the leaving or supply air temperature will be 76° to 70°F during the reheat mode. If field adjustment is required to raise or lower the leaving air temperature, this may be accomplish by turning the temperature control dial on the OFMC (Figure 24). Turning the dial to a higher temperature setting will increase the leaving or supply air temperature and turning the dial to a lower setting will reduce the leaving or supply temperature. During cooling modes the OFMC will operate at full speed (green light –Figure 24). During reheat modes the OFMC will typically operate at variable speed (amber light – Figure 24) but can change to full speed or off (no lights) depending on the reheat capacity required. During high reheat, the 7½ and 10 ton models must operate the OFMC at full speed to prevent excessive head pressure on system 2.

TABLE B

OFMC	
Factory Settings	
Unit	Setpoint
090	95°F
120	90°F
180	100°F
240	95°F
300	90°F

FIGURE 24



ST-A1141-15

XX. SYSTEM OPERATING INFORMATION

ADVISE THE CUSTOMER

1. Change the air filters regularly. The heating system operates better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This reduces the heating and cooling load on the system.
4. Avoid excessive use of exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles three feet from the unit and exhaust system.
7. ***IMPORTANT:*** *Replace all blower doors and compartment cover after servicing the unit. Do not operate the unit without all panels and doors securely in place.*
8. Do not allow snow or other debris to accumulate in the vicinity of the appliance.

FURNACE SECTION MAINTENANCE

The unit's furnace should operate for many years without excessive scale build-up in flue passageways; however, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the exhaust system and the burners for continued safe operation, paying particular attention to deterioration from corrosion or other sources.

If during inspection the flue passageways and exhaust system are determined to require cleaning, the following procedures should be followed **(by a qualified installer, service agency, or gas supplier):**

1. **Turn off the electrical power to the unit and set the thermostat to the lowest temperature.**
2. **Shut off the gas supply to the unit either at the meter or at manual valve in the supply piping.**
3. Remove the furnace controls access panel and the control box cover.
4. Disconnect the gas supply piping from the gas valve.
5. Disconnect the wiring to the induced draft blower motors, gas valve, flame sensor, and flame roll-out control, and ignitor cable. **Mark all wires disconnected for proper reconnection**.
6. Remove the screws (4) connecting the burner tray to the heat exchanger mounting panel.
7. Remove the burner tray and the manifold assembly from the unit.
8. Remove the screws (10) connecting the four induced draft blowers to the collector box and screws (12) connecting the inducer mounting plate to the heat exchanger center panel. Remove the induced draft blowers and the collector box from the unit.
9. Remove the turbulators from inside the heat exchangers by inserting the blade of a screwdriver under the locking tabs. Pop the tabs out of the expanded grooves of the heat exchanger. Slide the turbulators out of the heat exchangers.
10. Direct a water hose into the outlet of the heat exchanger top. Flush the inside of each heat exchanger tube with water. Blow out each tube with air to remove excessive moisture.

⚠ WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

HOLES IN THE EXHAUST TRANSITION OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME. THE EXHAUST TRANSITION OR HEAT EXCHANGER MUST BE REPLACED IF THEY HAVE HOLES OR CRACKS IN THEM. FAILURE TO DO SO CAN CAUSE CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING MAINTENANCE. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK OR SEVERE PERSONAL INJURY OR DEATH.

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

⚠ WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING THE UNIT. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

11. Reassemble (steps 1 through 9 in reverse order). **Be careful not to strip out the screw holes used to mount the collector box and inducer blower. Replace inducer blower gasket and collector box gasket with factory replacements if damaged.**

The manufacturer recommends that a qualified installer, service agency or the gas supplier visually inspect the burner flames for the desired flame appearance at the beginning of the heating season and approximately midway in heating season.

The manufacturer also recommends that a qualified installer, service agency or the gas supplier clean the flame sensor with steel wool at the beginning of the heating season.

LUBRICATION

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are prelubricated by the manufacturer and do not require further attention.

A qualified installer, service agency or the gas supplier must periodically clean the motors to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict air flow and the motor depends upon sufficient air flowing across and through it to prevent overheating.

COOLING SECTION MAINTENANCE

It is recommended that at the beginning of each cooling season a qualified installer or service agency inspect and clean the cooling section of this unit. The following areas should be addressed: evaporator coil. condenser coil, condenser fan motor and venturi area.

To inspect the evaporator coil:

1. Open the control/filter access panel and remove filters. Also, remove blower access panel. In downflow applications remove the horizontal return to gain access.
2. Shine a flashlight on the evaporator coil (both sides) and inspect for accumulation of lint, insulation, etc.
3. If coil requires cleaning, follow the steps shown below.

Cleaning Evaporator Coil

1. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
2. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
3. Inspect the drain pan and condensate drain at the same time the evaporator coil is checked. Clean the drain pan by flushing with water and removing any matters of obstructions which may be present.
4. Go to next section for cleaning the condenser coil.

Cleaning Condenser Coil, Condenser Fan, Circulation Air Blower and Venturi

1. Remove the condenser access end panel and/or compressor access louver panel. Disconnect the wires to the condenser fan motor in the control box (see wiring diagram).
2. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
3. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
4. The venturi should also be inspected for items of obstruction such as collections of grass, dirt or spider webs. Remove any that are present.

5. Inspect the circulating air blower wheel and motor for accumulation of lint, dirt or other obstruction and clean it necessary. Inspect the blower motor mounts and the blower housing for loose mounts or other damage. Repair or replace if necessary.

Re-assembly

1. Reconnect fan motor wires per the wiring diagram attached to the back of the control cover.
2. Replace the control box cover.
3. Close the filter/control access panel and replace the blower/evaporator coil access panels.
4. Restore electrical power to the unit and check for proper operation, especially the condenser fan motor.

REPLACEMENT PARTS

Contact your local distributor for a complete parts list.

TROUBLESHOOTING

Refer to Figures 24 and 25 for determining cause of unit problems.

WIRING DIAGRAMS

Figures 26 and 27 are complete wiring diagrams for the unit and its power sources. Also located on back of control access panel.

CHARGING

See Figures 28, 29 and 30 for proper charging information.

AIRFLOW PERFORMANCE — 15 TON [52.7kW] — 60 Hz — SIDEFLOW

Air Flow CFM [L/s]	Capacity 15 tons [52.7kW]																																			
	External Static Pressure — Inches of Water [kPa]																																			
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
4800 [2265]	—	—	—	—	—	—	—	—	—	—	565	1521	591	1621	616	1723	640	1827	663	1934	686	2044	708	2156	729	2270	750	2387	770	2507	789	2629	808	2753	825	2880	843	3009	859	3141
5000 [2359]	—	—	—	—	—	—	—	—	—	—	574	1587	599	1692	624	1799	648	1909	671	2021	693	2136	715	2253	736	2372	757	2494	777	2619	796	2746	814	2875	832	3007	849	3142	865	3279
5200 [2454]	—	—	—	—	—	—	—	—	557	1553	583	1661	608	1771	632	1883	656	1998	679	2115	701	2235	723	2357	744	2482	764	2609	784	2739	802	2871	821	3006	838	3143	855	3283	871	3425
5400 [2548]	—	—	—	—	—	—	—	—	566	1630	592	1742	617	1857	641	1975	664	2095	687	2218	709	2343	731	2470	751	2600	771	2732	791	2867	809	3005	827	3144	845	3287	861	3431	877	3579
5600 [2643]	—	—	—	—	—	—	—	—	576	1714	601	1832	625	1952	649	2075	673	2200	695	2328	717	2458	738	2591	759	2726	779	2863	798	3003	816	3146	834	3291	851	3438	868	3588	884	3740
5800 [2737]	—	—	—	—	—	—	559	1686	585	1807	610	1930	634	2055	658	2183	681	2313	703	2446	725	2582	746	2719	766	2860	786	3002	805	3148	823	3295	841	3445	858	3598	874	3753	890	3910
6000 [2831]	—	—	—	—	—	—	569	1781	594	1907	619	2035	643	2166	667	2299	689	2435	712	2573	733	2713	754	2856	774	3001	794	3149	812	3300	830	3452	848	3608	865	3765	881	3926	896	4088
6200 [2926]	—	—	—	—	—	—	578	1885	603	2016	628	2149	652	2285	675	2423	698	2564	720	2707	741	2852	762	3001	782	3151	801	3304	820	3460	838	3618	855	3778	871	3941	887	4106	902	4274
6400 [3020]	—	—	—	—	562	1862	588	1996	613	2132	637	2270	661	2411	684	2555	707	2701	728	2849	749	3000	770	3153	790	3309	809	3467	827	3628	845	3791	862	3956	878	4124	894	4295	909	4468
6600 [3114]	—	—	—	—	572	1976	597	2115	622	2256	647	2400	670	2546	693	2695	715	2846	737	2999	758	3155	778	3313	797	3474	816	3638	835	3804	852	3972	869	4143	885	4316	901	4491	915	4670
6800 [3209]	—	—	555	1957	582	2099	607	2242	632	2389	656	2537	679	2689	702	2842	724	2999	745	3157	766	3318	786	3482	805	3648	824	3816	842	3987	859	4161	876	4337	892	4515	907	4696	—	—
7000 [3303]	—	—	566	2082	592	2228	617	2378	641	2529	665	2683	688	2839	711	2998	733	3160	754	3323	774	3490	794	3658	813	3830	832	4003	850	4179	867	4358	883	4539	899	4722	914	4908	—	—
7200 [3398]	—	—	576	2215	602	2366	627	2521	651	2677	675	2836	698	2998	720	3162	742	3328	763	3497	783	3669	803	3843	821	4019	840	4198	857	4379	874	4563	890	4749	906	4938	921	5129	—	—

NOTE: L-Drive left of bold line, M-Drive right of bold line

Drive Package	R						S					
Motor H.P. [W]	3 [2237.1]						5 [3728.5]					
Blower Sheave	BK105H						BK105H					
Motor Sheave	1VP-44						1VP-56					
Turns Open	**1**	2	3	4	5	6	1	2	3	**4**	5	6
RPM	**716**	689	655	624	593	560	920	888	860	**826**	795	761

NOTES: 1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 15 TON [52.7kW]

CFM [L/s]	4800 [2265]	5000 [2359]	5200 [2454]	5400 [2548]	5600 [2643]	5800 [2737]	6000 [2831]	6200 [2926]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]
	Resistance — Inches of Water [kPa]												
Wet Coil	0.03 [.01]	0.04 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]
Downflow	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.08 [.02]
Downflow Economizer RA Damper Open	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]
Horizontal Economizer RA Damper Open	0.00 [.00]	0.01 [.00]	0.01 [.00]	0.02 [.00]	0.02 [.00]	0.03 [.01]	0.03 [.01]	0.04 [.01]	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]
Concentric Grill RXRN-AD80 or RXRN-AD81 & Transition RXMC-CJ07	0.21 [.05]	0.25 [.06]	0.28 [.07]	0.32 [.08]	0.35 [.09]	0.39 [.10]	0.43 [.11]	0.46 [.11]	0.50 [.12]	0.54 [.13]	0.57 [.14]	0.61 [.15]	0.64 [.16]

AIRFLOW CORRECTION FACTORS — 15 TON [52.7kW]

	CFM [L/s]	4800 [2265]	5000 [2359]	5200 [2454]	5400 [2548]	5600 [2643]	5800 [2737]	6000 [2831]	6200 [2926]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]
	Total MBH	0.97	0.97	0.98	0.98	0.99	1.00	1.00	1.01	1.02	1.02	1.03	1.03	1.04
	Sensible MBH	0.87	0.90	0.92	0.94	0.97	0.99	1.02	1.04	1.06	1.09	1.11	1.14	1.16
	Power kW	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02

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

[ ] Designates Metric Conversions

AIRFLOW PERFORMANCE — 20 TON [70.3kW] — 60 Hz — SIDEFLOW

Air Flow CFM [L/s]	Capacity 20 Tons [70.3kW] External Static Pressure — Inches of Water [kPa]																																			
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
6400 [3020]	—	—	—	—	—	—	—	—	—	—	628	2260	652	2378	675	2498	697	2621	719	2746	740	2873	762	3004	782	3136	802	3272	822	3410	842	3550	860	3693	879	3838	897	3986	915	4136
6600 [3114]	—	—	—	—	—	—	—	—	615	2247	638	2367	661	2489	684	2613	706	2740	728	2869	749	3001	770	3136	790	3273	810	3412	830	3555	849	3699	867	3846	886	3996	903	4148	921	4303
6800 [3209]	—	—	—	—	—	—	—	—	625	2358	648	2482	671	2608	694	2736	715	2868	737	3001	758	3138	778	3277	798	3418	818	3562	837	3708	856	3857	875	4008	893	4162	910	4319	927	4478
7000 [3303]	—	—	—	—	—	—	612	2352	636	2477	659	2605	681	2735	703	2868	725	3004	746	3142	767	3282	787	3426	807	3571	826	3719	845	3870	864	4023	882	4179	900	4337	917	4498	934	4661
7200 [3398]	—	—	—	—	—	—	623	2475	646	2605	669	2737	691	2872	713	3009	734	3149	755	3291	776	3436	796	3583	815	3733	834	3885	853	4040	871	4198	889	4358	907	4520	924	4685	940	4853
7400 [3492]	—	—	—	—	—	—	634	2607	657	2741	679	2877	701	3016	723	3158	744	3302	764	3448	784	3597	804	3749	824	3903	842	4060	861	4219	879	4381	897	4545	914	4712	930	4881	947	5053
7600 [3586]	—	—	—	—	622	2611	645	2747	667	2885	689	3026	711	3169	732	3315	753	3463	774	3614	794	3767	813	3923	832	4082	851	4243	869	4406	887	4572	904	4741	921	4912	937	5085	953	5261
7800 [3681]	—	—	—	—	633	2756	656	2895	678	3038	700	3183	721	3331	742	3481	763	3633	783	3788	803	3946	822	4106	841	4269	859	4434	877	4602	895	4772	912	4945	928	5120	944	5298	960	5478
8000 [3775]	—	—	622	2767	644	2908	667	3053	689	3199	711	3349	732	3500	752	3655	773	3812	793	3971	812	4133	831	4297	849	4464	868	4634	885	4806	902	4980	919	5157	936	5337	952	5519	967	5704
8200 [3869]	—	—	633	2923	656	3069	678	3218	700	3369	721	3523	742	3679	762	3837	783	3998	802	4162	821	4328	840	4497	858	4668	876	4842	894	5018	910	5197	927	5378	943	5562	959	5749	974	5937
8400 [3964]	622	2941	645	3089	667	3239	689	3392	711	3547	732	3705	752	3865	773	4028	792	4194	812	4362	831	4532	849	4705	867	4881	885	5059	902	5239	919	5422	935	5608	951	5796	966	5987	981	6180
8600 [4058]	634	3111	657	3263	679	3417	701	3574	722	3734	743	3896	763	4061	783	4228	802	4397	822	4570	840	4744	858	4922	876	5101	893	5284	910	5468	927	5656	943	5846	958	6038	974	6233	988	6430
8800 [4153]	647	3289	669	3445	691	3604	712	3765	733	3929	754	4095	774	4264	793	4436	813	4610	831	4786	850	4965	868	5147	885	5331	902	5517	919	5706	935	5898	951	6092	966	6289	981	6488	—	—
9000 [4247]	659	3475	681	3635	702	3799	724	3964	744	4132	765	4303	784	4476	804	4652	823	4830	841	5011	859	5194	877	5380	894	5568	911	5759	927	5952	943	6148	959	6347	974	6548	989	6751	—	—
9200 [4341]	671	3670	693	3835	714	4002	735	4172	756	4344	776	4519	795	4697	814	4877	833	5059	851	5244	869	5432	887	5622	904	5814	920	6009	936	6207	952	6407	967	6610	982	6815	—	—	—	—
9400 [4436]	684	3873	705	4042	726	4214	747	4388	767	4565	787	4744	806	4925	825	5110	843	5297	861	5486	879	5678	896	5872	913	6069	929	6268	945	6470	960	6675	975	6881	990	7091	—	—	—	—
9600 [4530]	696	4085	717	4258	738	4434	759	4612	779	4793	798	4977	817	5163	836	5351	854	5542	872	5736	889	5932	906	6131	922	6332	938	6535	954	6742	969	6950	984	7162	—	—	—	—	—	—

NOTE: L-Drive left of bold line, M-Drive right of bold line, N-Drive right of double line.

Drive Package	R						S						T (field installed only)					
Motor H.P. [W]	5 [3728.5]						7.5 [5592.7]						7.5 [5592.7]					
Blower Sheave	BK130H						BK130H						BK120H					
Motor Sheave	1VP-56						1VP-71						1VP-71					
Turns Open	**1**	2	3	4	5	6	1	2	3	**4**	5	6	1	2	3	4	5	6
RPM	**748**	723	696	668	641	614	927	902	875	**848**	820	793	994	967	940	912	883	853

NOTES: 1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 20 TON [70.3kW]

CFM [L/s]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]	7400 [3492]	7600 [3586]	7800 [3681]	8000 [3775]	8200 [3869]	8400 [3964]	8600 [4058]	8800 [4153]	9000 [4247]	9200 [4341]	9400 [4436]	9600 [4530]
	Resistance — Inches of Water [kPa]																
Wet Coil	0.00 [.00]	0.00 [.00]	0.00 [.00]	0.01 [.00]	0.01 [.00]	0.02 [.00]	0.02 [.00]	0.03 [.01]	0.03 [.01]	0.04 [.01]	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.07 [.02]
Downflow	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.08 [.02]	0.08 [.02]	0.09 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.18 [.04]	0.19 [.05]	0.20 [.05]	0.22 [.05]
Downflow Economizer RA Damper Open	0.15 [.04]	0.16 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]	0.19 [.05]	0.20 [.05]	0.21 [.05]	0.22 [.05]	0.23 [.06]	0.24 [.06]	0.25 [.06]	0.26 [.06]	0.27 [.07]	0.28 [.07]	0.29 [.07]	0.30 [.07]
Horizontal Economizer RA Damper Open	0.04 [.01]	0.05 [.01]	0.05 [.01]	0.06 [.01]	0.06 [.01]	0.07 [.02]	0.07 [.02]	0.08 [.02]	0.09 [.02]	0.09 [.02]	0.10 [.02]	0.10 [.02]	0.11 [.03]	0.11 [.03]	0.12 [.03]	0.12 [.03]	0.13 [.03]
Concentric Grill RXRN-AD86 & Transition RXMC-CK08	0.26 [.06]	0.29 [.07]	0.32 [.08]	0.35 [.09]	0.38 [.09]	0.41 [.10]	0.44 [.11]	0.47 [.12]	0.50 [.12]	0.53 [.13]	0.56 [.14]	0.59 [.15]	0.62 [.15]	0.65 [.16]	0.69 [.17]	0.72 [.18]	0.75 [.19]

AIRFLOW CORRECTION FACTORS — 20 TON [70.3kW]

	CFM [L/s]	6400 [3020]	6600 [3114]	6800 [3209]	7000 [3303]	7200 [3398]	7400 [3492]	7600 [3586]	7800 [3681]	8000 [3775]	8200 [3869]	8400 [3964]	8600 [4058]	8800 [4153]	9000 [4247]	9200 [4341]	9400 [4436]	9600 [4530]
	Total MBH	0.97	0.97	0.98	0.98	0.99	0.99	1.00	1.00	1.01	1.01	1.02	1.02	1.03	1.03	1.03	1.04	1.04
	Sensible MBH	0.88	0.90	0.92	0.94	0.96	0.97	0.99	1.01	1.03	1.05	1.07	1.09	1.10	1.12	1.14	1.16	1.18
	Power kW	0.98	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.02	1.02	1.02

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

[ ] Designates Metric Conversions

AIRFLOW PERFORMANCE — 25 TON [87.9kW] — 60 Hz — SIDEFLOW

Air Flow CFM [L/s]	Capacity 25 Tons [87.9kW]																																					
	External Static Pressure — Inches of Water [kPa]																																					
	0.1 [.02]		0.2 [.05]		0.3 [.07]		0.4 [.10]		0.5 [.12]		0.6 [.15]		0.7 [.17]		0.8 [.20]		0.9 [.22]		1.0 [.25]		1.1 [.27]		1.2 [.30]		1.3 [.32]		1.4 [.35]		1.5 [.37]		1.6 [.40]		1.7 [.42]		1.8 [.45]		1.9 [.47]		2.0 [.50]	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
8000 [3775]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	807	4333	826	4498	845	4666	863	4837	882	5010	900	5187	918	5366	936	5549	954	5734	971	5922	988	6113
8200 [3869]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	797	4331	816	4499	835	4670	854	4844	872	5021	890	5201	909	5383	927	5569	944	5757	962	5949	979	6143	996	6340
8400 [3964]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	806	4505	825	4679	844	4856	863	5036	881	5219	899	5404	917	5593	935	5784	953	5979	970	6176	987	6377	1004	6580
8600 [4058]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	797	4514	816	4691	835	4871	854	5054	872	5240	890	5429	908	5621	926	5816	944	6013	961	6214	979	6417	996	6623	1012	6833
8800 [4153]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	807	4707	826	4890	845	5077	863	5266	882	5458	900	5653	918	5851	935	6051	953	6255	970	6462	987	6671	1004	6883	1021	7099
9000 [4247]	—	—	—	—	—	—	—	—	—	—	—	—	798	4727	817	4914	836	5103	855	5295	873	5490	891	5689	909	5890	927	6094	944	6300	962	6510	979	6723	996	6938	1013	7157	1029	7378
9200 [4341]	—	—	—	—	—	—	—	—	—	—	790	4751	809	4941	828	5133	846	5329	865	5527	883	5728	901	5932	919	6140	936	6349	954	6562	971	6778	988	6997	1005	7218	1021	7443	1038	7670
9400 [4436]	—	—	—	—	—	—	—	—	—	—	801	4972	820	5167	838	5366	857	5567	875	5772	893	5979	911	6189	928	6403	946	6619	963	6837	980	7059	997	7284	1014	7512	1030	7742	1046	7976
9600 [4530]	—	—	—	—	—	—	—	—	793	5007	812	5205	830	5407	849	5612	867	5819	885	6030	903	6243	921	6459	938	6679	956	6901	973	7126	990	7354	1006	7584	1023	7818	1039	8055	1055	8294
9800 [4624]	—	—	—	—	—	—	—	—	804	5247	823	5452	841	5660	860	5871	878	6084	896	6301	914	6520	931	6743	949	6968	966	7196	983	7427	999	7661	1016	7898	1032	8138	1048	8380	1064	8626
10000 [4719]	—	—	—	—	—	—	797	5293	815	5501	834	5712	852	5926	871	6143	889	6363	907	6585	924	6811	942	7039	959	7270	976	7504	993	7742	1009	7982	1026	8224	1042	8470	1058	8719	—	—
10200 [4813]	—	—	—	—	789	5343	808	5554	827	5768	846	5985	864	6205	882	6428	900	6654	917	6882	935	7114	952	7348	969	7586	986	7826	1003	8069	1019	8315	1035	8564	1051	8816	1067	9071	—	—
10400 [4908]	—	—	—	—	802	5611	820	5828	839	6048	857	6271	875	6497	893	6726	911	6958	928	7193	946	7430	963	7671	980	7914	996	8161	1013	8410	1029	8662	1045	8917	1061	9175	—	—	—	—
10600 [5002]	—	—	795	5672	814	5892	832	6115	851	6342	869	6571	887	6803	905	7038	922	7276	940	7516	957	7760	974	8007	990	8256	1007	8508	1023	8764	1040	9022	1056	9283	1071	9547	—	—	—	—
10800 [5096]	789	5736	807	5960	826	6186	845	6416	863	6648	881	6883	899	7121	916	7362	934	7606	951	7853	968	8103	985	8355	1001	8611	1018	8869	1034	9131	1050	9395	1066	9662	—	—	—	—	—	—
11000 [5191]	801	6031	820	6261	839	6494	857	6729	875	6967	893	7209	910	7453	928	7700	945	7950	962	8203	979	8458	996	8717	1012	8979	1029	9243	1045	9511	1061	9781	—	—	—	—	—	—	—	—
11200 [5285]	814	6340	833	6575	851	6814	869	7056	887	7300	905	7547	923	7797	940	8051	957	8307	974	8566	991	8827	1007	9092	1024	9360	1040	9630	1056	9904	1071	10180	—	—	—	—	—	—	—	—
11400 [5379]	827	6661	846	6903	864	7148	882	7395	900	7646	917	7899	935	8155	952	8414	969	8677	986	8942	1002	9209	1019	9480	1035	9754	1051	10031	1067	10310	—	—	—	—	—	—	—	—	—	—
11600 [5474]	841	6996	859	7244	877	7494	895	7748	912	8004	930	8264	947	8526	964	8791	981	9060	998	9331	1014	9605	1030	9881	1046	10161	1062	10444	—	—	—	—	—	—	—	—	—	—	—	—
11800 [5568]	854	7343	872	7597	890	7854	908	8114	925	8376	943	8642	960	8910	977	9181	993	9456	1010	9733	1026	10013	1042	10296	1058	10582	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12000 [5663]	868	7704	886	7964	903	8227	921	8493	938	8761	955	9033	972	9307	989	9585	1006	9865	1022	10148	1038	10434	1054	10723	1070	11015	—	—	—	—	—	—	—	—	—	—	—	—	—	—

NOTE: L-Drive left of bold line, M-Drive right of bold line, N-Drive right of double line.

Drive Package	R						S					
Motor H.P. [W]	7.5 [5592.7]						10 [7457.0]					
Blower Sheave	BK130H						BK120H					
Motor Sheave	1VP-71						1VP-75					
Turns Open	**1**	2	3	4	5	6	1	2	3	**4**	5	6
RPM	**922**	894	870	843	818	791	1067	1041	1010	**987**	954	929

NOTES: 1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at ARI minimum External Static Pressure
4. Drive data shown is for horizontal airflow with dry coil. Add component resistance (below) to duct resistance to determine total External Static Pressure.

COMPONENT AIRFLOW RESISTANCE — 25 TON [87.9kW]

CFM [L/s]	8000 [3775]	8400 [3964]	8800 [4153]	9200 [4341]	9600 [4530]	10000 [4719]	10400 [4908]	10800 [5096]	11200 [5285]	11600 [5474]	12000 [5663]
	Resistance — Inches of Water [kPa]										
Wet Coil	0.07 [.02]	0.09 [.02]	0.10 [.02]	0.12 [.03]	0.13 [.03]	0.15 [.04]	0.16 [.04]	0.18 [.04]	0.19 [.05]	0.21 [.05]	0.22 [.05]
Downflow	0.12 [.03]	0.14 [.03]	0.16 [.04]	0.19 [.05]	0.22 [.05]	0.25 [.06]	0.29 [.07]	0.33 [.08]	0.37 [.09]	0.42 [.10]	0.46 [.11]
Downflow Economizer RA Damper Open	0.22 [.05]	0.24 [.06]	0.26 [.06]	0.28 [.07]	0.30 [.07]	0.32 [.08]	0.34 [.08]	0.37 [.09]	0.39 [.10]	0.41 [.10]	0.44 [.11]
Horizontal Economizer RA Damper Open	0.09 [.02]	0.10 [.02]	0.11 [.03]	0.12 [.03]	0.13 [.03]	0.14 [.03]	0.15 [.04]	0.16 [.04]	0.17 [.04]	0.18 [.04]	0.19 [.05]
Concentric Grill RXRN-AD88 & Transition RXMC-CL09	0.17 [.04]	0.23 [.06]	0.30 [.07]	0.36 [.09]	0.43 [.11]	0.50 [.12]	0.56 [.14]	0.63 [.16]	0.69 [.17]	0.76 [.19]	0.82 [.20]

AIRFLOW CORRECTION FACTORS — 25 TON [87.9kW]

CFM [L/s]	8000 [3775]	8400 [3964]	8800 [4153]	9200 [4341]	9600 [4530]	10000 [4719]	10400 [4908]	10800 [5096]	11200 [5285]	11600 [5474]	12000 [5663]
Total MBH	0.97	0.98	0.99	0.99	1.00	1.01	1.02	1.03	1.03	1.04	1.05
Sensible MBH	0.89	0.92	0.95	0.98	1.01	1.04	1.08	1.11	1.14	1.17	1.20
Power kW	0.99	0.99	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02

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

[ ] Designates Metric Conversions

IX. ELECTRICAL DATA - RKNL

ELECTRICAL DATA - RKNL SERIES									
		G180CR	**G180CS**	**G180DR**	**G180DS**	**G240CR**	**G240CS**	**G240DR**	**G240DS**
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506	187-253	187-253	414-506	414-506
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Minimum Circuit Ampacity	78/78	81/81	38	40	101/101	109/109	52	56
	Minimum Overcurrent Protection Device Size	90/90	90/90	45	45	110/110	125/125	60	60
	Maximum Overcurrent Protection Device Size	100/100	100/100	45	50	125/125	125/125	60	70
Compressor Motor	No.	2	2	2	2	2	2	2	2
	Volts	200/230	200/230	460	460	200/230	200/230	460	460
	Phase	3	3	3	3	3	3	3	3
	RPM	3450	3450	3450	3450	3450	3450	3450	3450
	HP, Compressor 1	7	7	7	7	10	10	10	10
	Amps (RLA), Comp. 1	25/25	25/25	12.2	12.2	33.3/33.3	33.3/33.3	17.9	17.9
	Amps (LRA), Comp. 1	164/164	164/164	100	100	239/239	239/239	125	125
	HP, Compressor 2	7	7	7	7	7 1/2	7 1/2	7 1/2	7 1/2
	Amps (RLA), Comp. 2	25/25	25/25	12.2	12.2	29.5/29.5	29.5/29.5	14.7	14.7
	Amps (LRA), Comp. 2	164/164	164/164	100	100	195/195	195/195	95	95
Condenser Motor	No.	4	4	4	4	6	6	6	6
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	1	1	1	1	1	1	1	1
	HP	1/3	1/3	1/3	1/3	1/3	1/3	1/3	1/3
	Amps (FLA, each)	2.4/2.4	2.4/2.4	1.4	1.4	2.4/2.4	2.4/2.4	1.4	1.4
	Amps (LRA, each)	4.7/4.7	4.7/4.7	2.4	2.4	4.7/4.7	4.7/4.7	2.4	2.4
Evaporator Fan	No.	1	1	1	1	1	1	1	1
	Volts	208/230	208/230	460	460	208/230	208/230	460	460
	Phase	3	3	3	3	3	3	3	3
	HP	3	5	3	5	5	7 1/2	5	7 1/2
	Amps (FLA, each)	11.5/11.5	14.9/14.9	4.6	6.6	14.7/14.7	23.1/23.1	6.6	9.6
	Amps (LRA, each)	74.5/74.5	82.6/82.6	38.1	46.3	82.6/82.6	136/136	46.3	67

ELECTRICAL DATA - RKNL (continued)

ELECTRICAL DATA - RKNL SERIES					
		G300CR	**G300CS**	**G300DR**	**G300DS**
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506
	Volts	208/230	208/230	460	460
	Minimum Circuit Ampacity	147/147	149/149	60	63
	Minimum Overcurrent Protection Device Size	175/175	175/175	70	70
	Maximum Overcurrent Protection Device Size	175/175	175/175	70	80
Compressor Motor	No.	2	2	2	2
	Volts	200/240	200/240	460	460
	Phase	3	3	3	3
	RPM	3450	3450	3450	3450
	HP, Compressor 1	11 1/2	11 1/2	11 1/2	11 1/2
	Amps (RLA), Comp. 1	48.1/48.1	48.1/48.1	18.6	18.6
	Amps (LRA), Comp. 1	245/245	245/245	125	125
	HP, Compressor 2	11 1/2	11 1/2	11 1/2	11 1/2
	Amps (RLA), Comp. 2	48.1/48.1	48.1/48.1	18.6	18.6
	Amps (LRA), Comp. 2	245/245	245/245	125	125
Condenser Motor	No.	4	4	6	6
	Volts	208/230	208/230	460	460
	Phase	1	1	1	1
	HP	1/3	1/3	1/3	1/3
	Amps (FLA, each)	2.4/2.4	2.4/2.4	1.4	1.4
	Amps (LRA, each)	4.7/4.7	4.7/4.7	2.4	2.4
Evaporator Fan	No.	1	1	1	1
	Volts	208/230	208/230	460	460
	Phase	3	3	3	3
	HP	7 1/2	10	7 1/2	10
	Amps (FLA, each)	24.2/24.2	28.5/28.5	9.6	12.5
	Amps (LRA, each)	136/136	178/178	67	74.6

X. TROUBLESHOOTING

FIGURE 24
COOLING TROUBLE SHOOTING CHART

⚠ WARNING

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

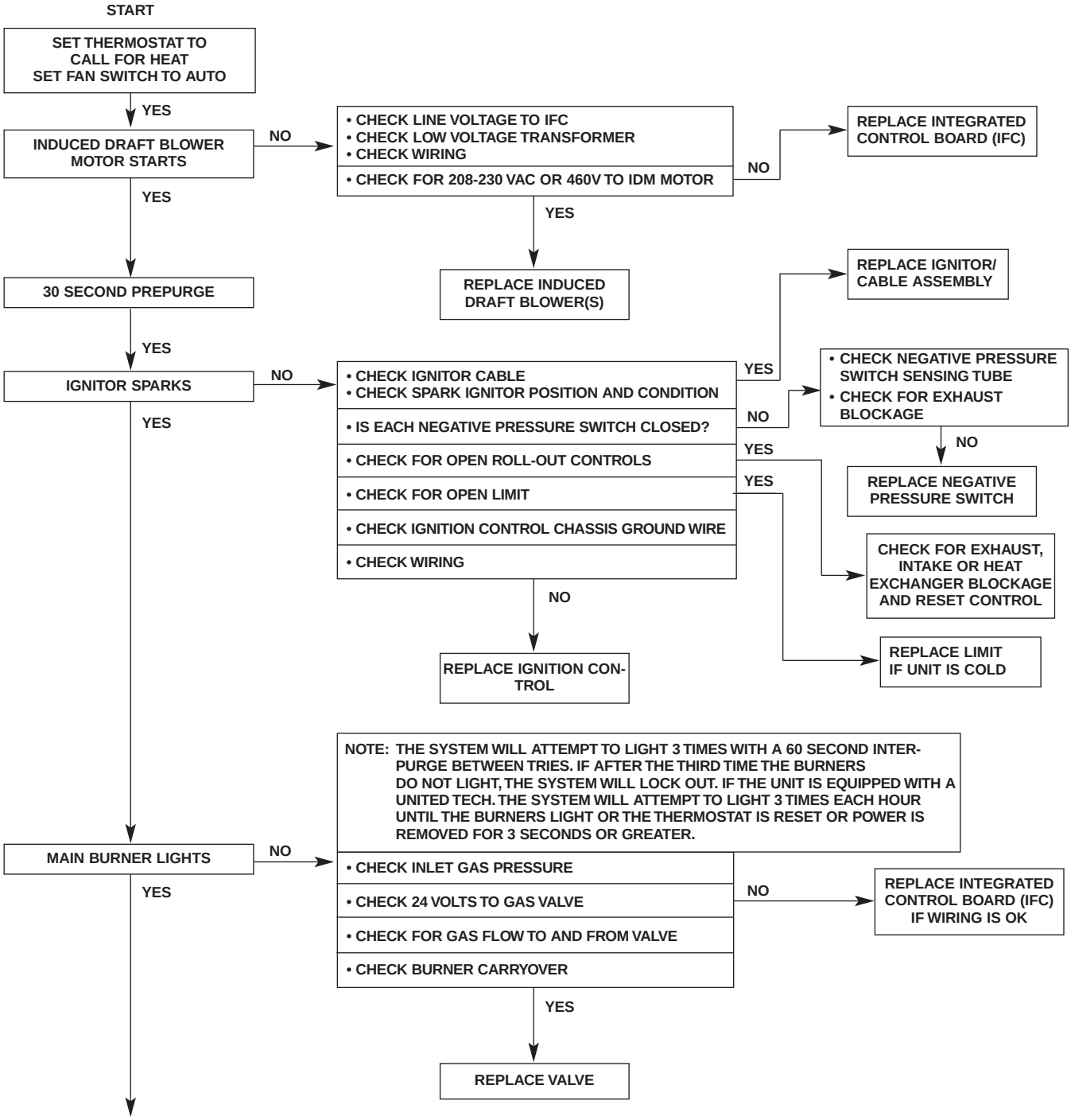
SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	• Power off or loose electrical connection • Thermostat out of calibration-set too high • Failed contactor • Blown fuses • Transformer defective • High pressure control open (if provided) • Interconnecting low voltage wiring damaged	• Check for correct voltage at compressor contactor in control box • Reset • Check for 24 volts at contactor coil - replace if contacts are open • Replace fuses • Check wiring-replace transformer • Reset-also see high head pressure remedy-The high pressure control opens at 610 PSIG • Replace thermostat wiring
Condenser fan runs, compressor doesn't	• Loose connection • Compressor stuck, grounded or open motor winding open internal overload. • Low voltage condition • Low voltage condition	• Check for correct voltage at compressor - check & tighten all connections • Wait at least 2 hours for overload to reset. If still open, replace the compressor. • At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating. • Increase voltage
Insufficient cooling	• Improperly sized unit • Improper airflow • Incorrect refrigerant charge • Air, non-condensibles or moisture in system • Incorrect voltage	• Recalculate load • Check - should be approximately 400 CFM per ton. • Charge per procedure attached to unit service panel. • Recover refrigerant, evacuate & recharge, add filter drier • At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.
Compressor short cycles	• Incorrect voltage • Defective overload protector • Refrigerant undercharge	• At compressor terminals, voltage must be ± 10% of nameplate marking when unit is operating. • Replace - check for correct voltage • Add refrigerant
Registers sweat	• Low evaporator airflow	• Increase speed of blower or reduce restriction - replace air filter
High head pressure-low vapor pressures	• Restriction in liquid line, expansion device or filter drier • TXV does not open	• Remove or replace defective component • Replace TXV
High head pressure-high or normal vapor pressure - Cooling mode	• Dirty condenser coil • Refrigerant overcharge • Condenser fan not running • Air or non-condensibles in system	• Clean coil • Correct system charge • Repair or replace • Recover refrigerant, evacuate & recharge
Low head pressure-high vapor pressures	• Defective Compressor valves	• Replace compressor
Low vapor pressure - cool compressor - iced evaporator coil	• Low evaporator airflow • Operating below 65°F outdoors • Moisture in system	• Increase speed of blower or reduce restriction - replace air filter • Add Low Ambient Kit • Recover refrigerant - evacuate & recharge - add filter drier
High vapor pressure	• Excessive load • Defective compressor	• Recheck load calculation • Replace
Fluctuating head & vapor pressures	• TXV hunting • Air or non-condensibles in system	• Check TXV bulb clamp - check air distribution on coil - replace TXV • Recover refrigerant, evacuate & recharge
Gurgle or pulsing noise at expansion device or liquid line	• Air or non-condensibles in system	• Recover refrigerant, evacuate & recharge

FIGURE 25
FURNACE TROUBLESHOOTING GUIDE
(COMBINATION HEATING AND COOLING UNITS WITH DIRECT SPARK IGNITION)

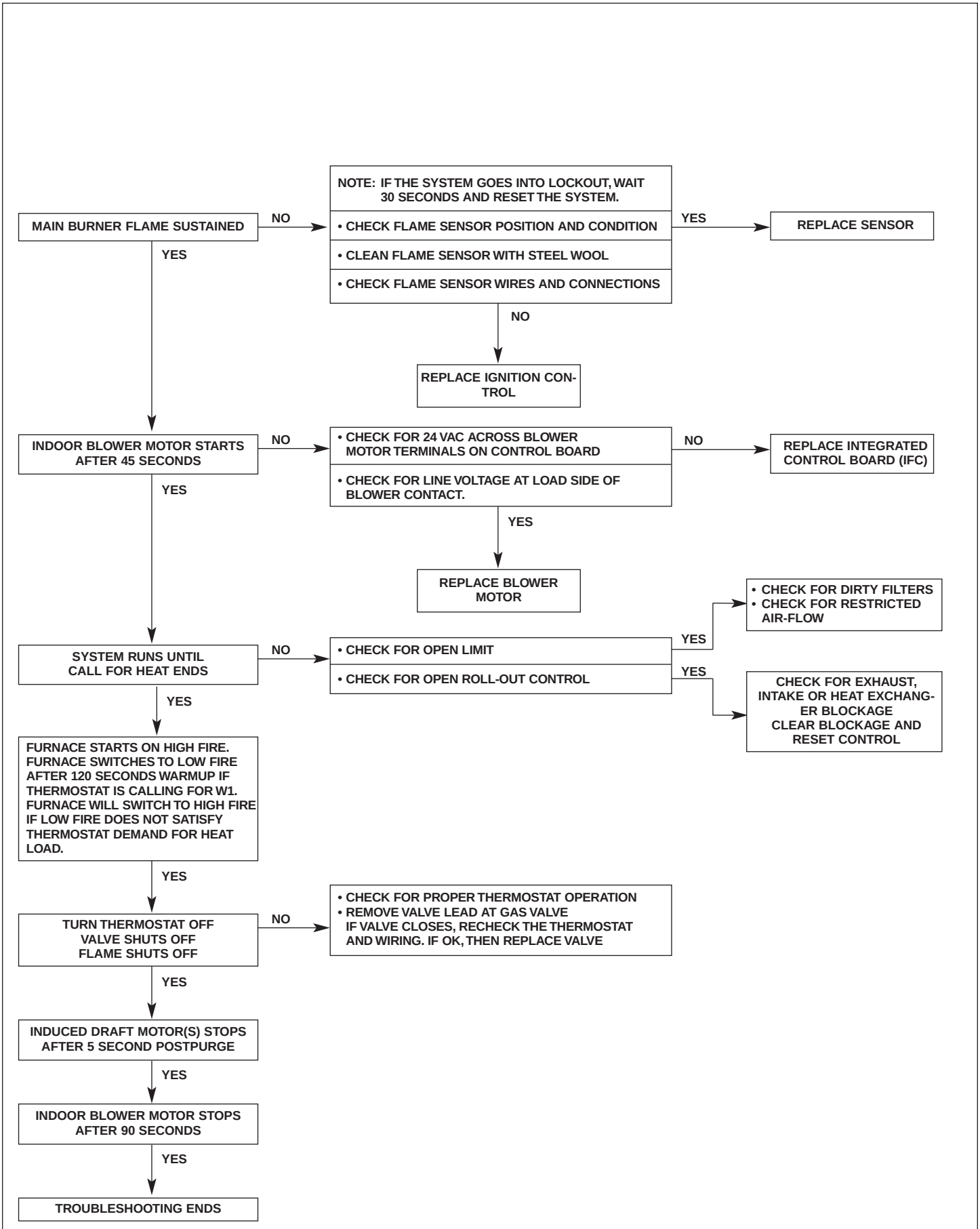
⚠ WARNING

HAZARDOUS VOLTAGE LINE VOLTAGE CONNECTIONS

DISCONNECT POWER BEFORE SERVICING.
SERVICE MUST BE BY A TRAINED, QUALIFIED SERVICE TECHNICIAN.

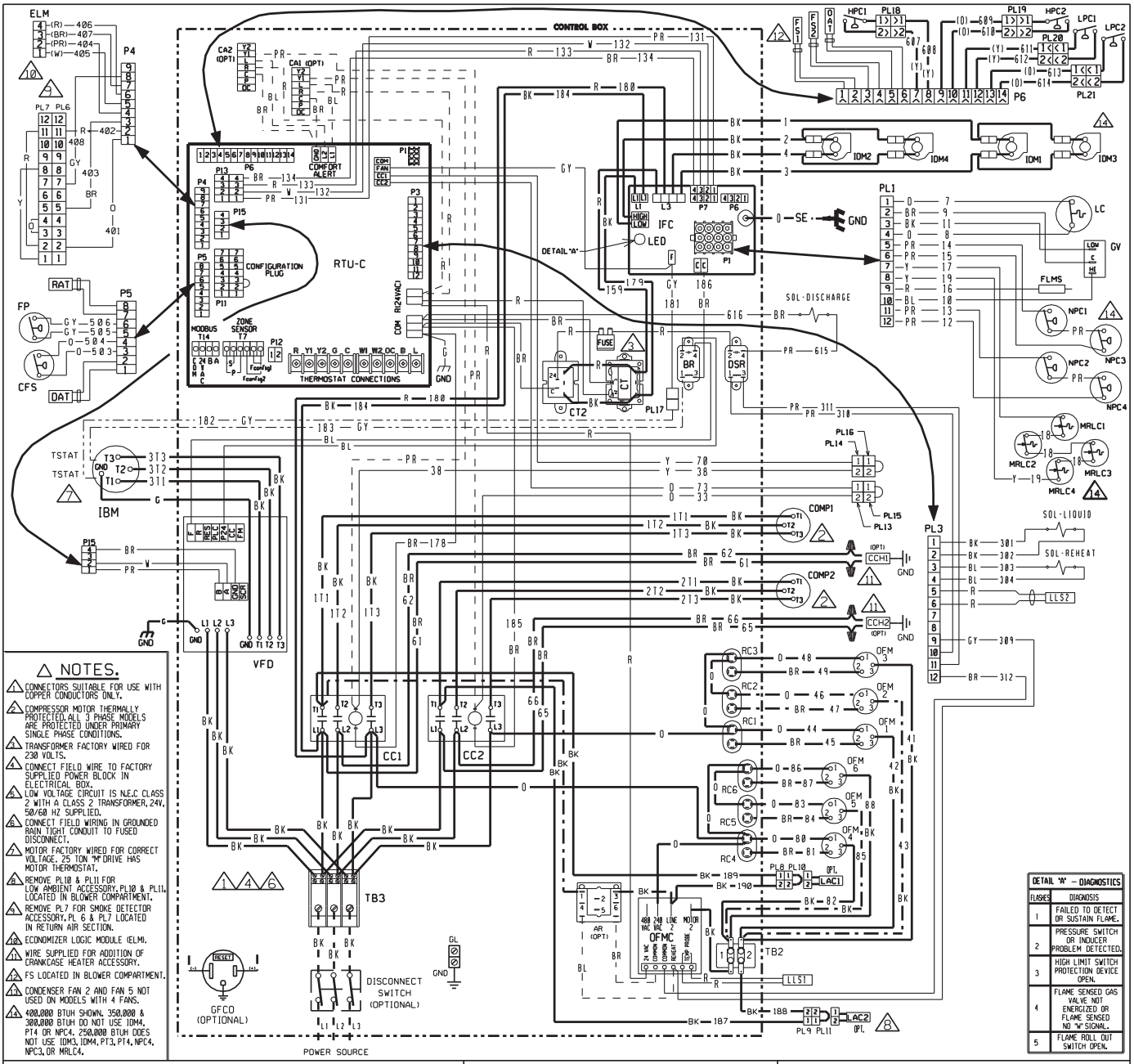


FLOW CHART CONTINUED ON NEXT PAGE


MAIN BURNER FLAME SUSTAINED
NO
NOTE: IF THE SYSTEM GOES INTO LOCKOUT, WAIT 30 SECONDS AND RESET THE SYSTEM.
• CHECK FLAME SENSOR POSITION AND CONDITION
• CLEAN FLAME SENSOR WITH STEEL WOOL
• CHECK FLAME SENSOR WIRES AND CONNECTIONS
YES
REPLACE SENSOR
YES
NO
REPLACE IGNITION CONTROL
INDOOR BLOWER MOTOR STARTS AFTER 45 SECONDS
NO
• CHECK FOR 24 VAC ACROSS BLOWER MOTOR TERMINALS ON CONTROL BOARD
• CHECK FOR LINE VOLTAGE AT LOAD SIDE OF BLOWER CONTACT.
NO
REPLACE INTEGRATED CONTROL BOARD (IFC)
YES
YES
REPLACE BLOWER MOTOR
SYSTEM RUNS UNTIL CALL FOR HEAT ENDS
NO
• CHECK FOR OPEN LIMIT
• CHECK FOR OPEN ROLL-OUT CONTROL
YES
• CHECK FOR DIRTY FILTERS
• CHECK FOR RESTRICTED AIR-FLOW
YES
CHECK FOR EXHAUST, INTAKE OR HEAT EXCHANGER BLOCKAGE
CLEAR BLOCKAGE AND RESET CONTROL
YES
FURNACE STARTS ON HIGH FIRE. FURNACE SWITCHES TO LOW FIRE AFTER 120 SECONDS WARMUP IF THERMOSTAT IS CALLING FOR W1. FURNACE WILL SWITCH TO HIGH FIRE IF LOW FIRE DOES NOT SATISFY THERMOSTAT DEMAND FOR HEAT LOAD.
YES
TURN THERMOSTAT OFF
VALVE SHUTS OFF
FLAME SHUTS OFF
NO
• CHECK FOR PROPER THERMOSTAT OPERATION
• REMOVE VALVE LEAD AT GAS VALVE
IF VALVE CLOSES, RECHECK THE THERMOSTAT AND WIRING. IF OK, THEN REPLACE VALVE
YES
INDUCED DRAFT MOTOR(S) STOPS AFTER 5 SECOND POSTPURGE
YES
INDOOR BLOWER MOTOR STOPS AFTER 90 SECONDS
YES
TROUBLESHOOTING ENDS
REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED.

XI. WIRING DIAGRAMS

FIGURE 26
RKNL SERIES



NOTES.

1. CONNECTORS SUITABLE FOR USE WITH COPPER CONDUCTORS ONLY.
2. COMPRESSOR MOTOR THERMALLY PROTECTED. ALL 3 PHASE MODELS ARE PROTECTED UNDER PRIMARY SINGLE PHASE CONDITIONS.
3. TRANSFORMER FACTORY WIRED FOR 230 VOLTS.
4. CONNECT FIELD WIRE TO FACTORY SUPPLIED POWER BLOCK IN ELECTRICAL BOX.
5. LOW VOLTAGE CIRCUIT IS N.E.C CLASS 2 WITH A CLASS 2 TRANSFORMER, 24V, 50/60 HZ SUPPLIED.
6. CONNECT FIELD WIRING IN GROUNDED RAIN TIGHT CONDUIT TO FUSED DISCONNECT.
7. MOTOR FACTORY WIRED FOR CORRECT VOLTAGE. 25 TON "M" DRIVE HAS MOTOR THERMOSTAT.
8. REMOVE PL10 & PL11 FOR LOW AMBIENT ACCESSORY. PL10 & PL11, LOCATED IN BLOWER COMPARTMENT.
9. REMOVE PL7 FOR SMOKE DETECTOR ACCESSORY. PL 6 & PL7 LOCATED IN RETURN AIR SECTION.
10. ECONOMIZER LOGIC MODULE (ELM).
11. WIRE SUPPLIED FOR ADDITION OF CRANKCASE HEATER ACCESSORY.
12. FS LOCATED IN BLOWER COMPARTMENT.
13. CONDENSER FAN 2 AND FAN 5 NOT USED ON MODELS WITH 4 FANS.
14. 400,000 BTUH SHOWN. 350,000 & 300,000 BTUH DO NOT USE IDM4. PT4 OR NPC4. 250,000 BTUH DOES NOT USE IDM3, IDM4, PT3, PT4, NPC4, NPC3, OR MRLC4.

DETAIL "A" – DIAGNOSTICS	
FLASHES	DIAGNOSIS
1	FAILED TO DETECT OR SUSTAIN FLAME.
2	PRESSURE SWITCH OR INDUCER PROBLEM DETECTED.
3	HIGH LIMIT SWITCH PROTECTION DEVICE OPEN.
4	FLAME SENSED GAS VALVE NOT ENERGIZED OR FLAME SENSED NO "W" SIGNAL.
5	FLAME ROLL OUT SWITCH OPEN.

COMPONENT CODE

AR	ACCESSORY RELAY
BR	BLOWER RELAY
CA	COMFORT ALERT MODULE
CC	COMPRESSOR CONTACTOR
CCH	CRANKCASE HEATER
CFS	CLOGGED FILTER SWITCH
COMP	COMPRESSOR
CT	CONTROL TRANSFORMER
DAT	DISCHARGE AIR SENSOR
DSR	DISCHARGE SOLENOID RELAY
DISC	DISCONNECT SWITCH
FLMS	FLAME SENSOR
FP	FAN PROVING
FS	FREEZE SENSOR
GFCO	GROUND FAULT CONVENIENCE OUTLET
GL	GROUND LUG
GND	GROUND
GV	GAS VALVE
HPC	HIGH PRESSURE CONTROL
IBM	INDOOR BLOWER MOTOR BELT DRIVE
IDM	INDUCED DRAFT MOTOR
IFC	INTEGRATED FURNACE CONTROL
LAC	LOW AMBIENT COOLING CONTROL
LC	LIMIT CONTROL
LLS	LIQUID LINE SENSOR
LPC	LOW PRESSURE CONTROL
MRLC	MANUAL RESET LIMIT CONTROL
NPC	NEGATIVE PRESSURE CONTROL
OAT	OUTSIDE AIR SENSOR
OFM	OUTDOOR FAN MOTOR
OFMC	OUTDOOR FAN MOTOR CONTROLLER
PL	PLUG
RAT	RETURN AIR SENSOR
RC	RUN CAPACITOR
RTU-C	ROOFTOP UNIT CONTROL
SE	SPARK ELECTRODE
TB	TERMINAL BLOCK
VFD	VARIABLE FREQUENCY DRIVE
	WIRE NUT

WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

LOW VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

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

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

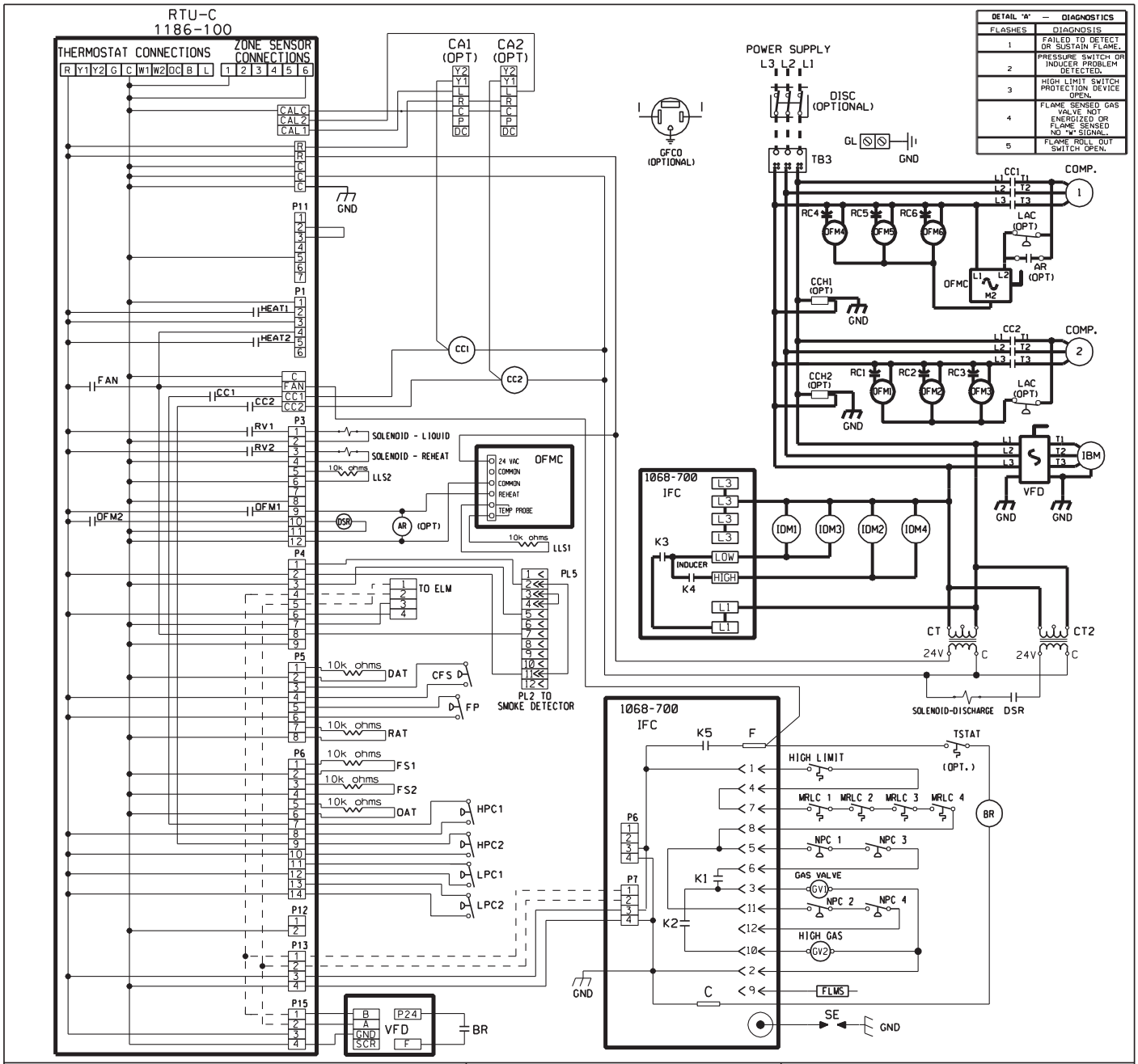
WIRE COLOR CODE

BK	BLACK	O	ORANGE
BR	BROWN	PR	PURPLE
BL	BLUE	R	RED
G	GREEN	W	WHITE
GY	GRAY	Y	YELLOW

WIRING DIAGRAM
REHEAT MODELS
208-230/460V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MCB		10-21-11	90-103079-04	01

FIGURE 27
RKNL SERIES



COMPONENT CODE

AR	ACCESSORY RELAY
BR	BLOWER RELAY
CA	COMFORT ALERT MODULE
CC	COMPRESSOR CONTACTOR
CCH	CRANKCASE HEATER
CFS	CLOGGED FILTER SWITCH
COMP	COMPRESSOR
CT	CONTROL TRANSFORMER
DAT	DISCHARGE AIR SENSOR
DSR	DISCHARGE SOLENOID RELAY
DISC	DISCONNECT SWITCH
FLMS	FLAME SENSOR
FP	FAN PROVING
FS	FREEZE SENSOR
GFCO	GROUND FAULT CONVENIENCE OUTLET
GL	GROUND LUG
GND	GROUND
GV	GAS VALVE
HPC	HIGH PRESSURE CONTROL
IBM	INDOOR BLOWER MOTOR BELT DRIVE
IDM	INDUCED DRAFT MOTOR
IFC	INTEGRATED FURNACE CONTROL
LAC	LOW AMBIENT COOLING CONTROL
LC	LIMIT CONTROL
LLS	LIQUID LINE SENSOR
LPC	LOW PRESSURE CONTROL
MRLC	MANUAL RESET LIMIT CONTROL
NPC	NEGATIVE PRESSURE CONTROL
OAT	OUTSIDE AIR SENSOR
OFM	OUTDOOR FAN MOTOR
OFMC	OUTDOOR FAN MOTOR CONTROLLER
PL	PLUG
RAT	RETURN AIR SENSOR
RC	RUN CAPACITOR
RTU-C	ROOFTOP UNIT CONTROL
SE	SPARK ELECTRODE
TB	TERMINAL BLOCK
VFD	VARIABLE FREQUENCY DRIVE
	WIRE NUT

WIRING INFORMATION

LINE VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

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

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

WIRE COLOR CODE

BK__BLACK	O___ORANGE
BR__BROWN	PR__PURPLE
BL__BLUE	R___RED
G___GREEN	W___WHITE
GY__GRAY	Y___YELLOW

WIRING SCHEMATIC
REHEAT 180/240/300
208-230/460V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MCB		10-21-11	90-103263-04	01

XII. CHARGE CHARTS

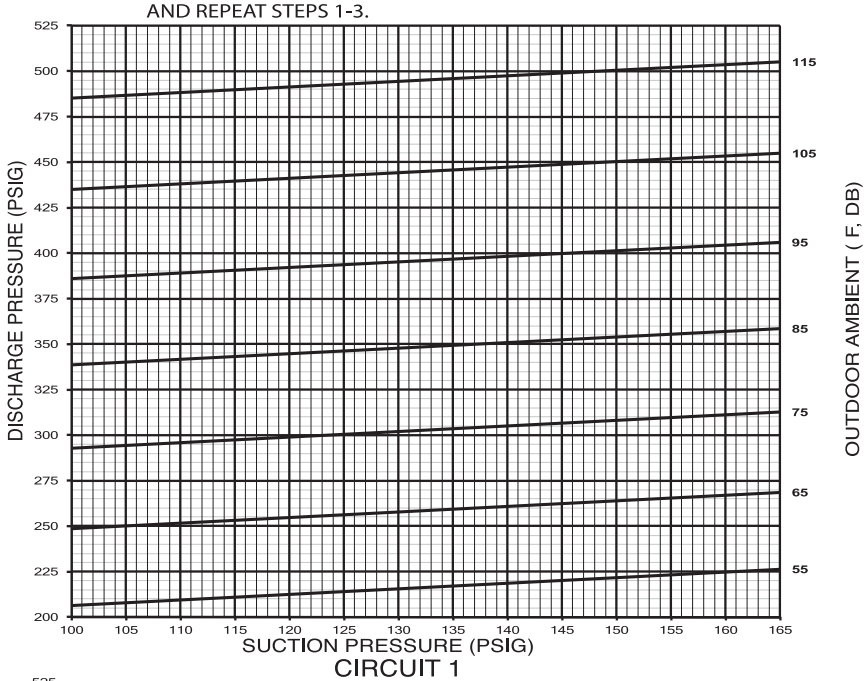
FIGURE 28

RKNL SYSTEM CHARGE CHARTS

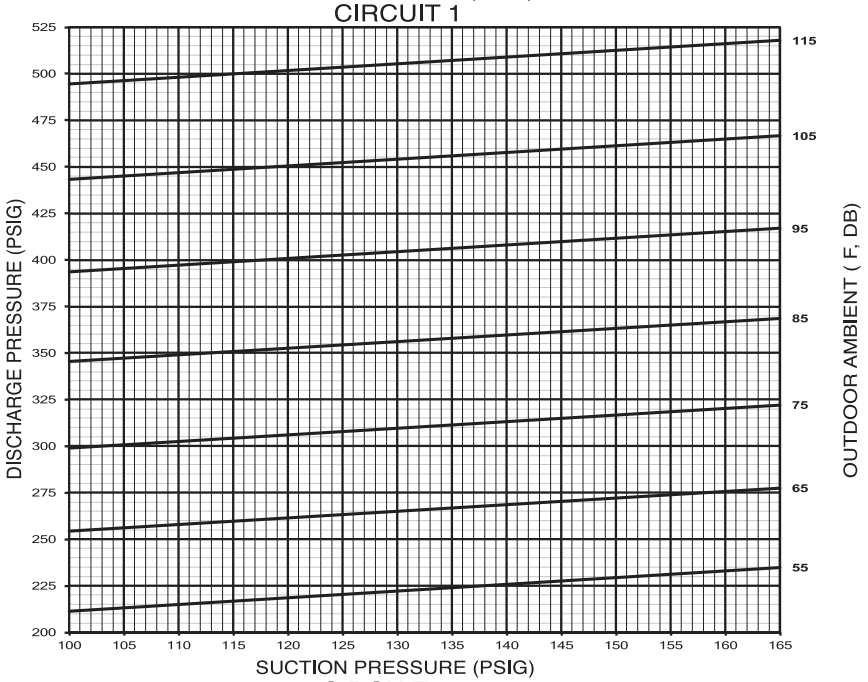
SYSTEM CHARGE CHART - REFRIGERANT 410A
15 TON, CIRCUITS 1 & 2

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



CIRCUIT 1



CIRCUIT 2

92-102778-05-00

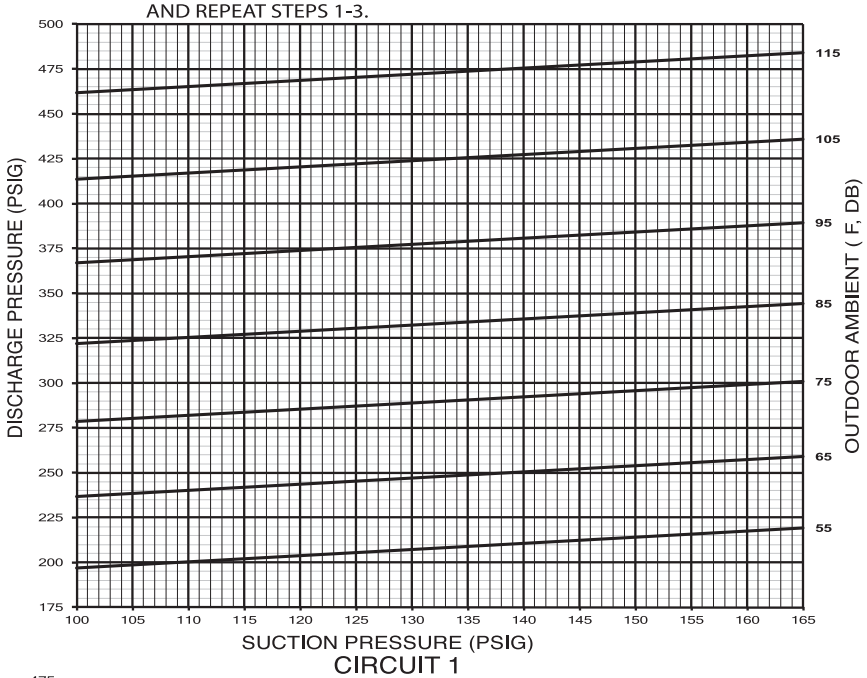
FIGURE 29

RKNL SYSTEM CHARGE CHARTS

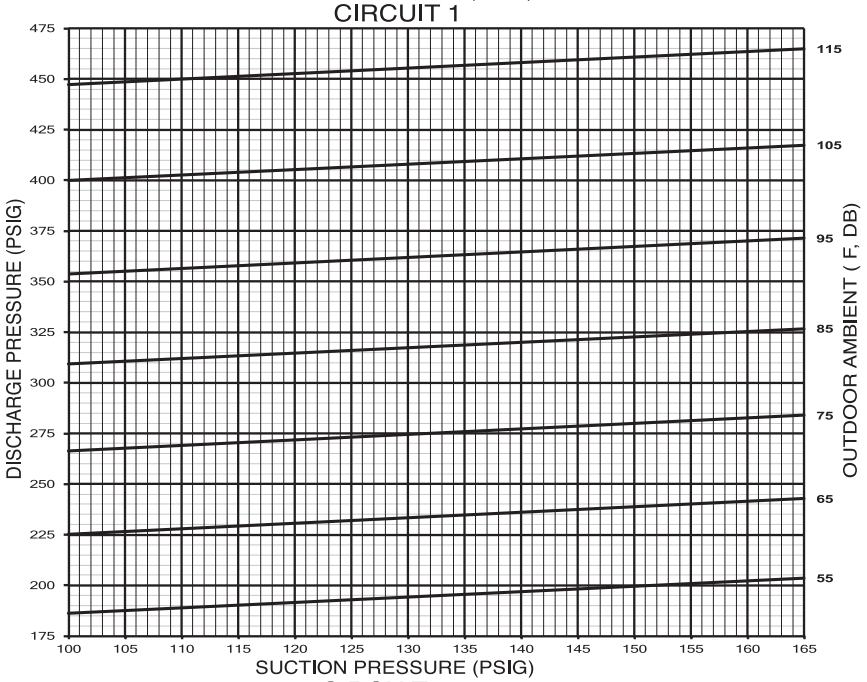
SYSTEM CHARGE CHART - REFRIGERANT 410A
20 TON, CIRCUITS 1 & 2

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



CIRCUIT 1



CIRCUIT 2

92-102778-06-00

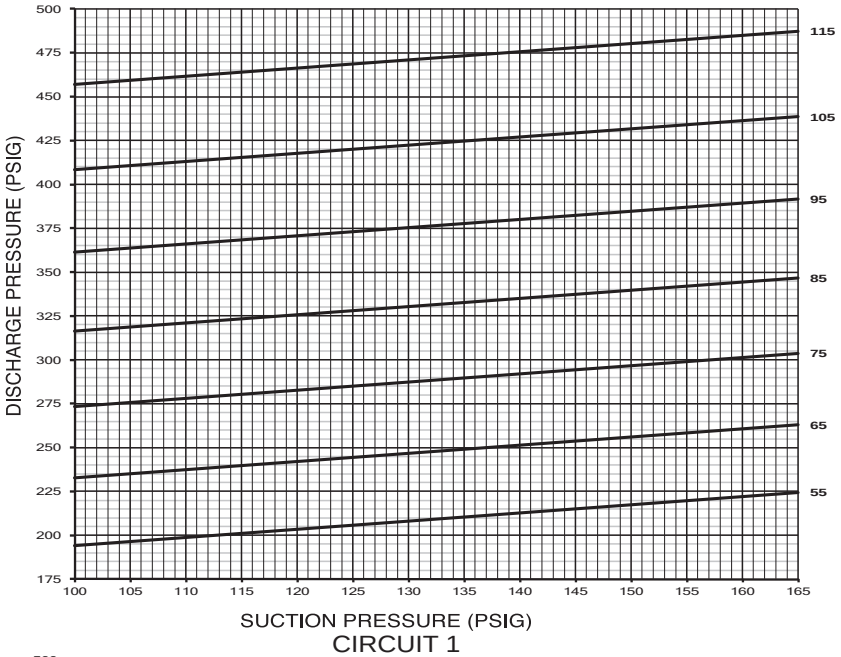
FIGURE 30

RKNL SYSTEM CHARGE CHARTS

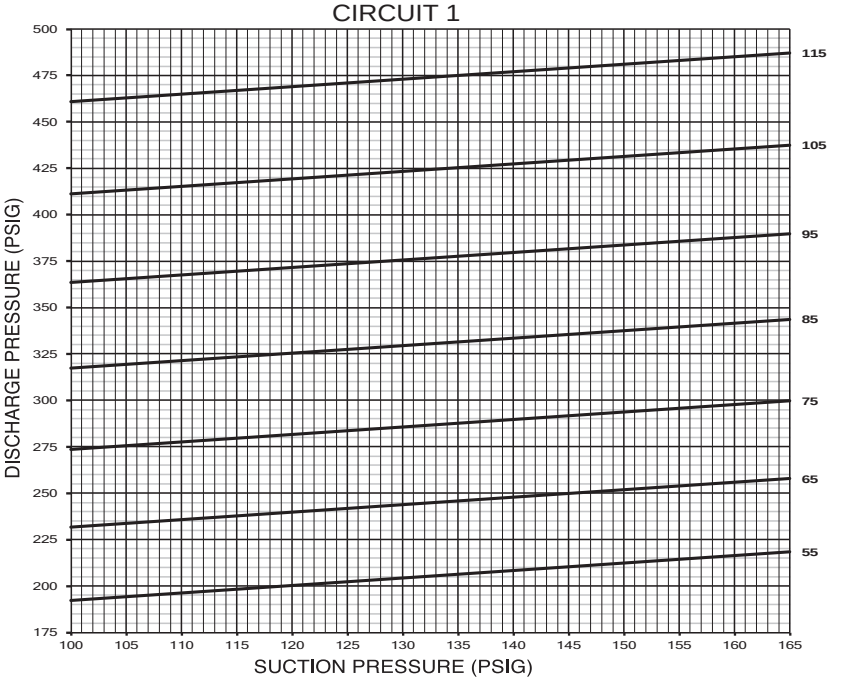
SYSTEM CHARGE CHART - REFRIGERANT 410A
25 TON, CIRCUITS 1 & 2

CAUTION:
1. BOTH COMPRESSORS MUST BE OPERATING BEFORE CHECKING REFRIGERANT CHARGE.
2. RETURN AIR TEMPERATURE MUST BE WITHIN COMFORT CONDITIONS BEFORE FINAL REFRIGERANT CHECK!

INSTRUCTIONS:
1. MEASURE PRESSURE AT COMPRESSOR SUCTION AND DISCHARGE.
2. MEASURE OUTDOOR AMBIENT TO UNIT.
3. PLACE (X) ON CHART WHERE SUCTION AND DISCHARGE INTERSECT.
4. IF (X) IS BELOW OUTDOOR AMBIENT LINE, ADD CHARGE AND REPEAT STEPS 1-3.
5. IF (X) IS ABOVE OUTDOOR AMBIENT LINE, RECOVER EXCESS CHARGE AND REPEAT STEPS 1-3.



CIRCUIT 1



CIRCUIT 2

92-102778-07-00