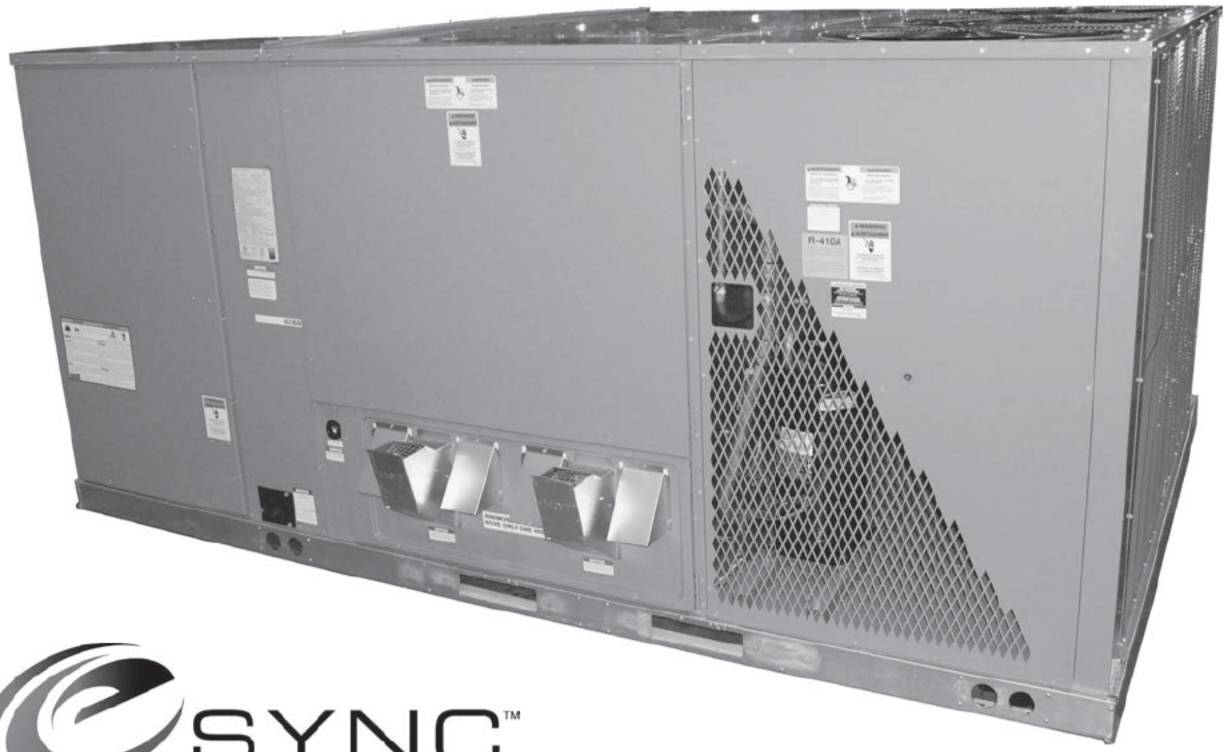
INSTALLATION INSTRUCTIONS

FOR THE RHEEM H_2AC ROOFTOP UNIT FEATURING eSYNC INTEGRATION TECHNOLOGY

RKHL-D SERIES 15 TON [52.8 kW]

ASHRAE 90.1 2007 COMPLIANT, WITH CLEAR CONTROL



eSYNC™ INTEGRATION TECHNOLOGY

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

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

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⚠ 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 Rheem H2AC Rooftop Unit Combination Gas Heating/Electric Cooling Rooftop with integrated Potable Water Heating is available in 250,000 BTUH and 350,000 BTUH gas heating inputs. Cooling capacity is 15 nominal tons.

Potable water heating capacities range from approximately 117,000 BTUH to 145,000 BTUH depending on water temperature, indoor air temperatures, and indoor CFM.

Units are designed for downflow-only supply and return air and are weatherized and intended for outdoor installation.

Since the waste-heat recovery/water heating feature of the H2AC Rooftop Unit only functions during the cooling mode, the unit should be installed to serve the area of the structure having the largest cooling run-time load, for instance the kitchen area of the restaurant, in order to provide the greatest water heating and energy saving benefits.

B. MAJOR COMPONENTS

The typical unit includes a hermetically-sealed refrigerating system consisting of a scroll compressor, condenser coil, evaporator coil with TXV, a circulation air blower, a condenser fan, a refrigerant to air heat exchanger assembly, a refrigerant to water heat exchanger, 3-way valve, and 2 solenoid valves, gas burner and control assembly, combustion air motor and fan, and all necessary internal electrical wiring. The cooling systems of these units are 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.

FIGURE 1
UNIT DIMENSIONS

FOR CLEARANCES SEE PAGE 14, FIGURE 4.

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

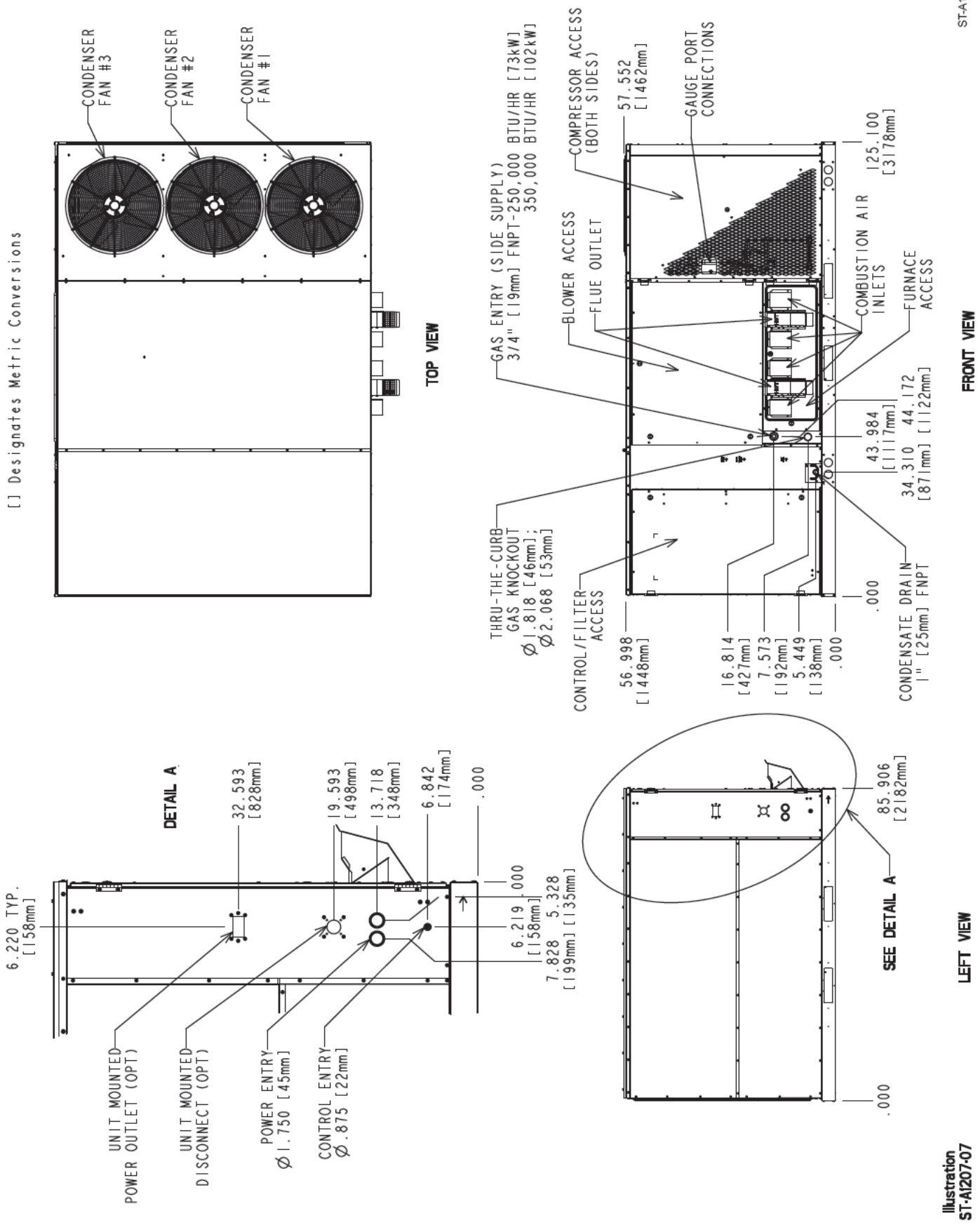
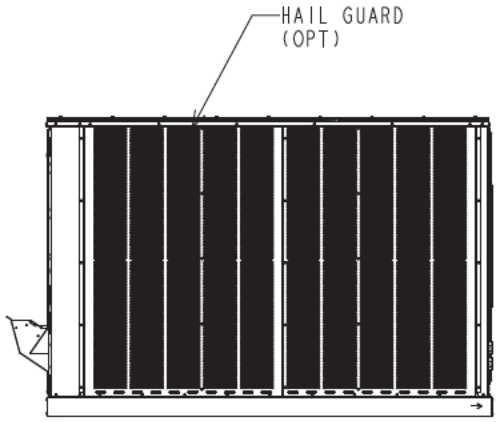
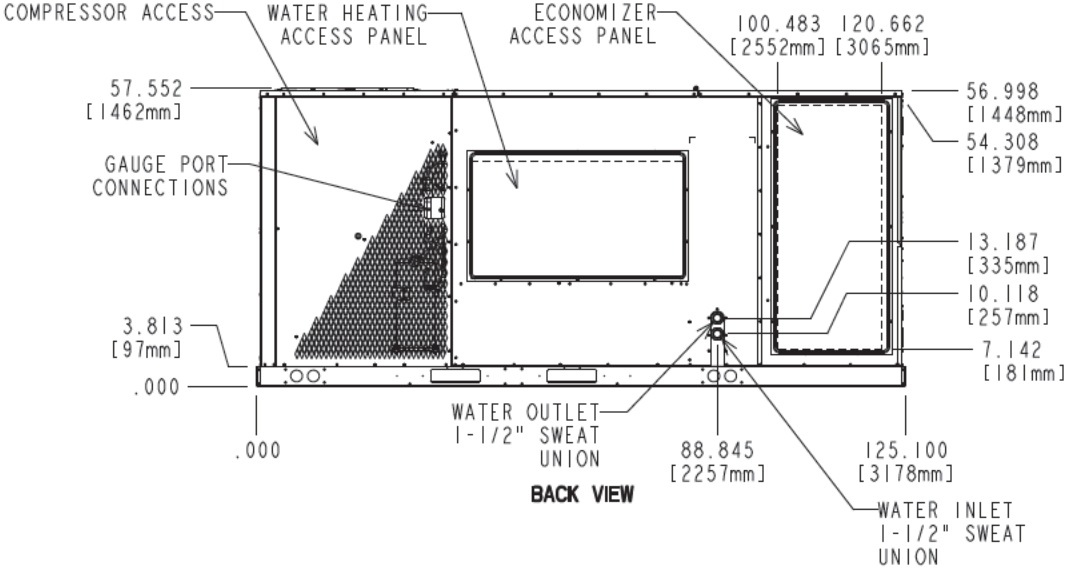


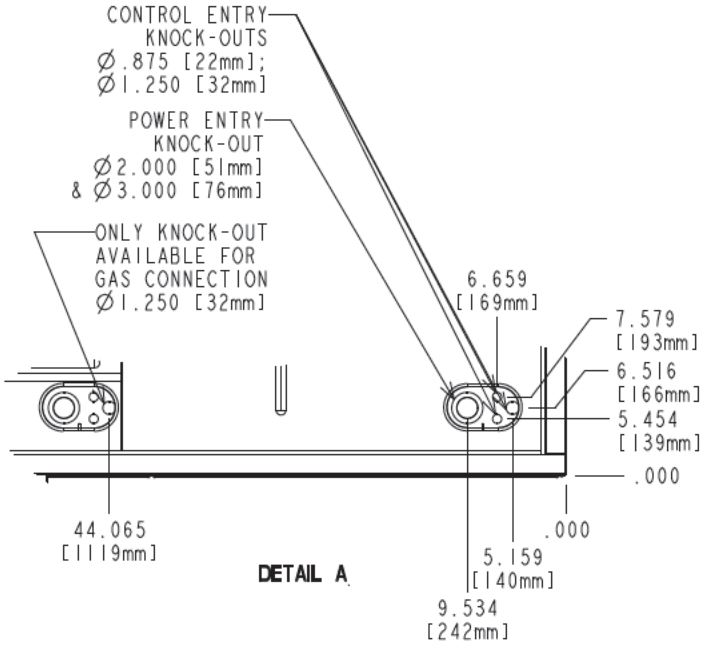
FIGURE 2



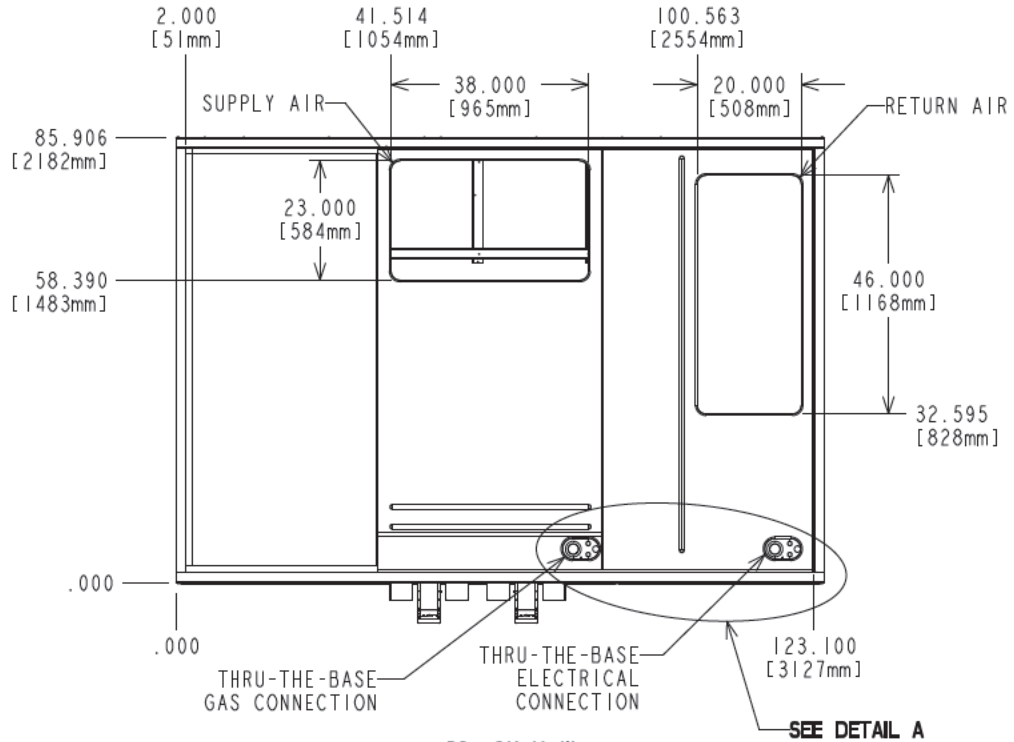
RIGHT VIEW



BACK VIEW



DETAIL A



BOTTOM VIEW

[] Designates Metric Conversions

ST-A1207-08

GENERAL DATA - RKHL

Model RKHL- Series	D180CL25E	D180CL35E	D180CM25E	D180CM35E
Cooling Performance[1]				Continued ->
Gross Cooling Capacity Btu [kW]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]
EER/SEER[2]	12.4/NA	12.4/NA	12.4/NA	12.4/NA
Nominal CFM/AHRI Rated CFM [L/s]	6000/5800 [2831/2737]	6000/5800 [2831/2737]	6000/5800 [2831/2737]	6000/5800 [2831/2737]
AHRI Net Cooling Capacity Btu [kW]	176,000 [51.57]	176,000 [51.57]	176,000 [51.57]	176,000 [51.57]
Net Sensible Capacity Btu [kW]	130,400 [38.21]	130,400 [38.21]	130,400 [38.21]	130,400 [38.21]
Net Latent Capacity Btu [kW]	45,600 [13.36]	45,600 [13.36]	45,600 [13.36]	45,600 [13.36]
IEER[3]	13	13	13	13
Net System Power kW	14.23	14.23	14.23	14.23
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)	101,500/203,000 [29.74/59.48]	142,000/284,000 [41.61/83.21]	101,500/203,000 [29.74/59.48]	142,000/284,000 [41.61/83.21]
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 State 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	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1 [25.4]	1 [25.4]	1 [25.4]	1 [25.4]
Face Area sq. ft. [sq. m]	50.8 [4.72]	50.8 [4.72]	50.8 [4.72]	50.8 [4.72]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Indoor 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]	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]
Outdoor Fan - Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	3/24 [609.6]	3/24 [609.6]	3/24 [609.6]	3/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	10000 [4719]	10000 [4719]	10000 [4719]	10000 [4719]
No. Motors/HP	3 at 1/3 HP	3 at 1/3 HP	3 at 1/3 HP	3 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	Single	Single	Single	Single
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
Potable Water Heat Recovery				
Heat Exchanger Type	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate
Material	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel
No. Flat Plates	50	50	50	50
Unit Water Connections No./Size in. [mm]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]
Water Pump - Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
GPM [L/s]	30 [1.89]	30 [1.89]	30 [1.89]	30 [1.89]
Head Pressure ft. H2O [kPa]	25 [74.7]	25 [74.7]	25 [74.7]	25 [74.7]
Motor HP	1/3	1/3	1/3	1/3
Motor RPM	3450	3450	3450	3450
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]	171/201 [4848/5698]	171/201 [4848/5698]	171/201 [4848/5698]	171/201 [4848/5698]
Weights				
Net Weight lbs. [kg]	2027 [919]	2040 [925]	2056 [933]	2069 [938]
Ship Weight lbs. [kg]	2154 [977]	2167 [983]	2183 [990]	2196 [996]

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 (IEER) is rated in accordance with AHRI Standard 210/240 or 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 - RKHL

Model RKHL- Series	D180DL25E	D180DL35E	D180DM25E	D180DM35E
Cooling Performance[1]				
Gross Cooling Capacity Btu [kW]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]	182,000 [53.33]
EER/SEER[2]	12.4/NA	12.4/NA	12.4/NA	12.4/NA
Nominal CFM/AHRI Rated CFM [L/s]	6000/5800 [2831/2737]	6000/5800 [2831/2737]	6000/5800 [2831/2737]	6000/5800 [2831/2737]
AHRI Net Cooling Capacity Btu [kW]	176,000 [51.57]	176,000 [51.57]	176,000 [51.57]	176,000 [51.57]
Net Sensible Capacity Btu [kW]	130,400 [38.21]	130,400 [38.21]	130,400 [38.21]	130,400 [38.21]
Net Latent Capacity Btu [kW]	45,600 [13.36]	45,600 [13.36]	45,600 [13.36]	45,600 [13.36]
IEER[3]	13	13	13	13
Net System Power kW	14.23	14.23	14.23	14.23
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)	101,500/203,000 [29.74/59.48]	142,000/284,000 [41.61/83.21]	101,500/203,000 [29.74/59.48]	142,000/284,000 [41.61/83.21]
Temperature Rise Range ºF [ºC] (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 State 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	MicroChannel	MicroChannel	MicroChannel	MicroChannel
MicroChannel Depth in. [mm]	1 [25.4]	1 [25.4]	1 [25.4]	1 [25.4]
Face Area sq. ft. [sq. m]	50.8 [4.72]	50.8 [4.72]	50.8 [4.72]	50.8 [4.72]
Rows / FPI [FPcm]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]	1 / 23 [9]
Indoor 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]	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]
Outdoor Fan - Type	Propeller	Propeller	Propeller	Propeller
No. Used/Diameter in. [mm]	3/24 [609.6]	3/24 [609.6]	3/24 [609.6]	3/24 [609.6]
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
CFM [L/s]	10000 [4719]	10000 [4719]	10000 [4719]	10000 [4719]
No. Motors/HP	3 at 1/3 HP	3 at 1/3 HP	3 at 1/3 HP	3 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	Single	Single	Single	Single
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
Potable Water Heat Recovery				
Heat Exchanger Type	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate	Vented Double-Wall Flat Plate
Material	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel	Cu Brazed Stainless Steel
No. Flat Plates	50	50	50	50
Unit Water Connections No./Size in. [mm]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]	2/1.625 [41.3]
Water Pump - Type	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive Type/No. Speeds	Direct/1	Direct/1	Direct/1	Direct/1
Housing Material	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
GPM [L/s]	30 [1.89]	30 [1.89]	30 [1.89]	30 [1.89]
Head Pressure ft. H2O [kPa]	25 [74.7]	25 [74.7]	25 [74.7]	25 [74.7]
Motor HP	1/3	1/3	1/3	1/3
Motor RPM	3450	3450	3450	3450
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]	171/201 [4848/5698]	171/201 [4848/5698]	171/201 [4848/5698]	171/201 [4848/5698]
Weights				
Net Weight lbs. [kg]	2027 [919]	2040 [925]	2056 [933]	2069 [938]
Ship Weight lbs. [kg]	2154 [977]	2167 [983]	2183 [990]	2196 [996]

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 (IEER) is rated in accordance with AHRI Standard 210/240 or 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.

GROSS COOLING PERFORMANCE DATA – RKHL-D180

Entering Indoor Air @ 80ºF [26.7ºC] dbE ①											
wbE			71ºF [21.7ºC]			67ºF [19.4ºC]			63ºF [17.2ºC]		
CFM [L/s]			7200 [3398]	5800 [2737]	4800 [2265]	7200 [3398]	5800 [2737]	4800 [2265]	7200 [3398]	5800 [2737]	4800 [2265]
DR ①			0.15	0.11	0.07	0.15	0.11	0.07	0.15	0.11	0.07
Outdoor Dry Bulb Temperature	75ºF [23.9ºC]	Total BTUH [kW]	222 [65.1]	212.7 [62.3]	206 [60.4]	210.7 [61.7]	201.9 [59.2]	195.5 [57.3]	205.6 [60.3]	197 [57.7]	190.8 [55.9]
		Sens BTUH [kW]	137.7 [40.4]	123.8 [36.3]	113.8 [33.3]	162.8 [47.7]	146.4 [42.9]	134.6 [39.4]	188.7 [55.3]	169.6 [49.7]	156 [45.7]
		Power	10.9	10.6	10.5	10.7	10.5	10.3	10.6	10.4	10.2
	80ºF [26.7ºC]	Total BTUH [kW]	216.6 [63.5]	207.5 [60.8]	201 [58.9]	205.3 [60.2]	196.7 [57.6]	190.5 [55.8]	200.2 [58.7]	191.8 [56.2]	185.8 [54.5]
		Sens BTUH [kW]	134.6 [39.4]	121 [35.5]	111.3 [32.6]	159.8 [46.8]	143.6 [42.1]	132 [38.7]	185.7 [54.4]	166.9 [48.9]	153.4 [45]
		Power	11.3	11.1	10.9	11.2	11	10.8	11.1	10.8	10.7
	85ºF [29.4ºC]	Total BTUH [kW]	211.3 [61.9]	202.4 [59.3]	196 [57.4]	200 [58.6]	191.6 [56.1]	185.6 [54.4]	194.9 [57.1]	186.7 [54.7]	180.8 [53]
		Sens BTUH [kW]	131.6 [38.6]	118.3 [34.7]	108.8 [31.9]	156.8 [45.9]	140.9 [41.3]	129.6 [38]	182.7 [53.5]	164.2 [48.1]	151 [44.2]
		Power	11.9	11.6	11.4	11.7	11.5	11.3	11.6	11.3	11.2
	90ºF [32.2ºC]	Total BTUH [kW]	205.9 [60.3]	197.3 [57.8]	191.1 [56]	194.6 [57]	186.5 [54.6]	180.6 [52.9]	189.5 [55.5]	181.6 [53.2]	175.9 [51.5]
		Sens BTUH [kW]	128.7 [37.7]	115.7 [33.9]	106.4 [31.2]	153.9 [45.1]	138.3 [40.5]	127.2 [37.3]	179.8 [52.7]	161.6 [47.3]	148.6 [43.5]
		Power	12.4	12.2	12	12.3	12	11.9	12.2	11.9	11.7
	95ºF [35.0ºC]	Total BTUH [kW]	200.6 [58.8]	192.2 [56.3]	186.1 [54.5]	189.3 [55.5]	181.4 [53.1]	175.7 [51.5]	184.2 [54]	176.5 [51.7]	171 [50.1]
		Sens BTUH [kW]	125.9 [36.9]	113.2 [33.2]	104.1 [30.5]	151.1 [44.3]	135.8 [39.8]	124.8 [36.6]	177 [51.9]	159 [46.6]	146.2 [42.9]
		Power	13.1	12.8	12.6	12.9	12.7	12.5	12.8	12.5	12.3
	100ºF [37.8ºC]	Total BTUH [kW]	195.3 [57.2]	187.1 [54.8]	181.2 [53.1]	184 [53.9]	176.3 [51.7]	170.8 [50]	178.9 [52.4]	171.4 [50.2]	166 [48.7]
		Sens BTUH [kW]	123.2 [36.1]	110.7 [32.4]	101.8 [29.8]	148.3 [43.5]	133.3 [39.1]	122.6 [35.9]	174.2 [51.1]	156.6 [45.9]	144 [42.2]
		Power	13.7	13.5	13.3	13.6	13.3	13.1	13.5	13.2	13
	105ºF [40.6ºC]	Total BTUH [kW]	190 [55.7]	182 [53.3]	176.3 [51.7]	178.7 [52.4]	171.2 [50.2]	165.9 [48.6]	173.7 [50.9]	166.4 [48.7]	161.1 [47.2]
		Sens BTUH [kW]	120.6 [35.3]	108.4 [31.8]	99.6 [29.2]	145.7 [42.7]	131 [38.4]	120.4 [35.3]	171.6 [50.3]	154.2 [45.2]	141.8 [41.6]
		Power	14.5	14.2	14	14.3	14	13.8	14.2	13.9	13.7
	110ºF [43.3ºC]	Total BTUH [kW]	184.8 [54.1]	177 [51.9]	171.5 [50.2]	173.5 [50.8]	166.2 [48.7]	161 [47.2]	168.4 [49.3]	161.3 [47.3]	156.3 [45.8]
		Sens BTUH [kW]	118 [34.6]	106.1 [31.1]	97.6 [28.6]	143.2 [42]	128.7 [37.7]	118.3 [34.7]	168.4 [49.3]	152 [44.5]	139.7 [40.9]
		Power	15.3	14.9	14.7	15.1	14.8	14.6	15	14.7	14.5
	115ºF [46.1ºC]	Total BTUH [kW]	179.5 [52.6]	172 [50.4]	166.6 [48.8]	168.2 [49.3]	161.2 [47.2]	156.1 [45.8]	163.2 [47.8]	156.3 [45.8]	151.4 [44.4]
		Sens BTUH [kW]	115.6 [33.9]	103.9 [30.4]	95.5 [28]	140.7 [41.2]	126.5 [37.1]	116.3 [34.1]	163.2 [47.8]	149.8 [43.9]	137.7 [40.4]
		Power	16.1	15.8	15.5	16	15.6	15.4	15.8	15.5	15.3
	120ºF [48.9ºC]	Total BTUH [kW]	174.3 [51.1]	167 [48.9]	161.8 [47.4]	163 [47.8]	156.2 [45.8]	151.3 [44.3]	157.9 [46.3]	151.3 [44.3]	146.6 [42.9]
		Sens BTUH [kW]	113.3 [33.2]	101.8 [29.8]	93.6 [27.4]	138.4 [40.6]	124.4 [36.4]	114.4 [33.5]	157.9 [46.3]	147.7 [43.3]	135.8 [39.8]
		Power	17	16.6	16.4	16.9	16.5	16.3	16.7	16.4	16.1
	125ºF [51.7ºC]	Total BTUH [kW]	169.1 [49.6]	162 [47.5]	156.9 [46]	157.8 [46.3]	151.2 [44.3]	146.5 [42.9]	152.8 [44.8]	146.3 [42.9]	141.7 [41.5]
		Sens BTUH [kW]	111 [32.5]	99.8 [29.2]	91.7 [26.9]	136.1 [39.9]	122.4 [35.9]	112.5 [33]	152.8 [44.8]	145.6 [42.7]	133.9 [39.2]
		Power	17.9	17.6	17.3	17.8	17.4	17.2	17.7	17.3	17

DR —Depression ratio Total —Total capacity x 1000 BTUH NOTES:

dbE —Entering air dry bulb Sens —Sensible capacity x 1000 BTUH ① When the entering air dry bulb is other than 80°F [27°C], adjust the sensible

wbE—Entering air wet bulb Power—KW input capacity from the table by adding [1.10 x CFM x (1 – DR) x (dbE – 80)].

GROSS WATER HEATING CAPACITY – D180

ENTERING INDOOR AIR @ 80°F [26.7°C] dbE												
wbE			71°F [21.7°C]			67°F [19.4°C]			63°F [17.2°C]			
CFM [Ls]			7200 [3398]	5800 [2737]	4800 [2265]	7200 [3398]	5800 [2737]	4800 [2265]	7200 [3398]	5800 [2737]	4800 [2265]	
OUTLET WATER TEMPERATURE °F [°C]	75 [23.9]	Total BTUH [kW]	145.0 [42.5]	142.9 [41.9]	140.3 [41.1]	140.9 [41.3]	132.3 [38.8]	131.9 [38.7]	141.4 [41.4]	134.6 [39.4]	129.3 [37.9]	
		Power kW	4.2	4.2	4.4	4.2	5.9	4.3	4.2	4.5	4.2	
	80 [26.7]	Total BTUH [kW]	142.8 [41.9]	140.8 [41.3]	138.7 [40.6]	139.0 [40.7]	130.9 [38.4]	130.4 [38.2]	139.5 [40.9]	133.2 [39.0]	128.2 [37.6]	
		Power kW	4.4	4.4	4.5	4.4	5.7	4.4	4.4	4.7	4.4	
	85 [29.4]	Total BTUH [kW]	140.7 [41.2]	138.7 [40.6]	137.1 [40.2]	137.2 [40.2]	129.4 [37.9]	128.9 [37.8]	137.5 [40.3]	131.8 [38.6]	127.0 [37.2]	
		Power kW	4.6	4.6	4.7	4.6	5.5	4.6	4.6	4.9	4.6	
	90 [32.2]	Total BTUH [kW]	138.5 [40.6]	136.6 [40.0]	135.5 [39.7]	135.3 [39.7]	128.0 [37.5]	127.4 [37.3]	135.6 [39.7]	130.3 [38.2]	125.9 [36.9]	
		Power kW	4.8	4.8	4.9	4.8	5.5	4.8	4.8	5.2	4.8	
	95 [35.0]	Total BTUH [kW]	136.4 [40.0]	134.4 [39.4]	133.9 [39.2]	133.4 [39.1]	126.5 [37.1]	126.0 [36.9]	133.7 [39.2]	128.9 [37.8]	124.7 [36.5]	
		Power kW	5.1	5.1	5.2	5.1	5.5	5.1	5.1	5.4	5.1	
	100 [37.8]	Total BTUH [kW]	134.3 [39.4]	132.3 [38.8]	132.4 [38.8]	131.5 [38.5]	125.1 [36.7]	124.5 [36.5]	131.7 [38.6]	127.5 [37.4]	123.6 [36.2]	
		Power kW	5.4	5.3	5.4	5.4	5.7	5.4	5.4	5.7	5.4	
	105 [40.6]	Total BTUH [kW]	132.1 [38.7]	130.2 [38.2]	130.8 [38.3]	129.7 [38.0]	123.6 [36.2]	123.0 [36.0]	129.8 [38.0]	126.1 [37.0]	122.4 [35.9]	
		Power kW	5.7	5.7	5.7	5.7	6.0	5.7	5.7	6.0	5.7	
	110 [43.3]	Total BTUH [kW]	130.0 [38.1]	128.1 [37.5]	129.2 [37.9]	127.8 [37.5]	122.2 [35.8]	121.6 [35.6]	127.9 [37.5]	124.7 [36.5]	121.3 [35.5]	
		Power kW	6.0	6.0	6.0	6.0	6.3	6.0	6.0	6.4	6.0	
	115 [46.1]	Total BTUH [kW]	127.9 [37.5]	126.0 [36.9]	127.6 [37.4]	125.9 [36.9]	120.7 [35.4]	120.1 [35.2]	125.9 [36.9]	123.3 [36.1]	120.1 [35.2]	
		Power kW	6.4	6.4	6.4	6.4	6.6	6.4	6.4	6.8	6.4	
	120 [48.9]	Total BTUH [kW]	125.7 [36.8]	123.8 [36.3]	126.0 [36.9]	124.1 [36.4]	119.3 [35.0]	118.6 [34.8]	124.0 [36.3]	121.9 [35.7]	119.0 [34.9]	
		Power kW	6.8	6.8	6.8	6.8	7.1	6.8	6.8	7.2	6.8	
	125 [51.7]	Total BTUH [kW]	123.6 [36.2]	121.7 [35.7]	124.4 [36.5]	122.2 [35.8]	117.8 [34.5]	117.2 [34.3]	122.1 [35.8]	120.5 [35.3]	117.8 [34.5]	
		Power kW	7.3	7.3	7.2	7.3	7.5	7.3	7.3	7.7	7.3	

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.
   Water piping supply length and routing

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

B. H_2AC ROOFTOP UNIT SPECIAL CONSIDERATIONS

Since the waste-heat recovery/water heating feature of the H_2AC rooftop unit only functions during the cooling mode, the unit should be installed to serve the area of the structure having the largest cooling run-time, for instance the kitchen area of a restaurant, in order to provide the greatest water heating and energy saving benefits.

The H_2AC rooftop unit is equipped with an outdoor temperature sensor that energizes the water pump continuously below 35°F to minimize the chance of the water system freezing, however this is not intended to be the sole method of unit freeze protection. **If the H_2AC rooftop unit is installed in a geographic location where freezing temperature can occur, the water lines, valves, and couplings connected outside the unit must be adequately protected with insulation and heat tape suitable for the lowest expected temperatures.**

Alternately, the unit and all connecting lines can be drained of water and the unit heat exchanger, pump, and internal piping winterized using a non-toxic recreational vehicle type of anti-freeze suitable for potable water systems.

The H_2AC rooftop unit is equipped with a water leak sensor designed to sense water that would accumulate in the pan under the water pump and refrigerant-to-water heat exchanger assembly located on the blower deck. If a leak is sensed in that area an alarm is triggered on the RTU-C (ClearControl) control board and a water shutoff relay is energized to activate the **optional** RXMV-AH electric water shut-off valve. It is strongly recommended that the RXMV-AH be installed to minimize the chance of water damage to the structure in case of a water leak in the unit.

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.

⚠ 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.

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.

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 1.

To attach exhaust/combustion air inlet hood:

1. Open blower access panel. For location of blower access panel, see Figure 1.
2. Remove exhaust/combustion air inlet hoods from the cartons, located inside the blower compartment.
3. Close blower access panel.
4. Attach the combustion air inlet/exhaust hoods with screws. Reference Figure 1 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.

⚠ 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.

D. 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 3.

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 3
COMPONENT LOCATIONS

15-TON

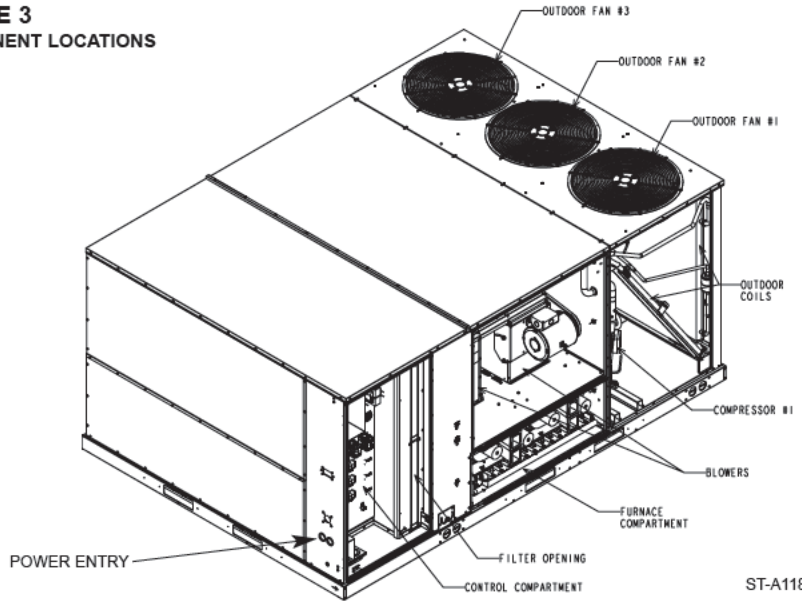
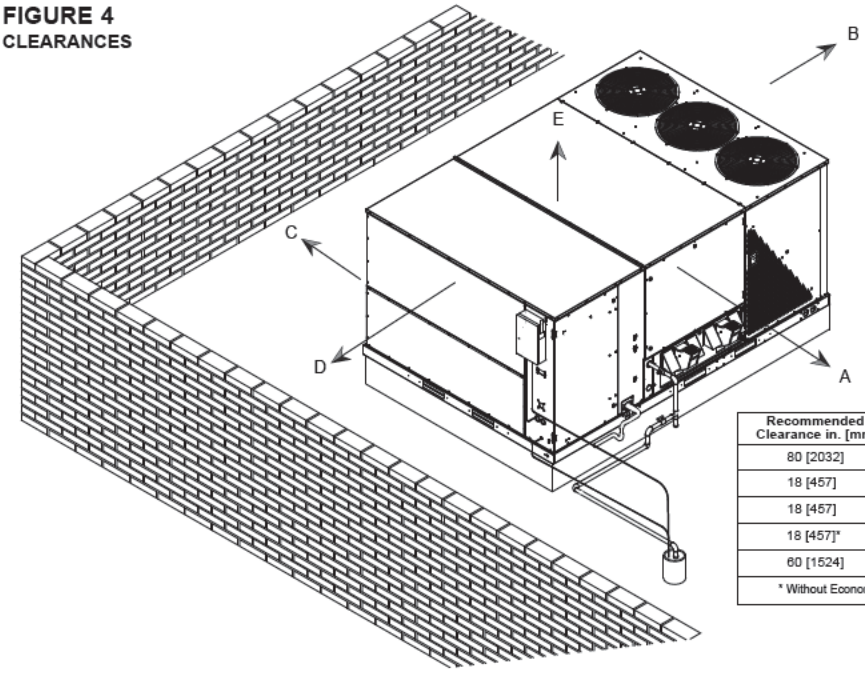


FIGURE 4
CLEARANCES



Recommended Clearance in. [mm]	Location
80 [2032]	A - Front
18 [457]	B - Condenser Coil
18 [457]	C - Duct Side
18 [457]*	D - Evaporator End
60 [1524]	E - Above
* Without Economizer 48 [1219] With Economizer	

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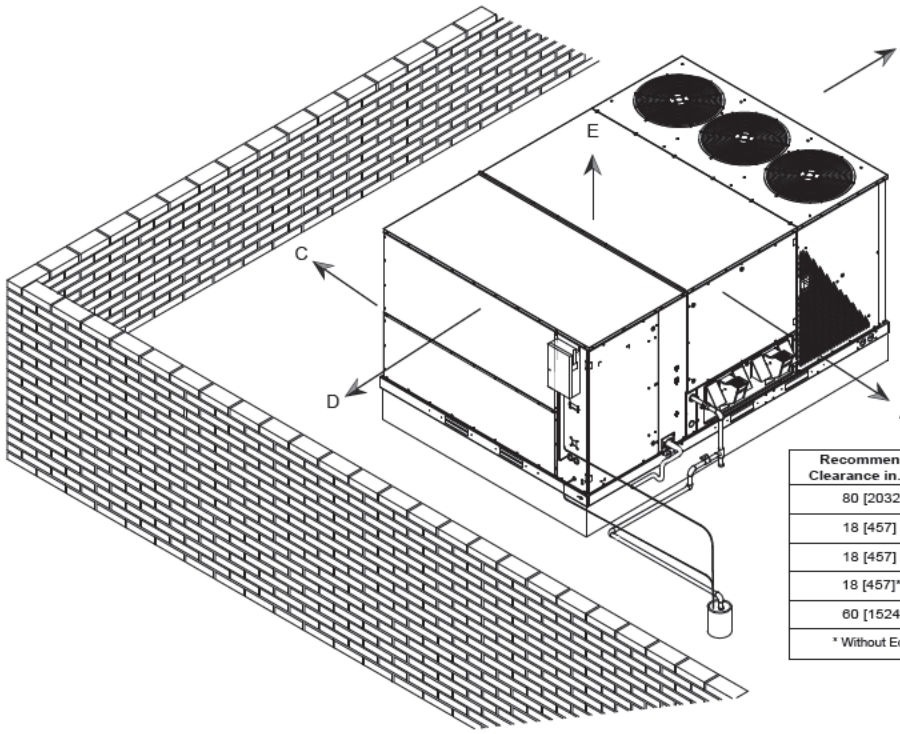
E. CLEARANCES

The following minimum clearances must be observed for proper unit performance and serviceability. Reference Figure 4.

F. 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.**

FIGURE 5
FLAT ROOFTOP INSTALLATION, ATTIC OR DROP CEILING DISTRIBUTING SYSTEM. MOUNTED ON ROOFCURB. CURB MUST BE LEVEL.



Recommended Clearance in. [mm]	Location
80 [2032]	A - Front
18 [457]	B - Condenser Coil
18 [457]	C - Duct Side
18 [457]*	D - Evaporator End
60 [1524]	E - Above
* Without Economizer 48 [1219] With Economizer	

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⚠ 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.

2. For rigging and roofcurb details, see Figures 6, 7 and 8.
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.*

G. 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.

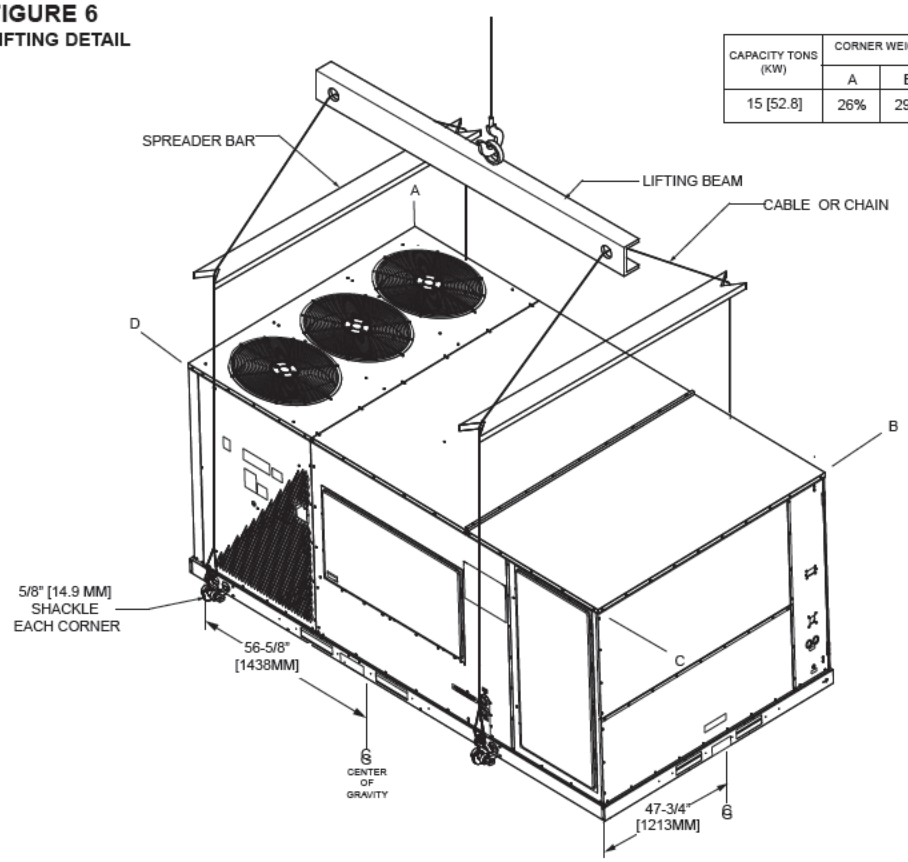
On ductwork exposed to outside temperature and humidity, use a minimum of 2" of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2" of insulation. ½" to 1" thick insulation is usually sufficient for ductwork inside the air conditioned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

FIGURE 6
LIFTING DETAIL

CAPACITY TONS (KW)	CORNER WEIGHTS BY PERCENTAGE			
	A	B	C	D
15 [52.8]	26%	29%	18%	27%



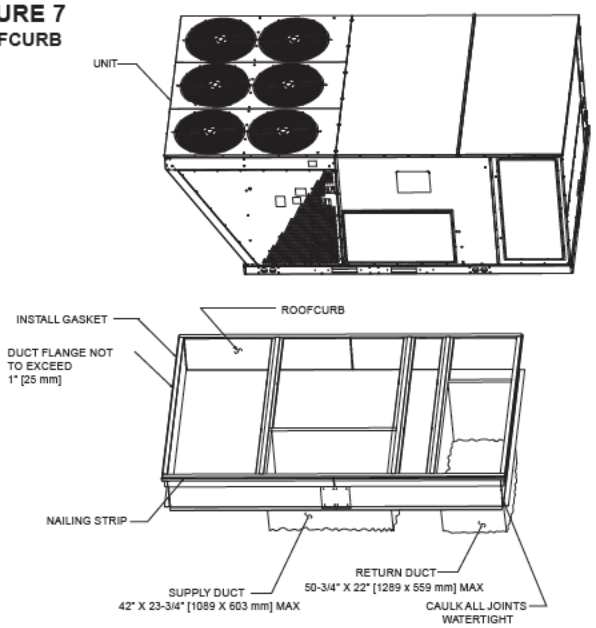
H. RETURN AIR

⚠ 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.

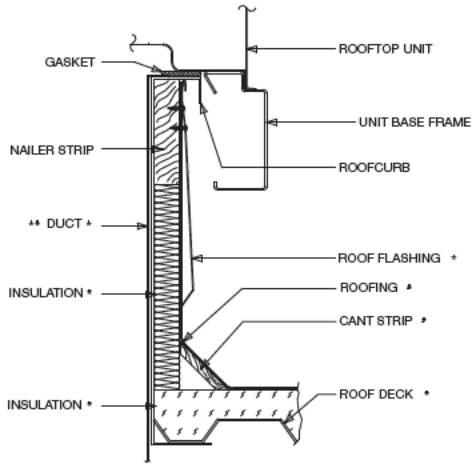
FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

FIGURE 7
ROOFCURB



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FIGURE 8
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 Figure 9 or through the base as shown in Figure 13.
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 9 and Figure 13.)
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)

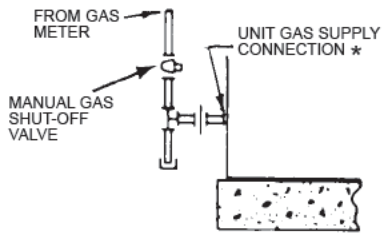
Nominal Iron Pipe Size, Inches	Equivalent Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
½	132	92	73	63	56	50	46	43
¾	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1¼	1,050	730	590	500	440	400	370	350
1½	1,600	1,100	890	760	670	610	560	530

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 9

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.

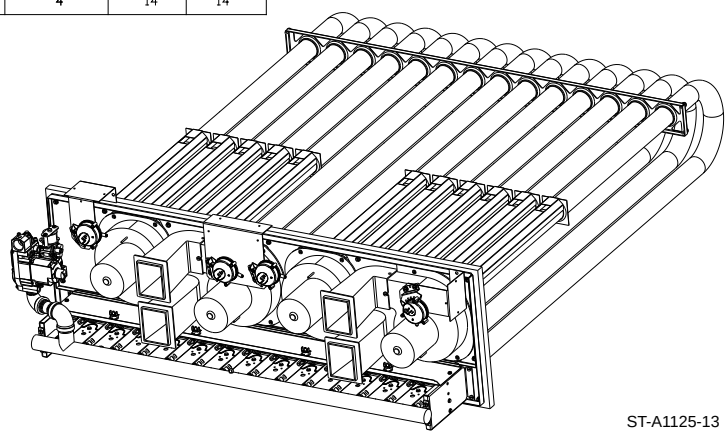
Convert the unit to use liquefied petroleum (LP) gas by replacing with the stem/spring assembly supplied in the conversion kit. The LP gas valve maintains the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit.

See Figure 10A 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.***

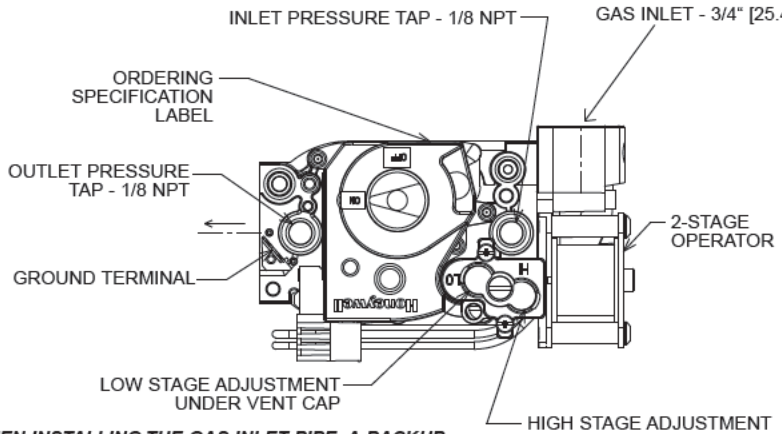
FIGURE 10A
HEAT EXCHANGER COMPONENT IDENTIFICATION

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 10B
HONEYWELL VR8305Q4120 TWO STAGE GAS VALVE



WHEN INSTALLING THE GAS INLET PIPE, A BACKUP WRENCH MUST BE USED ON THE GAS VALVE TO AVOID DAMAGE.

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 10B.

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 10B. **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.

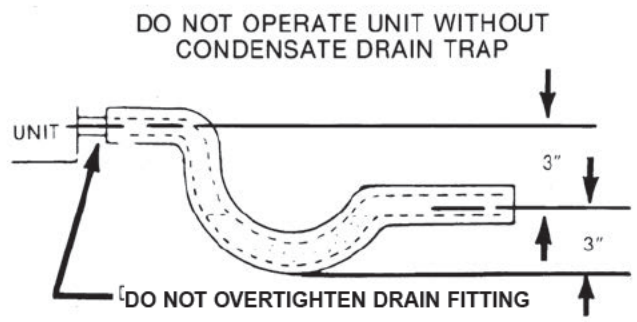
IMPORTANT NOTE FOR ALTITUDES ABOVE 2,000 FEET (610 METERS): The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2,000 feet in the USA or Canada, or for elevations of 2,000 - 4,500 feet (610 -1,373 meters) in Canada 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 11
CONDENSATE DRAIN



D. CONDENSATE DRAIN

IMPORTANT: Install a condensate trap to ensure proper condensate drainage. See Figure 11.

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 13.** All fittings and conduit are field supplied for this application. Reference the chart in **Figure 13** 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.

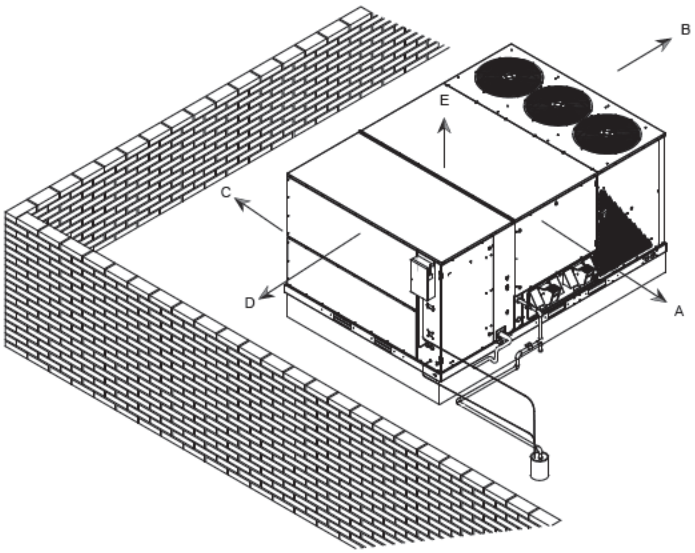
IMPORTANT: THIS UNIT IS APPROVED FOR USE WITH COPPER CONDUCTORS ONLY CONNECTED TO UNIT CONTACTOR.

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 12
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.

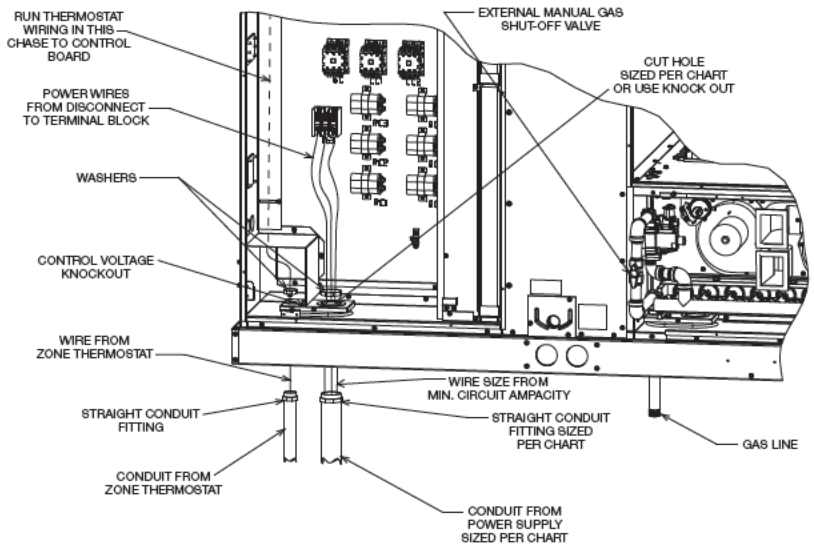
Refer to Figure 13 for location of wiring entrances.

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 13
BASE ENTRY LOCATIONS

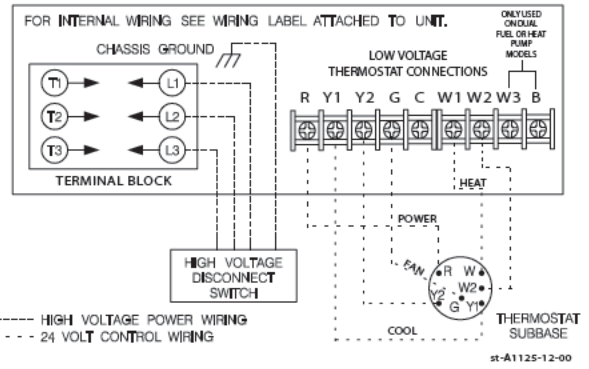


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	WIRE SIZE, AWG											
	14	12	10	8	6	4	3	2	1	0	00	000
CONDUIT SIZE	1/2″	1/2″	1/2″	3/4″	1″	1″	1-1/4″	1-1/4″	1-1/2″	1-1/2″	2″	2″
HOLE SIZE	7/8″	7/8″	7/8″	1-31/32″	1-23/64″	1-23/64″	1-23/32″	1-23/32″	1-31/32″	1-31/32″	2-15/32″	2-15/32″

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 14
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

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 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 13) 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.

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. WATER CONNECTIONS AND START UP FOR POTABLE WATER HEATING

A. WATER PIPING

1. Use of copper pipe suitable for potable water is recommended. Plumbing must meet applicable national and local plumbing and building codes.
2. The H_2AC rooftop unit should be installed as close to the storage tank as possible to minimize heat loss from interconnecting piping.

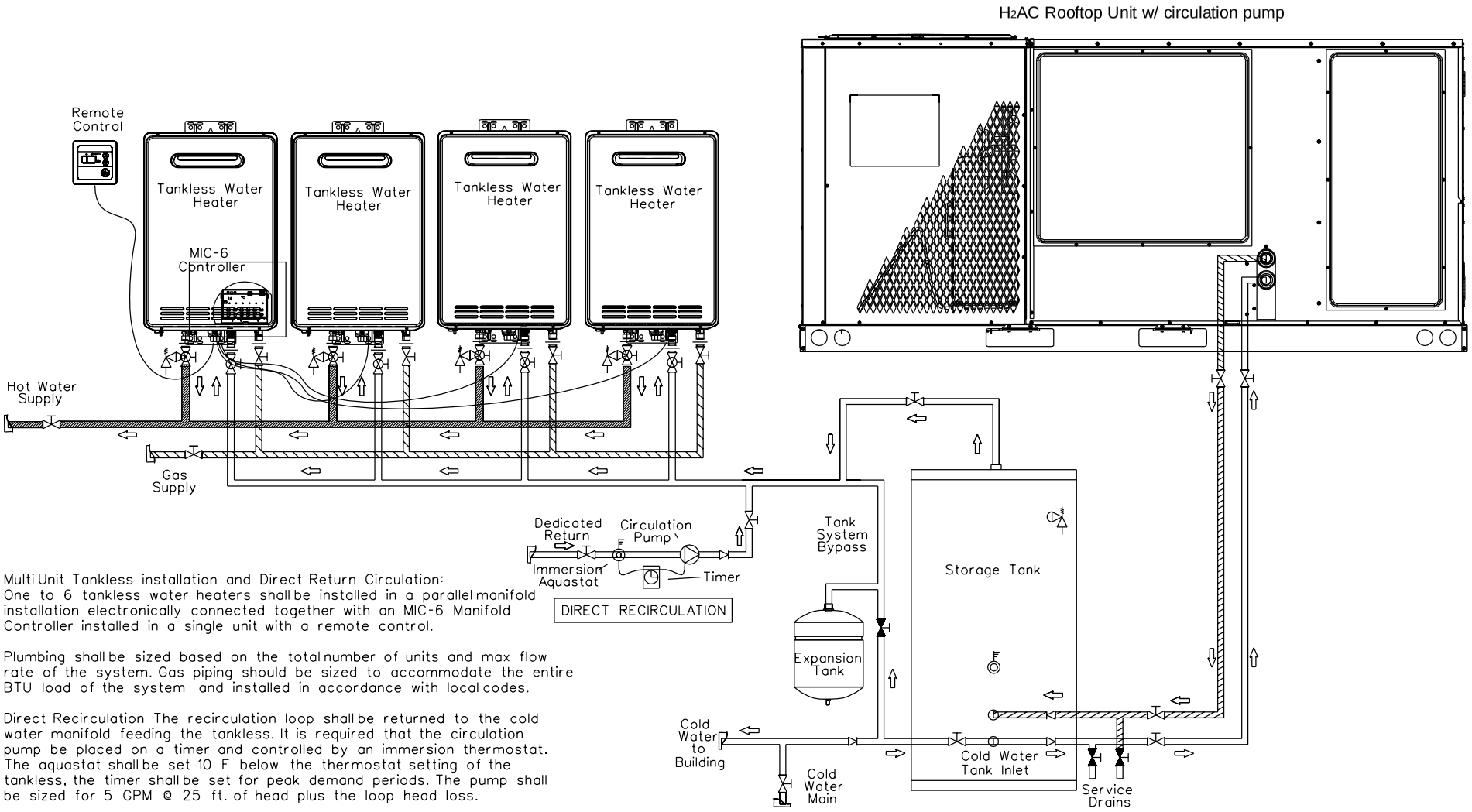
FIGURE 15
ISOLATION/FLUSHING VALVE



3. Use only solder, brazing, and pipe thread sealing materials approved for potable water systems.
4. Refer to connection diagram for typical piping, storage tank, and valve configurations.
5. **It is highly recommended that the H_2AC rooftop unit be installed with isolation/flushing valves (see Figure 15, Webstone #41436 or similar) on the inlet and outlet water connections to facilitate required periodic lime and scale removal from the water-to-refrigerant heat exchanger.**
6. Maximum equivalent length of water piping is to be in accordance with the procedure shown in this manual. Consult the pressure loss tables for the values associated with the required water fittings, valves, and straight lengths.
7. Use the H_2AC Water Flowrate vs. Water Pressure Drop graph to verify that total system equivalent piping length will not result in less than the 15 GPM minimum flow rate.

B. SYSTEM PRESSURE TEST AND START UP

1. Pressure test system complete system after all plumbing connections are made using accepted plumbing leak test procedures.
2. **The refrigerant-to-water heat exchanger and water pump housing will contain a small amount of non-toxic RV-type water system anti-freeze left over from the factory run test. Be certain to flush the unit and all connecting piping with fresh water prior to start up and initial use.**
3. Verify that air bleed valve in blower section on H_2AC rooftop unit is open during initial filling with water. Air must be bled from the highest point in the system. If unit installation results in a higher point than the integral air bleed valve, an additional valve needs to be installed at that point.
4. Start unit and verify the correct sequence of operation.



Multi Unit Tankless installation and Direct Return Circulation:
One to 6 tankless water heaters shall be installed in a parallel manifold installation electronically connected together with an MIC-6 Manifold Controller installed in a single unit with a remote control.

Plumbing shall be sized based on the total number of units and max flow rate of the system. Gas piping should be sized to accommodate the entire BTU load of the system and installed in accordance with local codes.

Direct Recirculation The recirculation loop shall be returned to the cold water manifold feeding the tankless. It is required that the circulation pump be placed on a timer and controlled by an immersion thermostat. The aquastat shall be set 10 F below the thermostat setting of the tankless, the timer shall be set for peak demand periods. The pump shall be sized for 5 GPM @ 25 ft. of head plus the loop head loss.

Legend

- Cold Water Isolator Valve Assembly
- Hot Water Isolator Valve Assembly
- Pressure Relief Valve
- Circulation Pump
- Normally Open Shut-off Valve
- Normally Closed Shut-off Valve
- Check Valve
- Union
- Gas Pipe
- Cold Water Pipe
- Hot Water Pipe
- Return Circulation Line

This drawing is intended as a guide only. It is not to be used as an alternative to a professionally engineered project drawing. This drawing does not imply compliance with local building codes. Installation may vary, depending on installation location, and must be done in accordance with all local building codes. Consult with local building officials prior to installation.

PROCEDURE FOR CALCULATING THE TOTAL EQUIVALENT LENGTH OF TUBING

List all piping components from the storage tank to the H_2AC rooftop unit and back again. The equivalent length of straight tubing is the same as the actual length. The equivalent length of fittings are obtained from the table below. Sum all of the individual component lengths to find the Total Equivalent Length.

***Pressure Loss in Fittings and Valves Expressed as Equivalent Length of Tube, feet**

Nominal or Standard Size, in		1-1/2"	2"
Fittings	Standard 90° Elbow	4	5.5
	Standard 45° Elbow	1.5	2
	90° Tee - Side Branch	7	9
	90° Tee - Straight Run	0.5	0.5
	Coupling	0.5	0.5
Valves	Ball	0.5	0.5
	Gate	—	0.5
	Btfly	—	7.5
	Check	6.5	9

No.Inlet		EQUIV. Length (ft.)	No.Outlet		EQUIV. Length (ft.)
1	side branch Tee	7.0	18	straight tubing	1
2	straight tubing	1.0	19	90° elbow	4.0
3	Check valve	6.5	20	straight tubing	0.5
4	straight tubing	0.5	21	1-1/2" MPT adapter ①	1
5	straight run Tee	0.5	22	Ball Isolation valve	0.5
6	straight tubing	1.5	23	1-1/2" MPT adapter ①	1.0
7	Ball valve	0.5	24	straight tubing	20.0
8	straight tubing	5.0	25	coupling	0.5
9	90° elbow	4.0	26	straight tubing	19.6
10	straight tubing	20.0	27	90° elbow	4.0
11	coupling	0.5	28	straight tubing	4.0
12	straight tubing	20.0	29	Ball valve	0.5
13	1-1/2" MPT adapter ①	1.0	30	straight tubing	1.5
14	Ball Isolation valve	0.5	31	straight run Tee	0.5
15	1-1/2" MPT adapter ①	1.0	32	straight tubing	0.5
16	straight tubing	0.5	33	Check valve	6.5
17	90° elbow - fitting	4.0	34	straight tubing	1.0
			35	90° elbow	4.0
		74.0			70.6
	Total Equivalent length	144.6 (ft.)			

*NOTES: ① For threaded fittings, double the allowances shown in the table.

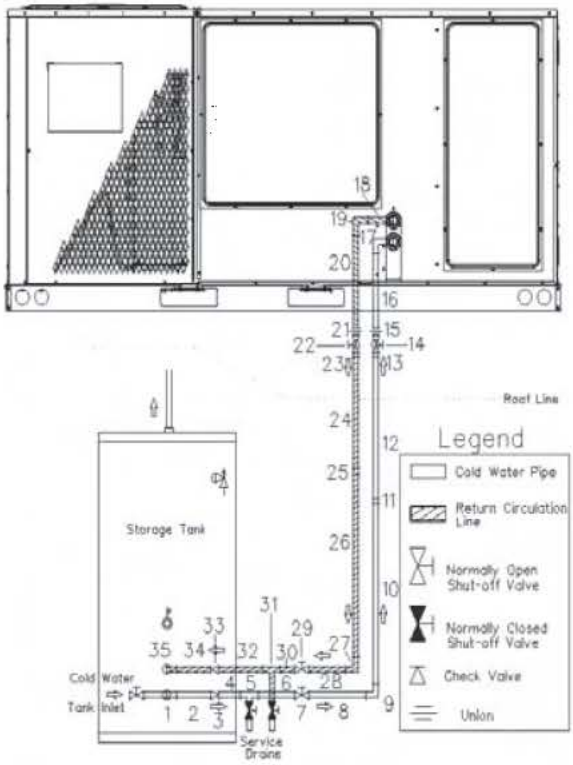
Data condensed from Table 7 of the Copper Development Organization.

Allowances are for streamlined soldered fittings and recessed threaded fittings.

The equivalent lengths presented above are based upon a C factor of 150 in the Hazen-Williams friction loss formula. The lengths shown are rounded to the nearest half foot.

In a closed system application the static (elevation) head is ignored. Only the pipe friction is used to calculate pressure drop.

FIGURE 16



PROCEDURE FOR CALCULATING THE TOTAL EQUIVALENT LENGTH OF TUBING

List all piping components from the storage tank to the H2AC rooftop unit and back again. The equivalent length of straight tubing is the same as the actual length. The equivalent length of fittings are obtained from the table below. Sum all of the individual coomponents lengths to find the Total Equivalent Length.

Water Flow Rate (GPM) (15 GPM minimum)		15	20	25	**30**
Water Velocity using 1-1/2" Nom. Type L Copper Tubing (fps)		2.71	3.61	4.51	5.41
Available Pressure Head at Unit @ 230/460 Volts	(Head ft.) (psig)	30.3 13.1	23.8 10.3	16.3 7.1	7.7 3.3
Maximum Equivalent Feet of 1-1/2 Nom. Type L. Copper tubing (ft.) at 230/460V		1504	695	314	106
Available Pressure Head at Unit @ 208 Units	(Head ft.) (psig)	26.8 11.6	19.5 8.4	11.3 4.9	2.2 0.9
Maximum Equivalent Feet of 1-1/2" Nom. Type L Copper Tubing (ft.) @ 208 V		1332	569	218	30

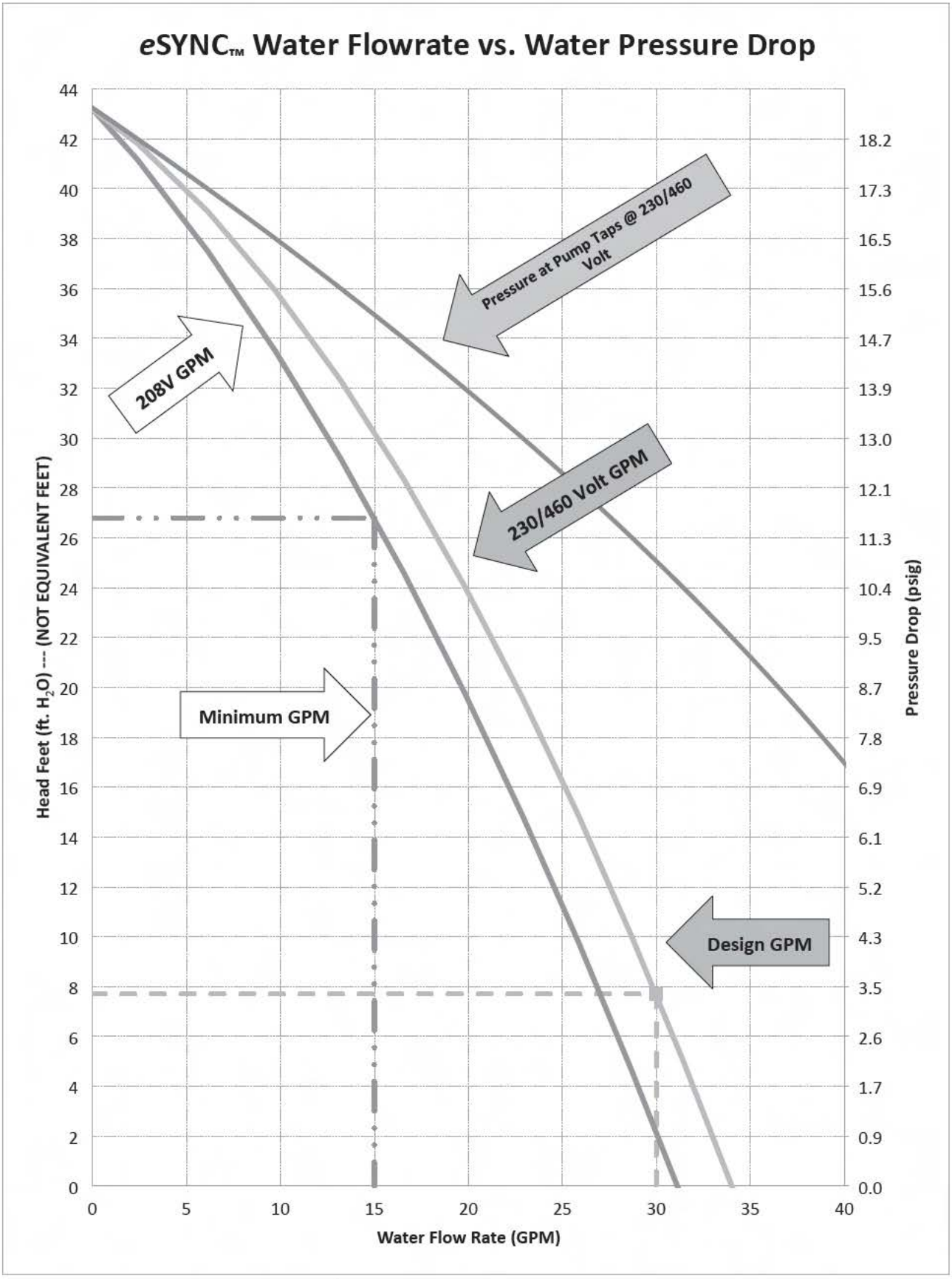
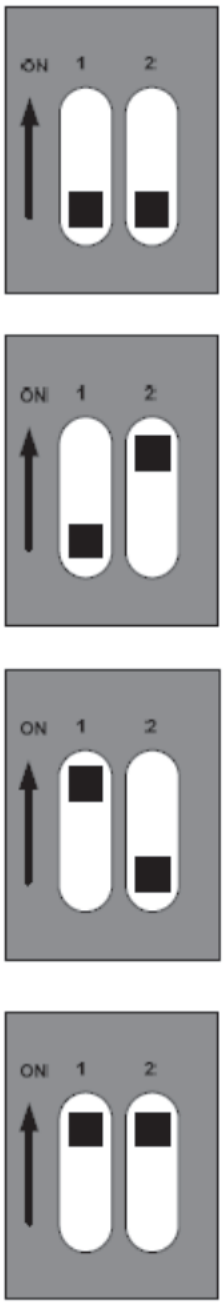

eSYNC™ Water Flowrate vs. Water Pressure Drop
Pressure at Pump Taps @ 230/460 Volt
208V GPM
230/460 Volt GPM
Minimum GPM
Design GPM
Head Feet (ft. H2O) --- (NOT EQUIVALENT FEET)
Pressure Drop (psig)
Water Flow Rate (GPM)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
0.0
0.9
1.7
2.6
3.5
4.3
5.2
6.1
6.9
7.8
8.7
9.5
10.4
11.3
12.1
13.0
13.9
14.7
15.6
16.5
17.3
18.2
0
5
10
15
20
25
30
35
40

FIGURE 17



H2AC ROOFTOP UNIT SEQUENCE OF OPERATION

1. On a call for cooling ("Y" from T'stat energized), unit always starts in air-cooled condenser mode and runs for two minutes.

   NOTE: For this two-stage cooling and potable water heating unit, the water heating section is located on the rear (second stage) refrigerant system. Because of the presence of eSYNC control, the unit will always start the rear compressor first (lag mode is permanently engaged), and then a Y2 call will energize the front compressor.

   a. Liquid line solenoid from water-cooled heat exchanger is energized during this time to expedite transfer of refrigerant from water-cooled condenser.

2. After two minutes water pump is energized for 60 seconds while water temperature is sampled by a thermistor.

   a. If water pressure switch does not sense adequate pressure (5 psig), or water inlet temperature is >95°F go to step 7.

3. If water pressure switch senses adequate pressure and water inlet temperature is <95°F, unit switches to water-cooled condenser mode*.

   a. Three-way valve is energized.

   b. Outdoor fans are switched off.

   c. Outdoor coil liquid line solenoid is energized to for two minutes to expedite return of liquid refrigerant in air-cooled condenser.

4. Unit operates in water-cooled condenser (water heating) mode until the call for cooling ends, outlet water temperature reaches 138°F, or liquid line pressure >565 psig.

5. The control will record the water inlet temperature when the refrigerant pressure reaches 550 psig. The control will use this value minus 20°F for the hybrid water inlet restart temperature.

6. If termination of a call for cooling ends the water-cooled condenser (water heating) cycle, the unit will restart as described in item 1 above on the next call for cooling.

7. If the water-cooled condenser (water heating) cycle terminates on water temperature rise (138°F) or pressure (>565 psig) and there is still a call for cooling, the unit three-way valve switches back to the air-cooled condenser mode, turns on the outdoor fans, and energizes the liquid line solenoid from the water-cooled condenser for two minutes.

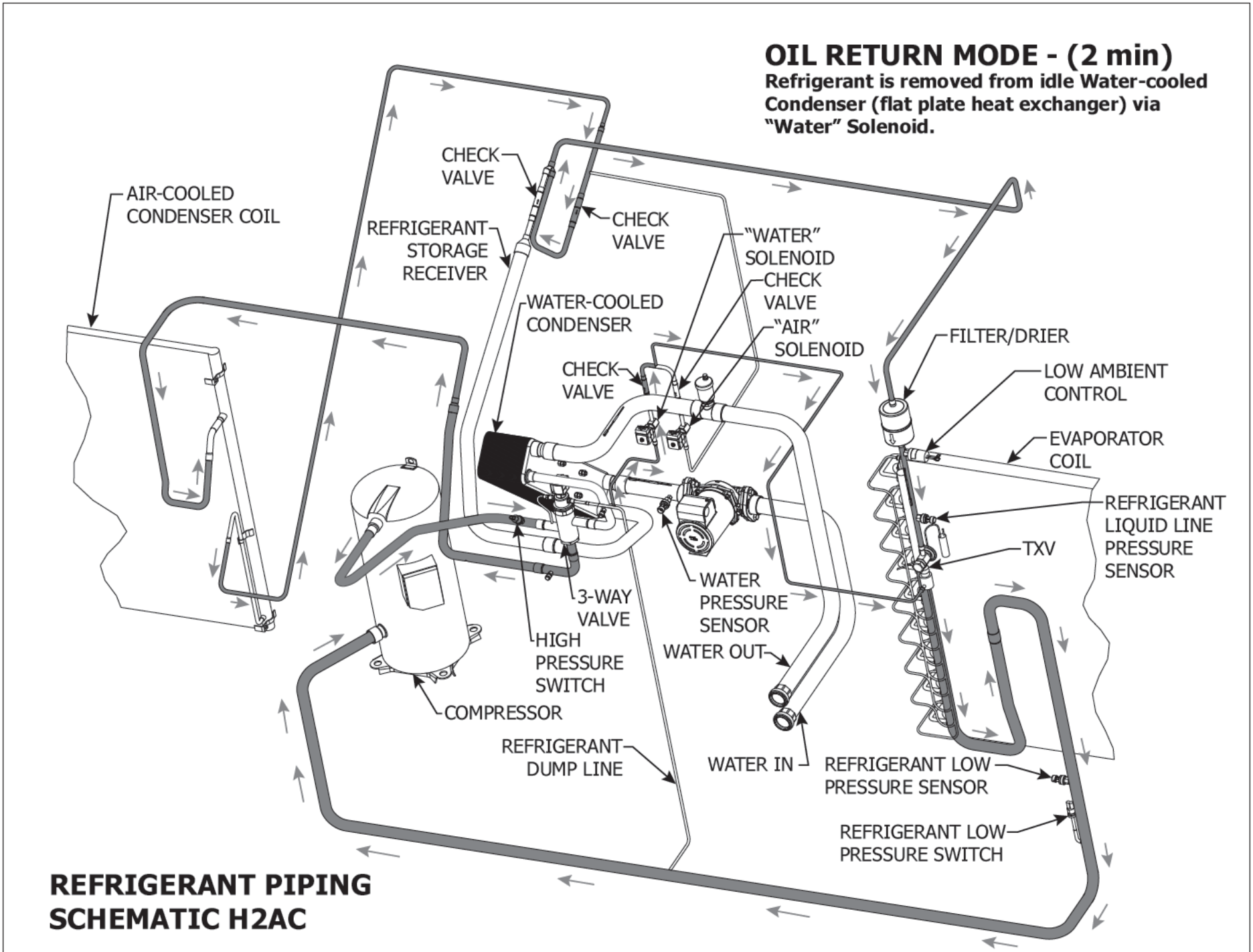
8. If a cooling ("Y") call continues, return to Step 2 after a selectable delay (default is ten minutes – see Figure 17).

FAULTS/LOCKOUTS/Misc.

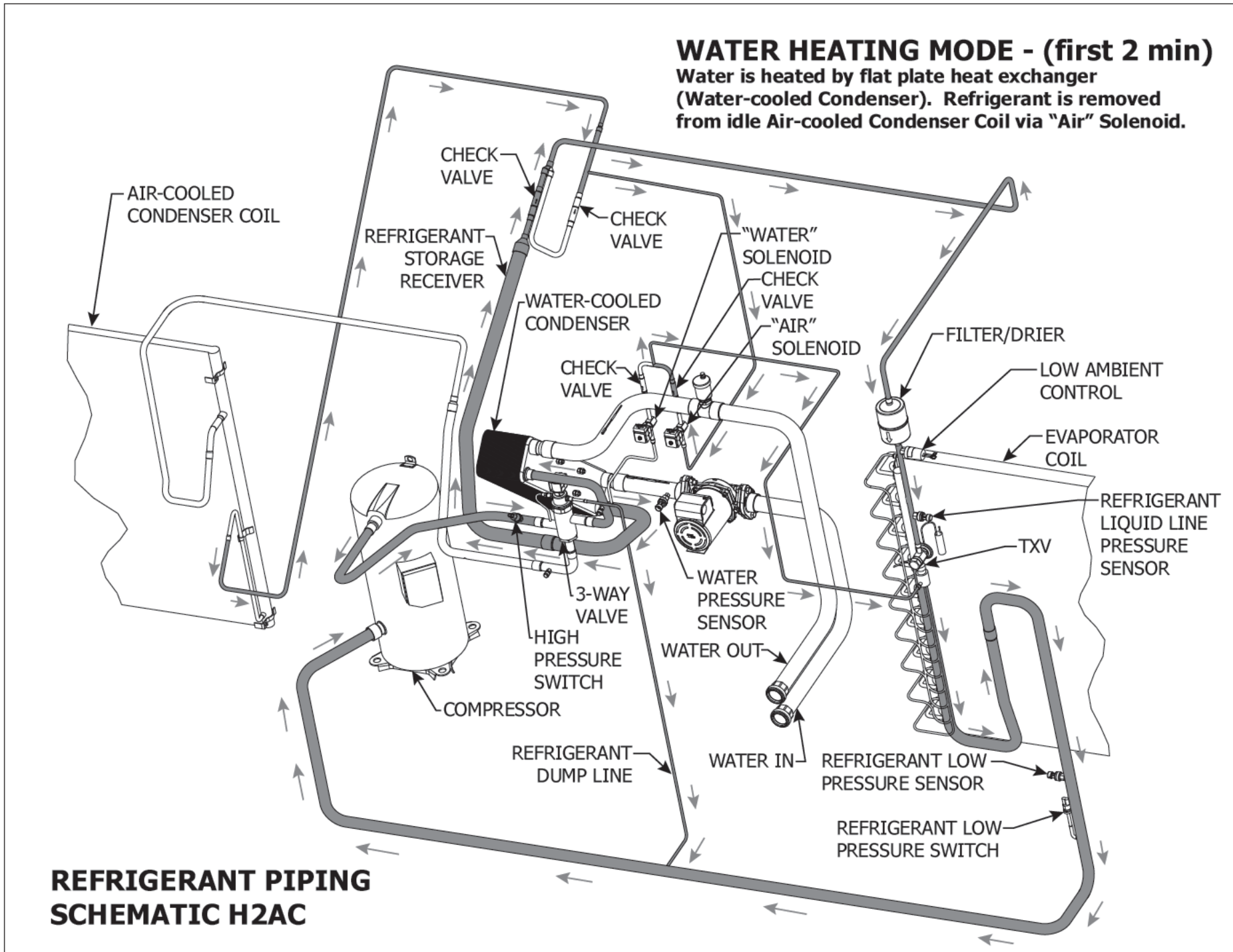
1. **Low-temperature lockout** - Occurs at 40°F for the water-cooled condenser (water heating) mode. Unit will only operate in the air-cooled condenser mode below 40°F.
2. **Standard DDC control lockouts –** High pressure control, low pressure control, low ambient control, etc.
3. **Three-way valve failure or water pump failure –** A rapid rise in liquid line pressure will occur. If liquid line pressure increases above 530 psig in less than one minute. If three of these trips occur during a call for cooling, a hard lockout of the water heating mode will occur, but the unit will still function in the air-cooled condenser mode.
4. **Airside solenoid valve failure –** shows up as an undercharge in the water heating mode. If subcooling is less than 4° or superheat is more than 25° after 2 minutes, 30 seconds unit will return to air cooled mode. If this happens three times in a row without a successful run of at least four minutes in the water heating mode, then a hard lockout of the water heating mode will occur, but the unit will still function in the air-cooled condenser mode.
5. **Freeze protection** - If ambient is <35°F, water pump is energized until ambient is >37°F.
6. **Leak detection** - If leak detector senses water, an alarm signal is sent to the thermostat and waterside operation is locked out until leak detection ends.

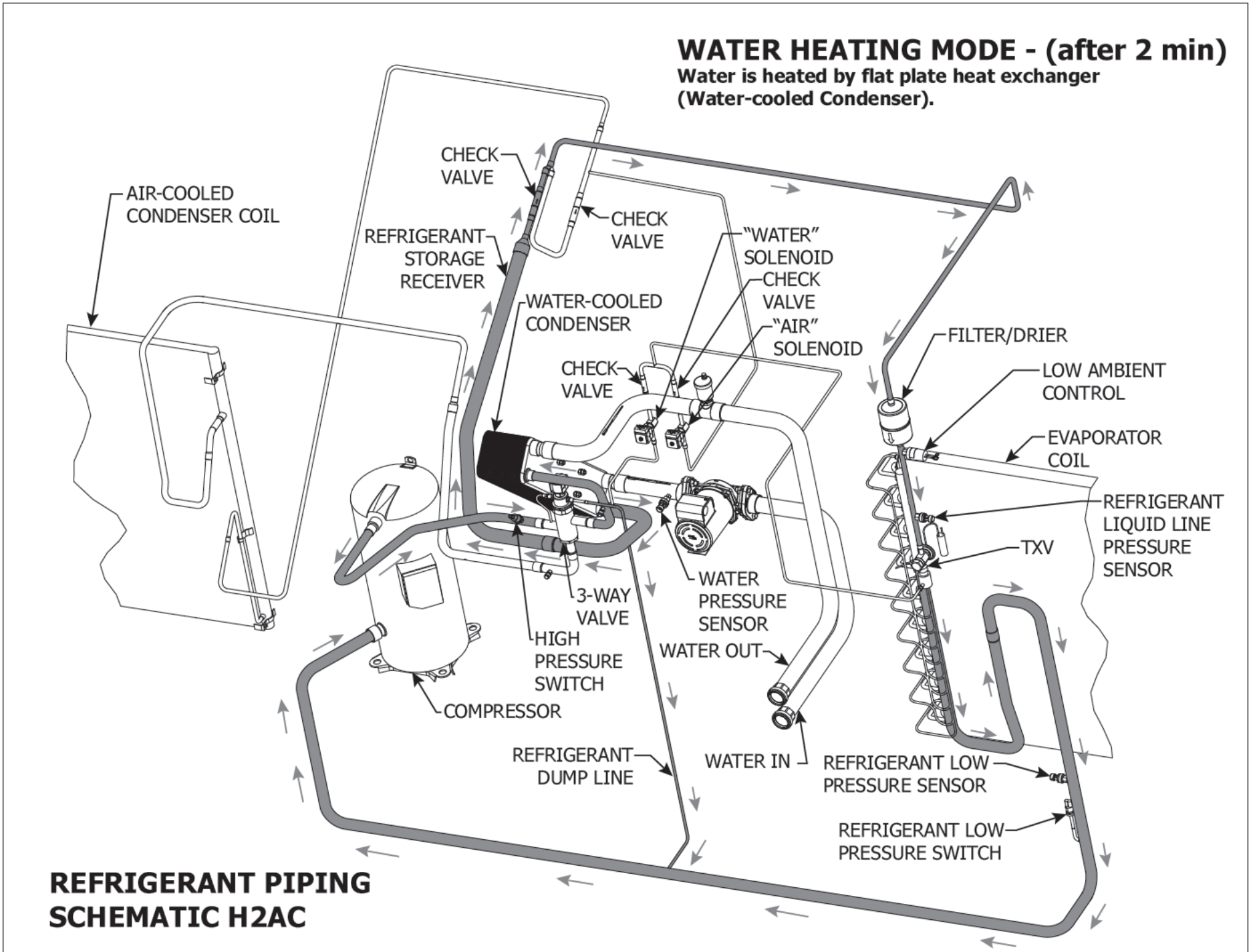
Misc.

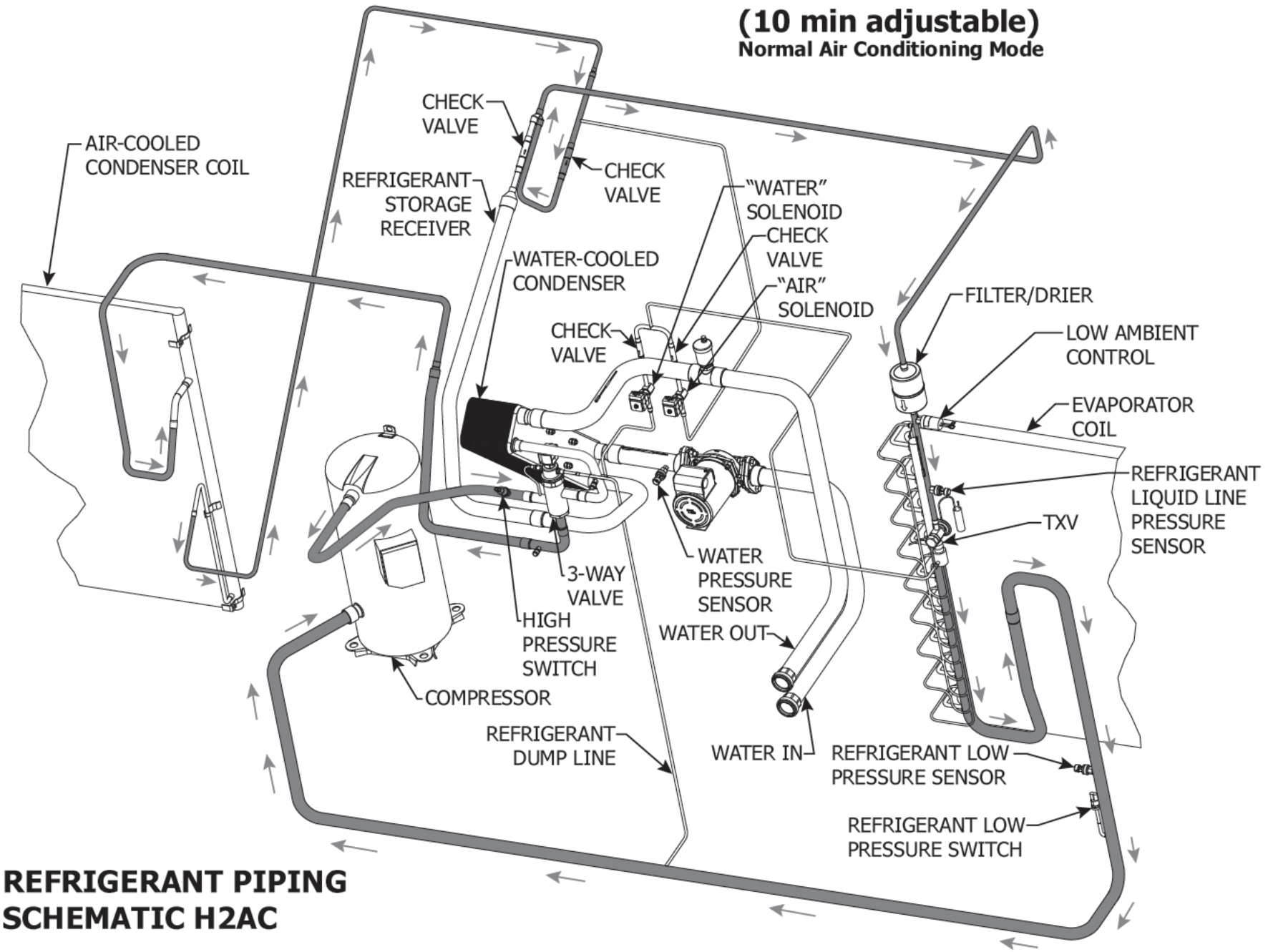
1. Water pump is energized once for 6 minutes every 24 hours to keep water from stagnating in times of no cooling operation.



REFRIGERANT PIPING SCHEMATIC H2AC


WATER HEATING MODE - (first 2 min)
Water is heated by flat plate heat exchanger (Water-cooled Condenser). Refrigerant is removed from idle Air-cooled Condenser Coil via "Air" Solenoid.
AIR-COOLED CONDENSER COIL
CHECK VALVE
CHECK VALVE
REFRIGERANT STORAGE RECEIVER
"WATER" SOLENOID
CHECK VALVE
"AIR" SOLENOID
WATER-COOLED CONDENSER
CHECK VALVE
FILTER/DRIER
LOW AMBIENT CONTROL
EVAPORATOR COIL
REFRIGERANT LIQUID LINE PRESSURE SENSOR
TXV
WATER PRESSURE SENSOR
3-WAY VALVE
HIGH PRESSURE SWITCH
WATER OUT
COMPRESSOR
REFRIGERANT DUMP LINE
WATER IN
REFRIGERANT LOW PRESSURE SENSOR
REFRIGERANT LOW PRESSURE SWITCH
REFRIGERANT PIPING SCHEMATIC H2AC


WATER HEATING MODE - (after 2 min)
Water is heated by flat plate heat exchanger
(Water-cooled Condenser).
AIR-COOLED
CONDENSER COIL
CHECK
VALVE
CHECK
VALVE
REFRIGERANT
STORAGE
RECEIVER
"WATER"
SOLENOID
CHECK
VALVE
WATER-COOLED
CONDENSER
"AIR"
SOLENOID
FILTER/DRIER
CHECK
VALVE
LOW AMBIENT
CONTROL
EVAPORATOR
COIL
REFRIGERANT
LIQUID LINE
PRESSURE
SENSOR
TXV
WATER
PRESSURE
SENSOR
3-WAY
VALVE
HIGH
PRESSURE
SWITCH
WATER OUT
COMPRESSOR
REFRIGERANT
DUMP LINE
WATER IN
REFRIGERANT LOW
PRESSURE SENSOR
REFRIGERANT LOW
PRESSURE SWITCH
REFRIGERANT PIPING
SCHEMATIC H2AC



REFRIGERANT PIPING SCHEMATIC H2AC

VI. 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 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:

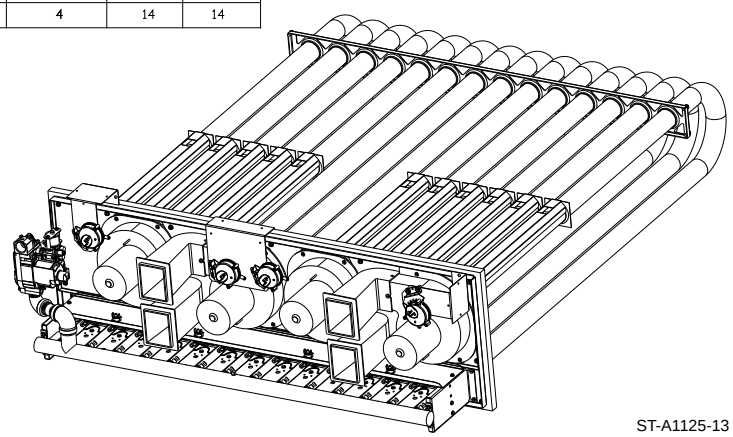
1. Once the call for second stage is satisfied, the control starts a 30 second off delay on W2 inducer and reduces the gas valve to first stage.
2. Control enters normal operating loop where all inputs are continuously checked.

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.

FIGURE 18

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

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.

⚠ 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!

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.

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.*

VII. COOLING SECTION OPERATION

COOLING MODE

NOTE: For this two-stage cooling and potable water heating unit, the water heating section is located on the rear (second stage) refrigerant system. Because of the presence of the eSYNC control, the unit will always start the rear compressor first (lag mode is permanently engaged), and then a Y2 call will energize the front compressor.

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 standby 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.

VIII. 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.
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

⚠ 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.

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.

IX. WATER HEATING SECTION MAINTENANCE

LIME AND SCALE FLUSHING PROCEDURE

Periodic flushing is required for the refrigerant-to-water heat exchanger contained in the Rheem H_2AC rooftop unit to remove lime and scale buildup and to prevent degradation of water heating performance. How often this is required depends on the

⚠ 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.

hardness of the water in your area and the run time in the water heating mode. The below instructions provide a safe and effective means of removing the lime and scale buildup in the heat exchanger. If you are not comfortable with the procedure, seek out the assistance of a plumbing professional.

This procedure assumes that isolation/flushing valves have been installed on the unit water inlet and outlet connections. If the unit was installed without valves, it is recommended that flushing be performed by a plumbing professional.

Required items:

- Five gallon bucket
- Small circulation pump
- Hoses with connections suitable for the unit drain valves and pump.
- 2-3 gallons of food-grade white vinegar.
- **The bucket, pump, and hoses can be ordered as Rheem flush kit RTG20124.**

Instructions:

1. Turn off the electric supply to the unit.
2. Shut off the water supply to the unit using the isolation ball valves. Consult the valve manufacturer's instructions for specifics in using their valve assemblies.
3. Attach a short hose to the threaded fittings on each drain valve. Connect the hose on the inlet valve to the outlet of a small circulation pump.
4. Pour approximately two to three gallons of food-grade white vinegar into the pail.
5. Place the inlet hose from the pump and the drain hose from the outlet valve on the unit into the pail.
6. Open the drain valves and turn on the pump. Allow the vinegar solution to circulate for 45-60 minutes.
7. Turn off pump and drain vinegar from the heat exchanger. Close the inlet water drain valve.
8. Open the inlet water supply shutoff valve and allow fresh water to flush the heat exchanger for at least five minutes to remove all traces of vinegar from the system.
9. Close the outlet water drain valve and open the outlet water supply shut-off valve.
10. Restore electrical power and verify correct unit operation.

FIGURE 19
ISOLATION/FLUSHING VALVE (WEBSTONE #41436 OR SIMILAR)



REPLACEMENT PARTS

Contact your local distributor for a complete parts list.

TROUBLESHOOTING

Refer to Figures 21 through 22 for determining cause of unit problems.

WIRING DIAGRAMS

Figures 23 through 26 are complete wiring diagrams for the unit and its power sources. Also located on back of control access panel.

CHARGING

See Figure 27 for proper charging information.

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

Air Flow CFM [L/s]	Model RKHL-D180 Voltage 208/230, 460 — 3 phase 60 Hz																																					
	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]	—	—	—	—	—	—	—	—	—	—	600	1409	629	1536	656	1671	684	1814	711	1964	738	2121	764	2286	790	2459	815	2640	840	2828	865	3023	889	3226	913	3437	—	—	—	—
5000 [2359]	—	—	—	—	—	—	—	—	581	1358	609	1479	637	1608	664	1744	691	1888	718	2040	744	2199	770	2366	795	2541	820	2723	844	2912	869	3109	892	3314	916	3527	—	—	—	—
5200 [2454]	—	—	—	—	—	—	—	—	590	1434	618	1557	645	1688	672	1826	699	1972	725	2125	750	2286	776	2454	800	2630	825	2814	849	3005	873	3204	896	3411	919	3625	—	—	—	—
5400 [2548]	—	—	—	—	—	—	572	1402	600	1519	627	1644	654	1776	680	1916	706	2063	732	2218	757	2381	782	2551	806	2729	830	2914	854	3107	877	3307	900	3515	922	3731	—	—	—	—
5600 [2643]	—	—	—	—	—	—	583	1494	610	1613	637	1739	663	1873	689	2014	714	2163	740	2320	764	2484	789	2656	812	2835	836	3022	859	3216	882	3419	904	3628	926	3846	—	—	—	—
5800 [2737]	—	—	—	—	—	—	594	1594	620	1714	647	1842	672	1978	698	2121	723	2271	747	2430	772	2595	795	2769	819	2950	842	3138	864	3335	887	3538	908	3750	930	3969	—	—	—	—
6000 [2831]	—	—	—	—	578	1588	605	1702	631	1824	657	1954	682	2091	707	2236	731	2388	756	2548	779	2715	803	2890	826	3073	848	3263	870	3461	892	3666	913	3879	—	—	—	—	—	—
6200 [2926]	—	—	—	—	590	1703	616	1819	642	1942	667	2074	692	2212	716	2359	740	2513	764	2674	787	2843	810	3020	833	3204	855	3396	876	3596	897	3803	918	4017	—	—	—	—	—	—
6400 [3020]	—	—	577	1716	602	1826	628	1944	653	2069	678	2202	702	2342	726	2490	750	2646	773	2809	796	2980	818	3158	840	3344	861	3538	883	3739	903	3947	924	4164	—	—	—	—	—	—
6600 [3114]	—	—	589	1846	615	1958	640	2077	665	2204	689	2338	713	2480	736	2630	759	2787	782	2952	804	3124	826	3304	848	3492	869	3687	889	3890	909	4100	929	4318	—	—	—	—	—	—
6800 [3209]	577	1878	603	1984	628	2098	652	2219	677	2347	700	2483	724	2627	747	2778	769	2937	791	3104	813	3278	834	3459	855	3648	876	3845	896	4050	916	4262	—	—	—	—	—	—	—	—
7000 [3303]	591	2023	616	2131	641	2246	665	2368	689	2499	712	2636	735	2782	757	2935	779	3095	801	3263	822	3439	843	3622	864	3813	884	4012	903	4218	923	4431	—	—	—	—	—	—	—	—
7200 [3398]	606	2177	630	2286	654	2402	678	2527	701	2659	724	2798	746	2945	768	3099	790	3262	811	3431	832	3609	852	3794	872	3986	892	4186	911	4394	930	4609	—	—	—	—	—	—	—	—

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

Drive Package	L							M						
Motor H.P. [W]	3 [2237.1]							5 [3728.5]						
Blower Sheave	BK105H							BK105H						
Motor Sheave	1VP-44							1VP-56						
Turns Open	0	1	2	**3**	4	5	6	0	1	2	3	**4**	5	6
RPM		732	701	**670**	642	608	575		925	896	866	**838**	805	774

NOTES: 1. Factory sheave settings are shown in bold type.
2. Do not set motor sheave below minimum or maximum turns open shown.
3. Re-adjustment of sheave required to achieve rated airflow at AHRI minimum External Static Pressure
4. Add component resistance (below) to duct resistance to determine total External Static Pressure.

Airflow CFM [L/s]	AIRFLOW CORRECTION FACTORS *			COMPONENT AIRFLOW RESISTANCE						
				Wet Coil		Downflow Economizer RA Damper Open		Concentric Grill RXRN-AD80 or RXRN-AD81 & Transition RXMC-CJ07	Concentric Grill RXRN-AD86 & Transition RXMC-CK08	
	Total MBH	Sensible MBH	Power kW	Resistance — Inches of Water [kPa]						
4800 [2265]	0.97	0.92	0.98	0.03 [.01]		0.09 [.02]		—	—	
5000 [2359]	0.97	0.94	0.99	0.04 [.01]		0.10 [.02]		—	—	
5200 [2454]	0.98	0.95	0.99	0.05 [.01]		0.10 [.02]		—	—	
5400 [2548]	0.99	0.97	0.99	0.06 [.01]		0.11 [.03]		—	—	
5600 [2643]	0.99	0.98	0.99	0.06 [.01]		0.12 [.03]		0.35 [.09]	—	
5800 [2737]	1.00	1.00	1.00	0.07 [.02]		0.13 [.03]		0.39 [.10]	—	
6000 [2831]	1.01	1.02	1.00	0.08 [.02]		0.13 [.03]		0.43 [.11]	—	
6200 [2926]	1.01	1.03	1.00	0.09 [.02]		0.14 [.03]		0.46 [.11]	—	
6400 [3020]	1.02	1.05	1.01	0.10 [.02]		0.15 [.04]		0.50 [.12]	—	
6600 [3114]	1.02	1.06	1.01	0.10 [.02]		0.16 [.04]		0.54 [.13]	—	
6800 [3209]	1.03	1.08	1.01	0.11 [.03]		0.16 [.04]		—	—	
7000 [3303]	1.04	1.10	1.01	0.12 [.03]		0.17 [.04]		—	—	
7200 [3398]	1.04	1.11	1.02	0.13 [.03]		0.18 [.04]		—	0.38 [.09]	

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

[ ] Designates Metric Conversions

XI. ELECTRICAL DATA - RKHL

ELECTRICAL DATA - RKHL- SERIES										
		D180CL	D180CM	D180DL	D180DM					
Unit Information	Unit Operating Voltage Range	187-253	187-253	414-506	414-506					
	Volts	208/230	208/230	460	460					
	Minimum Circuit Ampacity	77/77	81/81	40	42					
	Minimum Overcurrent Protection Device Size	90/90	90/90	45	45					
	Maximum Overcurrent Protection Device Size	100/100	100/100	50	50					
Compressor Motor	No.	2	2	2	2					
	Volts	200/230	200/230	460	460					
	Phase	3	3	3	3					
	RPM	3450	3450	3450	3450					
	HP, Compressor 1	7 1/2	7 1/2	7 1/2	7 1/2					
	Amps (RLA), Comp. 1	25/25	25/25	12.8	12.8					
	Amps (LRA), Comp. 1	164/164	164/164	100	100					
	HP, Compressor 2	7 1/2	7 1/2	7 1/2	7 1/2					
	Amps (RLA), Comp. 2	25/25	25/25	12.8	12.8					
	Amps (LRA), Comp. 2	164/164	164/164	100	100					
Condenser Motor	No.	3	3	3	3					
	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	3	5	3	5					
	Amps (FLA, each)	11.5/11.5	14.9/14.9	4.6	6.6					
	Amps (LRA, each)	74.5/74.5	95/95	38.1	47.5					
Water Pump	No.	1	1	1	1					
	Volts	208/230	208/230	208/230	208/230					
	Phase	1	1	1	1					
	HP	1/3	1/3	1/3	1/3					
	Amps (FLA, each)	1.7	1.7	1.7	1.7					
	Amps (LRA, each)	5.1	5.1	5.1	5.1					

XII. TROUBLESHOOTING

FIGURE 20
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.

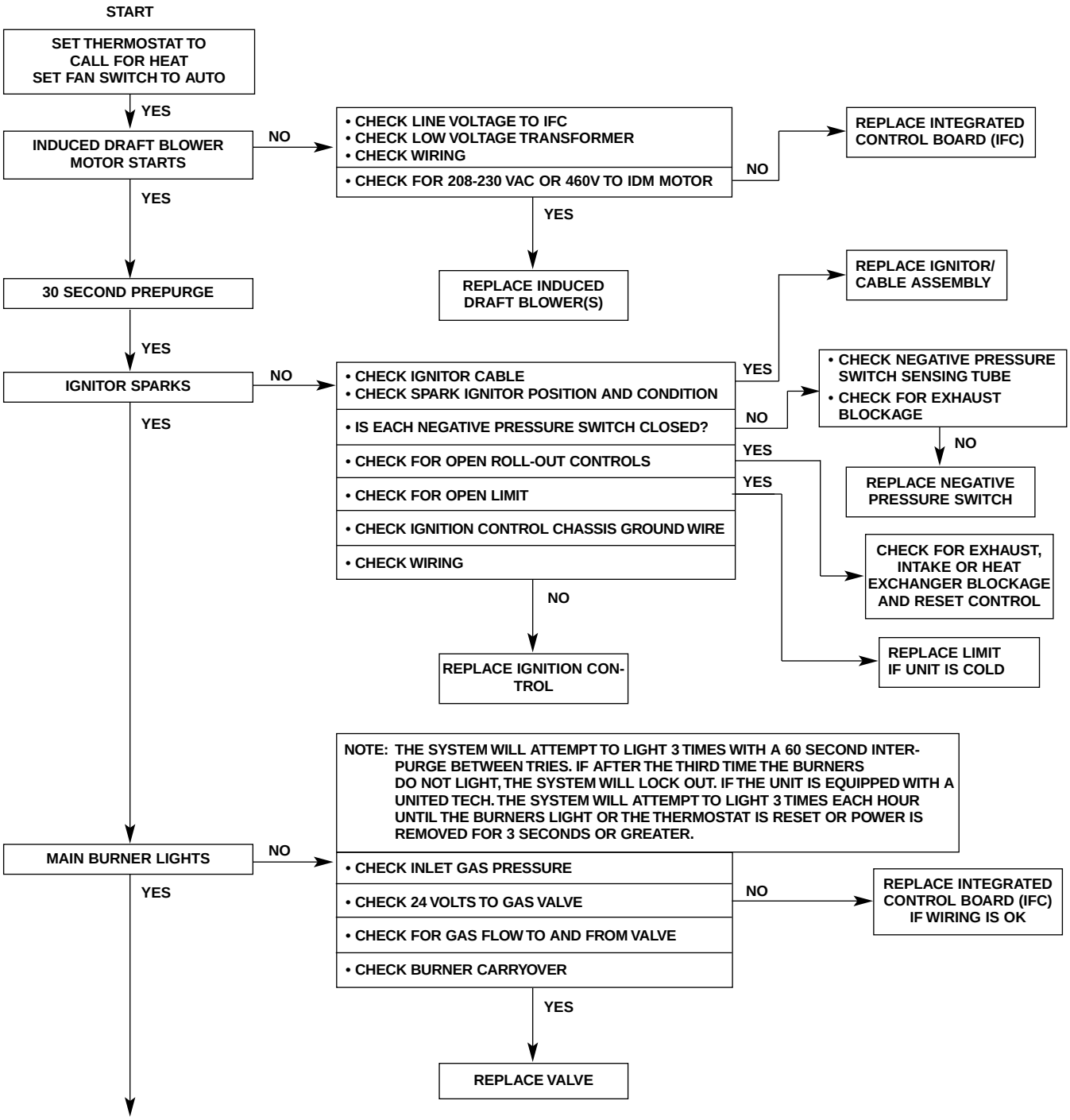
SYMPTOM	POSSIBLE CAUSE	REMEDY
Unit will not run	• Power off or loose electrical connection • Thermostat out of calibration-set too high • Failed contactor • Blown fuses • Transformer defective • High pressure control open (if provided) • Interconnecting low voltage wiring damaged	• Check for correct 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 21
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

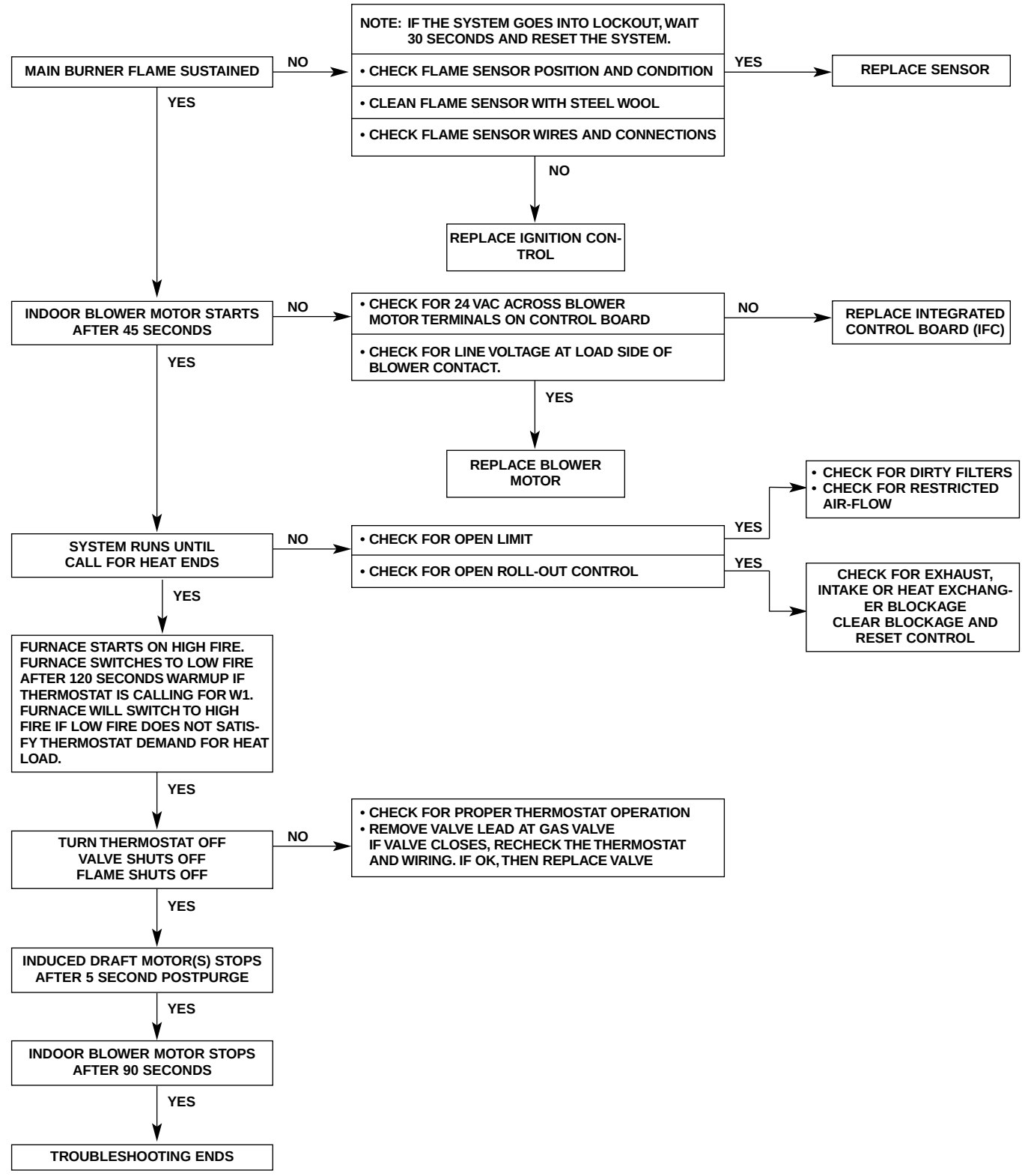
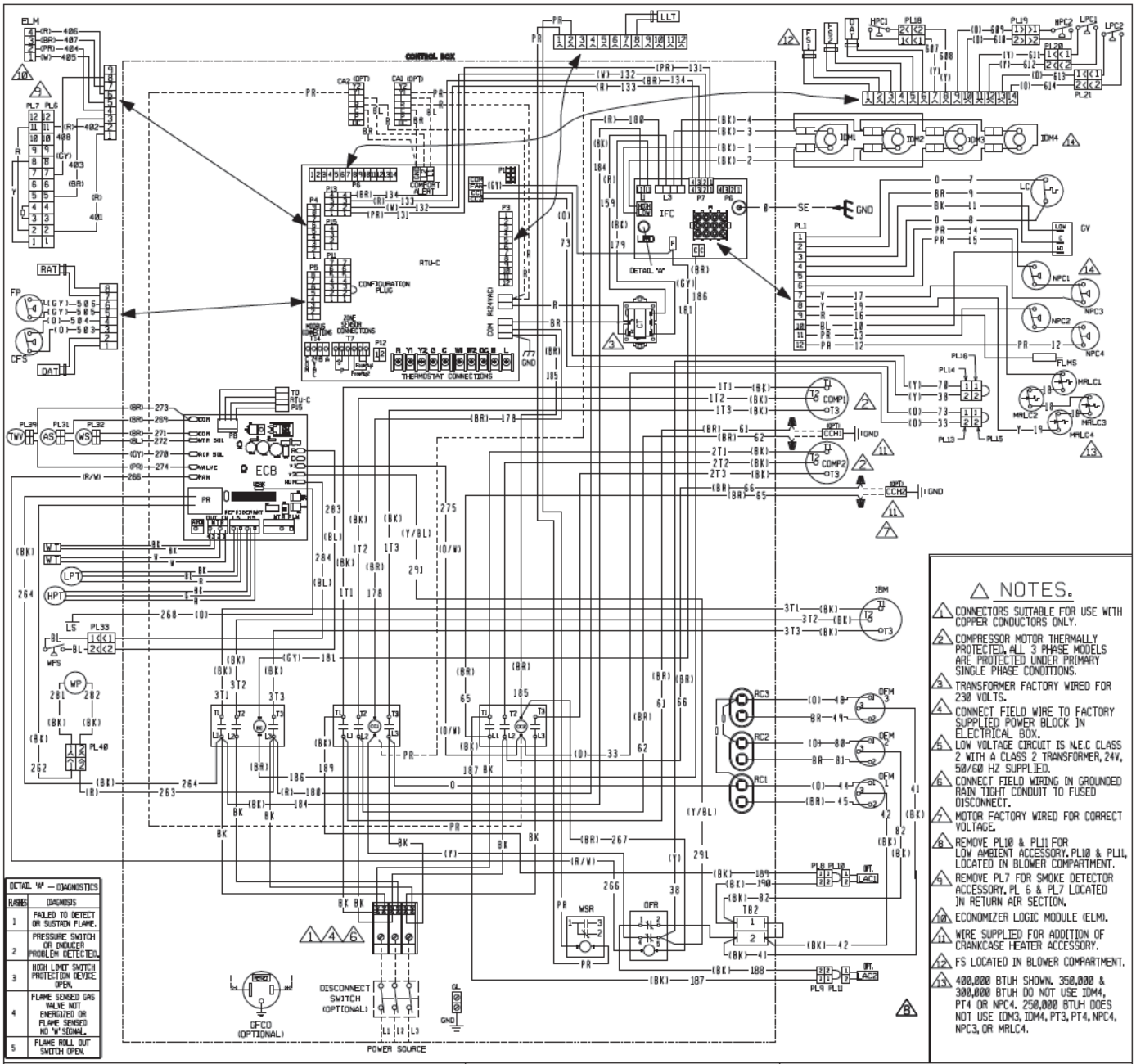

NOTE: IF THE SYSTEM GOES INTO LOCKOUT, WAIT 30 SECONDS AND RESET THE SYSTEM.
MAIN BURNER FLAME SUSTAINED
NO
YES
• CHECK FLAME SENSOR POSITION AND CONDITION
• CLEAN FLAME SENSOR WITH STEEL WOOL
• CHECK FLAME SENSOR WIRES AND CONNECTIONS
YES
REPLACE SENSOR
NO
REPLACE IGNITION CONTROL
INDOOR BLOWER MOTOR STARTS AFTER 45 SECONDS
NO
YES
• 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
REPLACE BLOWER MOTOR
SYSTEM RUNS UNTIL CALL FOR HEAT ENDS
NO
YES
• 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
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.

FIGURE 22 H2AC ROOFTOP UNIT ALARMS AND TROUBLESHOOTING

Alarm Designation	MODBUS "Current Alarm" Code	Description	Troubleshooting Information
H2AC Rooftop Unit Water Leakage	102	The sensor in the water heating (hybrid) section of the unit has detected a water leak and stopped water heating operation. A relay output for an optional field-installed water shutoff valve is energized.	> Check for loose or defective air vent valve on water discharge line in water heating section. > Check for water pump seal leakage. > Check that sensor is installed correctly on control. > Replace the sensor.
H2AC Rooftop Unit Low Water Pressure	103	Obsolete (replaced by switch) No alarm is set. The water sensor measures potable water pressure in the water heating section. If the water pressure is below 5 PSIG, water heating operation will not begin. If the sensor becomes unavailable, water heating operation terminates. The unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Freeze Protection Mode	104	The outdoor ambient sensor on the RTU-C has detected outdoor ambient temperature below 35°F. The water pump is energiced continuously until the outdoor ambient temperature rises above 38°F.	> Check that sensor is installed correctly on control. > Check sensor location. > Replace the sensor.
H2AC Rooftop Unit Solenoid Fault	105	At the beginning of each water heating cycle, if the high pressure sensor value exceeds 530 PSIG after 3 seconds but before 60 seconds are elapsed, an alarm is set.	> Check water pump operation, shut-off valves, etc. for adequate water flow. > Check for 24VAC at control transformer > Check for 24VAC at hybrid unit 3-way refrigerant valve. > Increase water sample delay time using DIP switches on hybrid control. > Replace 3-way refrigerant valve if it fails to shift.
H2AC Rooftop Unit Ambient Sensor Fault	106	The water pump is energzed continuously until the sensor becomes available.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Inlet Sensor Fault	107	If the sensor becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Outlet Sensor Fault	108	If the sensor becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensor.
H2AC Rooftop Unit Water Inlet and Outlet Sensor Fault	109	If both sensors becomes unavailable, an alarm will be set and water heating operation terminates. Unit can continue to operate in cooling mode.	> Extreme temperatures. > Check that sensor is installed correctly. > Replace the sensors.
H2AC Rooftop Unit High Pressure Sensor Fault	110	The high pressure sensor measures liquid refrigerant pressure. If the sensor becomes unavailable, water heating operation terminates and an alarm is set. Unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Low Pressure Sensor Fault	111	The low pressure sensor measures liquid refrigerant pressure. If the sensor becomes unavailable, water heating operation terminates and an alarm is set. Unit can continue to operate in cooling mode.	> Check that sensor is correctly installed on control. > The sensor has three wires that attach to the hybrid control. Check for 5VDC between the outer terminals. If 5VDC is not present, replace the hybrid control. > Replace the sensor.
H2AC Rooftop Unit Lockout Fault	112	If alarms 105, 115, 116, 117, or 118 are initiated more than 3 times from unit power-up, an alarm is set and water heating mode is terminated until the alarm is cleared. **The lockout fault can only be cleared by removing power to the unit, by sending a "Clear All Alarms" command through the BAS network or after 24 hr lockout timer is reset.**	> Check individual alarms.
H2AC Rooftop Unit Low Subcooling - water heating mode	115	If, 4 minutes after the 3-way valve has shifted, low subcooling was continuously measured for more than 30 seconds during the water heating mode an alarm is set. Unit operation continues.	> If low subcooling occurs after exiting the air conditioning mode, check wiring and verify operation of outdoor refrigerant (air side) solenoid. > Check location of liquid line temperature sensor. > Verify correct refrigerant charge.
Low Subcooling - air conditioning mode	116	If, 4 minutes after the 3-way valve has shifted, low subcooling was continuously measured for more than 30 seconds during the air conditining mode an alarm is set. Unit operation continues.	> If low subcooling occurs after exiting the water heating mode, check wiring and verify operation of flat plate heat exchanger (water side) solenoid. > Check location of liquid line temperature sensor. > Verify correct refrigerant charge.
High Superheat - water heating mode	117	If, 4 minutes after the 3-way valve has shifted, high superheat was continuously measured for more than 30 seconds during the water heating mode an alarm is set. Unit operation continues.	> High internal building load. > Expansion valve is not operating correctly.
High Superheat - air conditioning heating mode	118	If, 4 minutes after the 3-way valve has shifted, high superheat was continuously measured for more than 30 seconds during the air conditioning mode an alarm is set. Unit operation continues.	> If high superheat occurs after exiting the water heating mode, check wiring and verify operation of flat plate heat exchanger (water side) solenoid. > High internal building lode. > Expansion valve is not operating correctly.

XIII. WIRING DIAGRAMS

FIGURE 23
RKHL SERIES



COMPONENT CODE

AS	AIR SOLENOID	HPT	HIGH PRESSURE TRANSDUCER	RC	RUN CAPACITOR
BC	BLOWER CONTACTOR	IBM	INDOOR BLOWER MOTOR BELT DRIVE	RTU-C	ROOFTOP UNIT CONTROL
CA	COMFORT ALERT MODULE	IDM	INDUCED DRAFT MOTOR	SE	SPARK ELECTRODE
CC	COMPRESSOR CONTACTOR	IFC	INTEGRATED FURNACE CONTROL	TB	TERMINAL BLOCK
CCH	CRANKCASE HEATER	LAC	LOW AMBIENT COOLING CONTROL	TWV	THREE-WAY VALVE
CFS	CLOGGED FILTER SWITCH	LC	LIMIT CONTROL	WFS	WATER FLOW SWITCH
COMP	COMPRESSOR	LLT	LIQUID LINE TEMPERATURE	WP	WATER PUMP
CT	CONTROL TRANSFORMER	LPC	LOW PRESSURE CONTROL	WS	WATER SOLENOID
DAT	DISCHARGE AIR SENSOR	LPT	LOW PRESSURE TRANSDUCER	WSR	WATER SHUTOFF RELAY
DISC	DISCONNECT SWITCH	LS	LEAK SENSOR	WT	WATER TEMPERATURE SENSER
ECB	ESYNC CONTROL BOARD	MRLC	MANUAL RESET LIMIT CONTROL		WIRE NUT
FLMS	FLAME SENSOR	NPC	NEGATIVE PRESSURE CONTROL		
FP	FAN PROVING	OAT	OUTSIDE AIR SENSOR		
FS	FREEZE SENSOR	OFM	OUTDOOR FAN MOTOR		
GFCO	GROUND FAULT CONVENIENCE OUTLET	OFR	OUTDOOR FAN RELAY		
GL	GROUND LUG	PL	PLUG		
GND	GROUND	PR	PUMP RELAY		
GV	GAS VALVE	PT	POWER TRANSFORMER		
HPC	HIGH PRESSURE CONTROL	RAT	RETURN AIR SENSOR		

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.

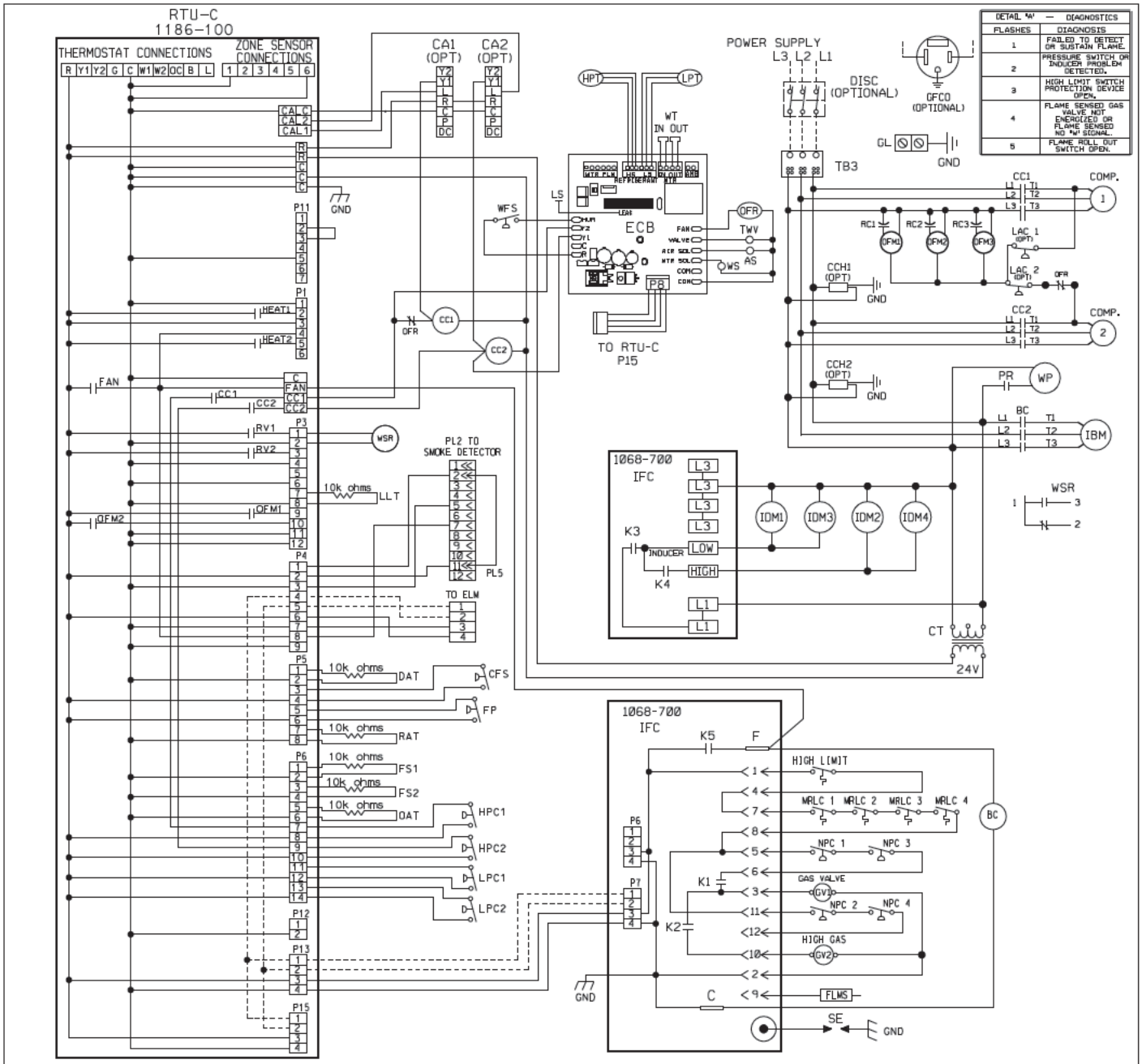
WIRE COLOR CODE

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

WIRING DIAGRAM
RKHL-D180
208-230V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-3-13	90-104652-01	00

FIGURE 24
RKHL



COMPONENT CODE

AS	AIR SOLENOID	HPT	HIGH PRESSURE TRANSDUCER	RTU-C	ROOFTOP UNIT CONTROL
BC	BLOWER CONTACTOR	IBM	INDOOR BLOWER MOTOR BELT DRIVE	SE	SPARK ELECTRODE
CA	COMFORT ALERT MODULE	IDM	INDUCED DRAFT MOTOR	TB	TERMINAL BLOCK
CC	COMPRESSOR CONTACTOR	IFC	INTEGRATED FURNACE CONTROL	TWV	THREE-WAY VALVE
CCH	CRANKCASE HEATER	LAC	LOW AMBIENT COOLING CONTROL	WFS	WATER FLOW SWITCH
CFS	CLOGGED FILTER SWITCH	LC	LIMIT CONTROL	WP	WATER PUMP
COMP	COMPRESSOR	LLT	LIQUID LINE TEMPERATURE	WS	WATER SOLENOID
CT	CONTROL TRANSFORMER	LPC	LOW PRESSURE CONTROL	WSR	WATER SHUTOFF RELAY
DAT	DISCHARGE AIR SENSOR	LPT	LOW PRESSURE TRANSDUCER	WT	WATER TEMPERATURE SENSOR
DISC	DISCONNECT SWITCH	LS	LEAK SENSOR	⏚	WIRE NUT
FLMS	FLAME SENSOR	MRLC	MANUAL RESET LIMIT CONTROL		
ECB	eSYNC CONTROL BOARD	NPC	NEGATIVE PRESSURE CONTROL		
ELM	ECONOMIZER LOGIC MODULE	OAT	OUTSIDE AIR SENSOR		
FP	FAN PROVING	OFM	OUTDOOR FAN MOTOR		
FS	FREEZE SENSOR	OFR	OUTDOOR FAN RELAY		
GFCO	GROUND FAULT CONVENIENCE OUTLET	PL	PLUG		
GL	GROUND LUG	PR	PUMP RELAY		
GND	GROUND	PT	POWER TRANSFORMER		
GV	GAS VALVE	RAT	RETURN AIR SENSOR		
HPC	HIGH PRESSURE CONTROL	RC	RUN CAPACITOR		

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.

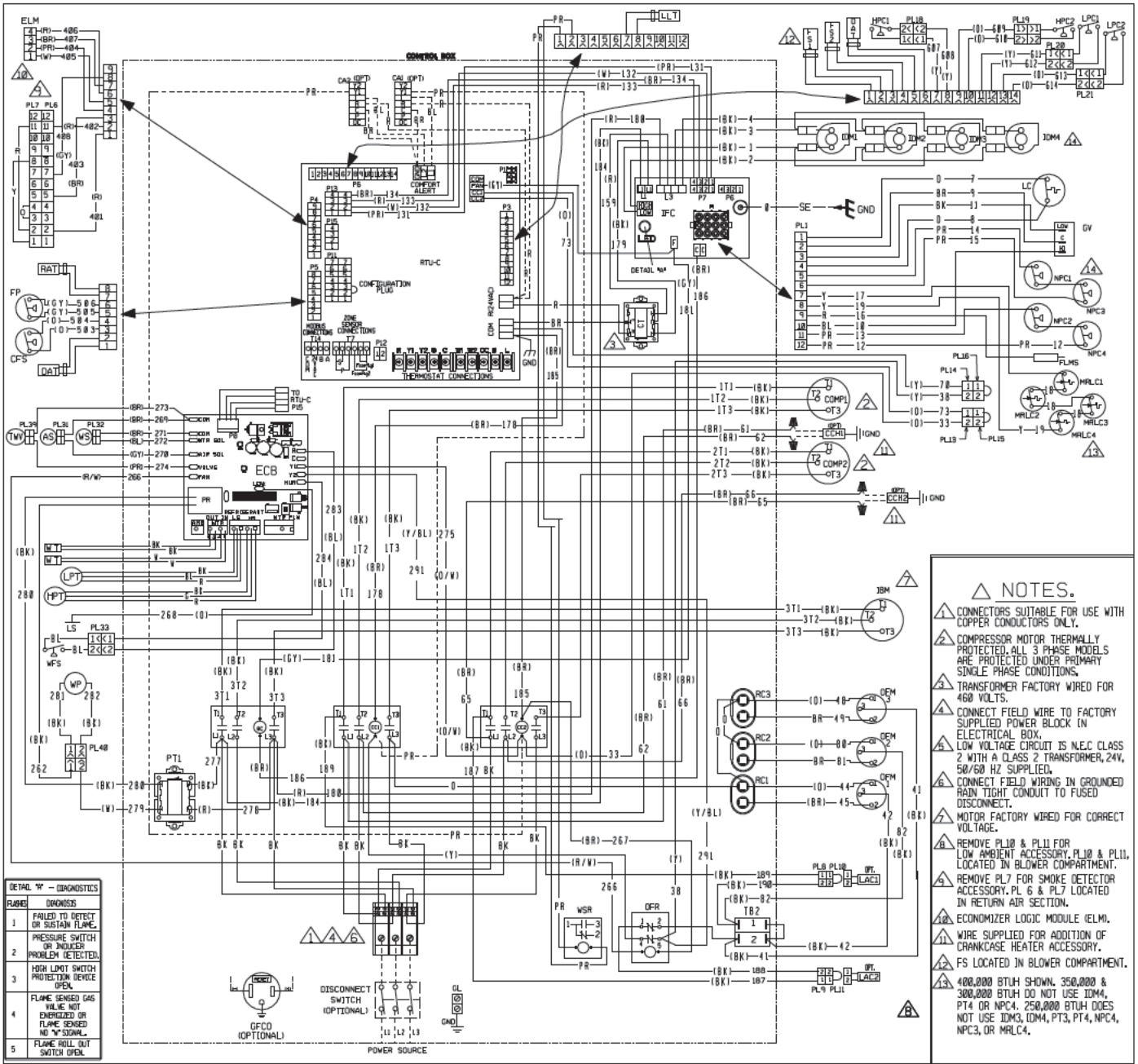
WIRE COLOR CODE

BK__BLACK	O___ORANGE
BR__BROWN	PR__PURPLE
BL___BLUE	R___RED
G___GREEN	W___WHITE
GY__GRAY	Y___YELLOW

WIRING SCHEMATIC
RKHL-D180
208-230V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-4-13	90-104655-01	00

FIGURE 25
RKHL SERIES



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 "A" SIGNAL.
5	FLAME ROLL OUT SWITCH OPEN.

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 460 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.
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. 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.

COMPONENT CODE

AS	AIR SOLENOID	HPT	HIGH PRESSURE TRANSDUCER	RC	RUN CAPACITOR
BC	BLOWER CONTACTOR	IBM	INDOOR BLOWER MOTOR BELT DRIVE	RTU-C	ROOFTOP UNIT CONTROL
CA	COMFORT ALERT MODULE	IDM	INDUCED DRAFT MOTOR	SE	SPARK ELECTRODE
CC	COMPRESSOR CONTACTOR	IFC	INTEGRATED FURNACE CONTROL	TB	TERMINAL BLOCK
CCH	CRANKCASE HEATER	LAC	LOW AMBIENT COOLING CONTROL	TWV	THREE-WAY VALVE
CFS	CLOGGED FILTER SWITCH	LC	LIMIT CONTROL	WFS	WATER FLOW SWITCH
COMP	COMPRESSOR	LLT	LIQUID LINE TEMPERATURE	WP	WATER PUMP
CT	CONTROL TRANSFORMER	LPC	LOW PRESSURE CONTROL	WS	WATER SOLENOID
DAT	DISCHARGE AIR SENSOR	LPT	LOW PRESSURE TRANSDUCER	WSR	WATER SHUTOFF RELAY
DISC	DISCONNECT SWITCH	LS	LEAK SENSOR	WT	WATER TEMPERATURE SENSER
ECB	ESYNC CONTROL BOARD	MRLC	MANUAL RESET LIMIT CONTROL	▲	WIRE NUT
FLMS	FLAME SENSOR	NPC	NEGATIVE PRESSURE CONTROL		
FP	FAN PROVING	OAT	OUTSIDE AIR SENSOR		
FS	FREEZE SENSOR	OFM	OUTDOOR FAN MOTOR		
GFCO	GROUND FAULT CONVENIENCE OUTLET	OFR	OUTDOOR FAN RELAY		
GL	GROUND LUG	PL	PLUG		
GND	GROUND	PR	PUMP RELAY		
GV	GAS VALVE	PT	POWER TRANSFORMER		
HPC	HIGH PRESSURE CONTROL	RAT	RETURN AIR SENSOR		

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.

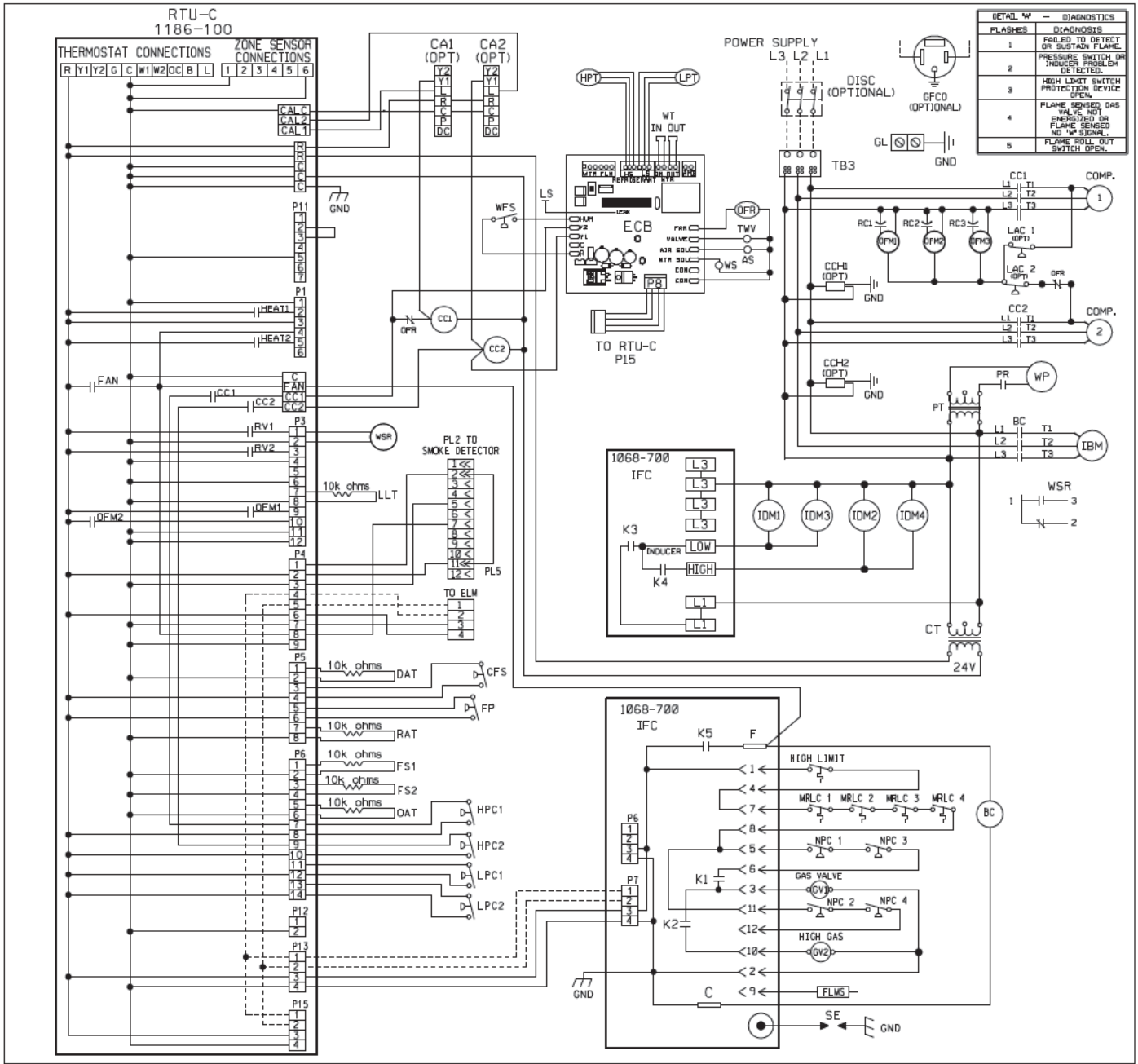
WIRE COLOR CODE

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

WIRING DIAGRAM
RKHL-D180
460V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-3-13	90-104652-02	00

FIGURE 26
RKHL SERIES



COMPONENT CODE

AS	AIR SOLENOID	HPT	HIGH PRESSURE TRANSDUCER	RTU-C	ROOFTOP UNIT CONTROL
BC	BLOWER CONTACTOR	IBM	INDOOR BLOWER MOTOR BELT DRIVE	SE	SPARK ELECTRODE
CA	COMFORT ALERT MODULE	IDM	INDUCED DRAFT MOTOR	TB	TERMINAL BLOCK
CC	COMPRESSOR CONTACTOR	IFC	INTEGRATED FURNACE CONTROL	TWV	THREE-WAY VALVE
CCH	CRANKCASE HEATER	LAC	LOW AMBIENT COOLING CONTROL	WFS	WATER FLOW SWITCH
CFS	CLOGGED FILTER SWITCH	LC	LIMIT CONTROL	WP	WATER PUMP
COMP	COMPRESSOR	LLT	LIQUID LINE TEMPERATURE	WS	WATER SOLENOID
CT	CONTROL TRANSFORMER	LPC	LOW PRESSURE CONTROL	WSR	WATER SHUTOFF RELAY
DAT	DISCHARGE AIR SENSOR	LPT	LOW PRESSURE TRANSDUCER	WT	WATER TEMPERATURE SENSOR
DISC	DISCONNECT SWITCH	LS	LEAK SENSOR		WIRE NUT
FLMS	FLAME SENSOR	MRLC	MANUAL RESET LIMIT CONTROL		
ECB	eSYNC CONTROL BOARD	NPC	NEGATIVE PRESSURE CONTROL		
ELM	ECONOMIZER LOGIC MODULE	OAT	OUTSIDE AIR SENSOR		
FP	FAN PROVING	OFM	OUTDOOR FAN MOTOR		
FS	FREEZE SENSOR	OFR	OUTDOOR FAN RELAY		
GFCO	GROUND FAULT CONVENIENCE OUTLET	PL	PLUG		
GL	GROUND LUG	PR	PUMP RELAY		
GND	GROUND	PT	POWER TRANSFORMER		
GV	GAS VALVE	RAT	RETURN AIR SENSOR		
HPC	HIGH PRESSURE CONTROL	RC	RUN CAPACITOR		

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
RKHL-D180
460V 3 PH, 60 HZ.
ROOFTOP W/RTU-C

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		1-4-13	90-104655-02	00

XIV. CHARGE CHARTS

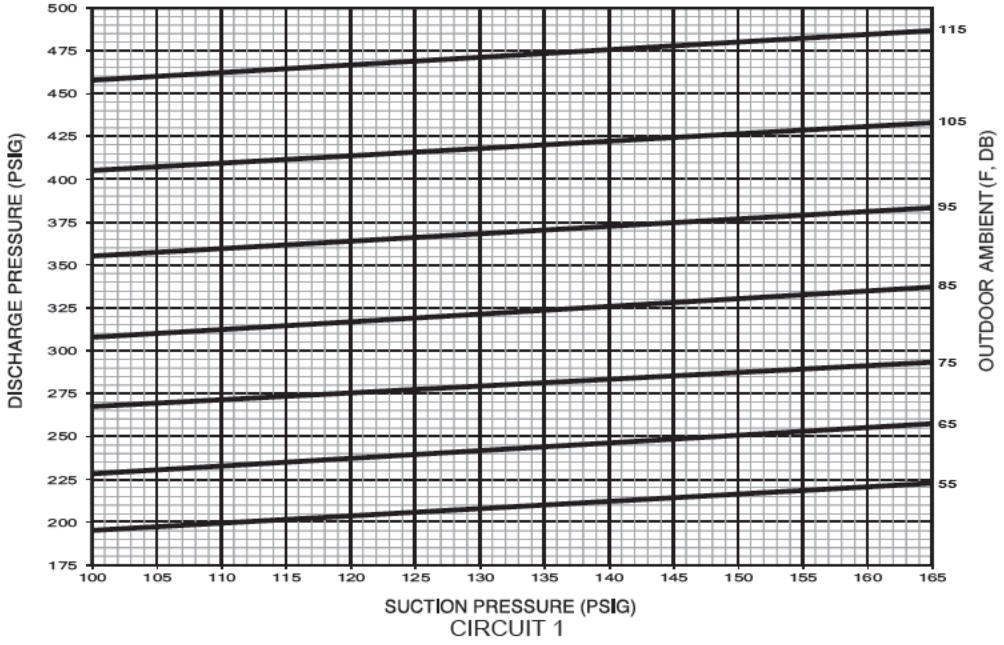
FIGURE 27

RKHL SYSTEM CHARGE CHARTS

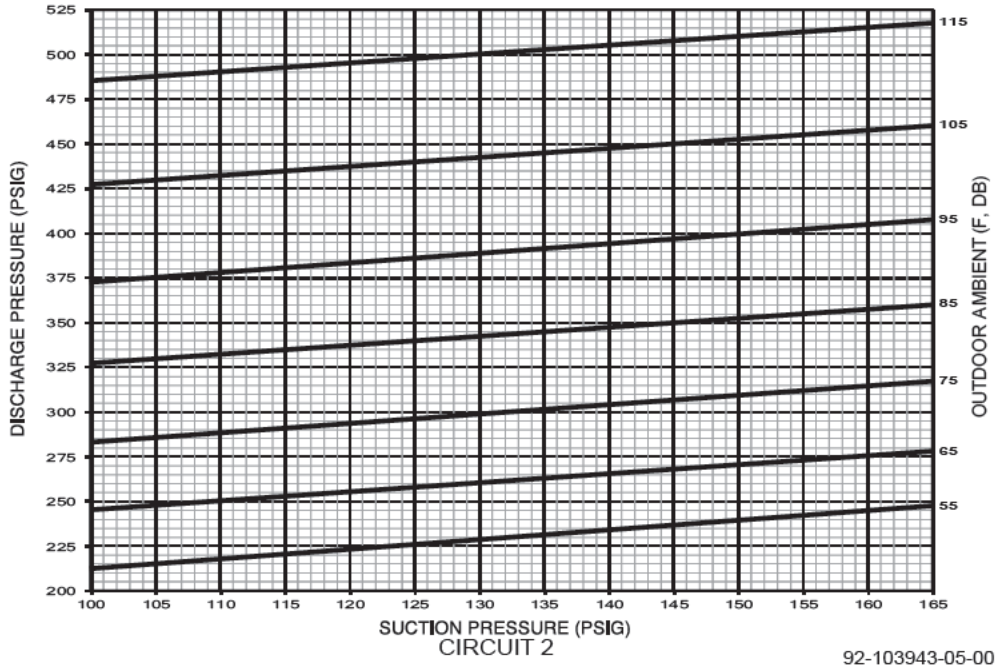
SYSTEM CHARGE CHART - REFRIGERANT 410A
15 TON, CIRCUITS 1 & 2

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

92-103943-05-00