

GAS-FIRED MAPS®II MODULAR AIR PROCESSING SYSTEM INSTALLATION, OPERATION, AND MAINTENANCE

DISCONTINUED MODELS RCA, RDA, RDCA, RDDA, RECA, AND REDA



⚠ DANGER ⚠

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury, death, or property damage.
- Improper installation, adjustment, alteration, service, or maintenance can cause serious injury, death, or property damage.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.
- Be sure to read and understand the installation, operation, and service instructions in this manual.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a phone remote from the building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

DO NOT DESTROY. PLEASE READ CAREFULLY. KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

WARNING:

All MAPS® II modular air processing systems contain either chlorodifluoromethane (HCFC-22) or a hydro-fluorocarbon blend (HFC-407C). HCFC-22 is believed to harm the public health and environment by destroying ozone in the upper atmosphere. Do not release HCFC-22 to the atmosphere. The U. S. Clean Air Act requires the recovery of any residual refrigerant.

WARNING:

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

FOR YOUR SAFETY

If you smell gas:

- Open windows.
- Do not touch any electrical switches.
- Extinguish any open flame.
- Immediately call your gas supplier.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

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1. General

1.1 Cautions and Warnings

There are warning labels on the unit, on the front page, and throughout this manual. For your safety, comply with all warnings during installation, operation, and service of this system. Definitions of the hazard intensity levels of the cautions, warnings, and dangers are shown below.

Definitions of Hazard Intensity Levels used in this Manual

HAZARD INTENSITY LEVELS

- 1. DANGER:** Failure to comply will result in severe personal injury or death and/or property damage.
- 2. WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
- 3. CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

**Warnings for Models
RCDA and RDDA with
Gas Heat Section**

WARNING:

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne silicone substances. See Hazard Levels, above.

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.

WARNING:

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and replace any gas control that has been under water.

**1.2 General
Information**

This booklet includes installation and operation information. Before beginning any procedure, carefully review the information, paying particular attention to the warnings. Handling of refrigerant should only be performed by a certified HVAC technician in compliance with all codes and requirements of authorities having jurisdiction.

The instructions in this manual apply to the following MAPS® II models:

Model	Description
RCA	Makeup Air Cooling Packaged System, 800-10000 CFM
RDCA	Makeup Air Cooling Packaged System, 800-10000 CFM, with Gas Heat Section (100-700 MBH)
RECA	Makeup Air Cooling Packaged System, 800-10000 CFM, with Electric Heat Section (5-88 kw)
RDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM
RDDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM, with a Gas Heat Section (100-700 MBH)
REDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM, with an Electric Heat Section (5-88 kw)
JHUP	Supplemental Gas-Fired Duct Furnace

Read this booklet and become familiar with the installation requirements of your particular model. If you do not have knowledge of local requirements, check with the local agencies who might have requirements concerning this installation. Before beginning, make preparations for necessary supplies, tools, and manpower.

Some information is by cabinet size; see cross-reference table in the APPENDIX, page 58.

1. General (cont'd)

1.3 Warranty

Refer to limited warranty information on the warranty form in the "Literature Bag" shipped with this system. If an optional extended warranty applies, keep the extended warranty information for future reference and verification of warranty.

Approval and Installation Codes

1.4 Installation Codes

These packaged systems are certified by ITS to Heating Cooling Equipment (latest edition), UL 1995 / CAN/CSA C22.2 No. 236. Electrical characteristics are shown on the system rating plate. All cooling and dehumidification reheat cycle circuits are factory-charged with R-22 or R407C refrigerant.

Model RDCA and Model RDDA include a gas heat section. The system includes a power-vented gas-fueled duct furnace. The gas-fired furnace using the Reznor® T_{CORE}²® combustion system is available in 13 sizes from 100 to 700 MBH for use with either natural or propane gas. The furnace is certified by ITS to both ANSI Z83.8b and CSA 2.6b-M. The ETL label, type of gas, and the firing rate are shown on the heat section rating plate.

Model RECA and Model REDA include an electric heat section. The electric heat section is available in 21 sizes from 5 to 88 kw with single or three-stage control. Refer to the system rating plate for electrical requirements. Models RECA and REDA require only a single-point electrical supply.

California Warning Label

If a gas-fired heat section is included and the system is being installed in the state of California, the installer MUST attach a warning label on the outside of the heat section access panel. The California Warning label is shipped in the "Literature Bag". If installation is in California, select a dry, clean location on the heat section access panel and adhere the label.

Massachusetts Requirements

If being installed in the Commonwealth of Massachusetts, this unit must be installed by a licensed plumber or licensed gas fitter.

2. Location

All of these packaged systems are designed to be mounted on a roof or slab using a manufacturer designed curb. Both downflow and horizontal curbs are available.

When the unit is being placed on a roof, location depends on the roof structure.

Position the curb so that the air inlet of the unit will not be facing into the prevailing wind.

Always comply with the clearances in Paragraph 4.3.

For condensate drainage and proper operation, it is important the installation be level.

3. Receiving, Moving, and Storage

3.1 Receiving and Moving

This system was test operated and inspected at the factory prior to crating and was in operating condition. If the equipment has incurred any damage in shipment, document the damage with the carrier and immediately contact your Reznor distributor.

Check the entire unit for damage paying particular attention to the structural integrity of both the points of attachment of the lifting lugs and the condenser fan section.

- **Lifting Lugs** - Inspect the points of attachment of the lifting lugs.
- **Condenser Fan Section** - On the side of the system, check the condenser fan guards and the fan blades.

IMPORTANT NOTE: Sizes 176, 226, 230, 280, 292, 346, 374, 428, and 446 have a "C" Size Cabinet and **MUST** be loaded and unloaded using all six lifting lugs with a spreader bar. **DO NOT** attempt to move a "C" size cabinet system with a fork lift.

Rating Plate

On the inside of the door of the high voltage electrical compartment, locate the system rating plate (See **FIGURE 1A**, below, and **FIGURE 2A or 2B**, page 7 or 8). Check the specifications and the electrical characteristics and verify compatibility with the electric supply at the installation site. Check fuses/breakers for correct sizing.

If installing a Model RDCA, RDDA, RECA, or REDA, check the rating plate on the inside cover of the heat section. Be sure that the rating plate information is compatible with the electric and/or gas supply at the installation site. (See **FIGURE 1B** for a sample of a gas-fired heat section rating plate.)

FIGURE 1A - Sample of System Rating Plate (applies to all models)

System Rating Plate Key:

A = Model
 B = Manufacturing Date (Month/Year)
 C = Blower Motor HP
 D = Volts/Phase/Hertz
 E = Full Load Amps of Blower Motor
 F = Minimum Circuit Ampacity
 G = Maximum Fuse Size
 H = Quantity - Compressor A
 I = Rated Load Amps of Compressor A
 J = Locked Rotor Amps of Compressor A
 K = Quantity - Compressor B
 L = Rated Load Amps of Compressor B
 M = Locked Rotor Amps of Compressor B
 N = Quantity - Compressor C
 O = Rated Load Amps of Compressor C
 P = Locked Rotor Amps of Compressor C
 Q = Quantity - Compressor D
 R = Rated Load Amps of Compressor D
 S = Locked Rotor Amps of Compressor D
 T = Quantity Condenser Fan Motors
 U = Rated Load Amps of Condenser(s)
 V = Refrigerant Charge (lbs) - Circuit A
 W = Refrigerant Charge (lbs) - Circuit B
 X = Refrigerant Charge (lbs) - Circuit C
 Y = Refrigerant Charge (lbs) - Circuit D
 Z = Condenser Fan Motor HP
 AA = Test Pressure High (psig)
 BB = Test Pressure Low (psig)
 CC = SCFM Airflow
 DD = External Static Pressure (" w.c.)
 EE = Drive (Option AM)
 FF = Wiring Diagram No.

REZNOR			
MERCER, PA., U.S.A. 16137			
RCA or RDA		MADE IN USA	
FOR INDUSTRIAL/COMMERCIAL USE ONLY			
SUITABLE FOR OUTDOOR USE			
MODEL [A]	[B]		
SERIAL NO. []	[]	ELECTRICAL	
[D] VOLTS +/- 10% [D] PHASE [D] HZ			
MINIMUM CIRCUIT AMPACITY(MCA)	[F]	AMPS	
MAXIMUM FUSE SIZE/*CKT BREAKER	[G]	AMPS	
SUPPLY AIR BLOWER MOTOR	QTY	FLA(EA)	HP(EA)
	1	[E]	[C]
CONDENSER FAN MOTOR (S)	[T]	[U]	[Z]
	QTY	RLA (EA)	LRA (EA)
COMPRESSOR(S) A	[H]	[I]	[J]
COMPRESSOR(S) B	[K]	[L]	[M]
COMPRESSOR(S) C	[N]	[O]	[P]
COMPRESSOR(S) D	[Q]	[R]	[S]
	CIRCUITS	A	B C D
REFRIGERANT - [] CHARGE - LBS	[V]	[W]	[X] [Y]
TEST PRESSURES	HIGH [AA]	PSIG	LOW [BB] PSIG
EQUIPPED FOR OPERATION AT AN AIR FLOW OF [CC] SCFM			
AGAINST A STATIC PRESSURE OF [DD] INCHES WATER COLUMN.			
DRIVE RPM [EE]			
WIRE DIAGRAM [FF]			
REFER TO RATING PLATE IN THE FURNACE SECTION (WHEN USED)			
FOR ADDITIONAL INFORMATION.			
*HACR TYPE REQUIRED PER NEC			

3. Receiving, Moving, and Storage (cont'd)

3.1 Receiving and Moving (cont'd)

FIGURE 1B - Sample of a Gas-Fired Heat Section Rating Plate (applies to Models RDCA and RDDA)

Gas Heat Section Rating Plate Key:

A = ANSI Standard Date
B = CSA Standard Date
C = Model No.
D = Amps
E = Type of Gas (natural or propane)
F = Orifice Size of Large Burner
G = Orifice Size of Small Burner
H = Normal BTUH Input (sea level)
I = Thermal Output BTUH (sea level)
J = Minimum BTUH Input (sea level)
K = Manifold Pressure
L = Minimum Gas Supply Pressure
M = Maximum Throughput
N = Minimum Throughput
P = Manufacturing Date (Month/Year)
Q = Altitude in Feet
R = Altitude in Meters

REZNOR	
MERCER, PA USA 16137	
DUCT FURNACE/GÉNÉRATEUR D'AIR CHAUD À GAINÉ	
CATEGORY III/CATÉGORIE III	
FOR INDUSTRIAL/COMMERCIAL USE ONLY	
POUR USAGE INDUSTRIEL/COMMERCIAL	
ANSI Z83.8b - [A]	
CGA 2.6b-M [B] DUCT FURNACE/GÉNÉRATEUR D'AIR CHAUD À GAINÉ	
MODEL/MOËLE [C]	[P]
SERIAL NO./#DE SÉRIE: []	
230 VOLTS 1 PH 60 HZ	MAXIMUM TOTAL INPUT [D] AMPS
CONSOMMATION TOTALE MAX. DE [D] A	
TYPE OF GAS/TYPE DE GAZ: [E]	
ALTITUDE [Q] FEET/PIEDS, [R] MÈTRES	
LARGE BURNER ORIFICE SIZE [F] DRILL HAS BEEN FACTORY ADJUSTED	
GRAND BRULEUR DIMENSION DE L'ORIFICE [F] FORET	
SMALL BURNER ORIFICE SIZE [G] DRILL HAS BEEN FACTORY ADJUSTED	
PETIT BRULEUR DIMENSION DE L'ORIFICE [G] FORET	
NORMAL INPUT/ENTRÉE NORMALE	[H] BTU/HR
THermal OUTPUT CAPACITY/RENDEMENT THERMIQUE	[I] BTU/HR
MINIMUM INPUT/ENTRÉE MIN.	[J] BTU/HR
NORMAL MANIFOLD PRESSURE	[K] IN.W.C.
PRESSION NORMALE DE LA TUB	[K] PO/COL D'EAU
MIN. PERMISSIBLE GAS SUPPLY PRESSURE	[L] IN.W.C.
FOR PURPOSE OF INPUT ADJUSTMENT.	[L] IN.W.C.
PRES. D'ALIM. MIN. ACCEPTABLE DE GAZ POUR	[L] IN.W.C.
DES FIN DE RÉGLAGE DE L'ENTRÉE	[L] PO/COL D'EAU
MAXIMUM THROUGHPUT / MINIMUM THROUGHPUT	[M] / [N] C.F.M.
CONSOMMATION MAXIMUM / MINIMUM	[M] / [N] PI3/MN

NOTE: Same type of rating plate applies to a Model JHUP-0250 Curb Duct Furnace.

Shipped-Separate Accessories and Shipped-Loose Parts

Check for shipped-separate accessories and shipped-loose parts.

All heating systems and cooling only systems with Option DU1 have a discharge sensor temporarily installed in the control compartment for the convenience of the installer at startup. (NOTE: Cooling only systems without Option DU1 have a discharge air sensor installed in a permanent location.) Depending on the application and optional controls, a sensor installed in a temporary location will have to either be relocated to the ductwork.

The roof curb is shipped separately (See Paragraph 5.2), and in most cases, in advance of the unit. A Model JHUP-0250 duct furnace curb section, an outside air hood, hood for optional power exhaust, optional economizer, or optional energy recovery module are shipped separately for field installation.

If ordered as options or components of options, other items that are shipped separately include a remote console, a disconnect switch, a discharge temperature control, a space temperature control, a space reheat override, an override thermostat, a room humidistat, a duct smoke detector, and/or a firestat.

3.2 Storage and Installation Checks

If this system is going to be stored, take precautions to prevent condensate formation inside the electrical compartments and motors. To prevent damage to the unit, do not store sitting on the ground.

After the system has been moved to its installation site, remove all of the shipping brackets and check all of the fans for free movement. See the check lists in Paragraph 10 before starting the unit and complete the Startup Form (shipped in the literature envelope).

4. Dimensions and Clearances

4.1 Dimensions - Models RCA, RDA, RDCA, RDDA

FIGURE 2A - General Arrangement and Dimensions (inches/mm) of Models RCA, RDA, RDCA, and RDDA

Dimensions are shown by Cabinet Size. For a cross-reference of cabinet size and model size, refer to the Appendix, pages 58.

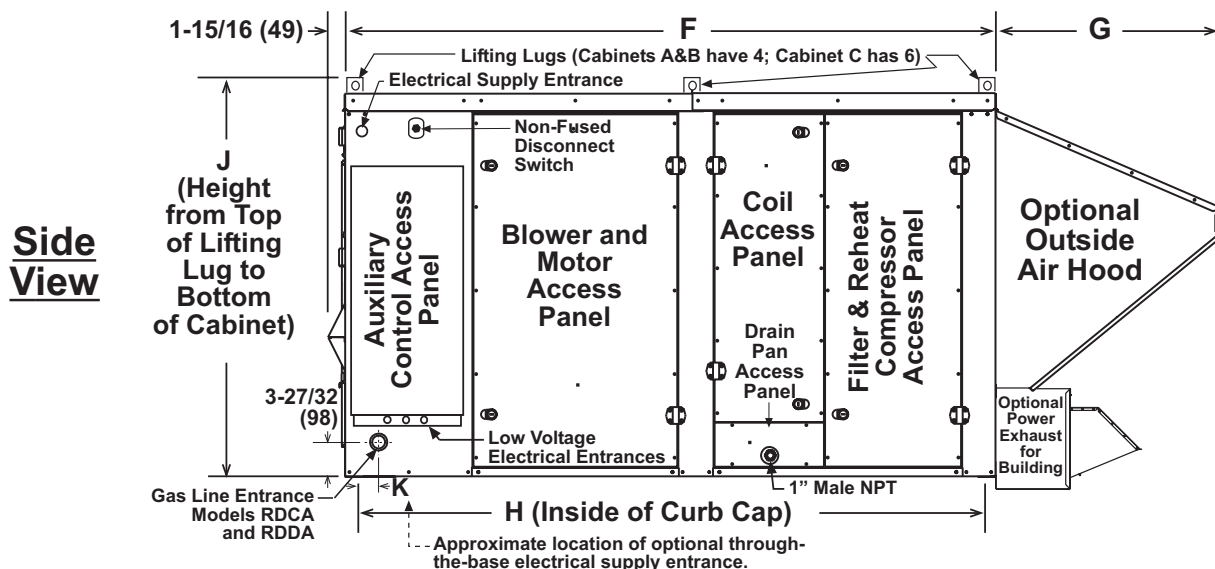
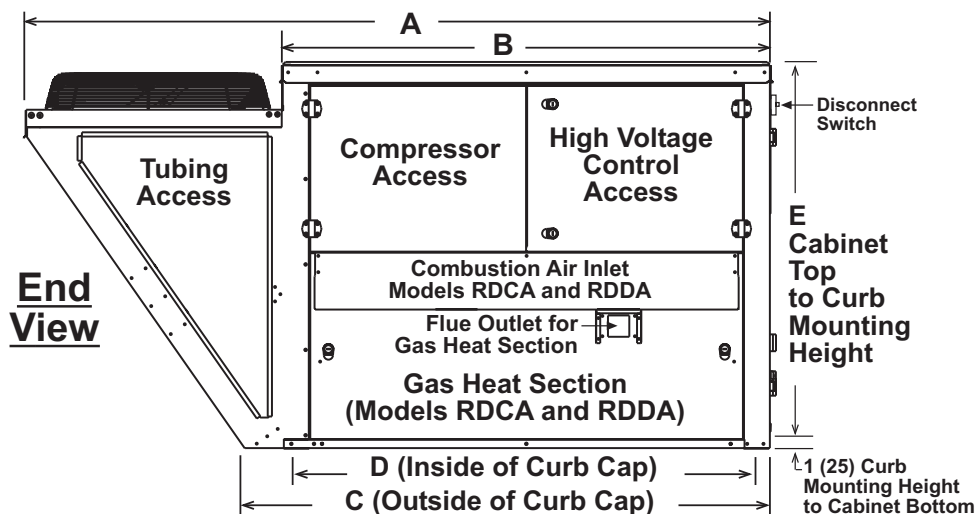
Dimensions - inches ($\pm 1/8"$)											
Cabinet Size	A	B	C	D	Illustration Codes						Outside Air Inlet Opening
					E	F	G	H	J	K	
A	72-5/16	42-5/16	46-1/2	39-1/2	43-7/8	76-5/16	26-3/4 without power exhaust; 44 with power exhaust	73-5/8	48-1/8	3	24 W x 20 H
B	87-5/16	57-5/16	61-1/2	54-1/2							36 W x 20 H
C	100-23/32	68-7/8	68-9/16	66	62	105-1/4	38	102-1/2	66-5/8	9-1/8	49-5/8 W x 25-5/8 H

Dimensions - mm (± 3 mm)											
Cabinet Size	A	B	C	D	Illustration Codes						Outside Air Inlet Opening
					E	F	G	H	J	K	
A	1837	1075	1181	1003	1114	1938	679 without power exhaust; 1118 with power exhaust	1870	1222	76	610 W x 508 H
B	2218	1456	1562	1384							914 W x 508 H
C	2558	1749	1742	1677	1575	2673	965	2604	1692	232	1260 W x 651 H

IMPORTANT NOTE: Sizes 176, 226, 230, 280, 292, 346, 374, 428, and 446 have a "C" Size Cabinet and **MUST** be loaded and unloaded by the lifting lugs. **DO NOT** attempt to move a "C" size cabinet system with a fork lift.

NOTE: Illustration is of a Cabinet A or B; Cabinet C has some slight variations in appearance.

NOTE: References to heat section apply only to Models RDCA and RDDA.



4. Dimensions and Clearances (cont'd)

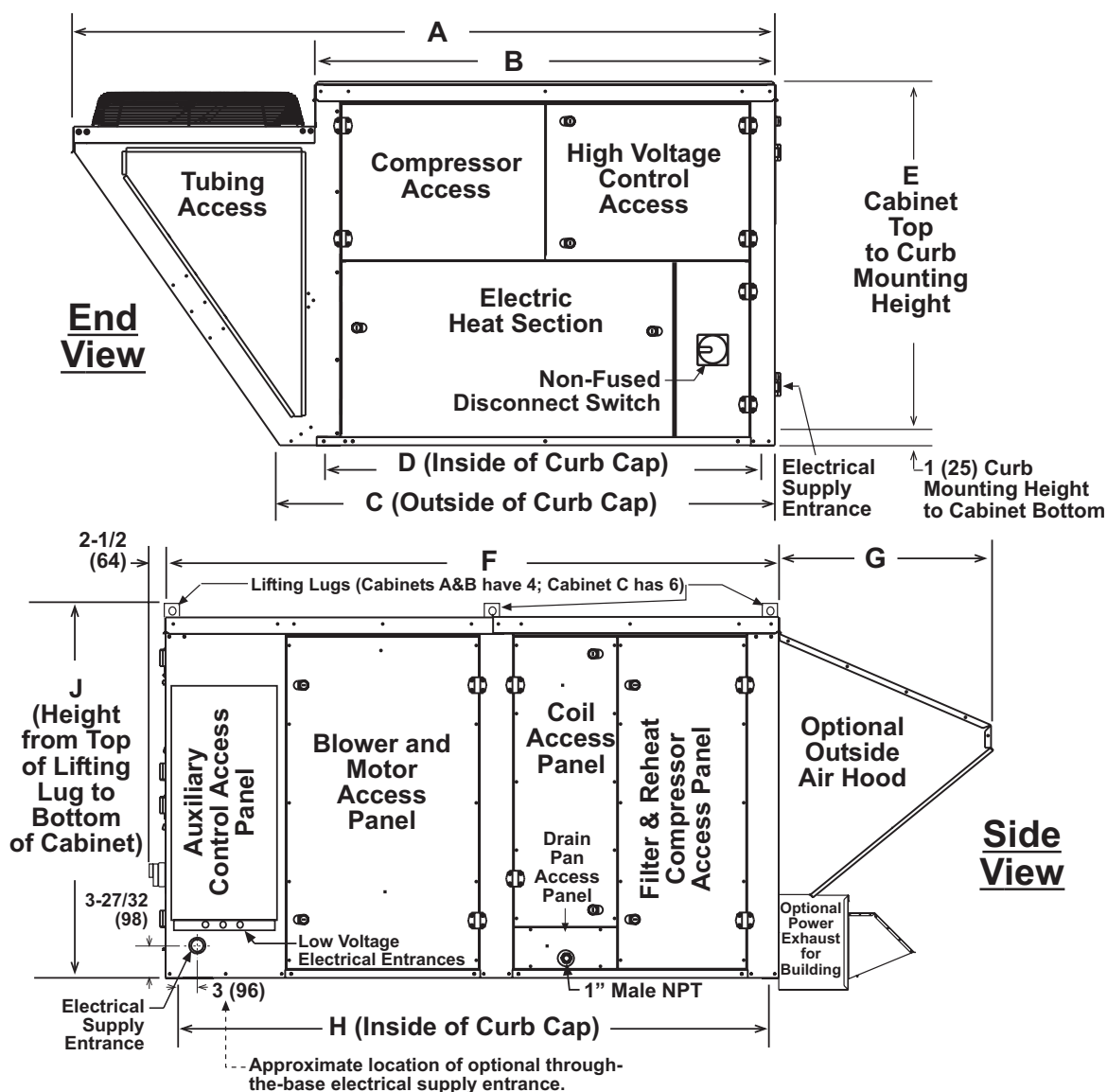
4.2 Dimensions - Models RECA, REDA

FIGURE 2B - General Arrangement and Dimensions (inches/mm) of Models RECA and REDA

Dimensions are shown by Cabinet Size. For a cross-reference of cabinet size and model size, refer to Appendix, page 58. **IMPORTANT NOTE:** "C" Size Cabinets **MUST** be loaded and unloaded by the lifting lugs. **DO NOT** attempt to move a "C" size cabinet system with a fork lift.

Dimensions - inches (±1/8")										
Cabinet Size	Illustration Codes									Outside Air Inlet Opening
	A	B	C	D	E	F	G	H	J	
A	72-5/16	42-5/16	46-1/2	39-1/2	43-7/8	76-5/16	26-3/4 w/o power exhaust; 44 with power exhaust	73-5/8	48-1/8	24 W x 20 H
B	87-5/16	57-5/16	61-1/2	54-1/2	43-7/8	76-5/16		73-5/8	48-1/8	36 W x 20 H
C	100-23/32	68-7/8	68-9/16	66	62	105-1/4	38	102-1/2	66-5/8	49-5/8 W x 25-5/8 H

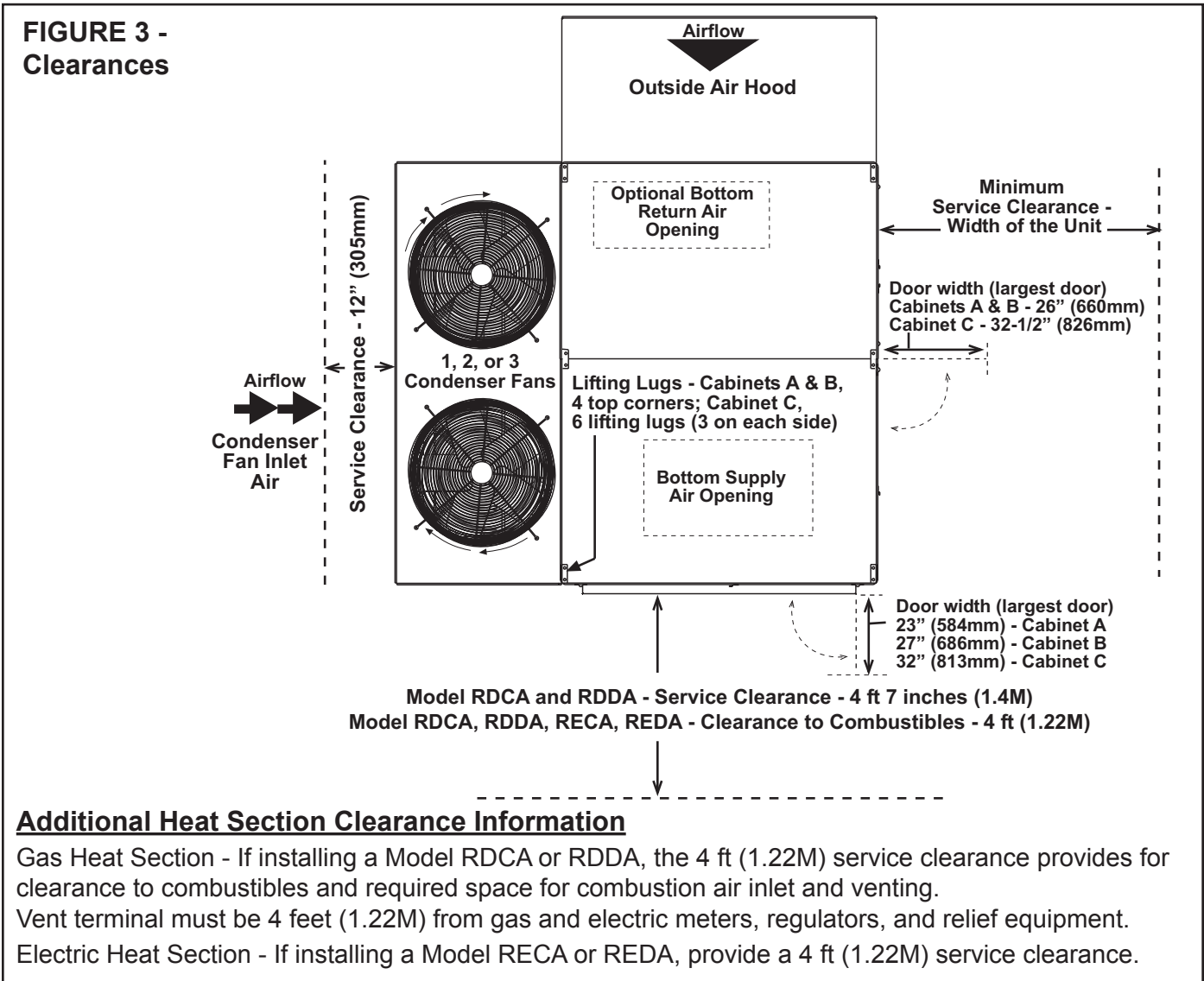
Dimensions - mm (±3mm)										
Cabinet Size	Illustration Codes									Outside Air Inlet Opening
	A	B	C	D	E	F	G	H	J	
A	1837	1075	1181	1003	1114	1938	679 w/o power exhaust; 1118 with power exhaust	1870	1222	610 W x 508 H
B	2218	1456	1562	1384	1114	1938		1870	1222	914 W x 508 H
C	2558	1749	1742	1677	1575	2673	965	2604	1692	1260 W x 651 H



4.3 Clearances

Provide minimum clearances as shown in **FIGURE 3**. Minimum clearances are required to ensure proper operation and access for service. If a heat section is included, clearances to combustibles are required. Clearance to combustibles is defined as the minimum distance from the heater to a surface or object that is necessary to ensure that a surface temperature of 90°F above the surrounding ambient temperature is not exceeded.

The area above the condenser fans **MUST** always be totally open space.



5. Mounting

5.1 Approximate Weights

5.1.1 Accessory Weights

Refer to the system weight charts on page 10 or 11 to determine Cabinet Size. Add the accessory weight to the system weight for model and size.

Optional building power exhaust is not listed because weight varies with motor horsepower. Additional motor only weight would be from 23-70 lbs (10-32 kg).

Accessory Weights (add to system weight in tables on page 10 or 11)

Cabinet Size	A		B		C	
Optional Accessory	lbs	kg	lbs	kg	lbs	kg
Outside Air Hood (Option AS16 or AS19)	35	16	45	20	80	36
Model JHUP-0250 Curb Duct Furnace	■		530	240	■	
Downflow Roof Curb (Option CJ31)	93	42	105	48	235	107
32" (813mm) High Horizontal Flow Roof Curb (Option CJ50)	210	95	240	109	530	240
36" (914mm) High Horizontal Flow Roof Curb (Option CJ49)	■		■		575	261

5. Mounting (cont'd)

5.1 Approximate Weights (cont'd)

NOTE: If approximate unit corner weights are required, refer to www.RezSpec.com, Form C-PC, Sales and Technical Catalog. Corner weights for Model JHUP-0250 curb duct furnace are in Paragraph 5.3.

5.1.2 Weights - Models RCA and RDA

Model RCA and Model RDA Weight (lbs)

Model RCA Cooling Only	Size	025	037	059	060	077	078	090	108	109	120	139	164	166	176	184	198	226	292	374
	Cabinet	A	A	A	A	A	A	A	A	A	A	B	A	B	C	B	B	C	C	C
	-000	689	700	815	775	857	904	915	894	1010	1019	1160	1139	1280	1891	1348	1416	1891	2276	2601

Model RDA Cooling w/ Reheat	Size	102	114	126	144	188	220	230	234	280	346	428	446
	Cabinet	A	A	A	A	B	B	C	B	C	C	C	C
	-000	982	993	972	1097	1372	1440	1968	1508	1968	2353	2677	2706

Model RCA and Model RDA Weight (kg)

Model RCA Cooling Only	Size	025	037	059	060	077	078	090	108	109	120	139	164	166	176	184	198	226	292	374
	Cabinet	A	A	A	A	A	A	A	A	A	A	B	A	B	C	B	B	C	C	C
	-000	313	318	370	352	389	410	415	406	458	462	526	517	581	858	611	642	858	1032	1180

Model RDA Cooling w/ Reheat	Size	102	114	126	144	188	220	230	234	280	346	428	446
	Cabinet	A	A	A	A	B	B	C	B	C	C	C	C
	-000	445	450	441	498	622	653	893	684	893	1067	1214	1227

5.1.3 Weights - Models RDCA and RDDA

Model RDCA and Model RDDA Weight (lbs)

Size	Model RDCA Cooling with Gas Heat Section												
	Cabinet A			Cabinet B		Cabinet C							
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
025	756	776	798	■	■	■	■	■	■	■	■	■	■
037	767	787	809	■	■	■	■	■	■	■	■	■	■
059	881	904	926	■	■	■	■	■	■	■	■	■	■
060	842	862	884	■	■	■	■	■	■	■	■	■	■
077	924	946	968	■	■	■	■	■	■	■	■	■	■
078	970	992	1014	1129	1153	■	■	■	■	■	■	■	■
090	981	1003	1025	1140	1164	■	■	■	■	■	■	■	■
108	961	981	1003	1120	1144	■	■	■	■	■	■	■	■
109	■	1098	1120	■	■	■	■	■	■	■	■	■	■
120	1087	1107	1129	1243	1270	■	■	■	■	■	■	■	■
139	■	■	■	1385	1411	■	■	■	■	■	■	■	■
164	■	1228	1250	■	■	■	■	■	■	■	■	■	■
166	■	■	■	1506	1530	■	■	■	■	■	■	■	■
176	■	■	■	■	■	2094	2094	2140	2140	2203	2203	2347	2347
184	■	■	■	1574	1598	■	■	■	■	■	■	■	■
198	■	■	■	1640	1667	■	■	■	■	■	■	■	■
226	■	■	■	■	■	2094	2094	2140	2140	2203	2203	2347	2347
292	■	■	■	■	■	2479	2479	2525	2525	2589	2589	2732	2732
374	■	■	■	■	■	2804	2804	2850	2850	2913	2913	3057	3057

Size	RDDA Cooling with Reheat and Gas Heat Section												
	Cabinet A			Cabinet B		Cabinet C							
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
102	1049	1070	1092	1207	1232	■	■	■	■	■	■	■	■
114	1060	1081	1103	1218	1243	■	■	■	■	■	■	■	■
126	1039	1060	1082	1197	1222	■	■	■	■	■	■	■	■
144	■	1185	1207	1322	1347	■	■	■	■	■	■	■	■
188	■	■	■	1502	1527	■	■	■	■	■	■	■	■
220	■	■	■	1570	1595	■	■	■	■	■	■	■	■
230	■	■	■	■	■	2221	2221	2267	2267	2330	2330	2474	2474
234	■	■	■	1638	1663	■	■	■	■	■	■	■	■
280	■	■	■	■	■	2221	2221	2267	2267	2330	2330	2474	2474
346	■	■	■	■	■	2606	2606	2652	2652	2715	2715	2859	2859
428	■	■	■	■	■	2930	2930	2976	2976	3039	3039	3183	3183
446	■	■	■	■	■	2959	2959	3005	3005	3068	3068	3212	3212

Model RDCA and Model RDDA Weight (kg)

Size	Model RDCA Cooling with Gas Heat Section												
	Cabinet A			Cabinet B		Cabinet C							
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
025	343	352	362	■	■	■	■	■	■	■	■	■	■
037	348	357	367	■	■	■	■	■	■	■	■	■	■
059	400	410	420	■	■	■	■	■	■	■	■	■	■
060	382	391	401	■	■	■	■	■	■	■	■	■	■
077	419	429	439	■	■	■	■	■	■	■	■	■	■
078	440	450	460	512	523	■	■	■	■	■	■	■	■
090	445	455	465	517	528	■	■	■	■	■	■	■	■
108	436	445	455	508	519	■	■	■	■	■	■	■	■
109	■	498	508	■	■	■	■	■	■	■	■	■	■
120	493	502	512	564	576	■	■	■	■	■	■	■	■
139	■	■	■	628	640	■	■	■	■	■	■	■	■
164	■	557	567	■	■	■	■	■	■	■	■	■	■
166	■	■	■	683	694	■	■	■	■	■	■	■	■
176	■	■	■	■	■	950	950	971	971	999	999	1065	1065
184	■	■	■	714	725	■	■	■	■	■	■	■	■
198	■	■	■	744	756	■	■	■	■	■	■	■	■
226	■	■	■	■	■	950	950	971	971	999	999	1065	1065
292	■	■	■	■	■	1125	1125	1146	1146	1174	1174	1239	1239
374	■	■	■	■	■	1272	1272	1293	1293	1321	1321	1387	1387

Size	RDDA Cooling with Reheat and Gas Heat Section												
	Cabinet A			Cabinet B		Cabinet C							
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
102	476	485	495	547	559	■	■	■	■	■	■	■	■
114	481	490	500	552	564	■	■	■	■	■	■	■	■
126	471	481	491	543	554	■	■	■	■	■	■	■	■
144	■	538	547	60	611	■	■	■	■	■	■	■	■
188	■	■	■	681	693	■	■	■	■	■	■	■	■
220	■	■	■	712	723	■	■	■	■	■	■	■	■
230	■	■	■	■	■	1007	1007	1028	1028	1057	1057	1122	1122
234	■	■	■	743	754	■	■	■	■	■	■	■	■
280	■	■	■	■	■	1007	1007	1028	1028	1057	1057	1122	1122
346	■	■	■	■	■	1182	1182	1203	1203	1232	1232	1297	1297
428	■	■	■	■	■	1329	1329	1350	1350	1379	1379	1444	1444
446	■	■	■	■	■	1342	1342	1363	1363	1392	1392	1457	1457

5.1.4 Weights - Models RECA and REDA

Model RECA and Model REDA Weight (lbs)

Model RECA Cooling with Electric Heat Section																															
Size	Cabinet A												Size	Cabinet B												Cabinet C					
	05S	10S	15S	20S	24S	15	20	25	30	35	39	15		20	25	30	35	39	50	60	75	88	39	50	60	75	88				
025	■	■	■	■	■	719										025	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
037	■	■	■	■	■	730										037	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
059	■	■	■	■	■	844										059	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
060	789					805										060	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
077	■	■	■	■	■	886										077	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
078	■	919				935	■	935		■	■	935	078	■	1030	■	■	1030	■	1058			■	■	■	■	■	■			
090	■	930				946	■	946		■	■	946	090	■	1041	■	■	1041	■	1069			■	■	■	■	■	■			
108	■	908				924	■	924		■	■	924	108	■	1019	■	■	1019	■	1049			■	■	■	■	■	■			
109	■	■	■	■	■	1041										109	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
120	■	1034				1049	■	1049		■	■	1049	120	■	1144	■	■	1144	■	1175			■	■	■	■	■	■			
139	■	■	■	■	■	■	■	■	■	■	■	139	1285					1314					■	■	■	■	■	■			
164	■	■	1153			1168										164	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
166	■	■	■	■	■	■	■	■	■	■	■	166	1310					1340					■	■	■	■	■	■			
176	■	■	■	■	■	■	■	■	■	■	■	176	■	■	■	■	■	■	■	■	■	1931	1971								
184	■	■	■	■	■	■	■	■	■	■	■	184	1378					1409					■	■	■	■	■	■			
198	■	■	■	■	■	■	■	■	■	■	■	198	■	1446					1477					■	■	■	■	■	■		
226	■	■	■	■	■	■	■	■	■	■	■	226	■	■	■	■	■	■	■	■	■	1931	1971								
292	■	■	■	■	■	■	■	■	■	■	■	292	■	■	■	■	■	■	■	■	■	2316	2356								
374	■	■	■	■	■	■	■	■	■	■	■	374	■	■	■	■	■	■	■	■	■	2641	2681								
Model REDA Cooling with Reheat and Electric Heat Section																															
Size	Cabinet A												Size	Cabinet B												Cabinet C					
	05S	10S	15S	20S	24S	15	20	25	30	35	39	15		20	25	30	35	39	50	60	75	88	39	50	60	75	88				
102	■	996				1011	■	1011		■	1011	102	■	1107	■	■	1107	■	1138			■	■	■	■	■	■				
114	1008					1023	■	1023		■	1023	114	■	1118	■	■	1118	■	1149			■	■	■	■	■	■				
126	■	■	988			1001	■	1001		■	1001	126	■	1093	■	■	1093	■	1127			■	■	■	■	■	■				
144	■	■	1111			1126	■	1126		■	1126	144	■	1221	■	■	1221	■	1252			■	■	■	■	■	■				
188	■	■	■	■	■	■	■	■	■	■	■	188	1402					1433					■	■	■	■	■	■			
220	■	■	■	■	■	■	■	■	■	■	■	220	■	1470					1499					■	■	■	■	■			
230	■	■	■	■	■	■	■	■	■	■	■	230	■	■	■	■	■	■	■	■	■	2058	2098								
234	■	■	■	■	■	■	■	■	■	■	■	234	■	1539					1567					■	■	■	■	■			
280	■	■	■	■	■	■	■	■	■	■	■	280	■	■	■	■	■	■	■	■	■	2058	2098								
346	■	■	■	■	■	■	■	■	■	■	■	346	■	■	■	■	■	■	■	■	■	2443	2483								
428	■	■	■	■	■	■	■	■	■	■	■	428	■	■	■	■	■	■	■	■	■	2767	2807								
446	■	■	■	■	■	■	■	■	■	■	■	446	■	■	■	■	■	■	■	■	■	2796	2836								

Model RECA and Model REDA Weight (kg)

Model RECA Cooling with Electric Heat Section																														
Size	Cabinet A												Size	Cabinet B												Cabinet C				
	05S	10S	15S	20S	24S	15	20	25	30	35	39	15		20	25	30	35	39	50	60	75	88	39	50	60	75	88			
025	■	■	■	■	■	326						025	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
037	■	■	■	■	■	331						037	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
059	■	■	■	■	■	383						059	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
060	358					365						060	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
077	■	■	■	■	■	402						077	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
078	■	417				424	■	424		■	424	078	■	467	■	■	467	■	480			■	■	■	■	■	■			
090	■	422				429	■	429		■	429	090	■	472	■	■	472	■	485			■	■	■	■	■	■			
108	■	412				419	■	419		■	419	108	■	462	■	■	462	■	476			■	■	■	■	■	■			
109	■	■	■	■	■	■	472					109	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
120	■	469				476	■	476		■	476	120	■	519	■	■	519	■	533			■	■	■	■	■	■			
139	■	■	■	■	■	■	■	■	■	■	■	139	583					596					■	■	■	■	■	■		
164	■	■	523			530						164	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
166	■	■	■	■	■	■	■	■	■	■	■	166	594					608					■	■	■	■	■	■		
176	■	■	■	■	■	■	■	■	■	■	■	176	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
184	■	■	■	■	■	■	■	■	■	■	■	184	925					639					■	894						
198	■	■	■	■	■	■	■	■	■	■	■	198	■	656					670					■	■	■	■	■		
226	■	■	■	■	■	■	■	■	■	■	■	226	■	■	■	■	■	■	■	■	■	■	876	894						
292	■	■	■	■	■	■	■	■	■	■	■	292	■	■	■	■	■	■	■	■	■	1051	1069							
374	■	■	■	■	■	■	■	■	■	■	■	374	■	■	■	■	■	■	■	■	■	1198	1216							
Model REDA Cooling with Reheat and Electric Heat Section																														
Size	Cabinet A												Size	Cabinet B												Cabinet C				
	05S	10S	15S	20S	24S	15	20	25	30	35	39	15		20	25	30	35	39	50	60	75	88	39	50	60	75	88			
102	■	452				459	■	459		■	459	102	■	502	■	■	502	■	516			■	■	■	■	■	■			
114	■	457				464	■	464		■	464	114	■	507	■	■	507	■	521			■	■	■	■	■	■			
126	■	■	448			454	■	454		■	454	126	■	496	■	■	496	■	511			■	■	■	■	■	■			
144	■	■	504			511	■	511		■	511	144	■	554	■	■	554	■	568			■	■	■	■	■	■			
188	■	■	■	■	■	■	■	■	■	■	■	188	636					650					■	■	■	■	■	■		
220	■	■	■	■	■	■	■	■	■	■	■	220	■	667				680					■	■	■	■	■	■		
230	■	■	■	■	■	■	■	■	■	■	■	230	■	■	■	■	■	■	■	■	■	933	952							
234	■	■	■	■	■	■	■	■	■	■	■	234	■	698					711					■	■	■	■	■		
280	■	■	■	■	■	■	■	■	■	■	■	280	■	■	■	■	■	■	■	■	■	933	952							
346	■	■	■	■	■	■	■	■	■	■	■	346	■	■	■	■	■	■	■	■	■	1108	1126							
428	■	■	■	■	■	■	■	■	■	■	■	428	■	■	■	■	■	■	■	■	■	1255	1273							
446	■	■	■	■	■	■	■	■	■	■	■	446	■	■	■	■	■	■	■	■	■	1268	1286							

5. Mounting (cont'd)

5.2 Roof Curb

5.2.1 Downflow Roof Curb, Option CJ31

Components

All of these packaged systems are designed to be mounted on a roof or slab using a manufacturer designed curb. Both downflow and horizontal curbs are available.

When the unit is being placed on a roof, location depends on the roof structure.

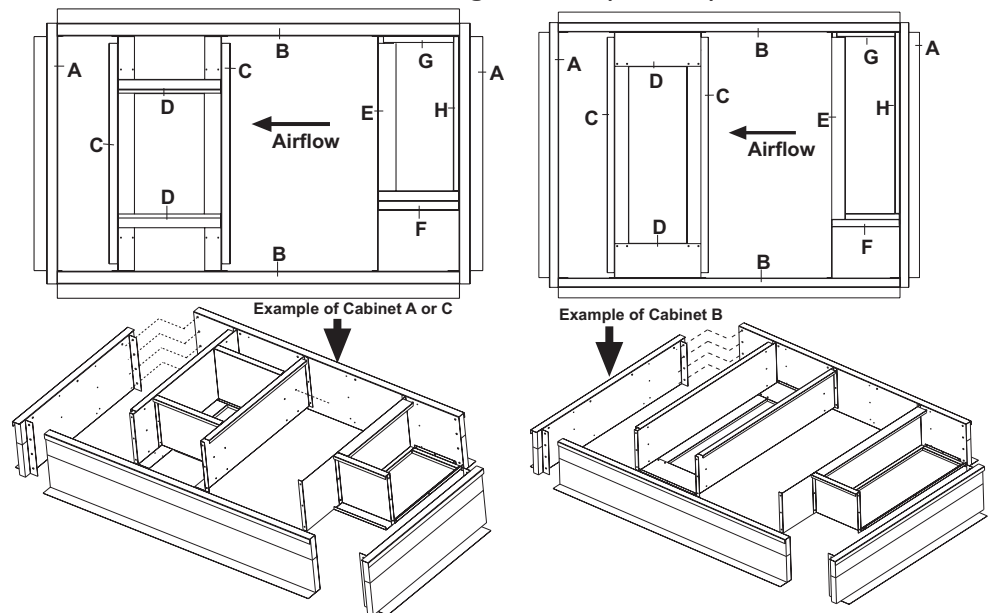
Position the curb so that the air inlet of the unit will not be facing into the prevailing wind. Always comply with the clearances in Paragraph 4.3. For condensate drainage and proper operation, it is important that the installation be level.

The downflow roof curb designed for this system is a 14" high insulated curb. The curb includes integral duct connections for supply air and optional return air as illustrated in **FIGURE 4**. See curb dimensions in **FIGURE 5** and assembly instructions on page 14.

**FIGURE 4 -
Roof Curb
Components
and Layout**

All curbs include corner hardware as shown on page 14 and screws for attaching duct pieces.

Top View Showing Field Assembly of Downflow Roof Curb, Option CJ31
Roof curb height is 14" (356mm).



Option CJ31 Components

Code	Components:	Qty
A & B	Curb End and Side Assemblies	2 ends; 2 sides
C & D	Parts to create the supply air duct through the curb. Pieces mate to the cabinet or heat exchanger discharge and provide a duct flange for installing ductwork.	2 ends; 2 sides (may be same or different depending on size of system)
E, F, G, & H	Parts to create the optional return air duct through the curb. Pieces mate to the cabinet and provide a duct flange for installing ductwork. If the system does not include optional return air, these pieces may be installed but are not required and will serve no function.	4 pieces - a side, an end, a side angle, and an end angle

Option CJ31 Roof Curb P/N's

Before installing, verify the appropriate P/N with table below. Follow the instructions on page 14.

Option CJ31 for Cooling Only Models RCA, RDA	Cabinet Size *	Model Sizes *	Pkg P/N
	A	* All except Size 164	205661
		Size 164	205662
	B	* All	205664
	C	176, 226, 230, 280	208854
		292, 374, 346, 428, 446	208856

Option CJ31 for Models RECA and REDA	Cabinet Size *	Model Size	Option CJ31 Roof Curb Pkg P/N
	A	All	205661
	B	All	205664
	C	All	208856

*See Appendix, page 58, for cross-reference by Cabinet Size and Model Size.

Option CJ31 for Models RDCA and RDDA	Option CJ31 Roof Curb Pkg P/N's by <u>Gas Heat Section Size</u>												
	100	150	200	250	300	350	400	450	500	550	600	650	700
	205660	205661	205662	205663	205664	208854		208855		208856		208857	

Dimensions - Downflow Roof Curb Option CJ31

FIGURE 5 - Roof Curb and Duct Opening Dimensions

IMPORTANT NOTES: Area enclosed by roof curb must comply with clearance to combustible materials. If the roof is constructed of combustible materials, area within the roof curb must be ventilated, left open, or covered with non-combustible material which has an "R" value of at least 5. If area within curb is left open, higher radiated sound levels may result.

If area inside curb is open, roof opening dimensions must be no greater than:

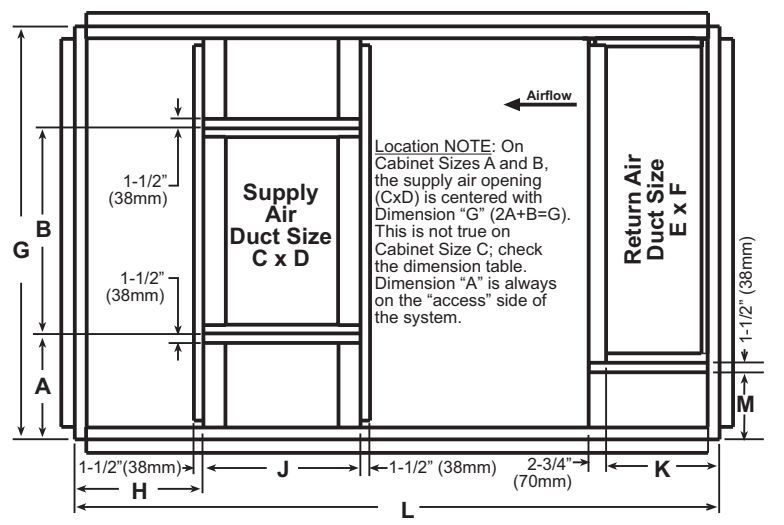
Cabinet A - 34-13/16" x 69" (884 x 1753mm);

Cabinet B - 49-13/16" x 69" (1265 x 1753mm);

Cabinet C - 61-5/16" x 97-7/8" (1557 x 2486mm).

NOTE: See Appendix, page 58, for cross-reference by Model Size and Cabinet Size.

When cutting only duct openings, cut opening 1" (25mm) larger than duct size to allow clearance for installation.



Cabinet Size	RCA Model Size	RDA Model Size	Illustration Codes - FIGURE 5											
			A	B	C	D	E	F	G	H	J	K	L	M
Curb Dimensions for Cooling Only Model RCA, RDA by Cabinet Size, Model Size - inches (±1/8)														
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120	102, 114, 126, 144	6-1/8	26-1/2	24	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
	164	--	N/A	N/A	24	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	N/A	N/A	36	12	36	12	53-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
C	176, 226	230, 280	19-3/8	32-3/8	30	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
	292, 374	346, 428, 446	10-3/4	49-1/2	47	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
Curb Dimensions for Cooling Only Model RCA, RDA by Cabinet Size, Model Size - mm (±3)														
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120	102, 114, 126, 144	156	673	610	305	610	305	981	337	445	327	1848	311
	164	--	N/A	N/A	610	305	610	305	981	337	445	327	1848	311
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	N/A	N/A	914	305	914	305	1362	337	445	327	1848	311
C	176, 226	230, 280	492	822	762	457	1168	381	1654	514	629	454	2581	337
	292, 374	346, 428, 446	273	1257	1194	457	1168	381	1654	514	629	454	2581	337

Cabinet Size *	RDCA Model Size*	RDDA, Model Size*	Gas Heat Size *	Illustration Codes - FIGURE 5											
				A	B	C	D	E	F	G	H	J	K	L	M
Curb Dimensions for Cooling/Gas Heat Makeup Air Model RDCA, RDDA by Cabinet Size, Model Size - inches (±1/8)															
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120, 164	102, 114, 126, 144	100	9-7/8	19	18	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
			150	6-1/8	26-1/2	24	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
			200	N/A	N/A	24	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	250	6-1/8	41-1/2	36	12	36	12	53-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
			300	N/A	N/A	36	12	36	12	53-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
C	176, 226, 292, 374	230, 280, 346, 428, 446	350, 400	19-3/8	32-3/8	30	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
			450, 500	13-1/4	44-1/2	42	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
			550, 600	10-3/4	49-1/2	47	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
			650, 700	8-1/4	55	52	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
Curb Dimensions for Cooling/Gas Heat Makeup Air Model RDCA, RDDA by Cabinet Size, Model Size - mm (±3)															
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120, 164	102, 114, 126, 144	100	251	483	457	305	610	305	981	337	445	327	1848	311
			150	156	673	610	305	610	305	981	337	445	327	1848	311
			200	N/A	N/A	610	305	610	305	981	337	445	327	1848	311
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	250	156	1054	914	305	914	305	1362	337	445	327	1848	311
			300	N/A	N/A	914	305	914	305	1362	337	445	327	1848	311
C	176, 226, 292, 374	230, 280, 346, 428, 446	350, 400	492	822	762	457	1168	381	1654	514	629	454	2581	337
			450, 500	337	1130	1067	457	1168	381	1654	514	629	454	2581	337
			550, 600	273	1257	1194	457	1168	381	1654	514	629	454	2581	337
			650, 700	210	1397	1321	457	1168	381	1654	514	629	454	2581	337

Cabinet Size*	RECA Model Size *	REDA Model Size *	* Electric Heat Size	Illustration Codes - FIGURE 5											
				A	B	C	D	E	F	G	H	J	K	L	M
Curb Dimensions for Cooling/Electric Heat Makeup Air Model RECA, REDA by Cabinet Size, Model Size - inches (±1/8)															
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120, 164	102, 114, 126, 144	All	N/A	N/A	24	12	24	12	38-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	All	N/A	N/A	36	12	36	12	53-5/8	13-1/4	17-1/2	12-7/8	72-3/4	12-1/4
C	176, 226, 292, 374	230, 280, 346, 428, 446	All	10-3/4	49-1/2	47	18	46	15	65-1/8	20-1/4	24-3/4	17-7/8	101-5/8	13-1/4
Curb Dimensions for Cooling/Electric Heat Makeup Air Model RECA, REDA by Cabinet Size, Model Size - mm (±3)															
A	025, 037, 059, 060, 077, 078, 090, 108, 109, 120, 164	102, 114, 126, 144	All	N/A	N/A	610	305	610	305	981	337	445	327	1848	311
B	078, 090, 108, 120, 139, 166, 184, 198	102, 114, 126, 144, 188, 220, 234	All	N/A	N/A	914	305	914	305	1362	337	445	327	1848	311
C	176, 226, 292, 374	230, 280, 346, 428, 446	All	273	1257	1194	457	1168	381	1654	514	629	454	2581	337

* See Appendix, page 58, for cross-reference by Model Size/Heat Size and Cabinet Size

5. Mounting (cont'd)

5.2 Roof Curb (cont'd)

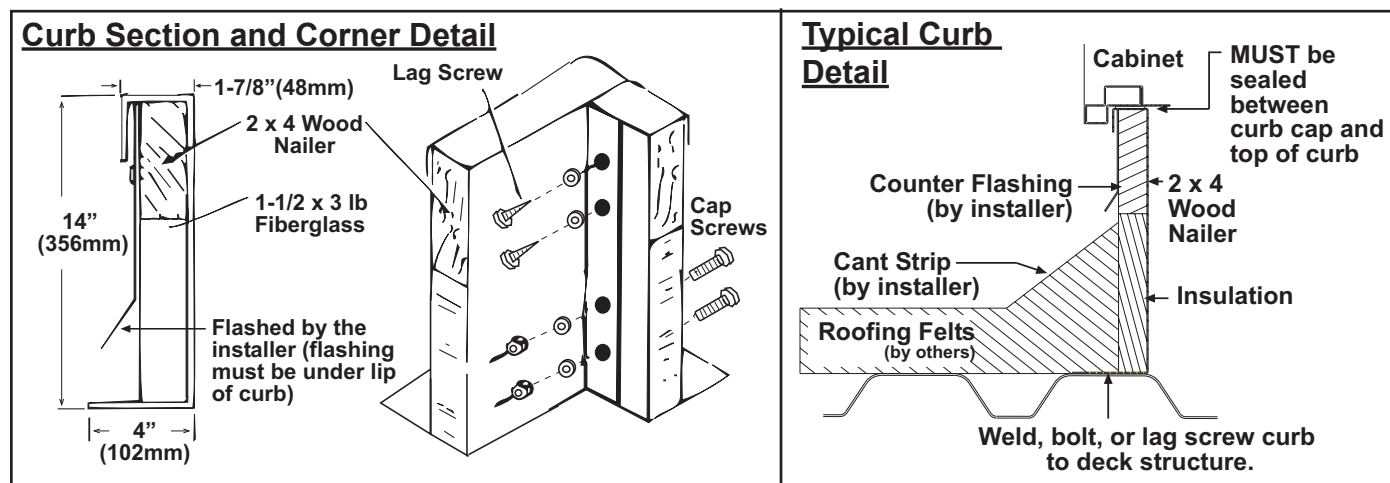
5.2.1 Downflow Roof Curb, Option CJ31 (cont'd)

Downflow Roof Curb Assembly and Installation Instructions

CAUTION: Before installation, recheck to be sure that the correct curb has been ordered. Be sure that the curb selected matches the unit ordered. Verify the dimensions of the curb received with the dimension table in **FIGURE 5**.

1. Position the roof curb end assemblies and side assemblies as shown in the drawing in **FIGURE 4**, page 12. Fasten with bolts and lag screws as illustrated in the corner detail (**FIGURE 6**, below).
2. Attach duct sides and ends to create the internal ductwork. Use the sheet-metal screws to attach the ductwork pieces. (Refer to **FIGURE 4**). Attach the return air duct angles to the attached end and side and to the roof curb. **NOTE:** If the system does not have a return air opening, the return air ductwork may be installed in the curb but is not required.
3. Check the roof curb for squareness. The curb must be adjusted so that the diagonal measurements are equal within a tolerance of $\pm 1/8"$ (3mm).
4. Level the roof curb. To ensure a good weatherproof seal between the cabinet curb cap and the roof curb, the curb must be leveled in both directions with no twist end to end. Shim as required and secure curb to the roof deck before installing flashing (See Curb Detail in **FIGURE 6**).
5. Install field-supplied flashing.
6. Before placing the unit on the curb, apply $1/4" \times 1-1/4"$ foam sealant tape to both the top surface of the curb rails and the top surface of the perimeter of the duct opening(s), being sure to make good butt joints at all corners. The sealant tape must be applied to the curb rails to prevent water leakage into the curb area due to blown rain and capillary action.

**FIGURE 6 - Option
CJ31 Downflow Roof
Curb Cross Section
and Corner Detail**



5.2.2 Curbs for Horizontal Airflow (Option CJ50 and Option CJ49)

Option CJ50 is a 32" (813mm) high curb designed to provide horizontal airflow into the side of a building or at a location through the roof that is not directly under the unit. Option CJ49 is the same design but is 36" (914mm) high. Both curbs are NRCA approved and are constructed of 14 gauge steel with a 2x4 full perimeter wood nailer strip.

Option CJ49 and CJ50 curbs are shipped in sections and require field assembly. Position the curb so that the air inlet of the unit will not be facing into the prevailing wind. Always comply with the clearances in Paragraph 4.3. Verify that the curb is the correct size and follow the assembly and installation instructions shipped with the curb.

For condensate drainage and proper operation, it is important that the installation be level. To ensure a good weatherproof seal between the unit curb cap and the curb, the curb must be leveled in both directions with no twist end to

end. Shim as required and secure curb before installing flashing. Flashing is field supplied.

If Option CJ50 or CJ49 curb was ordered to arrive prior to the heater, it will be identified by the following P/N's. Verify the appropriate P/N before installing the curb.

Before placing the unit on the curb, apply 1/4" x 1-1/4" foam sealant tape to both the top surface of the curb sides and the top surface of the perimeter of the duct opening(s), being sure to make good butt joints at all corners.

Option CJ50 and CJ49 curbs should only be used for the Models and Sizes for which they are designed. The supply duct panels are insulated so should not be used in an installation that prohibits insulation in the supply duct.

Horizontal Airflow Roof Curb P/N's

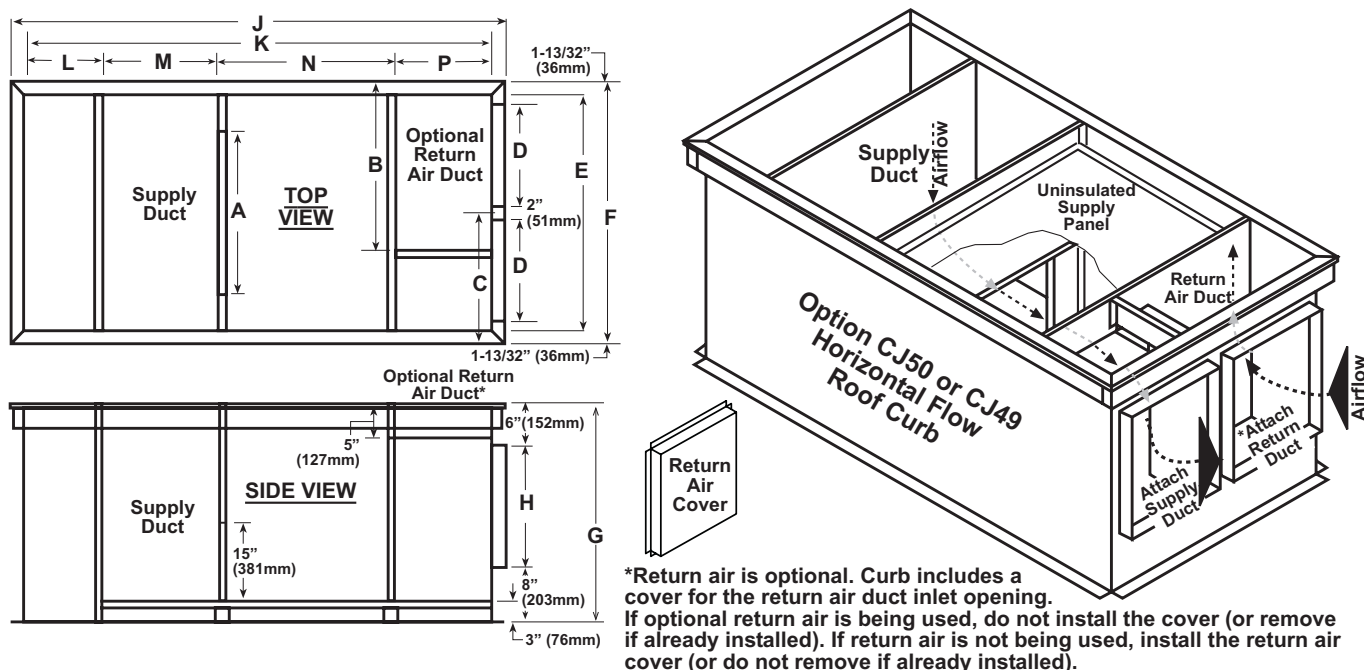
Option CJ50 for Models RCA, RDA, RECA, REDA	Cabinet Size*	P/N	Option CJ50 for Models RDCA and RDDA	with Gas Heat Section Size														
	A	206116		100	150	200	250	300	350	400	450	500	550	600	650	700		
	B	206118																
	C	208944		206116			206118			208944								
Option CJ49 for Models RCA, RDA, RECA, REDA	Cabinet Size*	P/N	Option CJ49 for Models RDCA and RDDA	with Gas Heat Section Size														
	C	208943		100	150	200	250	300	350	400	450	500	550	600	650	700		
				N/A						208943								

*See cross-reference by Model Size and Cabinet Size in the APPENDIX, page 58.

Dimensions

FIGURE 7A - P/N's, Dimensions, and Airflow of Horizontal Curbs, Option CJ50 and CJ49

Dimensions are shown by Cabinet Size; see cross-reference of cabinet size and model size, Appendix, page 58.



5. Mounting (cont'd) **Assembly and Installation Instructions for Option CJ49 and CJ50, Curbs for Horizontal Airflow**

5.2 Roof Curb (cont'd)

5.2.2 Curbs for Horizontal Airflow (Option CJ50 and Option CJ49) (cont'd)

CAUTION: Before installing, recheck to be sure that the correct curb has been ordered and received. Be sure that the curb selected matches the unit ordered. Verify the dimensions of the curb received with the dimension table in FIGURE 7A.

Verify all the components and be sure that the curb is correct for the system being installed. A short version of the installation instructions is included in this manual. When assembling, follow the complete step-by-step illustrated instructions included with the curb.

FIGURE 7B - Exploded View of Horizontal Airflow Curb Assembly Showing all Components

Hardware Package	
Qty	Description
24	1/4-20 x 1/2 Hex Bolts with Nuts
24	1/4 Split Lock Washers
24	1/4 Flat Washers
88	10-16 x 1/2 Hex Screws
1	3/4" x 1-1/4" x 14' Gasket

Instructions

Layout the four curb sides. Join the corners using six of the bolts and washer sets at each corner. Be sure curb assembly is square. Line up the holes and use the screws in the hardware kit to attach the component parts in the following order:

- 1 - Two bottom support braces
- 2 - Divider panel
- 3 - 3 Bottom panels (supply bottom 1 and 2 and return bottom)
- 4 - Supply duct divider
- 5 - Return divider - 1
- 6 - Supply duct top panel
- 7 - Return divider - 2
- 8 - Return air cover (Install only if the application does not require return air. If the application includes return air, this cover is not used.)

Complete curb installation with the following field supplied items: counter flashing, roofing felt, rigid insulation, and cant strip. See **FIGURE 7C**.

Before placing the unit on the curb, apply the 3/4" x 1-1/4" gasket to both the top surface of the curb rails and the top surface of the perimeter of the duct opening(s), being sure to make good butt joints at all corners.

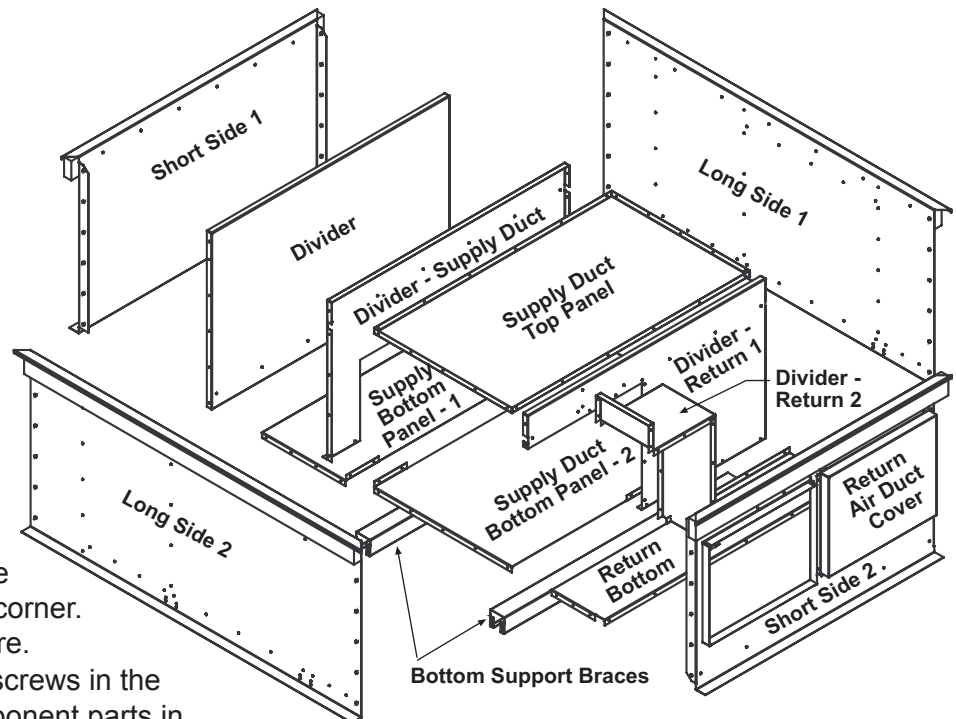
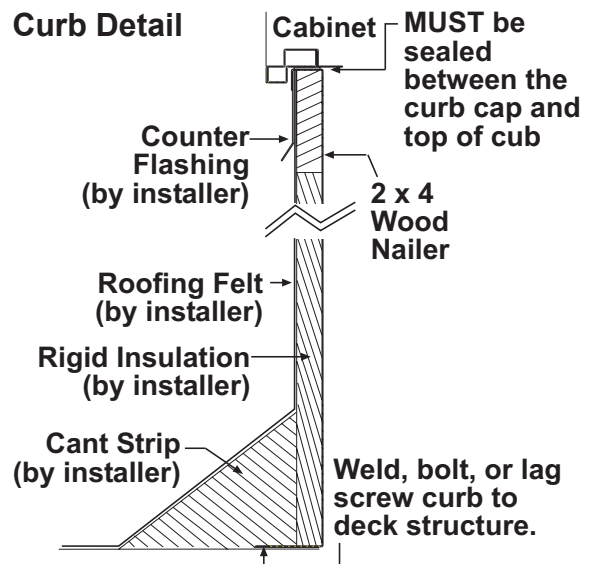


FIGURE 7C - Curb Detail

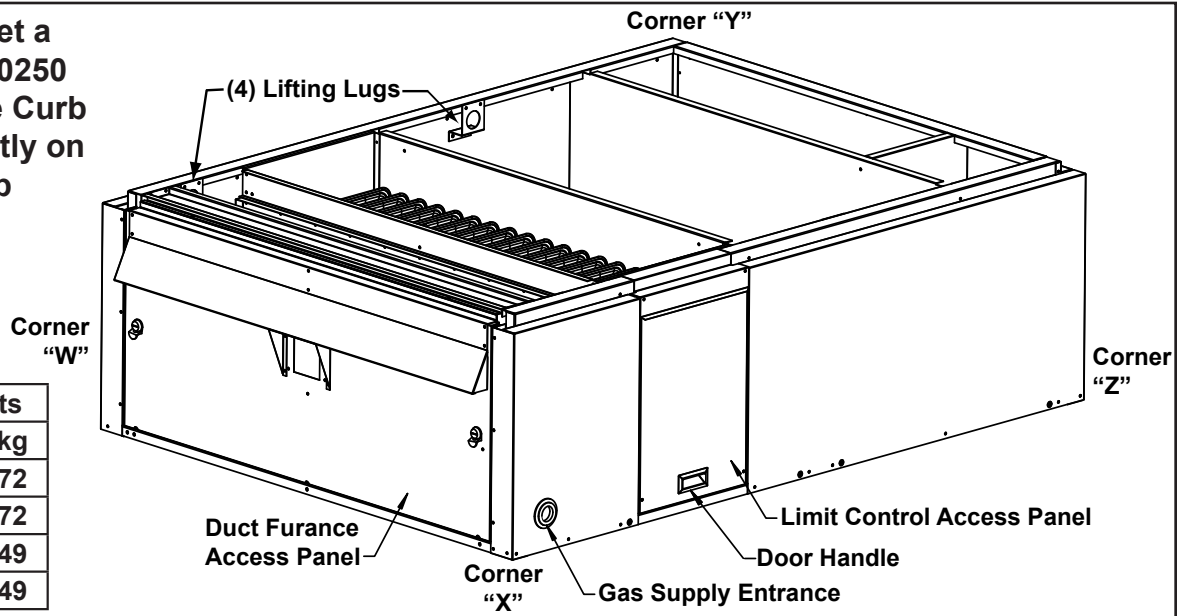


5.3 Duct Furnace Curb Section, Model JHUP-0250

If a Model JHUP-0250 duct furnace curb section is included in the installation, it must be set on a Cabinet B roof curb before placing the Model RDDA or Model RDCA system. Verify that gasketing has been applied to the top surfaces of the installed roof curb. Using all four lifting lugs and being sure the ductwork matches, set the duct furnace curb section on the roof curb. Refer to **FIGURE 8** and the lifting information in Paragraph 5.4.

FIGURE 8 - Set a Model JHUP-0250 Duct Furnace Curb Section directly on the Roof Curb

Corner Weights		
Corner	lbs	kg
"W"	158	72
"X"	158	72
"Y"	107	49
"Z"	107	49



Follow the wiring diagram and instructions in Paragraph 9.4 for making gas and electrical connections.

Before setting the Model RDDA or RDCA unit on top of the duct furnace curb section, apply gasket strips to the top perimeter and to the duct connections of the duct furnace curb section.

5.4 Rigging and Lifting the Unit

DANGER: If there is any visible damage or any question about the integrity of the lifting lugs, DO NOT LIFT the system. Consult the factory. See Hazard Intensity Levels, page 2.

See approximate net weights in Paragraph 5.1. If corner weights are required, refer to Sales/Technical Catalog Form C-PC (available on the Website, www.RezSpec.com). **IMPORTANT NOTE:** "C" Cabinet systems **MUST** be loaded and unloaded by the lifting lugs. Due to size, **DO NOT** attempt to move a "C" cabinet system with a fork lift.

Check to be sure that gasketing has been applied to the curb or duct furnace curb section prior to lifting the unit.

Lifting lugs are provided for rigging. Cabinets A and B have four lifting lugs -- one on each corner. Cabinet C has six lifting lugs -- three on each side. Inspect the lugs and their attachment points. If there is any doubt about the integrity of the lifting lugs or their attachment points, contact the factory.

DANGER: To prevent injury, death, or equipment damage when lifting, use ALL lifting lugs. See Hazard Intensity Levels, page 2.

The unit **MUST** be lifted with appropriate spreader bars that lift the unit straight up with vertical force only on the lifting lugs. Using **ALL** lifting lugs (4 or 6) is mandatory.

5. Mounting (cont'd)

5.4 Rigging and Lifting (cont'd)

Test lift the unit to be sure that it is secure. Lift the unit slowly, following safe lifting procedures.

Failure to lift by the manufacturer's instructions could cause damage to the equipment and/or personal injury or death. The equipment manufacturer is not responsible for unsafe rigging or lifting procedures.

DANGER: To prevent injury, death, or equipment damage caused by inadequate or improper rigging, test lift the unit before attempting to install it on the roof. See Hazard Intensity Levels, page 2.

6. Mechanical

6.1 Duct Connections

Supply and optional return air duct connections are made at the curb and can be made prior to the unit being set on the curb. See **FIGURE 5** for downflow roof curb or **FIGURE 7** for horizontal flow curb.

To facilitate startup, on systems with a heat section or in cooling only systems with Option DU1, the discharge temperature sensor is factory-installed temporarily in the outlet. Depending on the controls, the sensor must either be re-located to the supply ductwork or disconnected. Because of the split burner system, ductwork configuration and location of the sensor are especially important on units with a gas heat section. See Paragraph 8.1 on ductwork configuration requirements and instructions about re-locating the sensor.

CAUTION: An external duct system static pressure not within the limits shown on the rating plate, or improper motor pulley or belt adjustment, may overload the motor. See Hazard Levels, page 2.

Requirements and Suggestions for Installing Ducts

- **Type of Ductwork** - The type of duct installation to be used depends in part on the type of construction of the roof (whether wood joist, steelbar joist, steel truss, pre-cast concrete) and the ceiling (whether hung, flush, etc.).
- **Ductwork Material** - Rectangular duct should be constructed of not lighter than No. 26 U.S. gauge galvanized iron or No. 24 B & S gauge aluminum.
- **Ductwork Structure** - All duct sections 24 inches (610mm) or wider, and over 48 inches (1219mm) in length, should be cross broken on top and bottom and should have standing seams or angle-iron braces. Joints should be S and drive strip, or locked.
- **Through Masonry Walls** - No supply air duct should come in contact with masonry walls. Insulate around all air ducts through masonry walls with not less than 1/2" (13mm) of insulation. 1" (25mm) is recommended.
- **Through Uncooled/Unheated Space** - Insulate all exposed supply air ducts passing through an uncooled or unheated space with at least 1/2" (1" is recommended) of insulation.
- **Duct Supports** - Suspend all ducts securely from buildings members. Do not support ducts solely by the unit duct connections.
- **Duct Sizing** - Proper sizing of the supply air ductwork is necessary to ensure a satisfactory installation. The recognized authority for such information is the Air Conditioning Contractors Association, 2800 Shirlington Road, Suite 300, Arlington, VA 22206 (www.acca.org). A manual covering duct sizing in detail may be purchased directly from them.
- **Duct Connections** - To minimize sound and vibration transmission, use flexible duct connections. Ducts must be attached and sealed to provide airtight connections.
- **Return Air Duct/Grill Size** - Make certain that return air ducting or grill has a free area equal to the return duct size connection.

6.2 Condensate Drain

A slide-out, removable drain pan with a 1" male NPT drain connection is located below the coil cabinet (See **FIGURE 2A** or **FIGURE 2B**, page 7 or 8). When connecting the drain line, provide a means of disconnecting the line at or near the cabinet connection to allow the drain pan to be removed for cleaning.

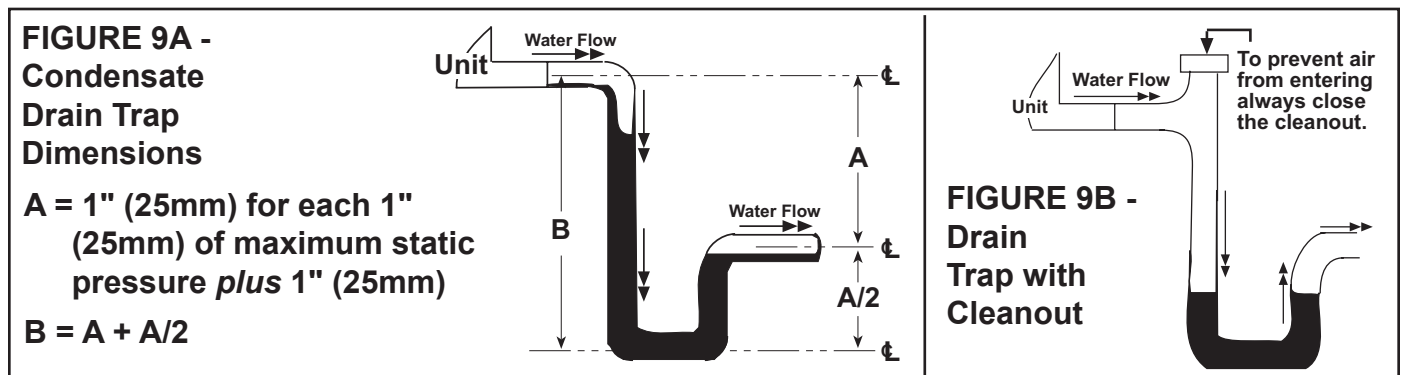
Ensure the system is level and install a trap in the drain (see **FIGURE 9A**). Pitch the drain line at least 1/2" (13mm) for every 10 feet (3M) of horizontal run. Drain lines must not interfere with drain pan or access panels. An obstruction in the drain or a poorly designed drain can cause condensate pan to over flow. Overflow could result in unit or building damage.

If the installation or local code requires, run drain into a waste water system.

Condensate Drain Trap

The design of the drain trap is important. Since the condensate drain pan is on the blower inlet side, there is a negative pressure at the drain relative to the ambient. The trap height must account for this static pressure difference. Maximum negative static can be determined by reading the negative pressure at the blower inlet and adding .2" w.c. to allow for dirty filters.

If dimension "B" in **FIGURE 9A** is not tall enough, the water seal will not hold, and air will be drawn through the drain pipe into the system. If the outlet leg of the trap is too tall, water will back up into the drain pan. As condensate forms during normal operation, the water level in the trap rises until there is a constant outflow. **FIGURE 9A** illustrates the appropriate dimensions for trapping a negative pressure system.



Improper trap design accounts for some condensate drainage system failures, but incorrect use and maintenance of condensate drain traps can also cause problems. The combination of airborne particles and moisture in the air handler can result in algae formation in the drain pan and traps. The traps must be cleaned regularly to avoid blockage that can slow or stop water flow, resulting in backup into the system.

If drains have a cleanout opening (**FIGURE 9B**), be sure to close the opening after cleaning.

Condensate Drain Use

Seasonal Usage - At the beginning of the cooling season, inspect and clean the entire cooling coil cabinet including the condensate drain pan. Thoroughly clean dirt, algae, grease, and other contaminants. Inspect condensate drain pans, traps, and piping; fill traps with water to ensure proper operation. During a wintertime shutdown of the cooling system it may be desirable to disconnect and remove all water from the traps and drains to prevent freeze damage. If local building codes permit, traps may be filled with an antifreeze solution. Or, piping may be designed with freeze plugs or other freeze protection methods (such as a heat tape).

Year Round Usage - Climates or applications with cooling requirements year round require more frequent inspections of the cooling coil cabinet and condensate drains. Depending on climate, freeze protection of traps may be required during non-cooling hours.

6. Mechanical (cont'd)

6.3 Inlet Air Hood

Option AS16 or AS19, Inlet Air Hood, Installation Instructions

Installation NOTE:
If equipped with
a power exhaust
option, attach the
power exhaust
hood(s) before
installing the outside
air hood. See
Paragraph 9.2,
pages 38-39.

NOTES:

- Inlet air hood painted parts are shipped with a protective plastic covering. As parts are being installed, remove the protective plastic covering.
- Select screws carefully. Use sheetmetal screws (slotted head with straight tip) when holes in the cabinet are provided. Use self-drilling screws (head is not slotted with drill-type tip) when cabinet holes are not provided.

The outside air inlet hood is a weatherized hood with permanent aluminum filters, designed to be field assembled and installed around the horizontal inlet air opening of the cabinet.

CAUTION: It is recommended that the inlet to the outside air hood NOT be facing into the prevailing wind. Allow 14" minimum clearance from the bottom of the air hood to the mounting surface.

To avoid possible damage, it is recommended that the outside air hood be installed after the system has been placed on the roof. The air hood should be installed before the blower is operated. Do not install the hood while the system is in operation.

All screw ends should be inside the air hood. Remove plastic film from painted parts before installing. Refer to the illustration that applies:

FIGURE 10A for Cabinet Sizes A and B without a power exhaust option

FIGURE 10B for Cabinet Size A with a power exhaust option

FIGURE 10C for Cabinet Size B with a power exhaust option

FIGURE 10D for Cabinet Size C with or without a power exhaust option

(NOTE: See Model Size/Cabinet Size cross-reference tables in the Appendix on page 58.)

Instructions (apply to all FIGURES except where noted):

- 1. Install Top Panel** - On the air inlet of the cabinet, remove and save the factory-installed screws attaching the system top. Slide the hood top panel underneath the edge of the cabinet top. **The edge of the hood top panel must be between the cabinet top and the end panel.** Reinsert all of the sheetmetal screws.
- 2. Install Left Side Panel (right when facing the unit)** - Locate the vertical row of cabinet screws to the right of the opening that attach the condenser section. Remove and save those screws. Position the hood left side panel under and to the **inside** of the hood top panel. Reinsert the screws to attach the side panel. Attach the hood side panel to the hood top with sheetmetal screws.
- 3. Install Right Side Panel (left when facing the unit)** - Position the hood right side panel under and to the inside of the hood top panel. Attach to the unit using the required number of **self-drilling screws**.
- 4. FIGURE 10C - Install Top Panel Slope Section** - Position the slope panel against the top panel and over the side panels. Attach to the top panel and both sides with sheetmetal screws.
- 5. Install Bottom Support** - Position the hood bottom support so that it is to the **inside** of the two side panels.
FIGURES 10A and 10D - Attach to the cabinet using the required number of **self-drilling screws**. Attach to both side panels with sheetmetal screws.
FIGURES 10B and 10C - Attach to both side panels with sheetmetal screws.
- 6. Install the Filter Assembly**
FIGURE 10A, Cabinet Sizes A and B without a power exhaust option - Attach the center support and the two side filter angles. Attach the filter spacer with wing screw receptacle. Position the four filters in the opening. Secure the filters with the filter clamp and the wing screws.
FIGURES 10B and 10C, Cabinet Size A or B with a power exhaust option - Install the filter frame with filters in place. Position the filter frame assembly in the inlet opening of the hood. Attach at the front and back holes with 1/2" sheetmetal screws. Insert a 3/4" sheetmetal screw at each of the center holes (one on each side).

FIGURE 10A - Installation of Outside Air Hood, Option AS16, on Cabinet Sizes A and B without an optional power exhaust

(For a cross-reference of cabinet size and model size, refer to the Appendix, page 58.)

Filter Sizes

Cabinet A - (4) 1x16x20

Cabinet B - (4) 1x16x25

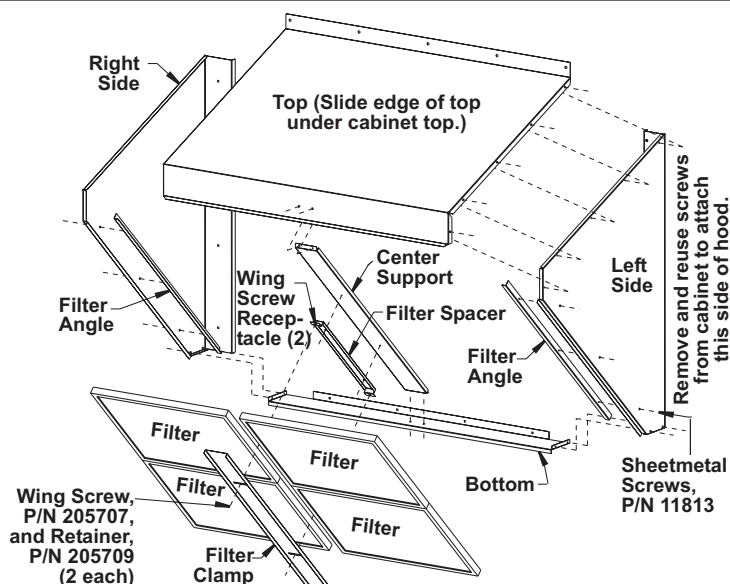
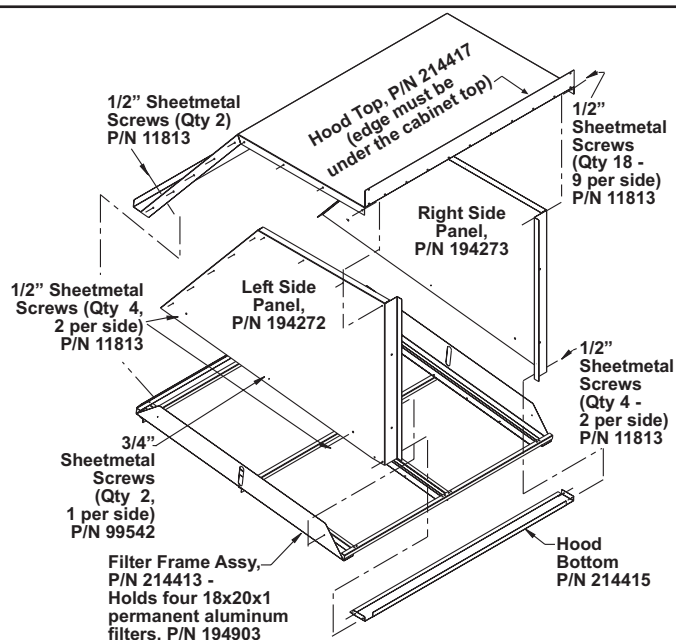


FIGURE 10B - Installation of Outside Air Hood, Option AS19, on Cabinet Size A with an optional power exhaust (Option PE1)

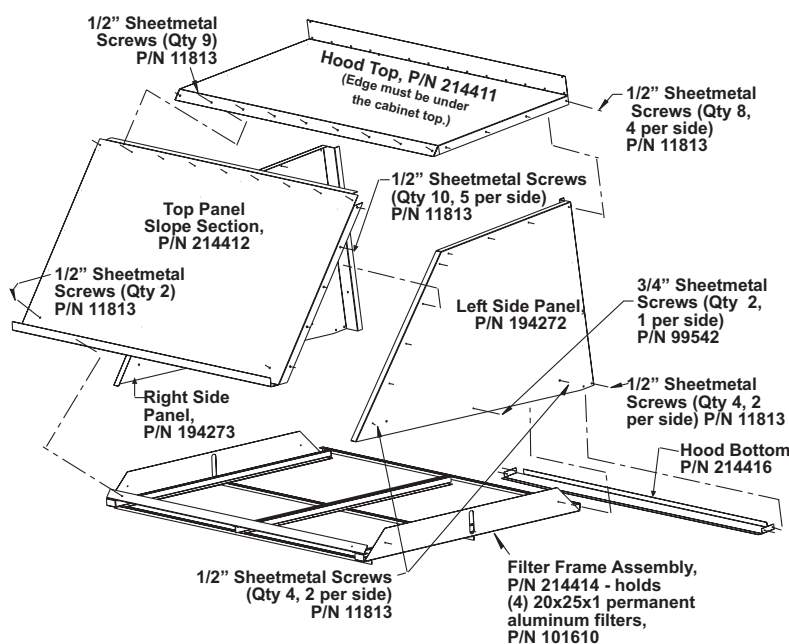
(For a cross-reference of cabinet size and model size, refer to the Appendix, page 58.)



NOTE: If filter tray is mistakenly installed without filters in place, see instructions in Form O-MAPS for installing filters.

FIGURE 10C - Installation of Outside Air Hood, Option AS19, on Cabinet Size B with an optional power exhaust (Option PE2)

(For a cross-reference of cabinet size and model size, refer to the Appendix, page 58.)



6. Mechanical

(cont'd)

6.3 Inlet Air Hood

(cont'd)

FIGURE 9D - Cabinet Size C with or without a power exhaust option -

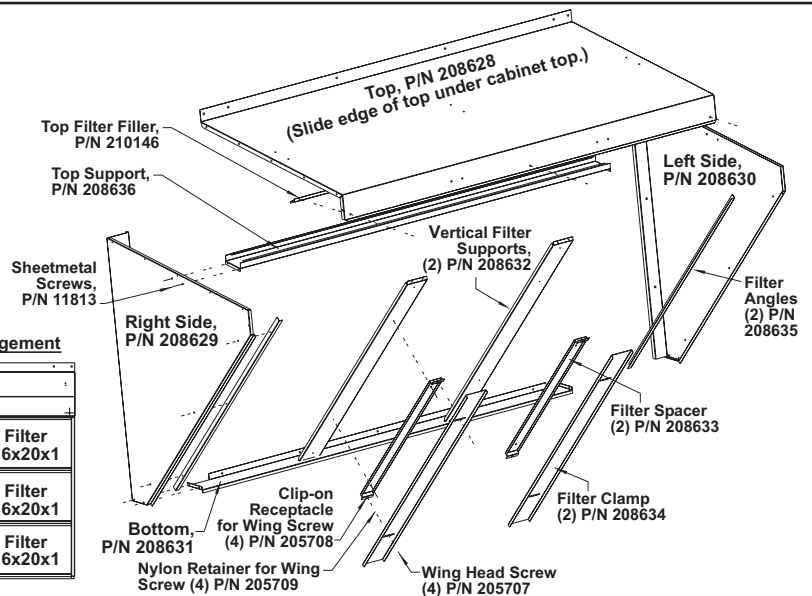
Attach the top filter filler, the two vertical filter supports and the two side filter angles. Attach the two inner filter spacers with wing screw receptacles. Position the nine filters in the opening as shown. Secure the filters with the filter clamps and the wing screws.

FIGURE 10D - Installation of Outside Air Hood, Option AS16 or Option AS19, on Cabinet Size C (Model Sizes 176, 226, 230, 280, 292, 346, 374, 428, and 446 are always Cabinet C.

For a cross-reference of cabinet size and model size, refer to the Appendix, page 58.)

Inlet View Showing Filter Arrangement

Filter 16x20x1	Filter 16x25x1	Filter 16x20x1
Filter 16x20x1	Filter 16x25x1	Filter 16x20x1
Filter 16x20x1	Filter 16x25x1	Filter 16x20x1



6.4 Blowers, Belts, and Drives

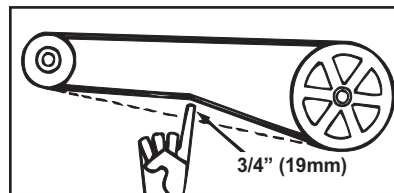
FIGURE 11 - Belt Tension

NOTE: The information in Paragraph 6.4 also applies to an optional power exhaust blower.

WARNING: All set-screws and locking collars must be tightened before applying power.

Pulley/Shaft Setscrews - Wrench torque 110 in-lb minimum to 130 in-lb maximum.
Bearing Hub - Socket size 5/16"; Torque 165 in-lbs.

6.4.1 Belts and Belt Tension



Blower systems with 1/2 to 5HP motors are equipped with either Power Twist Plus® linked blower belts or solid belts. The linked belts are designed in sections allowing for easy sizing and adjustment. Blower systems with 7-1/2 or 10 HP motors have solid V-belts. The belt is sized at the factory for the proper tension. Check belt tension. Proper belt tension is important to the long life of the belt and motor. A loose belt will cause wear and slippage. Too much tension will cause excessive motor and blower bearing wear.

Linked Belts - If the belt needs tightening, the recommended method of tightening the belt length is to count the number of links and remove one link for every 24. (A link is made up of two joining sections of belt. For easier removal of links, turn the belt inside out. But be sure to turn it back before installing. If belt is removed or replaced, be sure to align directional arrows on the belt to the proper drive rotation.) The belt tension should be checked after the first 24 hours of running at full load and at regular maintenance inspections.

Solid Belts - Adjust the belt tension by turning the adjusting screw on the motor base until the belt can be depressed 3/4" (19mm). (See **FIGURE 11**.) After correct tension is achieved, re-tighten the locknut on the adjustment screw. Be sure that the belt is aligned in the pulleys.

The blower speed may be adjusted to achieve the desired outlet temperature. If the system includes a gas heat section, any adjustment must be within the temperature rise and the static pressure limits shown on the furnace rating plate. Temperature rise is the difference between the inlet air temperature and the discharge air temperature at high fire. Allowable temperature rise range for a gas heat section is 45 to 100°F. Motors are factory set between maximum and minimum blower speeds.

If the duct resistance is low, the blower may deliver too high an air volume. If the resistance is very low, the blower may deliver enough excess air to over-

amp the motor, causing the overload protector to cycle the motor. Reducing the blower speed will correct these conditions. If ductwork is added to an installation, it may be necessary to increase the blower speed. Decreasing blower speed will increase outlet temperature (heating) or decrease outlet temperature (cooling); increasing blower speed will decrease outlet temperature (heating) or increase outlet temperature (cooling).

At final adjustment, amperes should not exceed motor nameplate amp rating. If gas heat section is included, the temperature rise must be within the 45°F to 100°F range specified on the furnace rating plate. If temperature rise is not in the approved range, blower speed must be adjusted and gas supply pressure checked (See Paragraph 9.2.2.1).

Motors are equipped with adjustable pitch pulleys which permit adjustment of blower speed.

To make adjustments to units with less than a 5HP motor, follow these instructions:

1. If equipped with gas heat, turn off the gas. Always disconnect the electric power.
2. Loosen belt tension and remove the belt.
3. Loosen the set screw on the side of the pulley away from the motor.
4. **To increase the blower speed**, turn the adjustable half of the pulley inward. **To decrease the blower speed**, turn the adjustable half of the pulley outward. One turn of the pulley will change the speed 8-10%.
5. Tighten the set screw on the flat portion of the pulley shaft.
6. Replace the belt and adjust the belt tension. Adjust tension by turning the adjusting screw on the motor base until the belt can be depressed 3/4". (See **FIGURE 11.**) Re-tighten the lock nut on the adjusting screw. Be sure that the belts are aligned in the pulley grooves properly and are not angled from pulley to pulley.
7. Turn on the gas and electric. Light the heater following the instructions on the lighting instruction plate.
8. Check the motor amps with an amp meter. The maximum motor amp rating on the motor nameplate must not be exceeded.
9. When service is complete, check for proper operation. When service is complete, check for proper operation.

For units with 5 HP and larger motor, follow these instructions for adjusting RPM:

1. If equipped with gas heat, turn off the gas. Always disconnect the electric power.
2. Slack off all belt tension by moving motor towards driven shaft until belts are free of grooves. For easiest adjustment, remove the belts from the grooves.
3. On the outer locking ring, locate the two locking screws that are directly across from each other. Loosen these two screws, but do not remove them. Do not loosen any other screws.
4. Adjust sheave to desired pitch diameter by turning the outer locking ring. One complete turn of the outer locking ring will result in .233" change in pitch diameter. To decrease blower speed, increase diameter; to increase blower speed, decrease diameter.

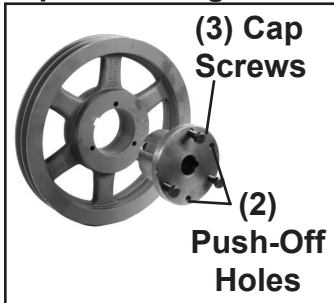
CAUTION: Sheaves should not be adjusted in either direction to the point where movable and stationary flanges are in contact.

5. After completing adjustment, tighten both locking screws in the outer locking ring (loosened in Step 2).
6. Replace belts and move motor away from the driven shaft to apply sufficient belt tension to prevent slippage. (See **FIGURE 11.**) Proper belt tension is important to the long life of the belt and motor. A loose belt will cause wear and slippage. Too much tension will cause excessive motor

6. Mechanical (cont'd)

6.4 Blowers (cont'd)

**FIGURE 12 - Split
Taper Bushing**



6.4.2 Adjusting Blower Speed (cont'd)

- and blower bearing wear. Be sure that the belts are aligned in the pulley grooves and are not angled from pulley to pulley.
7. Check motor amps with an amp meter. The maximum motor amp rating on the nameplate must not be exceeded.
 8. When service is complete, check for proper operation.

6.4.3 Blower Pulley

Some blower pulleys require the use of a split taper bushing in the blower pulley. These split taper bushings must be loosened in order to remove the pulley. Follow these instructions to loosen the bushing:

- a) Notice that there are three cap screws in the bushing and two holes without screws, called push-off holes. (See **FIGURE 12.**)
- b) Remove the three cap screws.
- c) Put two of the cap screws into the two push-off holes. Tighten these two screws evenly until the pulley is loosened.
- d) Pulley may now be removed from the shaft.

6.4.4 Blower Bearings

The blower on systems with less than a 10 HP motor are permanently lubricated cartridge ball bearings and do not require greasing. The bearings on systems with a 10HP motor are pillow block ball bearings and are equipped with a grease fitting. Refer to Form O-MAPS for maintenance instructions.

6.4.5 Blower Rotation

Each blower housing is marked for proper rotation. Check blower rotation with the arrow on the housing. If actual rotation is not correct, interchange the two wires on the 3-phase supply connections at the terminal block. Do not change load side wiring.

7. Electrical and Wiring

7.1 General, Wiring Diagram, and Unit Wiring Requirements

All electrical wiring and connections, including electrical grounding **MUST** be made in accordance with the National Electric Code ANSI/NFPA No. 70 (latest edition). In addition, the installer should be aware of any local ordinances or electric company requirements that might apply.

Check and tighten all electrical terminals.

CAUTION: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C. See Hazard Levels, page 2.

Each unit has a custom wiring diagram in the control compartment. All optional electrical components ordered with the unit are shown on that wiring diagram. Codes for those options are listed across the bottom of the diagram. To identify option codes, see the list in the **APPENDIX**, page 58.

After all field wiring is completed, seal all electrical entrances.

7.2 Supply Wiring

Check the rating plate for the supply voltage and current requirements. Run a separate line voltage supply directly from the main electrical panel, making connection at the factory-supplied disconnect switch. The built-in disconnect switch requires copper wiring with ampacity based on 60°C maximum temperature rating at the line side terminals. All external wiring must be within approved conduit and all other external wiring must have a minimum temperature rise rating of 60°C. Run conduit so that it does not interfere with the system access panels. See **FIGURE 2A or 2B**, page 7 or 8, for location of supply wiring entrance.

Or, if the system is equipped with an optional through-the-base electrical supply entrance (Option AVC1), run the wiring from underneath, through the hole in the cabinet bottom, and up to the disconnect switch.

Through-the-Base Electrical Entrance

Voltage

NOTE: If the system was ordered with a voltage loss safety switch (Option BF14, **FIGURE 16B**) that monitors voltage balance, the circuit to the compressors will be opened in the event of voltage imbalance. In six minutes, the switch will recheck the circuit. If the problem is eliminated, the circuit will be re-activated.

7.3 Disconnect Switch

FIGURE 13 - Built-in, non-fusible, lockable Disconnect Switch



NOTE: Illustration shows disconnect used for cooling only and cooling with a gas heat section. Cooling with electric heat requires a larger disconnect.

7.4 Control Wiring

Digital Control Wiring

Wire Gauge	Maximum Sensor Wire Length (Digital Control)	
	Feet	Meters
14	800	244
16	500	152
18	310	94
20	200	61
22	124	38

The electric supply to the unit must meet stringent requirements for the system to operate properly. Voltage supply and voltage imbalance between phases should be within the tolerances listed below. If the power is not within these voltage tolerances, contact the power company prior to operating the system.

Voltage Supply - See voltage use range on the rating plate. Measure (and record) each supply leg voltage at all line disconnect switches. Readings must fall within the allowable range on the rating plate.

Voltage Imbalance - In a 3-phase system, excessive voltage imbalance between phases will cause motors to overheat and eventually fail. Maximum allowable imbalance is 2%. To determine voltage imbalance, use recorded voltage measurements in this formula.

Key:	V1, V2, V3 = line voltages as measured	Formula:
	$VA \text{ (average)} = \frac{(V1 + V2 + V3)}{3}$	$\% \text{ Voltage Imbalance} = \frac{[100 \times (VA - VD)]}{VA}$
	VD = Line voltage (V1, V2, or V3) that deviates farthest from average	

The system is equipped with a built-in non-fusible, lockable disconnect switch (**FIGURE 13**). If an additional optional fusible disconnect is ordered, it will be shipped separately for field installation (or may be field supplied).

When running electrical conduit, be careful that it is clear of all access panels. The built-in disconnect switch requires copper wiring with ampacity based on 60°C maximum temperature rating at the line side terminals.

If field installing an additional disconnect switch, it is recommended that there is at least four feet (1.2M) of service room between the switch and system access panels. When providing or replacing fuses in a fusible disconnect, use dual element time delay fuses and size according to the rating plate.

DANGER: To prevent injury or death due to electrocution or contact with moving parts, lock disconnect switch open. See Hazard Levels, page 2.

WARNING: If an optional gas furnace is included, if you turn off the power supply, turn off the gas.

Wire 24 volt controls according to the wiring diagram. Refer to the chart on the right for minimum control wire gauge by length.

Field Control Wiring Length/Gauge				
Total Wire Length		Distance from Unit to Control		Minimum Recommended Wire Gauge
ft	M	ft	M	
150	46	75	23	18
250	76	125	38	16
350	107	175	53	14

Digital control inputs are low-current, resistance-based signals. The manufacturer recommends for optimum temperature control performance that the analog and digital inputs (zone sensors, discharge air sensors, etc.) that are connected to the FX05 or FX06 controller be routed in one of the following manners:

- In separate conduits, isolated from 24VAC controls and line voltage power to the unit; **OR**
- If the wires are to be run in the same conduit as the 24 VAC control wiring, the sensor wiring must use shielded cable and be bundled separately from 24 VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

NOTE: If wire is included with the digital sensor, it is 22 AWG.

7. Electrical and Wiring (cont'd)

7.5 Blower Motor

7.6 Condenser Fan Motors and Fans

7.7 Compressors

FIGURE 14A - Compressor



(For additional information, see Operation/Maintenance/Service Manual, Form O-MAPS II.)

Compressor Amps/Voltage

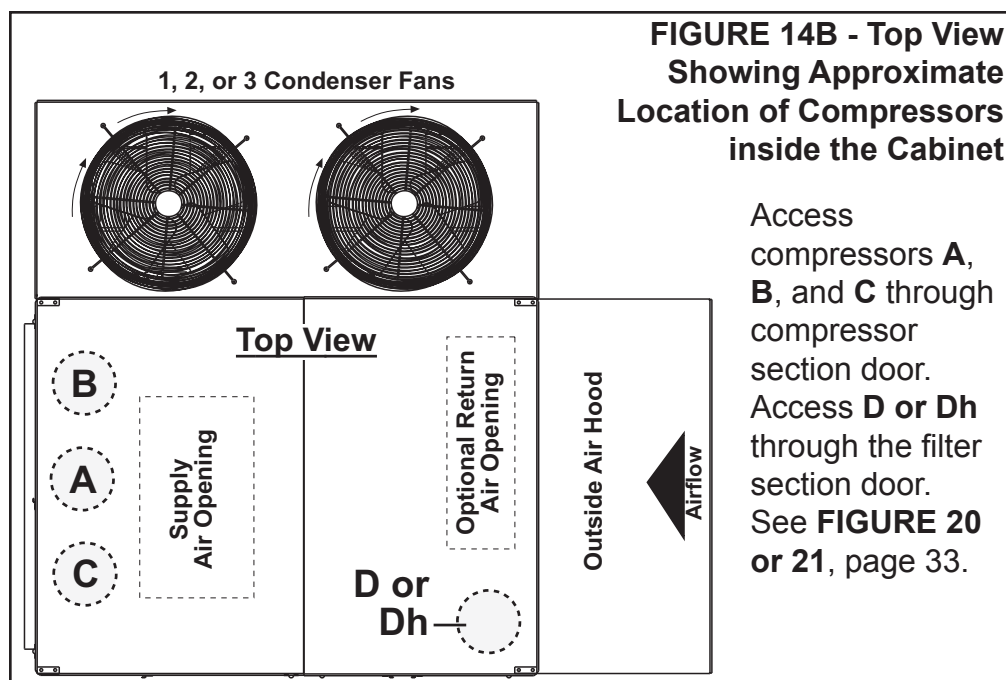
Check the unit rating plate or motor name plate to verify voltage, HP, and type. Use an amp meter to check motor amps. Amps may be adjusted downward by reducing blower RPM or increasing duct system static pressure.

Blower motors over 3HP and all motors on systems using 575V include a starter. 1/2-3HP, 208, 230, and 460 volt motors have internal overload protection but may be equipped with an optional starter (Option AN10); check the wiring diagram.

All systems have one, two, or three direct-drive, statically and dynamically balanced, permanently lubricated, condenser fan motors. Condenser fan motors are open dripproof motors with external sling protection against water penetration and have auto reset thermal overload protection.

Maintain minimum clearances around the fans as illustrated in **FIGURE 3** on page 9. Above the fans should always be unrestricted, open area.

All of the compressors are high efficiency hermetic scroll type. Circuit A, B, and C cooling compressors are in the Compressor Section (see **FIGURE 2A** or **2B**, page 7 or 8). Circuit D or Dh compressor (D for cooling or Dh for re-heat heat pump) is located in the cabinet filter section.



Compressor Model	ARI Tonnage	RLA 230 V	LRA 230 V	RLA 460 V	LRA 460 V	RLA 575 V	LRA 575 V
ZR22K3	2	7.9	45	3.9	22.4	N/A	N/A
ZR36K3	3	11.4	77	5.7	39	4.7	31
ZR54KC	4.5	16.4	124	8.2	59.6	6.6	49.4
ZR72KC	6.2	20.7	156	10	70	8.2	54
ZR144KC	12	47.1	245	19.6	125	15.8	100
ZR125KC	10	42	239	19.2	125	13.8	80

Note: Model ZRT144KC uses two ZR72KC compressors in tandem (6.2t).

Compressor Staging

Each Model system leaves the factory with the compressor staging sequence shown in the table. Models RDCA and RECA have the same staging as Model RCA. Models RDDA and REDA have the same staging as Model RDA.

Model RCA	Model RDA	Cabinet Size	ARI Tonnage	Compressor Circuit ID	Staging Sequence (Refer to locations in FIGURE 14B.)			
					RDA Staging Sequence (Y1) - ALWAYS CKT Dh	1st Stage (Y2)	2nd Stage (Y3) - 1st Stage disabled	3rd Stage (Y2 + Y3)
Model RCA and RDA Sizes Designed for Temperate/Semi-Humid Climates								
060	N/A	A	3	CKT A	N/A	B	A	A + B
			2	CKT B				
078	102	A&B	4.5	CKT A	CKT Dh	B	A	A + B
			2	CKT B				
090	114	A&B	4.5	CKT A	CKT Dh	B	A	A + B
			3	CKT B				
108	126	A&B	6.2	CKT A	CKT Dh	B	A	A + B
			3	CKT B				
120	144	A&B	6.2	CKT A	CKT Dh	B	A	A + B
			4.5	CKT B				
164	N/A	A	3	CKT D	N/A	B	A + D	A + B + D
			4.5	CKT B				
			6.2	CKT A				
166	188	B	3	CKT C	CKT Dh	A	B + C	A + B + C
			4.5	CKT A				
			6.2	CKT B				
184	220	B	4.5	CKT C	CKT Dh	A	B + C	A + B + C
			4.5	CKT A				
			6.2	CKT B				
198	234	B	6.2	CKT C	CKT Dh	B	A + C	A + B + C
			4.5	CKT A				
			6.2	CKT B				
176	230	C	4.5	CKT A	CKT Dh	A	B	A + B
			10.0	CKT B				
226	280	C	6.2	CKT C	CKT Dh	A	B + C	A + B + C
			6.2t	CKT A & B				
			6.2t					
292	346	C	6.2t	CKT A & B	CKT Dh	A	A + B	A + B + C
			6.2t					
			12.0	CKT C				
374	428	C	10.0	CKT C	CKT Dh	A	B + C	A + B + C
			10.0	CKT A				
			10.0	CKT B				
	446	C	10.0	CKT C	CKT Dh	A	B + C	A + B + C
			10.0	CKT A				
			10.0	CKT B				
Model RCA Sizes Designed for Dry Climate, Approved for up to 125°F Ambient Temperature								
059	N/A	A	3	CKT A	N/A	B	A	A + B
			2*	CKT B				
077	N/A	A	4.5	CKT A	N/A	B	A	A + B
			2*	CKT B				
109	N/A	A	6.2	CKT A	N/A	B	A	A + B
			3*	CKT B				
139	N/A	B	4.5	CKT A	N/A	A	B + D	A + B + D
			3 / 4.5	CKT D / CKT B				
Model RCA Sizes Designed for Dry Climate, Mountain Range								
025	N/A	A	2	CKT A	N/A	A	N/A	N/A
037	N/A	A	3	CKT A	N/A	A	N/A	N/A
Model RCA	Model RDA	Cabinet Size	ARI Tonnage	Compressor Circuit ID	Staging Sequence (Refer to locations in FIGURE 14B.)			
					RDA Staging Sequence (Y1) - ALWAYS CKT Dh	1st Stage (Y2)	2nd Stage (Y3) - 1st Stage disabled	3rd Stage (Y2 + Y3)

* Crankcase heater installed.

7. Electrical and Wiring (cont'd)

7.7 Compressors (cont'd)

Optional Hot Gas Bypass

CAUTION: An operating bypass valve is very hot to the touch.

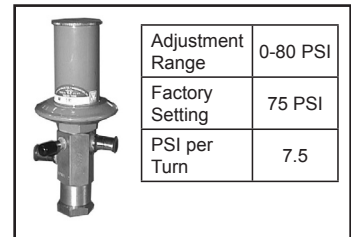
Compressor Protection

A low pressure cutoff (LPCO) switch is used for protection against compressor damage due to a loss of system charge. This protection prevents short cycling on the internal overload (IOL) which can pump the oil out of the compressor. All compressors located in positions A, B, and C and the compressor in position D on Sizes 139 and 164 have manual reset high pressure cutouts.

The hot gas bypass option provides expanded compressor modulation at low outside air temperatures. It is factory set; however, the factory adjustment should be checked at startup. To check the valve operation and/or make field adjustments, it is necessary to simulate a light load condition.

Check Bypass Valve Setting - Connect a pressure gauge to the suction line and block the entering air to the evaporator coil. Suction pressure will drop, and the hot gas bypass valve should begin to open at approximately 75 psig. The valve has a range of 6 psig and will be fully open at 69 psig. When the valve begins to open, it will be hot to the touch. To adjust the pressure, remove the cap and turn the adjusting stem clockwise to increase the setting pressure and counterclockwise to decrease the setting pressure. Make adjustments in small increments. Allow five minutes between adjustments for the system to stabilize. When finished, replace the cap on the adjustment stem and remove the pressure gauge.

FIGURE 15 - Optional Hot Gas Bypass Valve



8. Controls

Reference NOTES:

For unit-mounted control location, refer to **FIGURE 20 or 21** on pages 32-33.

8.1 Digital Control Systems

All systems have a unit-mounted, factory-wired, 24-volt DDC controller that is specifically designed to control cooling (3 stages) and heating based on discharge air temperature, outdoor air temperature, dewpoint, and enthalpy.

The integrated display will show the current discharge air temperature, outdoor air temperature, dewpoint, and enthalpy; which outputs are enabled; and the mode of operation. The controller allows the user to change setpoints, change prop bands, and adjust the time clock (Option BHB1 with Option D12; standard with Option D12A). For instructions on changing or adjusting the controller, see the forms supplied in the literature envelope.

The digital controller monitors or provides the following: air proving switch, low limit protection, anti-cycle protection, minimum on/off times, gas valve modulation, and electric heat staging. Controllers may be equipped with optional cards for use with Johnson N2 (Option BHB2) or LON (Option BHB3) Building Automation System.

Summary of Control Features available on all MAPS II Models

FIGURE 16 - Programmable Controllers



FX05 Controller in Option D12



FX06 Controller in Option D12A

Both control options provide the functions listed below.

- Discharge air reset with heating/cooling setpoints
- Zone heating/cooling setpoints
- Reheat override options (disable reheat on call for cooling)
- Cooling lockouts (enthalpy)
- Discharge air reset based on outdoor dry bulb (linear reset)

In addition, Option D12A control system provides.

- Real time clock function built in with 8 event, 7-day schedule
- 9 menu selections for setpoint adjustments and unit status
- Optional remote display and remote space temperature setpoint adjustment

REFERENCE: For controller instructions, see either **Form CP-MAPS D12 w/FX05 or CP-MAPS D12A w/FX06** in the literature envelope or download from www.RezSpec.com.

Optional Controls/ Sensors with Options D12 and D12A

If unsure which options are on the unit being installed, check the wiring diagram for the option codes.

Optional Control used only with System Control Option D12 (FX05 Controller)

Wall-Mounted Space (Zone) Temperature Sensor, Option CL53, P/N 207239 (or Option RT11 if factory mounted on an optional console, Paragraph 8.2)



Control works with either cooling or heating, providing zone temperature sensing, occupied setpoint boost (-3° cooling; 4° heating) and unoccupied override button, and LED fan and alarm status for cooling. Provides space temperature identification only (no space adjustment).

Depending on how it is ordered, the control is shipped separately for field installation or factory-mounted on a shipped-separate console. Follow the instructions supplied with the control and the wiring diagram on the unit.

Optional Controls used only with System Control Option D12A (FX06 Controller)

Wall-Mount Space Air Sensor, Option CL67, P/N 222052 (or Option RT14 if factory-mounted on an optional console, Paragraph 8.2)



The wall or console mounted sensor should be located on an interior wall (avoid direct placement in the sun) with the wall opening insulated to prevent cold drafts. Locate the sensor where it will sample representative space air.

The optional space sensor with setpoint adjust transfers the data back to the unit controller. The sensor requires 24VAC power and two wire communication. See the unit wiring diagram for wiring details.

Optional Remote Medium User Interface, Option RB2A, P/N 223125 (or Option RT15 if factory-mounted on an optional console, Paragraph 8.2)



The wall or console mounted user interface provides access to all controller setpoint and commands except test mode. Follow the instructions supplied with the control. Wire according to the wiring diagram on the unit.

Optional Controls used with either System Control Option D12 (FX05) and D12A (FX06)

Option DT5, Outside Air Relative Humidity Transmitter, P/N 206081



Option DT5 - The sensor is factory-mounted in the outside air intake and sequences compressor operation based on outdoor dewpoint. It is recommended for humid and temperate climates. (NOTE: This control is standard on Models RDA, RDDA, REDA and other units with reheat Option AU25.)

Option CL47, Room Dehumidistat, P/N 177231 (or Option RT13 if factory-mounted on an optional console)



Option CL47 - Uses standard control reheat sequences, except that the zone relative humidity input controls the reheat outputs. The relative humidity controller enables reheat upon a rise in relative humidity.

Control is shipped separately for field installation. Follow the instructions supplied with the control. Wire according to the wiring diagram on the unit.

Option BNC1, Damper Changeover

Option BNC1 - Control is unit mounted. Used in conjunction with a customer-supplied time clock, control overrides the outside air damper during unoccupied mode. Setup and setback setpoints are provided through the programmable control. Time clock contacts are closed during occupied mode.

Discharge Temperature Sensor

The discharge sensor element on cooling only or cooling with reheat systems (Models RCA/RDA) is attached to the discharge opening of the system. On systems with a heat section (Models RDCA/RDDA/RECA/REDA) or Models

8. Controls (cont'd)

8.1 Digital Control Systems (cont'd)

FIGURE 17 - Discharge Air Sensor Assembly in heating systems (RDCA/RDDA/RECA/REDA) or cooling only systems with Option DU1



FIGURE 18 - On units with a gas heat section, avoid an immediate "T" in the discharge duct.

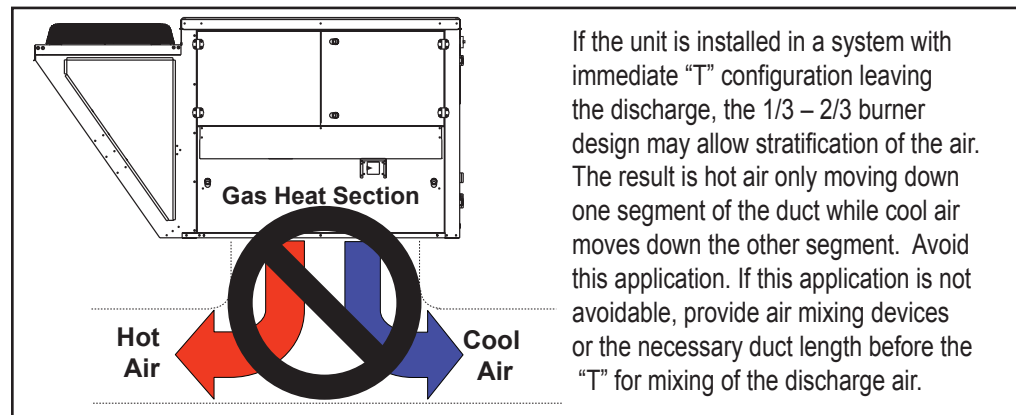
Discharge Temperature Sensor (cont'd)

RCA and RDA with Option DU1, the sensor is temporarily installed for heater startup but must be relocated to the ductwork.

When installed in the ductwork the sensor must be housed in a mixing tube which is attached to a 2x4 electrical box. The assembled parts (See **FIGURE 17**) are shipped in the control compartment. Read the instructions below and follow carefully to relocate the discharge temperature sensor.

Discharge Temperature Sensor Relocation Instructions - Apply to all Models RDCA/RDDA/RECA/REDA and Models RCA/RDA with Option DU1

Placement of the discharge air sensor in the ductwork is critical to the correct operation of a MAPS system in both the cooling and heating modes. Due to the split burner and dual heat exchanger features of the MAPS gas heat section, it is extremely important in the heating mode when equipped with an optional gas heat section. The gas heat section of the MAPS unit is designed to conserve fuel by only firing that portion of the burner or one of the dual heat exchangers as required to supply the demand for heat. Improperly locating the sensor can result in poor control of discharge temperature; see **FIGURE 18**.



1. **Determine the appropriate distance from the unit.** Be sure there is sufficient distance from the outlet to have a good mixture of discharge air temperature. According to the latest edition of AMCA Standard 201, in straight ducts, the air is typically well mixed a minimum of five equivalent duct diameters from the discharge of the unit with equivalent duct diameter defined as equal to the square root of $4AB/3.14$. "A" and "B" are the duct cross-sectional dimensions.

Example: Supply ductwork cross-sectional dimension is 24" x 12" (610mm x 305mm).

$$5 \times \sqrt{\frac{4 \times 12 \times 24}{3.14}} = 96" \quad 5 \times \sqrt{\frac{4 \times 305 \times 610}{3.14}} = 2435\text{mm}$$

Locate the sensor a minimum of 96" (2435mm) from the outlet of the unit.

NOTE: If the length of the discharge duct is less than 8 ft (2.4M), a mixing vane is recommended for mixing the discharge air.

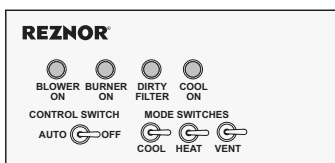
Do not mount the sensor in the ductwork after a split in the supply as that will cause loss of control in the duct that does not house the sensor.

2. **Determine the location and orientation of the sensor holder assembly.** The position of the sensor holder in the duct is also important. In horizontal ductwork, locate the sensor assembly in the top, middle of the duct with the sensor holder extending vertically down into the center of the airstream. In vertical ductwork, locate the sensor assembly in the middle of the side of the duct that corresponds with the top middle of the discharge outlet. The sensor holder will extend horizontally into the center of the airstream.

Wire Gauge	Maximum Sensor Wire Length (Digital Control)	
	Feet	Meters
14	800	244
16	500	152
18	310	94
20	200	61
22	124	38

NOTE: If wire is supplied with the sensor, it is 22 AWG.

8.2 Remote Console



Field Control Wiring Length/Gauge				
Total Wire Length		Distance from Unit to Control		Minimum Recommended Wire Gauge
ft	M	ft	M	
150	46	75	23	18
250	76	125	38	16
350	107	175	53	14

FIGURE 19 - Dirty Filter Switch, P/N 105507

Push the sensing element into the clip attached to the inside of the sensor holder. Turn the metal holder so that the element will be shielded from direct airflow and will sense the temperature in the airstream as it flows through the holes in the sensor holder. At the location selected, mark the diamond-shaped hole required for the sensor holder. Cut the hole no larger than required for the holder, approximately 1" x 1" (25mm x 25mm).

In the electrical box portion of the sensor holder, determine where the sensor wire should come through the box and remove the knockout at that location.

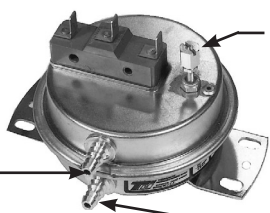
- 3. Attach the sensor holder assembly.** Slide the sensor holder into the opening in the ductwork. Using four field-provided No. 6 sheetmetal screws, attach the box to the ductwork. Attach a field-supplied cable connector to the box, run the sensor wire out, and attach the cover to the box.
- 4. Run the sensor wire to the unit.** Digital control inputs are low-current, resistance-based signals. The manufacturer recommends for optimum temperature control performance that the analog and digital inputs (zone sensors, discharge air sensors, etc.) that are connected to the FX05 or FX06 controller be routed to the unit in one of the following manners:
 - In separate field-supplied conduits, isolated from 24 VAC controls and line voltage power to the unit, **OR**
 - If the digital wires are to be run in the same field-supplied conduit as the 24 VAC control wiring, the digital wiring must be completed using shielded cable and bundled separately from 24 VAC control wiring. The shield must be drained at the unit and taped on the opposite end.

A selection of remote consoles is available with certain appropriate combinations of controls factory mounted. All consoles include indicator lights for blower and cooling operation and an auto/off control switch. **NOTE:** The auto/off switch must be closed (Auto) for the display on the programmable controller (**FIGURE 16**, page 28) to read "on" (Terminals TB-48 and TB-49). Burner indicator light, dirty filter light, and mode switches depend on option selection. If the unit is ordered with a damper control option that includes a potentiometer, the potentiometer may be mounted on the console.

If any of the field-mounted optional cooling/heating or reheat controls are ordered, one may be mounted on the remote console. Console dimensions with mounting ring are length 15-3/4" (400mm) x height 7-5/8" (194mm) x depth 2-5/8" (67mm). If recessing the console (not using the mounting ring), subtract 7/8" (22mm) from the height and width.

Wire controls on the remote console according to the wiring diagram. Refer to the chart (left) for minimum control wire gauge by length.

Dirty Filter Switch - If there is a dirty filter indicator light on the console, there is a dirty filter switch in the unit. For location, see **FIGURE 20 or 21**, page 33, Item 14. After the unit is started, before continuous operation, the dirty filter switch must be set.



Setscrew (on front of switch) must be manually adjusted after the system is in operation.

Negative pressure connection is toward the "front or top" of the switch (senses blower side of filters)

Positive pressure connection is toward the "back or bottom" of the switch (senses air inlet side of filters)

Instructions for Setting Dirty Filter Switch -

With clean filters in place; all doors closed (except electrical compartment); and the blower operating, increase the pressure setting by adjusting the setscrew on the switch clockwise until the filter light is energized or the screw is bottomed out. At that point, adjust the setscrew three full turns counterclockwise or until the screw is top-ended. At that setpoint, the filter light will be activated at approximately 50% filter blockage.

8. Controls (cont'd)

8.3 Control Locations

Except where indicated, the locations and number codes in the list (page 33) apply to both **FIGURE 20** and **FIGURE 21**.

FIGURE 20 - Models RCA, RDA, RDCA, RDDA - Locations of Standard and Optional Controls and Service Ports

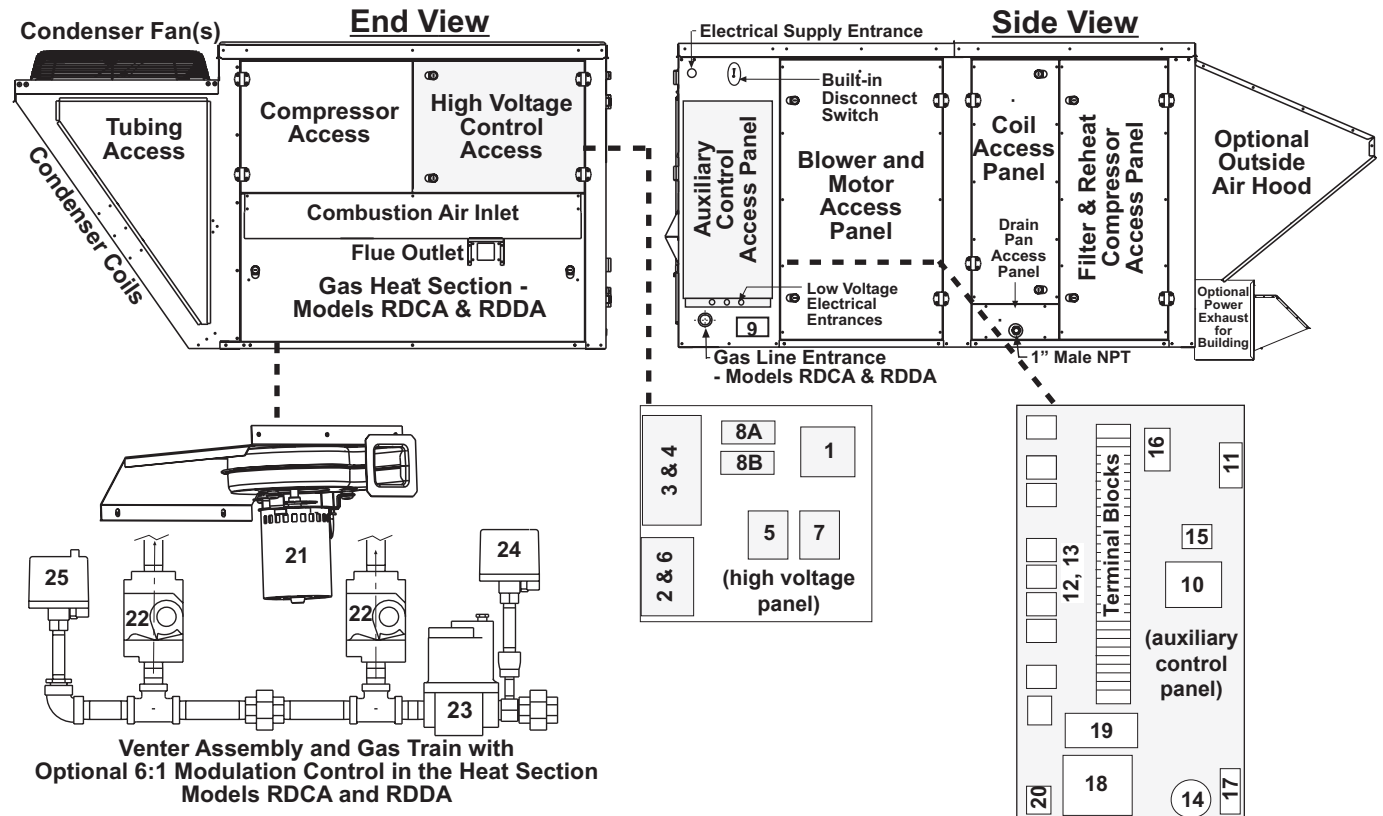
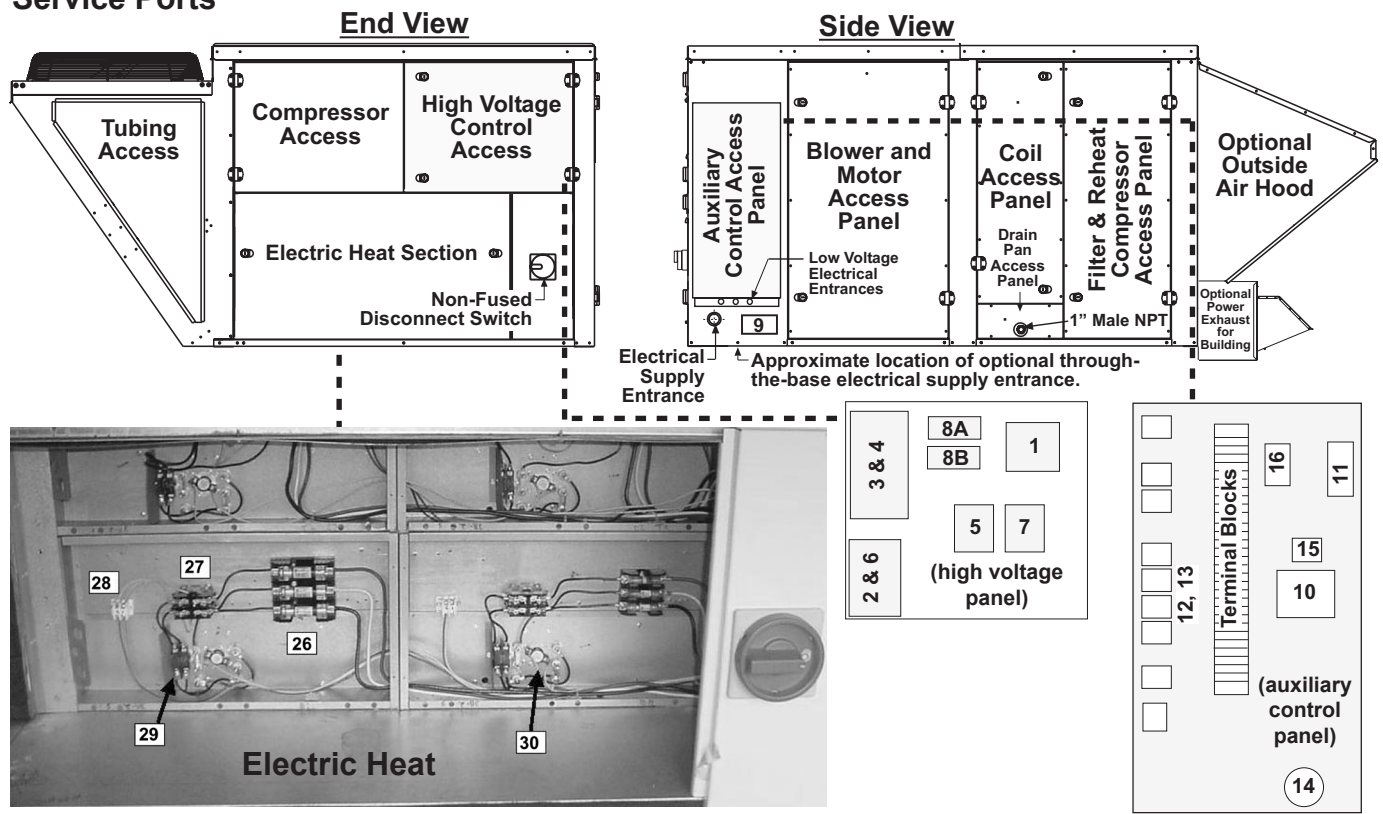


FIGURE 21 - Models RECA and REDA - Locations of Standard and Optional Controls and Service Ports



TUBING SECTION

- Low Refrigerant Pressure Cutouts
- High Refrigerant Pressure Cutouts
- Filter Driers
- Liquid Line Service Gauge Ports

COMPRESSOR SECTION

- Ckt A Compressor
- Ckt B Compressor
- Ckt C Compressor
- Discharge & Suction Service Ports
- Optional Hot Gas Bypass Valve(s)

HIGH VOLTAGE ELECTRICAL COMPARTMENT

- 1) Blower Motor Contactor or Starter
- 2) Control Transformers (as required)
- 3) Dehumidification Compressor Contactor (RDA,RDDA,REDA)
- 4) Condenser/Compressor Contactor
- 5) Optional Phase Loss/Phase Reversal Control (optional beginning 10/05; standard prior to 10/05)
- 6) Optional Damper Motor Transformer
- 7) Optional Over/Under Voltage Control
- 8A&B) Condenser Motor Capacitors
- 9) Optional Convenience Outlet (requires separate supply line)

AUXILIARY COMPARTMENT

- 10) Digital Controller (FX05 or FX06)
- 11) Air Proving Pressure Switch
- 12&13) Optional Control Relays
- 14) Optional Dirty Filter Switch
- 15) Optional Time Clock or BAS Card
- 16) Humidity Input Converter

Models RDCA & RDDA With Gas Heat Section (FIGURE 20 only):

- 17) Combustion Air Pressure Switch
- 18) Ignition Control
- 19) Optional Power Signal Converter
- 20) Venter Motor Capacitor (line voltage)

BLOWER SECTION

- Blower Motor

Models RDCA & RDDA With Gas Heat Section (FIGURE 20 only):

- Limit Control (capillary type)

COIL SECTION

- Evaporator Coils
- Thermal Expansion Valves
- Froststat (one per cooling circuit)
- Optional Subcooling Valves (RCA/RDCA/RECA)

FILTER AND INLET AIR SECTION

- Inlet Air, Humidity, & Override Sensors

- Outside Air Relative Humidity Transmitter (Std RDA/RDDA/REDA; Optional RCA/RDCA/RECA)
- Ckt D or Dh Compressor
- Optional Damper Motor

Models RDCA & RDDA With Gas Heat Section (FIGURE 20 only):

- 21) Venter Assembly
- 22) Single-Stage Gas Valves
- 23) Optional Modulating Gas Valve
- 24) Optional Low Gas pressure Switch
- 25) Optional High Gas Pressure Switch

Models RECA & REDA With Electric Heat Section (FIGURE 21 only):

- 26) Fuse Block/Fuses
- 27) Contactor
- 28) Low Voltage Terminals
- 29) Manual Reset Limit
- 30) Auto Reset Limit

FIELD INSTALLED

- Discharge Air Sensor (supply duct)
- Optional Return Air Firestat (duct)
- Optional Discharge Air Firestat (duct)
- Optional Smoke Detector (duct)
- Optional wall-mounted controls in Paragraph 8.1

8.4 Miscellaneous Electrical and Control Options

Other electrical or control options that could have been ordered with the unit include phase loss monitor, over or under voltage protection, exhaust fan relay, photoelectric air duct smoke detector, an inlet or discharge firestat, or a 115V convenience outlet. See **FIGURES 22-26** to identify each control and its option code. Consult the system wiring diagram for option identification. For location of unit-mounted controls, see **FIGURE 20 or 21**.

FIGURE 22A - Opt BF15, Phase Loss Monitor, P/N 206105 (factory installed)

With a phase loss monitor the cooling compressors or heat sections will not start or will shutdown if a phase loss or phase reversal situation is present. This is an auto reset device. If needed, interchange two wires on the 3-phase supply connections to the line side of the disconnect switch. DO NOT change load side wiring. All factory installed wiring is color-coded matched to assist in making certain the phase integrity is in tact and to assist in troubleshooting if necessary.



**Auto Reset
Phase Loss
Device**

FIGURE 22B - Opt BF14, Over/Under Voltage Protection, P/N 176826 (factory installed)

Shuts unit down on high or low voltage condition. Resets automatically when power condition is corrected.



FIGURE 23 - Option BG3, Exhaust Fan Relay, P/N 211411 (factory installed)

DPDT relay for coordination with operation of building exhaust fan

Socket is **P/N 211415**..



8. Controls (cont'd) 8.4 Miscellaneous Electrical and Control Options (cont'd)

FIGURE 24 - Option SA1, Smoke Detector, P/N 159553 (field installed)

Photoelectric smoke detector to be field-installed in ductwork. Follow instructions supplied with the control. Follow wiring diagram on the unit. Comply with local building codes.



FIGURE 25 - Option BD5, Firestat (200°F), P/N 42782

Firestat for field installation in either the return air or outlet air ductwork. Follow instructions supplied with the control. Follow wiring diagram on the unit. Comply with local building codes.



FIGURE 26 - Option BC2, 115V Convenience GFI Outlet (external weatherproof factory-installed outlet requires separate field-supplied power supply)

115V duplex weatherproof receptacle includes ground fault protection. Requires separate field-supplied 115 volt power supply (transformer not included).



9. Optional Equipment including Heat Sections

Optional Equipment (alphabetically listed)Where to Look

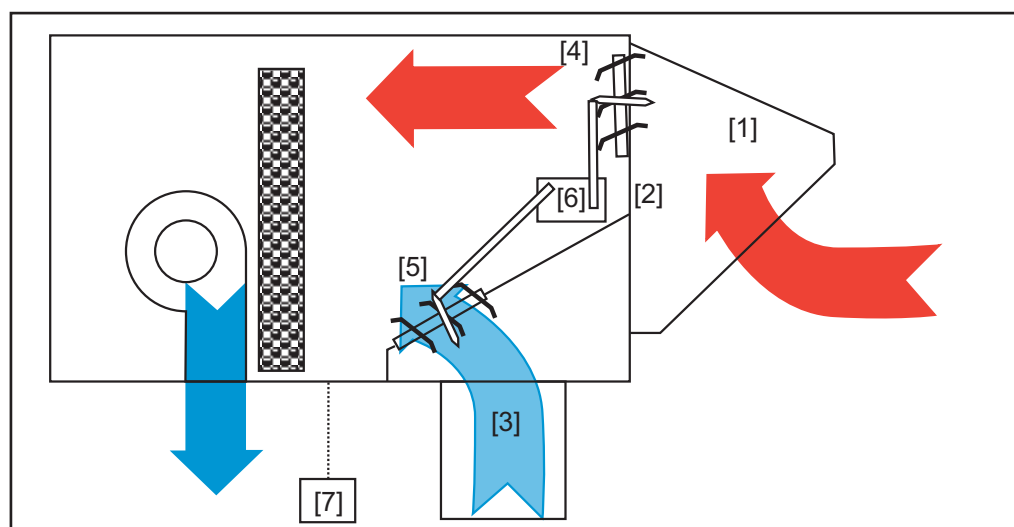
Air Control Options, Option AR	Paragraph 9.1.1, pages 34-36
Duct Furnace Curb, Model JHUP	Paragraph 5.3, page 17, Paragraph 9.4, pages 50-51, plus sections of 9.3
Economizer Options, Option AR2	Paragraph 9.1.2, page 37
Electric Heat Section (Models RECA/REDA).....	Paragraph 9.5, page 51, plus throughout manual
Energy Recovery, Option ER (field installed).....	Paragraph 9.1.3, pages 37-38
Gas Heat Section (Models RDCA/RDDA)	Paragraph 9.3, pages 39-49, plus throughout manual
Inlet Air Hood, Opt AS16 or AS19	Paragraph 6.3, pages 20-22
Power Exhaust, Option PE	Paragraph 9.2, pages 38-39
Roof Curb, Opt CJ31, CJ50, or CJ49	Paragraph 5.2, pages 12-16
Through-the-Base Electrical Supply Entrance, Opt AVC1 ...	Paragraph 7.2, page 24

9.1 Inlet Air Control and Energy Recovery Options

The system may be equipped with a variety of air control options including 100% outside air, a variety of damper controls for 100% outside air or outside air and return air, economizers, and field-installed energy recovery modules. Air controls including economizers are identified as Option AR on the system wiring diagram. Energy recovery modules are identified as Option ER. Refer to the FIGURES and listings below to identify applications and components. Identify and inspect the inlet air control option on the unit.

9.1.1 Inlet Air Options - Dampers and Damper Controls

FIGURE 27 - Component Locations of Air Control Options AR1, AR8, AR11, AR17, AR18, AR23, and AR27



<u>Option AR1</u> - Provides continuous intake air opening. Review Building Energy Codes for approval. (1) Outside Air Intake Hood (Option AS16 or AS19) Required (2) Horizontal Outside Air Inlet Opening	100% closed when the system is enabled. If system is disabled, outside air dampers are closed (return air dampers opened) by spring return. Field-installed time clocks may provide for occupied and unoccupied control sequences. (1) Outside Air Intake Hood (Option AS16) Required (2) Horizontal Outside Air Inlet Opening (3) Bottom Return Air Opening (4) Outside Air Dampers (5) Return Air Dampers (6) 2-Position Damper Motor (either 100% outside air or 100% return air)	to maintain zone pressure (modulates from zero to 100%) by regulating return and outside air quantities (constant volume). (1) Outside Air Intake Hood (Option AS16) Required (2) Horizontal Outside Air Inlet Opening (3) Bottom Return Air Opening (4) Outside Air Dampers (5) Return Air Dampers (6) Modulating Damper Motor (7) Remote Pressure Null Switch (0-100% outside air) (shipped separately)
<u>Option AR8</u> - Motorized outside air damper is opened 100% during system operation. If system is disabled, outside air damper is closed by spring return. (1) Outside Air Intake Hood (Option AS16 or AS19) Required (2) Horizontal Outside Air Intake Opening (4) Outside Air Dampers (6) 2-Position Damper Motor (open/closed)	<u>Option AR18</u> - Motorized outside air dampers and return air dampers. Damper positions are controlled by a potentiometer that is installed in the space. (1) Outside Air Intake Hood (Option AS16) Required (2) Horizontal Outside Air Inlet Opening (3) Bottom Return Air Opening (4) Outside Air Dampers (5) Return Air Dampers (6) Modulating Damper Motor (7) Remote Potentiometer (shipped separately)	<u>Option AR27</u> - Modulates return and outside air damper positions to maintain zone pressure (modulates from zero to 100%) by regulating return and outside air quantities (constant volume airflow with minimum outside air damper position). (1) Outside Air Intake Hood (Option AS16) Required (2) Horizontal Outside Air Inlet Opening (3) Bottom Return Air Opening (4) Outside Air Dampers (5) Return Air Dampers (6) Modulating Damper Motor (7) Remote Pressure Null Switch (minimum outside air damper position) (shipped separately)
<u>Option AR11</u> - Provides manual adjustment of return and outside air dampers. (1) Outside Air Intake Hood (Option AS16) Required (2) Horizontal Outside Air Inlet Opening (3) Bottom Return Air Opening (4) Outside Air Dampers (5) Return Air Dampers	<u>Option AR23</u> - Modulates return and outside air damper positions	
<u>Option AR17</u> - Motorized outside air dampers are driven 100% open and return air dampers are driven		

Damper Linkage

Damper linkage provides limited air balance of return and outside air quantities. Return duct and outside air hood pressure drop differentials may require field-installed balancing devices.

NOTES: Damper linkage may not provide adequate air balance of return and outside air quantities. Compare return duct and outside air inlet hood pressure drops to determine balancing requirements. Damper operation is not integrated with the standard system controller. If equipped with Option BNC1 and a time clock, the controller will close the dampers.

Pressure Null Switch in Damper Options AR23 and AR27

The pressure null switch used in Option AR23 and AR27 is a Dwyer #1640-0 with a range of .01-.20" w.c. It is shipped separately for field installation. Refer to the following paragraphs and the manufacturer's installation instructions included with the switch.

Description and Application - The pressure null switch is a diaphragm operated differential pressure switch used in makeup air applications to control building pressure. It maintains a selected positive or negative pressure setpoint by changing the amount of outside air being introduced to the building through the modulating outside air dampers. As more pressure is required in the build-

9. Optional Equipment including Heat Sections (cont'd)

9.1 Inlet Air Control and Energy Recovery Options (cont'd)

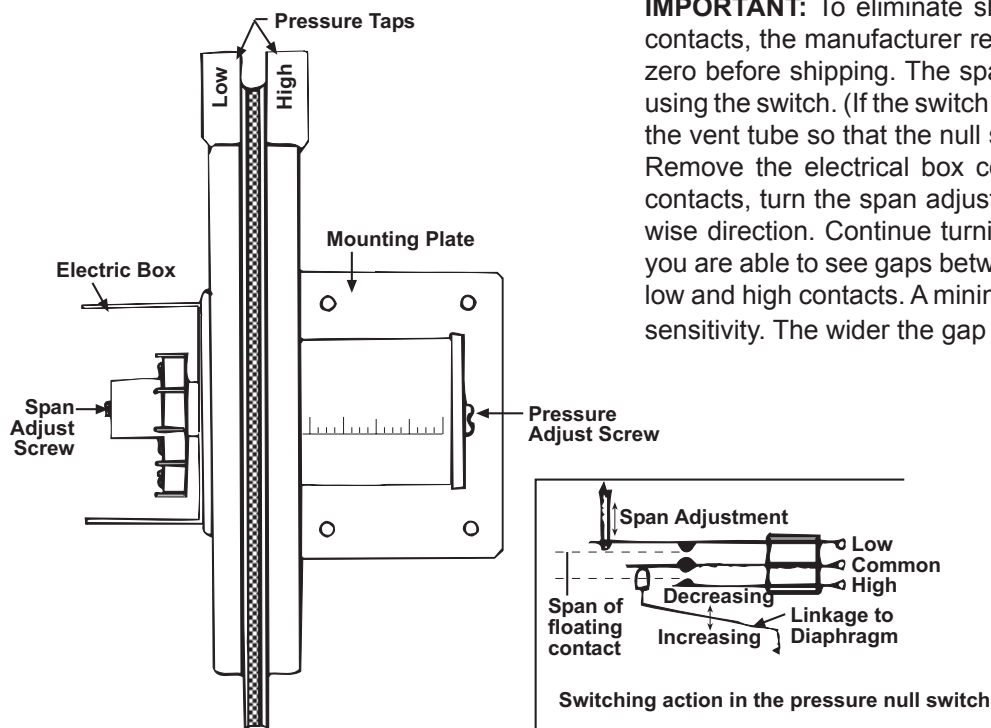
9.1.1 Inlet Air Options - Dampers and Damper Controls (cont'd)

ing, the pressure null switch activates the damper motor driving the outside air damper towards the full open position and the recirculated air damper towards the closed position. Conversely, as less pressure is required, the switch drives the dampers in the opposite direction.

Installation Instructions for Pressure Null Switch

1. Select an indoor location free from excessive vibration where oil or water will not drip onto the switch and where ambient temperature will be within a range of -30°F (dry air) to 110°F.
2. **Mount the switch with the diaphragm in a vertical plane.** The switch is position sensitive and is calibrated to operate properly when the diaphragm is vertical. Mount switch securely.
3. Connect the pressure taps on the top of the switch to sources of air pressure differential. Metal tubing with 1/4" O.D. is recommended, but any tubing system which will not unduly restrict the air flow may be used. To maintain a positive building pressure, vent the low pressure tap to the outdoors and allow the high pressure tap to monitor building pressure. To maintain a negative building pressure, reverse the functions of the high and low pressure taps. In either case, be sure that the outdoor vent is protected from the wind and screened from insects.
4. **Adjustment of the Switch** - The "HIGH" actuation point of the null switch is indicated on a calibrated scale secured to the transparent range screw enclosure. Building pressure is set by turning the adjustment screw. The "Low" actuation point is set by adjusting the span of the null by turning the span adjustment screw. The span range is .01 to .03" w.c.
5. See the wiring diagram included with the furnace to make electrical connections.

FIGURE 28 - Pressure Null Switch (shipped separately for use with Options AR23 and AR27)

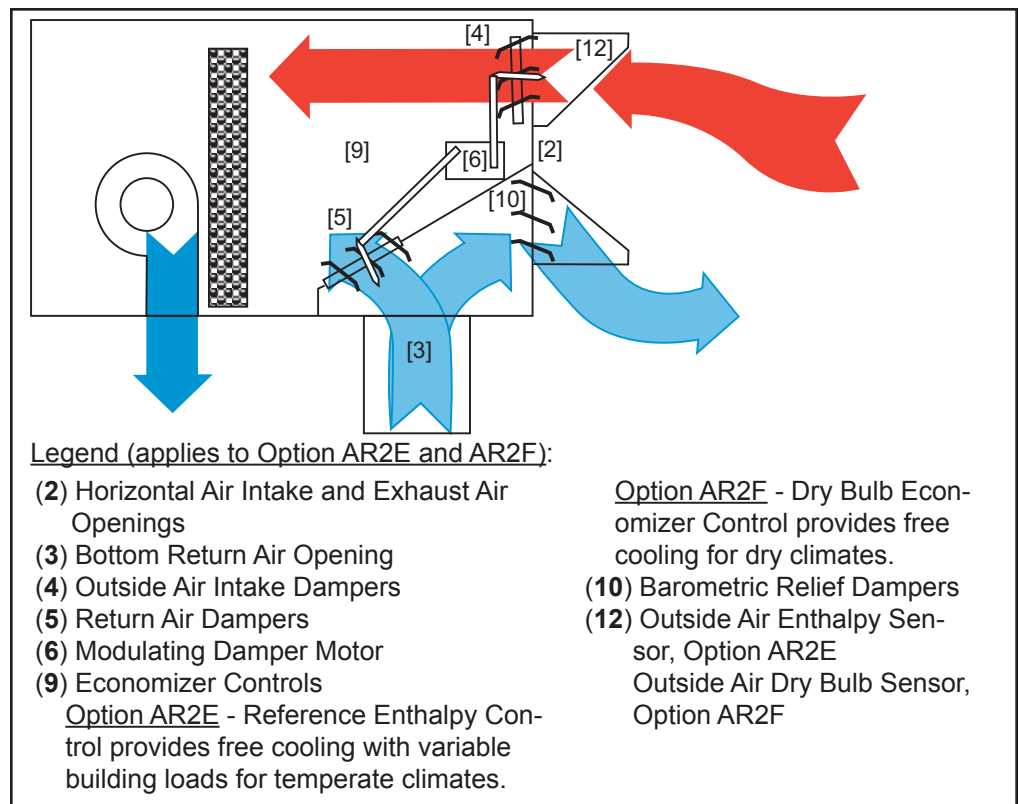


IMPORTANT: To eliminate shipping damage to the switch contacts, the manufacturer reduced the span adjustment to zero before shipping. The span should be adjusted prior to using the switch. (If the switch has been installed, disconnect the vent tube so that the null switch is in a neutral position.) Remove the electrical box cover and while observing the contacts, turn the span adjustment screw slowly in a clockwise direction. Continue turning the adjustment screw until you are able to see gaps between the common and both the low and high contacts. A minimum gap provides the greatest sensitivity. The wider the gap the lower the sensitivity.

9.1.2 Economizer Options

**FIGURE 29 -
Component Locations
of Economizer Air
Control Options
AR2E and AR2F**

NOTE: Damper linkage may not provide adequate air balance of return and outside air quantities. Compare return duct and outside air inlet hood pressure drops to determine balancing requirements.



FX05/FX06 Controller Setting Change

Display	New	Default
EN1	20	29
OC1	58°F	68°F

With the economizer and return air, the "mixed" air temperature sensed at the evaporator coil is raised. Lowering the EN1 and OC1 setpoints on the controller as shown in the table, will allow the enthalpy controller on the economizer to take over control of mechanical cooling. For instructions on setting the controller, refer to the control instruction sheet in the literature envelope.

Also, check the enthalpy setting on the economizer; it needs to be at the "D" setting. Adjust the minimum position potentiometer for the mixture of air required for the installation.

(NOTE: The EXH, DCV1, and CDV2 functions on the control are not used.)

Operating Sequence with Economizer Option AR2E

On a call for low stage cooling

1. The blower motor is energized.
2. With the outdoor enthalpy less than the return air enthalpy:
 - a) The "A" and "B" cool circuits are locked out.
 - b) Dampers are positioned by the economizer and mixed air sensor.
3. With outdoor air enthalpy higher than the return air enthalpy:
 - a) The "A" cool circuit is energized.
 - b) Dampers are positioned for minimum outside air.
 - c) On a call for high stage cooling, the "B" circuit is staged appropriately.

9.1.3 Energy Recovery Module Options

Energy recovery modules are shipped separately for field installation. Modules include an enthalpy wheel, a supply air blower, an exhaust blower, an intake hood, and an exhaust hood with a gravity damper. Energy recovery modules are identified as Option ER and are selected by CFM. The modules also have a variety of options. In addition to the Option ER energy recovery module, either air control Option AR2B or AR2A is required. See **FIGURE 30A** or **FIGURE 30B** for application and control components.

Follow the installation instructions shipped with the module.

9. Optional Equipment including Heat Sections (cont'd)

9.1 Inlet Air Control and Energy Recovery Options (cont'd)

9.1.3 Energy Recovery Module Options (cont'd)

FIGURE 30A - System with Optional Energy Recovery Module showing Component Locations of Energy Recovery Air Control Option AR2A

- (2) Horizontal Air Intake & Exhaust Air Openings
- (3) Bottom Return Air Opening
- (8) Energy Recovery Module (Option ER) required
- (10) Gravity Dampers
- (11) Optional - Motorized Two-Position Outside Air Intake Hood Dampers (Option ARD3)

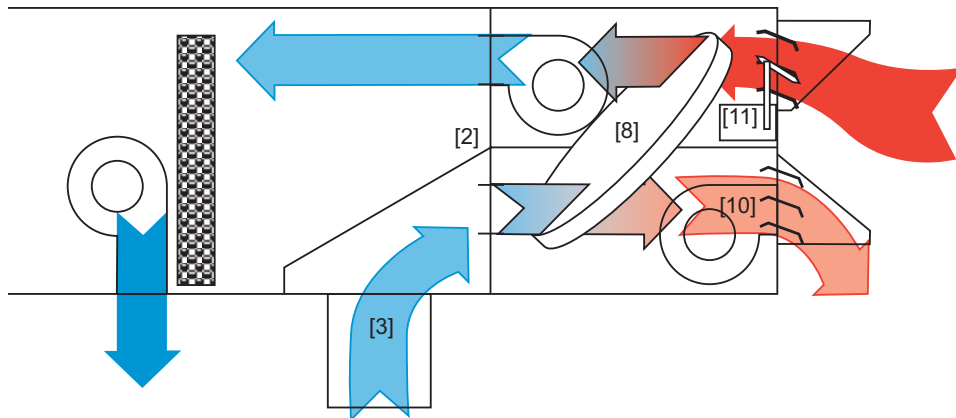
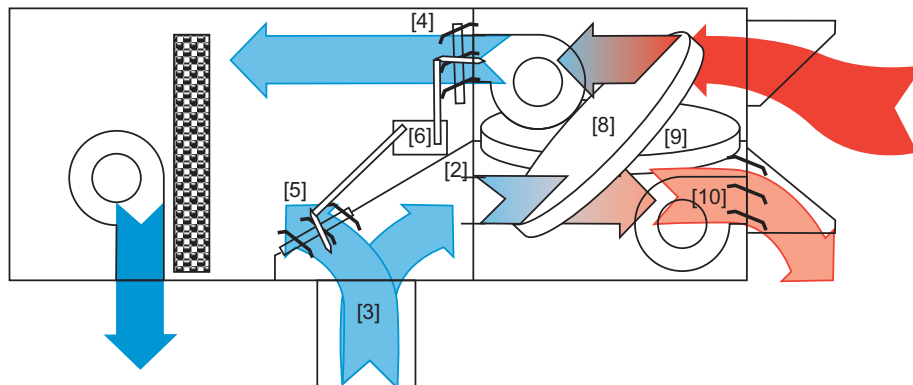


FIGURE 30B - System with Optional Energy Recovery Module showing Component Locations of Energy Recovery Air Control Option AR2B

- (2) Horizontal Air Intake and Exhaust Air Openings
- (3) Bottom Return Air Opening
- (4) Outside Air Intake Dampers
- (5) Return Air Dampers
- (6) Modulating Damper Motor
- (8) Energy Recovery Module (Option ER) required
- (9) Energy Recovery Module Economizer Control (allows wheel to pivot out of air-streams when outside air does not need tempering)
- (10) Gravity Dampers



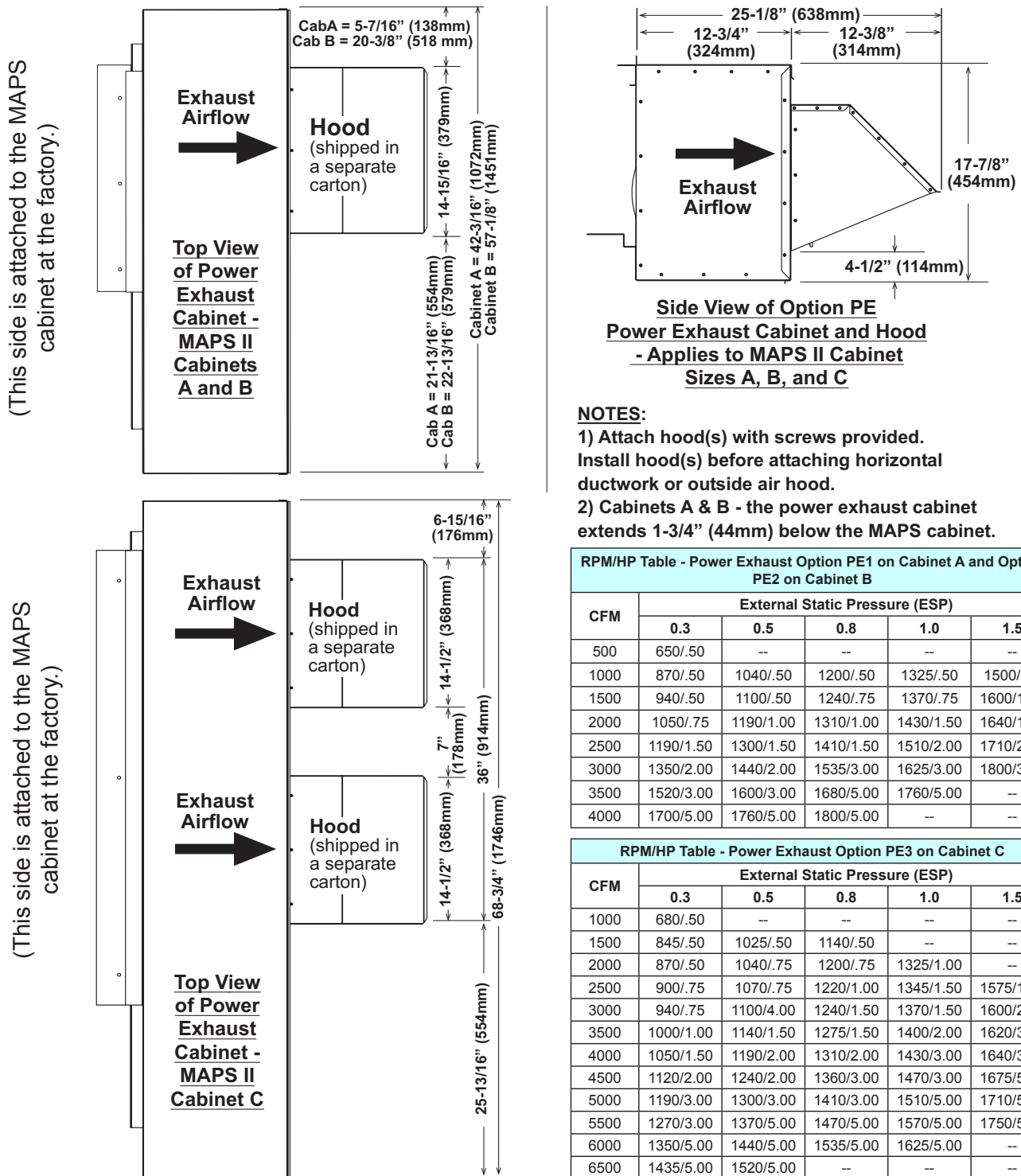
9.2 Power Exhaust (Building)

If ordered with Option PE, the system is factory equipped with a power exhaust for building air. The power exhaust blower, motor, and damper are assembled and attached to the cabinet below the outside air hood or inlet duct. (See location and dimensions in Paragraph 4.1 and **FIGURE 31**.) The power exhaust hood(s) is factory assembled and shipped in a separate carton to be installed at the site. To attach, slide the hood(s) over the flange and fasten with the sheetmetal screws provided. **NOTE:** Attach the power exhaust hood before installing the outside air hood or horizontal discharge ductwork.

Cabinet A and B sizes (see Cross Reference, page 58) have a 9x10 exhaust blower, gravity damper, and one shipped-separate hood. Cabinet C sizes have dual 9x10 blowers, gravity dampers, and two shipped-separate hoods. Check the rating plate for motor size (1/2 - 5 HP).

Standard control would turn the exhaust blower on when the unit blower runs. If optional return air dampers are ordered, the power exhaust is wired to coordinate with the appropriate damper position.

FIGURE 31 - Optional Power Exhaust Dimensions



9.3 Gas Heat Module - Models RDCA and RDDA

9.3.1 Gas Heat Module - General

A system with a gas heat section is equipped with a Reznor® TCore² combustion system with 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, or 700 MBH input. The 83% thermal efficient furnace is power vented and has either a 3:1 turndown with sequenced gas valves or a 6:1 turndown modulating gas capacity control. A system with 3:1 turndown gas control could be for either natural or propane gas. A 6:1 turndown modulating system is natural gas only.

9. Optional Equipment including Heat Sections (cont'd)

9.3 Gas Heat Module - Models RDCA and RDDA (cont'd)

Temperature Guidelines for Gas Heat Section

Minimum Circulating Discharge Air Temperature (°F)	80	75	70	65	60
Minimum Design Ambient (°F)	-30 to - 21	-20 to - 11	-10 to -1	0 to 9	10 and above

9.3.2 Gas Heat Module - Mechanical

NOTE: If a Model JHUP-0250 duct furnace curb section is part of the installation, much of the information in this section applies to the duct furnace also; see Paragraph 9.4.

9.3.2.1 Gas Piping and Pressures

All piping must be in accordance with requirements outlined in the National Fuel Gas Code ANSI/Z223.1a (latest edition) or CSA-B149.1 and B149.2. Gas supply piping installation should conform with good practice and with local codes.

WARNING: PRESSURE TESTING SUPPLY PIPING

Test pressures ABOVE 1/2 psi (3.5kPa): Disconnect the heater and the manual valve from the gas supply line which is to be tested. Cap or plug the supply line.

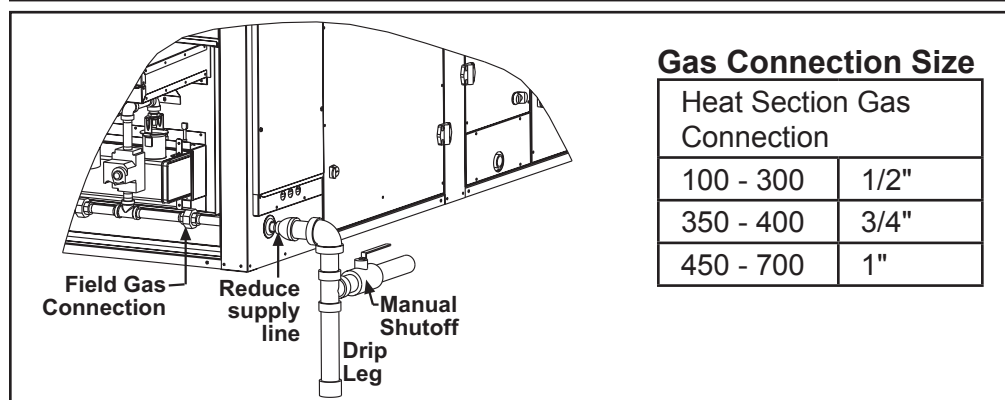
Test pressure EQUAL TO or BELOW 1/2 psi (3.5kPa): Before testing, close the manual valve at the heater.

Furnaces for natural gas are orificed for operating with gas having a heating value of 1000 (±50) BTU per cubic ft. If the gas at the installation does not meet this specification, consult the factory for proper orifice.

Pipe joint compounds (pipe dope) shall be resistant to the action of liquefied petroleum gas or any other chemical constituents of the gas being supplied.

WARNING: All components of a gas supply system must be leak tested prior to placing equipment in service. NEVER TEST FOR LEAKS WITH AN OPEN FLAME. Failure to comply could result in personal injury, property damage or death.

FIGURE 32 - Gas Connection



Sizing Gas Supply Lines

CAPACITY OF PIPING - Cubic Feet per Hour based on 0.3" w.c. Pressure Drop														
Specific Gravity for Natural Gas -- 0.6 (Natural Gas -- 1000 BTU/Cubic Ft)														
Specific Gravity for Propane Gas -- 1.6 (Propane Gas -- 2550 BTU/Cubic Ft)														
Length of Pipe	Diameter of Pipe													
	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"	
	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane
20 ft	92	56	190	116	350	214	730	445	1100	671	2100	1281	3300	2013
30 ft	73	45	152	93	285	174	590	360	890	543	1650	1007	2700	1647
40 ft	63	38	130	79	245	149	500	305	760	464	1450	885	2300	1403
50 ft	56	34	115	70	215	131	440	268	670	409	1270	775	2000	1220
60 ft	50	31	105	64	195	119	400	244	610	372	1105	674	1850	1129
70 ft	46	28	96	59	180	110	370	226	560	342	1050	641	1700	1037
80 ft	43	26	90	55	170	104	350	214	530	323	990	604	1600	976
90 ft	40	24	84	51	160	98	320	195	490	299	930	567	1500	915
100 ft	38	23	79	48	150	92	305	186	460	281	870	531	1400	854
125 ft	34	21	72	44	130	79	275	168	410	250	780	476	1250	763
150 ft	31	19	64	39	120	73	250	153	380	232	710	433	1130	689
175 ft	28	17	59	36	110	67	225	137	350	214	650	397	1050	641
200 ft	26	16	55	34	100	61	210	128	320	195	610	372	980	598

Note: When sizing supply lines, consider possibilities of future expansion and increased requirements.

Refer to National Fuel Gas Code for additional information on line sizing.

Supply Pressures - Before attempting to measure valve outlet gas pressure, the inlet supply pressure **must** be within the specified range both when the heater is in operation and on standby. Incorrect inlet pressure could cause excessive valve outlet gas pressure immediately or at some future time.

Natural gas inlet supply pressure for the 3-stage gas control system must be a minimum of 5.5" w.c. Minimum natural gas supply pressure for the modulating 6:1 gas control system is 6.0" w.c.

Maximum natural gas supply pressure is 14" w.c.

If natural gas supply pressure is too high, install a regulator in the supply line before it reaches the heater. If natural gas supply pressure is too low, contact your gas supplier.

Propane gas inlet supply pressure must be a minimum of 11" w.c. and a maximum of 14" w.c.

CAUTION: DO NOT bottom out the gas valve regulator adjusting screw. This can result in unregulated manifold pressure causing excess over-fire and heat exchanger failure

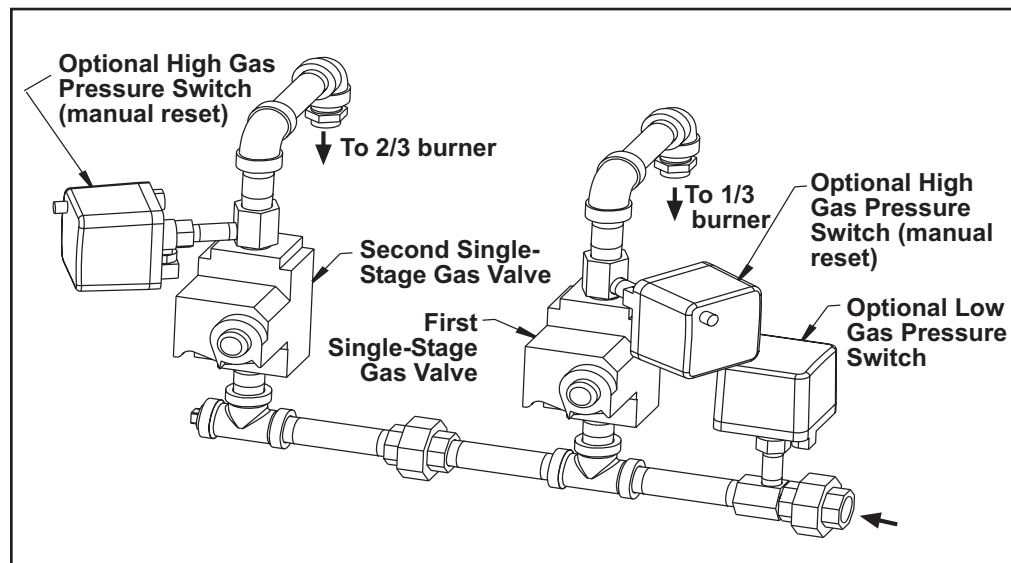
Gas Capacity Controls

The gas train is equipped with either 3:1 turndown gas capacity control (**FIGURE 33A or 35A**) or optional 6:1 turndown (**FIGURE 33B or 35B**). Both the 3:1 and 6:1 system have a split burner design (1/3 and 2/3) with two single-stage gas valves in heat section Sizes 100, 150, 200, 250, and 300. Heat section Sizes 350, 400, 350, 500, 550, 600, 650, and 700 have two section burners. One section is split 1/3 and 2/3 and the other is a "non-split" burner. Two single-stage gas valves feed the split burner and a third single-stage gas valve feeds the non-split burner.

The optional 6:1 turndown system includes a modulating/regulating valve and a power signal converter (**FIGURE 34**). Control is through the system cooling/heating controller (See Paragraph 8) based on heating air setpoint and inlet air temperature. **NOTE:** Propane gas systems are 3:1 turndown (6:1 is available with natural gas only).

WARNING: The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting the unit to ensure positive closure. See Hazard Levels, page 2.

FIGURE 33A - Gas Train for Heat Section Sizes 100-400 showing Furnace with 3:1 Turndown (Option AG55) and both optional Low and High Gas Pressure Switches



9. Optional Equipment including Heat Sections (cont'd)

9.3 Gas Heat Module

9.3.2 Gas Heat Module - Mechanical (cont'd)

9.3.2.1 Gas Piping and Pressures (cont'd)

FIGURE 33B - Gas Train for Heat Section Sizes 100-400 with Optional 6:1 Turndown (Option AG57, natural gas only) and both optional Low and High Gas Pressure Switches

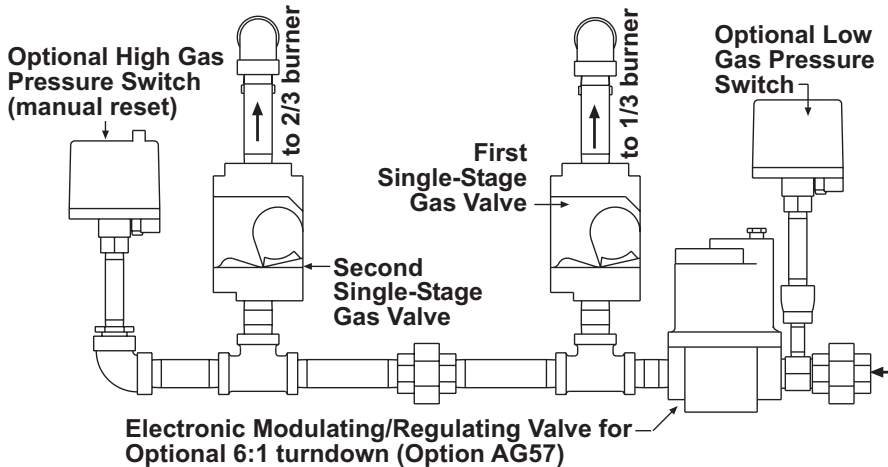


FIGURE 34 - Signal Conditioner, P/N 134170, used in Option AG57, Gas Controls with 6:1 Turndown

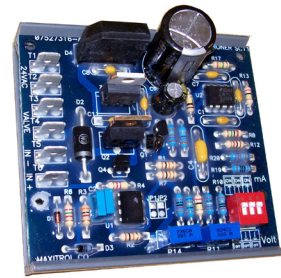


FIGURE 35A - Gas Train for Heat Section Sizes 450-700 with 3:1 Turndown (Option AG55)

Sequence of Operation:

The 1/3 burner valve and the 2/3 burner valve are energized. After 20 seconds the 1/3 burner valve is de-energized (this is Stage 1). For Stage 2, the full (non-split) burner valve and the 1/3 burner valve are energized, while the 2/3 burner valve is de-energized. Stage 3 brings the 2/3 burner valve back on so all valves are energized.

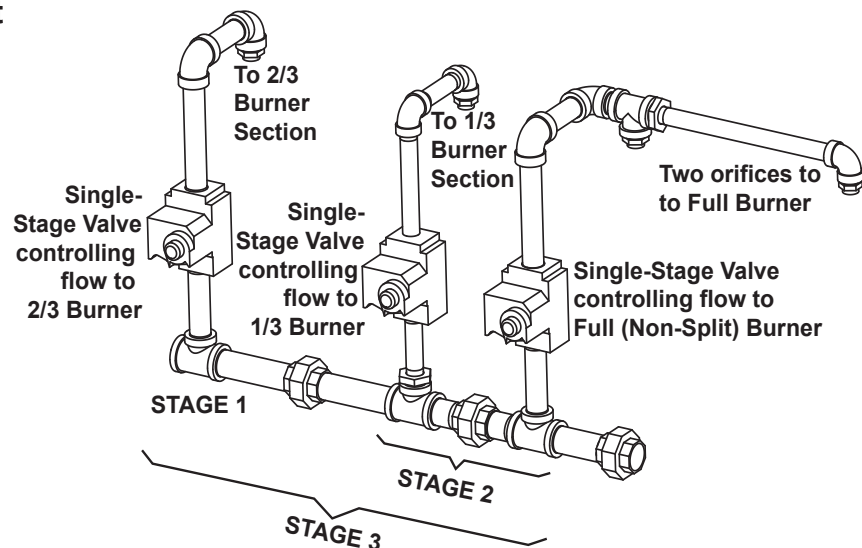
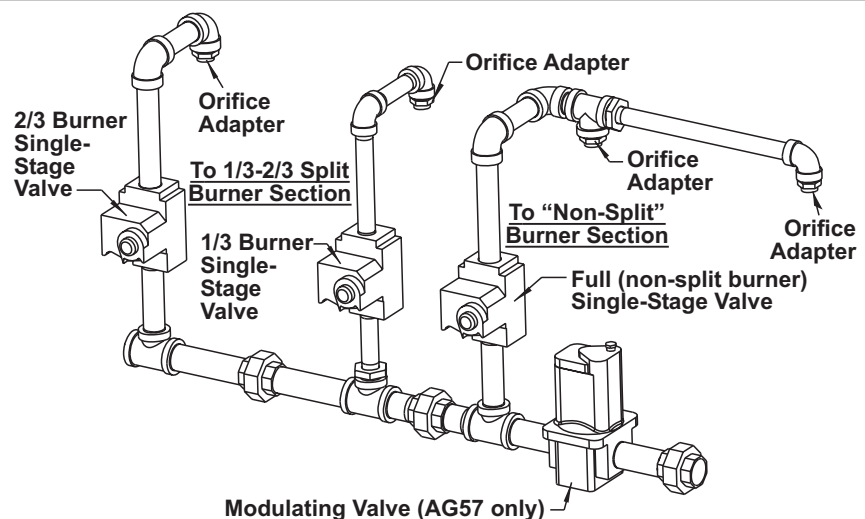


FIGURE 35B - Gas Train for Heat Section Sizes 450-700 with Optional 6:1 Turndown (Option AG57, natural gas only)

NOTE: See **FIGURE 34** for signal conditioner.



Manifold Pressure

WARNING: Manifold gas pressure must never exceed 3.5" w.c. for natural gas or 10" w.c. for propane gas.

Instructions for Checking Outlet Pressure of Valves (can only be done after heater is operating)

FIGURE 36 - View of Standard Single-Stage Valve (all units have two) showing Outlet Pressure Tap and Adjustment Locations

CAUTION: DO NOT bottom out the gas valve regulator adjusting screw. This can result in unregulated manifold pressure causing excess overfire and heat exchanger failure.

The valves are set at the factory for the appropriate outlet pressure. Check the furnace rating plate for the manifold pressure setting.

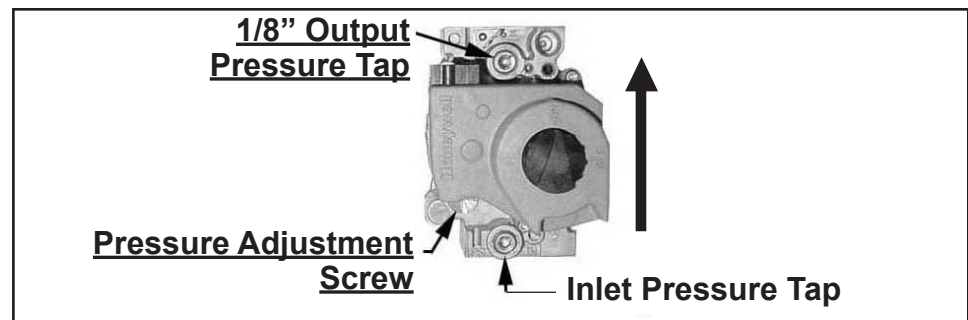
Measuring manifold gas pressure cannot be done until the heater is in operation. It is included in the steps of the "Check-Test-Start" procedure in Paragraph 10. The following warnings and instructions apply.

All furnaces have two or three single-stage gas valves. Follow the instructions to check the outlet pressure of all valves. If equipped with an optional modulating/regulating valve, unit must be operating at full rate.

Measure the Full Fire Outlet Pressure of all Single-Stage Valves - Turn the manual valve in the gas line off. Locate the 1/8" output pressure tap on the first single-stage gas valve (See **FIGURE 36**). Connect a manometer to the 1/8" pipe outlet pressure tap in the valve. **NOTE:** A manometer (fluid-filled gauge) is recommended rather than a spring type gauge due to the difficulty of maintaining calibration of a spring type gauge.

Turn on the manual gas valve. Check the outlet pressure. (Reminder: If the unit has optional 6:1 modulating turndown, burner must be at full fire.) Manifold pressure for sea level operation should be 3.5" w.c. for natural gas or 10.0" w.c. for propane gas. If the unit was ordered for high altitude operation, check the high altitude plate or the Table below.

In most cases the outlet pressure will be correct, but in the rare instance that adjustment is required, refer to **FIGURE 36** and follow the instructions.



Altitude		Natural Gas	Propane
Feet	Meters	Outlet Pressure of Single Stage Valves at FULL RATE	
Manifold Pressure Settings by Altitude for the UNITED STATES			
0-2000	0-610	3.5" w.c.	10.0" w.c.
2001-3000	611-915	3.1" w.c.	8.8" w.c.
3001-4000	916-1220	3.0" w.c.	8.5" w.c.
4001-5000	1221-1525	2.8" w.c.	8.1" w.c.
5001-6000	1526-1830	2.7" w.c.	7.7" w.c.
6001-7000	1831-2135	2.6" w.c.	7.4" w.c.
7001-8000	2136-2440	2.5" w.c.	7.1" w.c.
8001-9000	2441-2745	2.4" w.c.	6.7" w.c.
9001-10000	2746-3045	2.3" w.c.	6.7" w.c.
Manifold Pressure Settings by Altitude for CANADA			
0-2000	0-610	3.5" w.c.	10.0" w.c.
2001-4500	611-1373	2.8" w.c.	8.1" w.c.

Adjustment to the valve outlet pressure setting is rarely necessary. If adjustment is necessary, remove the cap from the adjustment screw. Set pressure to correct setting by turning the regulator screw IN (clockwise) to increase pressure. Turn regulator screw OUT (counterclockwise) to decrease pressure. After an adjustment is made, cycle the burner. Re-check the outlet pressure. When outlet pressure is correct for the installation, remove the manometer and replace the cap. Check for leak at the pressure tap fitting.

9. Optional Equipment including Heat Sections (cont'd)

9.3 Gas Heat Module - Models RDCA and RDDA (cont'd)

9.3.2 Gas Heat Module - Mechanical (cont'd)

9.3.2.1 Gas Piping and Pressures (cont'd)

Turn the manual valve off. Connect the manometer to the second valve and repeat to check the outlet pressure of the other single-stage gas valves. High-fire outlet pressure should be the same for each valve.

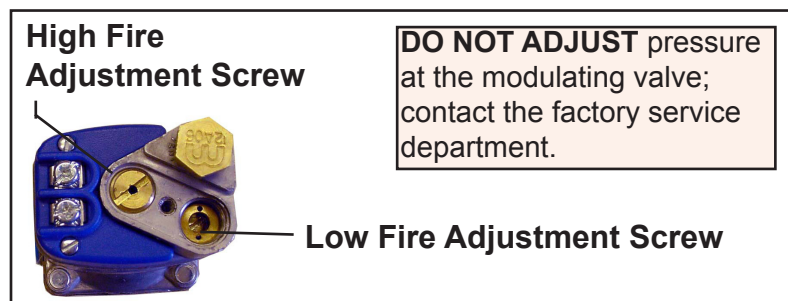
If equipped with Option AG57, the furnace has a modulating valve to provide 6:1 turndown. To measure the minimum fire outlet pressure, check the outlet pressure of the single-stage valve at the 2/3 burner (See **FIGURE 33B or 35B**). Connect the manometer at the same pressure tap as when measuring high fire outlet pressure. Disconnect one of the lead wires to the modulating valve. With the unit at full fire, measure the outlet gas pressure at the single-stage valve. Gas pressure should be as listed for "Full Rate Inlet Pressure" in the table below. (Modulating valve is a reverse acting valve; 0-6 is high fire and 15-24 is low fire.) If pressure is not correct, contact the factory. This setting is not field adjustable. After checking pressure, be sure to reconnect the wire to the modulating valve.

For reference purposes only, pressures by altitude are shown in the table below. **CONTACT THE FACTORY SERVICE DEPT IF PRESSURE IS INCORRECT. DO NOT ADJUST.**

Altitude		Natural Gas		
Feet	Meters	Minimum "Fire" OUTLET Gas Pressure for 2/3 Burner Section *	Full Rate INLET Gas Pressure at Single-Stage Valves with both Burner Sections Operating	Full Rate OUTLET Gas Pressure
Tolerance		(-.1 to +.2 " w.c.)	(-.15 to +.15 " w.c.)	(-.15 to +.15 " w.c.)
UNITED STATES				
0-2000	0-610	1.20" w.c.	4.5" w.c.	3.5" w.c.
2001-3000	611-915	1.05" w.c.	4.1" w.c.	3.1" w.c.
3001-4000	916-1220	1.00" w.c.	4.0" w.c.	3.0" w.c.
4001-5000	1221-1525	.95" w.c.	3.8" w.c.	2.8" w.c.
5001-6000	1526-1830	.90" w.c.	3.7" w.c.	2.7" w.c.
6001-7000	1831-2135	.86" w.c.	3.6" w.c.	2.6" w.c.
7001-8000	2136-2440	.84" w.c.	3.5" w.c.	2.5" w.c.
8001-9000	2441-2745	.80" w.c.	4.4" w.c.	2.4" w.c.
9001-10000	2746-3045	.78" w.c.	3.3" w.c.	2.3" w.c.
CANADA				
0-2000	0-610	1.20" w.c.	4.5" w.c.	3.5" w.c.
2001-4500	611-1373	2.80" w.c.	3.8" w.c.	2.8" w.c.

*The 1/3 burner outlet pressure will be slightly higher; it does not need to be set.

FIGURE 37 - Top View of Electronic Modulating/Regulating Valve in Option AG57, 6:1 modulating turndown



High Altitude Capacity Changes

The input and/or the capacity of the gas heat section changes with altitude. The tables below list inputs and capacities at altitudes from sea level to 10,000 ft (3045M).

BTUH Inputs and Capacities by Altitude in the UNITED STATES for Gas Heat Section in Models RDCA and RDDA													
ALTITUDE		Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input
Feet	Meters	Size 100			Size 150			Size 200			Size 250 & JHUP-0250		
0-2000	0-610	100,000	83,000	70,000	150,000	124,500	105,000	200,000	166,000	140,000	250,000	207,500	175,000
2001-3000	611-915	94,000	78,020	65,800	141,000	117,030	98,700	188,000	156,040	131,600	235,000	195,050	164,500
3001-4000	916-1220	92,000	76,360	64,400	138,000	114,540	96,600	184,000	152,720	128,800	230,000	190,900	161,000
4001-5000	1221-1525	90,000	74,700	63,000	135,000	112,050	94,500	180,000	149,400	126,000	225,000	186,750	157,500
5001-6000	1526-1830	88,000	73,040	61,600	132,000	109,560	92,400	176,000	146,080	123,200	220,000	182,600	154,000
6001-7000	1831-2135	86,000	71,380	60,200	129,000	107,070	90,300	172,000	142,760	120,400	215,000	178,450	150,500
7001-8000	2136-2440	84,000	69,720	58,800	126,000	104,580	88,200	168,000	139,440	117,600	210,000	174,300	147,000
8001-9000	2441-2745	82,000	68,060	57,400	123,000	102,090	86,100	164,000	136,120	114,800	205,000	170,150	143,500
9001-10000	2746-3045	80,000	66,400	56,000	120,000	99,600	84,000	160,000	132,800	112,000	200,000	166,000	140,000
Feet	Meters	Size 300			Size 350			Size 400			Size 450		
0-2000	0-610	300,000	249,000	210,000	350,000	290,500	245,000	400,000	332,000	280,000	450,000	373,500	315,000
2001-3000	611-915	282,000	234,060	197,400	329,000	273,070	230,300	376,000	312,080	263,200	423,000	351,090	296,100
3001-4000	916-1220	276,000	229,080	193,200	322,000	267,260	225,400	368,000	305,440	257,600	414,000	343,620	289,800
4001-5000	1221-1525	270,000	224,100	189,000	315,000	261,450	220,500	360,000	298,800	252,000	405,000	336,150	283,500
5001-6000	1526-1830	264,000	219,120	184,800	308,000	255,640	215,600	352,000	292,160	246,400	396,000	328,680	277,200
6001-7000	1831-2135	258,000	214,140	180,600	301,000	249,830	210,700	344,000	285,520	240,800	387,000	321,210	270,900
7001-8000	2136-2440	252,000	209,160	176,400	294,000	244,020	205,800	336,000	278,880	235,200	378,000	313,740	264,600
8001-9000	2441-2745	246,000	204,180	172,200	287,000	238,210	200,900	328,000	272,240	229,600	369,000	306,270	258,300
9001-10000	2746-3045	240,000	199,200	168,000	280,000	232,400	196,000	320,000	265,600	224,000	360,000	298,800	252,000
Feet	Meters	Size 500			Size 550			Size 600			Size 650		
0-2000	0-610	500,000	415,000	350,000	550,000	456,500	385,000	600,000	498,000	420,000	650,000	539,500	455,000
2001-3000	611-915	470,000	390,100	329,000	517,000	429,110	361,900	564,000	468,120	394,800	611,000	507,130	427,700
3001-4000	916-1220	460,000	381,800	322,000	506,000	419,980	354,200	552,000	458,160	386,400	598,000	496,340	418,600
4001-5000	1221-1525	450,000	373,500	315,000	495,000	410,850	346,500	540,000	448,200	378,000	585,000	485,550	409,500
5001-6000	1526-1830	440,000	365,200	308,000	484,000	401,720	338,800	528,000	438,240	369,600	572,000	474,760	400,400
6001-7000	1831-2135	430,000	356,900	301,000	473,000	392,590	331,100	516,000	428,280	361,200	559,000	463,970	391,300
7001-8000	2136-2440	420,000	348,600	294,000	462,000	383,460	323,400	504,000	418,320	352,800	546,000	453,180	382,200
8001-9000	2441-2745	410,000	340,300	287,000	451,000	374,330	315,700	492,000	408,360	344,400	533,000	442,390	373,100
9001-10000	2746-3045	400,000	332,000	280,000	440,000	365,200	308,000	480,000	398,400	336,000	520,000	431,600	364,000
Feet	Meters	Size 700											
0-2000	0-610	700,000	581,000	490,000									
2001-3000	611-915	658,000	546,140	460,600									
3001-4000	916-1220	644,000	534,520	450,800									
4001-5000	1221-1525	630,000	522,900	441,000									
5001-6000	1526-1830	616,000	511,280	431,200									
6001-7000	1831-2135	602,000	499,660	421,400									
7001-8000	2136-2440	588,000	488,040	411,600									
8001-9000	2441-2745	574,000	476,420	401,800									
9001-10000	2746-3045	560,000	464,800	392,000									

BTUH Inputs and Capacities by Altitude in CANADA for Gas Heat Section in Models RDCA and RDDA													
ALTITUDE		Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input	Normal Input	Thermal Output Capacity	Minimum Input
Feet	Meters	Size 100			Size 150			Size 200			Size 250 & JHUP-0250		
0-2000	0-610	100,000	83,000	70,000	150,000	124,500	105,000	200,000	166,000	140,000	250,000	207,500	175,000
2001-4500	611-1373	90,000	74,700	63,000	135,000	113,400	94,500	180,000	151,200	126,000	225,000	189,000	157,500
Feet	Meters	Size 300			Size 350			Size 400			Size 450		
0-2000	0-610	300,000	249,000	210,000	350,000	290,500	245,000	400,000	332,000	280,000	450,000	373,500	315,000
2001-4500	611-1373	270,000	226,800	189,000	315,000	264,600	220,500	360,000	302,400	252,000	405,000	340,200	283,500
Feet	Meters	Size 500			Size 550			Size 600			Size 650		
0-2000	0-610	500,000	415,000	350,000	550,000	456,500	385,000	600,000	498,000	420,000	650,000	539,500	455,000
2001-4500	611-1373	450,000	378,000	315,000	495,000	415,800	346,500	540,000	453,600	378,000	585,000	491,400	409,500
Feet	Meters	Size 700											
0-2000	0-610	700,000	581,000	490,000									
2001-4500	611-1373	630,000	529,200	441,000									

9. Optional Equipment including Heat Sections (cont'd)

Optional Gas Pressure Safety Switches

(See FIGURES 33A and 33B.)

9.3 Gas Heat Module - Models RDCA and RDDA (cont'd)

9.3.2 Gas Heat Module - Mechanical (cont'd)

9.3.2.1 Gas Piping and Pressures (cont'd)

If the manifold is equipped with optional high and/or low gas pressure switches, the switches protect against a malfunction that would cause an increase or decrease in the regulated gas pressure.

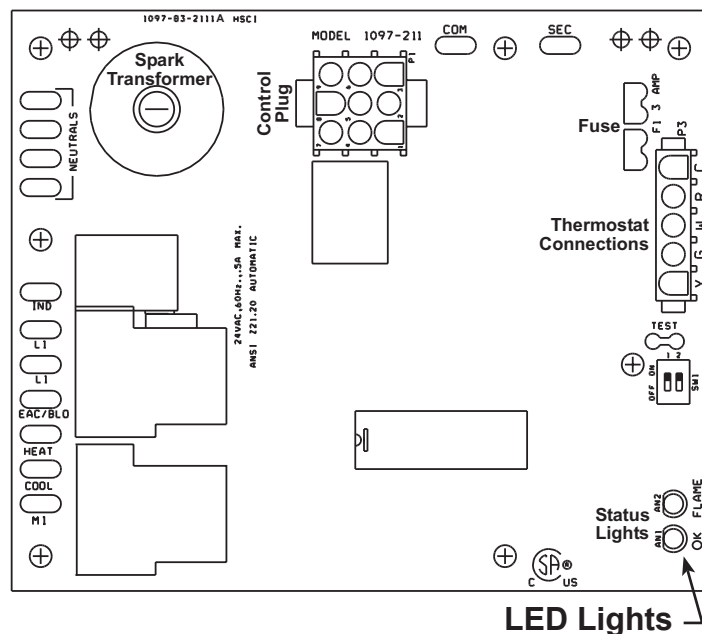
The low gas pressure switch is an automatic reset switch factory set to activate if the gas pressure is 50% of the minimum as stated on the unit rating plate.

The high gas pressure switch is a manually reset switch that is set to activate if the gas pressure is 125% of the manifold pressure stated on the rating plate.

9.3.3 Ignition System

This furnace is equipped with a direct spark integrated control module (circuit board). The module monitors the safety devices and controls the operation of the venter motors and the gas valve between heat cycles.

FIGURE 387 – DSI Integrated Control Module (circuit board)



Control Status - Green LED Codes

Steady ON . Normal Operation, No call for heat

Fast Flash.. Normal Operation, Call for heat

1 Flash..... System Lockout, Failed to detect or sustain flame

2 Flashes... Pressure switch did not close within 30 seconds of venter motor

3 Flashes... High limit switch open

4 Flashes... Pressure switch is closed before venter motor is energized

Steady OFF Blown Fuse, No Power, or Defective Board

Flame Status - Yellow LED Codes

Steady ON . Flame is sensed

Slow Flash . Weak flame (current below 1.0 microamps $\pm 50\%$)

Fast Flash.. Undesired Flame (valve open and no call for heat)

Normal Heat Cycle Operating Sequence

1) Call for Heat - The heating/cooling system controller calls for heat. The ignition system circuit board checks to see that the limit switch is closed and the pressure switch is open. If the limit switch is open, the circuit board responds as defined in the "Abnormal Heat Cycle, Limit Switch Operation". If the pressure switch is closed, the circuit board will do four flashes on the green LED and wait indefinitely for the pressure switch to open. If the pressure switch is open, the circuit board proceeds to prepurge.

2) Prepurge - The circuit board energizes the venter motor and waits for the pressure switch to close. If the pressure switch does not close within 30 seconds of the venter motor energizing, the circuit board will do two flashes on the green LED. The circuit board will leave the venter motor energized indefinitely as long as the call for heat remains and the pressure switch is open.

When the pressure switch is proven closed, the circuit board begins the prepurge time. If flame is present any time while in prepurge, the prepurge time is restarted. If flame is present long enough to cause lockout, the circuit board responds as defined in "Fault Modes, Undesired Flame".

The ignition system circuit board runs the venter motor for a 20 second pre-purge time, then proceeds to the ignition trial period.

3) Ignition Trial Period - The ignition system circuit board energizes the spark and main gas valve. The venter remains energized. If flame is sensed at the 1/3 burner section during the first 16 seconds, the spark is de-energized. If flame has not been sensed during the first 16 seconds, the control de-energizes the spark output and keeps the gas valve energized for an additional one second flame proving period. If flame is not present after the flame proving period, the control de-energizes the gas valve and proceeds with ignition re-tries as specified in "Abnormal Heat Cycle, Ignition Retry". If flame is present, the circuit board proceeds to steady heat..

4) Steady Heat - Circuit board inputs are continuously monitored to ensure limit and pressure switches are closed, flame is established (sensor on both burner sections), and the system controller call for heat remains. When the call for heat is removed, the ignition system circuit board de-energizes the gas valve and begins postpurge timing.

5) Post Purge - The venter motor output remains on for a 45 second postpurge period after the system controller is satisfied.

Abnormal Heat Cycle Functions

Interrupted Call for Heat - If the system controller call for heat is removed before the flame is recognized, the circuit board will run the venter motor for the post purge period and de-energize all outputs.

If the call for heat is removed after successful ignition, the circuit board will de-energize the gas valve and run the venter motor through post purge.

Ignition Retry - If flame is not established on the 1st trial for ignition period, the ignition system circuit board de-energizes the gas valve, and the venter motor remains energized for an inter-purge period of 10 seconds. The spark and gas valve are then re-energized, and the circuit board initiates a 2nd trial for ignition.

If flame is not established on the 2nd trial for ignition, the circuit board de-energizes the gas valve and venter motor remains energized. The spark and gas valve are re-energized and the circuit board initiates a 3rd trial for ignition.

If flame is not established on the 3rd trial for ignition period, the circuit board de-energizes the gas valve, and the venter motor remains energized for an inter-purge period of 10 seconds. The circuit board then re-energizes the gas valve and spark and initiates a 4th trial for ignition.

If flame is not established on the 4th trial for ignition (initial try plus 3 re-tries), the circuit board de-energizes the gas valve and goes into lockout. The circuit board goes to one flash on the green LED to indicate ignition failure lockout.

Limit Switch Operation - The limit switch is ignored unless a call for heat is present. If the limit switch is open and a call for heat is present, the control de-energizes the gas valve and runs the venter motor.

When the switch re-closes or the call for heat is lost, the control runs the venter motor through post purge. The control will return to normal operation.

Pressure Switch - If the pressure switch opens before the trial for ignition period, the venter motor will run through the pressure switch recognition delay (2 seconds), the gas valve will be de-energized, and the venter motor will run through the postpurge time. The ignition system circuit board will re-start the heat cycle at the pressure switch proving state if the call for heat still exists.

Pressure switch opening for less than 2 seconds during the trial for ignition period shall not interrupt the heat cycle. (Gas valve will de-energize while the pressure switch is open.)

If the pressure switch opens after a successful ignition, the circuit board will de-energize the gas valve. If flame is lost before the end of the 2 second pres-

9. Optional Equipment including Heat Sections (cont'd)

Ignition System Fault Modes

9.3 Gas Heat Module - Models RDCA and RDDA (cont'd)

9.3.3 Ignition System (cont'd)

Abnormal Heat Cycle Functions (cont'd)

sure switch recognition delay, the circuit board will respond to the loss of flame. If the pressure switch remains open for 2 seconds and the flame remains, the circuit board de-energizes the gas valve and the venter motor runs through postpurge

Undesired Flame - If flame is sensed longer than 20 seconds while the gas valve is de-energized, the circuit board shall energize the venter motor. When flame is no longer sensed, the venter motor will run through postpurge. The circuit board will do a soft lockout, but will still respond to open limit and flame. The FLAME (yellow) LED shall flash rapidly when lockout is due to undesired flame.

Gas Valve Relay Fault - If the circuit board senses the gas valve as energized for more than one second when the circuit board is not attempting to energize the gas valve, or the gas valve is sensed as not energized when it is supposed to be energized, then the circuit board will lockout with the green LED off. The control assumes either the contacts of the relay driving the gas valve have welded shut, or the sensing circuit has failed. The venter motor is forced off to open the pressure switch to stop gas flow unless flame is present.

If the gas valve was sensed as closed when it should be open, and has not de-energized after the venter motor was shutoff for 15 seconds, then the venter motor is re-energized to vent the unburned gas.

Soft Lockout - The circuit board shall not initiate a call for heat while in lockout. The circuit board will still respond to an open limit and undesired flame. Lockout shall automatically reset after one hour. Lockout may be manually reset by removing power from the circuit board for more than one second or removing the call for heat for more than one and less than 20 seconds.

Hard Lockout - If the circuit board detects a fault on the board, the status LED will be de-energized, and the circuit board will lockout as long as the fault remains. A hard lockout will automatically reset if the hardware fault clears.

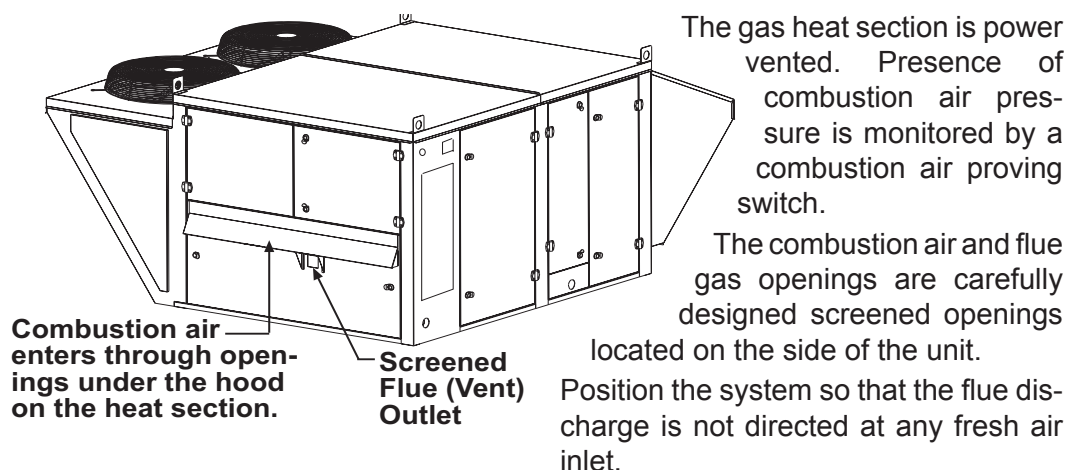
Power Interruption - During a momentary power interruption or at voltage levels below the minimum operating voltage (line voltage or low voltage) the ignition system will self-recover without lockout when voltage returns to the operating range.

Power interruptions of less than 80mS shall not cause the circuit board to change operating states. Power interruptions greater than 80mS may cause the circuit board to interrupt the current operating cycle and re-start.

9.3.4 Venting and Combustion Air

Location of the Vent and Combustion Air Inlets

FIGURE 39 - Location of Flue Exhaust (vent) and Combustion Air Openings



Vent Extension Field Kit

The gas-fired heat section vents combustion gas horizontally. A field-installed vent extension kit (**P/N 221120**) provides for attaching a vertical vent pipe that will allow the vent terminal to extend above the unit. For information, contact your distributor or see Form CP-MAPS-Vnt Ext on www.RezSpec.com.

Combustion Air Proving Switch



DANGER: Safe operation requires proper venting flow. Never bypass the combustion air proving switch or attempt to operate the unit without the venter running and proper flow in the vent system. Hazardous condition could result. See Hazard Levels, page 2.

The combustion air proving switch is a pressure switch that monitors air pressure to ensure that proper combustion airflow is available. The switch on a Size 100 furnace is designed to close when a negative pressure is sensed in the venter housing. The switch on Sizes 150-700 senses the differential pressure between the negative pressure in the venter housing and the pressure in the cabinet. For location of the combustion air proving switch, see **FIGURE 20**, page 33, Item 17.

On startup when the furnace is cold, the sensing pressure is at the most negative level, and as the furnace and the flue system warmup, the sensing pressure becomes less negative. After the system has reached equilibrium (approximately 20 minutes), the sensing pressure levels off. If a restriction causes the sensing pressure to become less than the switch setpoint, the pressure switch will function to shut off the burner. The burner will remain off until the system has cooled and/or the flue system resistance is reduced. The table below gives approximate water column negative pressure readings and switch setpoints for sea level operating conditions.

Sensing Type	Size	Startup (Cold)	Equilibrium (Hot)	Setpoint ON	Setpoint OFF	Label Color	Switch P/N
Single Negative Pressure	100	1.2±.2" w.c.	0.65±.1" w.c.	0.68±.1" w.c.	0.5" w.c.	Orange	196388
	150	1.4±.2" w.c.	0.6±.1" w.c.	0.68±.1" w.c.	0.5" w.c.	Orange	196388
Differential Pressure	200	1.4±.2" w.c.	0.6±.1" w.c.	0.73±.1" w.c.	0.5" w.c.	White	196362
	250	1.5±.2" w.c.	0.7±.1" w.c.	0.73±.1" w.c.	0.55" w.c.	White	196362
	300	1.5±.2" w.c.	0.7±.1" w.c.	0.73±.1" w.c.	0.55" w.c.	White	196362
	350	3.5±.2" w.c.	1.8±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	400	3.3±.2" w.c.	2.0±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	450	2.7±.2" w.c.	1.8±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	500	2.8±.2" w.c.	1.8±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	550	3.0±.2" w.c.	2.1±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	600	3.0±.2" w.c.	2.1±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	650	3.0±.2" w.c.	1.9±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028
	700	3.0±.2" w.c.	2.0±.2" w.c.	0.83±.1" w.c.	0.65" w.c.	Yellow	197028

9.3.5 High Temperature Limit Control

All furnaces are equipped with a temperature activated auto reset limit control. The control is factory set and is non-adjustable. If the setpoint is reached, the limit control will interrupt the electric supply to the gas valves. This safety device provides protection in the case of a lack of airflow due to dirty filters or a restriction at the inlet or outlet.

The limit control switch is mounted on the side of the heat exchanger with a capillary sensor that extends across the discharge opening. The switch is accessible in the blower compartment.

CAUTION: The auto reset limit control will continue to shut down the heater until the cause is corrected. Never bypass the limit control; hazardous conditions could result. See Hazard Intensity Levels, page 2.

9. Optional Equipment including Heat Sections (cont'd)

9.4 Optional Gas-Fired Duct Furnace Curb Section, Model JHUP-0250 (natural gas only)

The Model JHUP-0250 duct furnace curb section includes a 250 BTUH gas-fired duct furnace. The curb section fits on a Cabinet B roof curb and mates to a Cabinet B Model RDCA or RDDA with a Size 250 heat section, placing a second heat exchanger in the discharge airstream. The Model JHUP-0250 duct furnace curb section adds 23-1/8" (587mm) to the height as shown in **FIGURE 40B**.

The duct furnace requires a separate gas line; gas connection is 1/2". See gas supply entrance location in **FIGURE 40B**. Refer to Paragraph 9.3.2.1 for gas supply piping and pressure requirements. Since the Size 250 duct furnace burner is the same as the burner on the unit and operates only at high fire, manifold pressure information is the same as for a Size 250 gas heat section at full fire.

The ignition system is the same as in Paragraph 9.3.3 and the vent/combustion air is the same as in Paragraph 9.3.4. The high temperature limit control shown in **FIGURE 40A** functions the same as in Paragraph 9.3.5.

Field wiring is required. Check the wiring diagram for field-wiring requirements. Follow the wiring diagram to connect the field-supplied wiring.

FIGURE 40A - Duct Furnace Curb Heater Gas Train and Limit Control Location

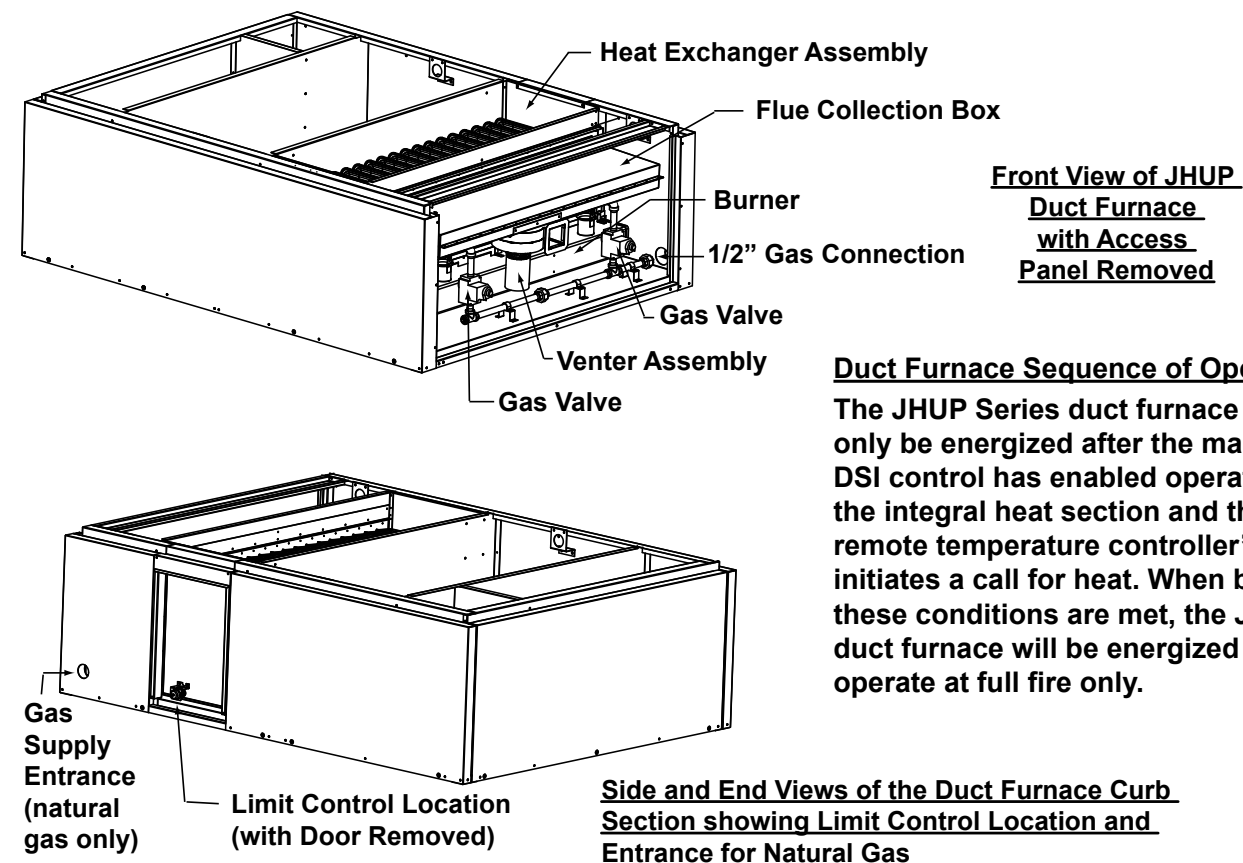
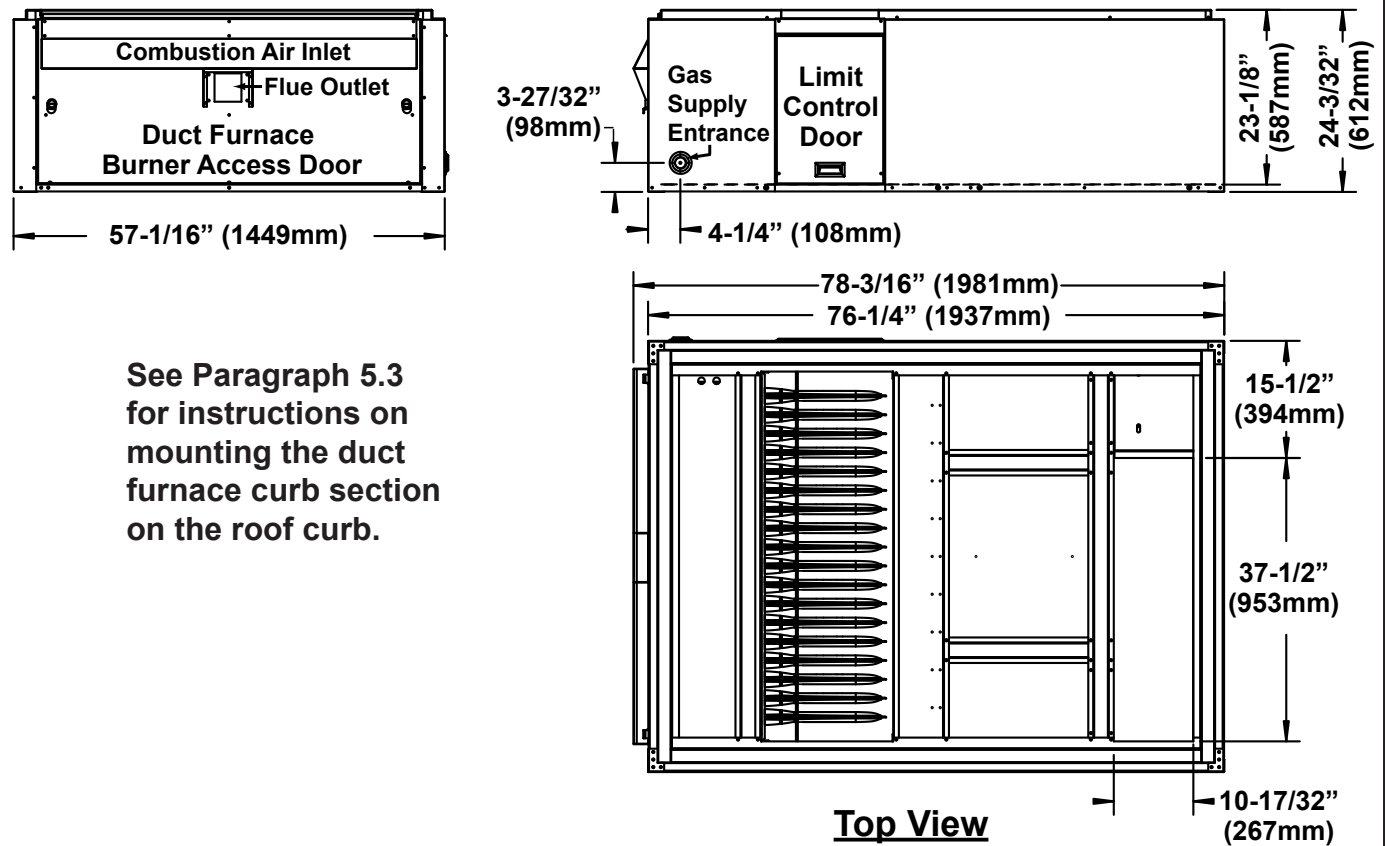


FIGURE 40B - Dimensions of a Model JHUP-0250 Duct Furnace Curb Section



9.5 Electric Heat Section - Model RECA and Model REDA

A system with an electric heat section is equipped to provide from 5 to 88 kw of electric heat. Depending on the size, electric heat sections provide one or three stages of heating operation. Call for heat and staging occur in response to system controls (See Paragraph 8).

Electric Heat Capacity and Sequence of Operation

Electric Heat Capacity Table						
Size	240/480/600V		208V		230/460/575V	
	KW	MBH	KW	MBH	KW	MBH
05S	5	17.1	3.8	12.8	4.6	15.7
10S	10	34.1	7.5	25.6	9.2	31.4
15S	15	51.2	11.3	38.4	13.8	47.1
20S	20	68.3	15.0	51.2	18.4	62.8
24S	24	82.0	18.0	61.5	22.1	75.4
15	15	51.2	11.3	38.4	13.8	47.1
20	20	68.3	15.0	51.2	18.4	62.8
25	25	85.4	18.8	64.0	23.0	78.5
30	30	102.5	22.5	76.8	27.6	94.3
35	35	119.5	26.3	89.6	32.2	110.0
39	39	133.2	29.3	99.9	35.9	122.5
60	60	204.9	45.0	153.7	55.2	188.5
75	75	256.1	56.3	192.1	69.0	235.6
88	88	300.5	66.0	225.4	81.0	276.5

NOTE: 575V and 600V apply to Model RECA only.

Size (kW)	Size	Cabinet	Electric Heaters Sequence of Operation		
			Stage 1	Stage 2	Stage 3
5	05S	A	5	-	-
10	10S	A	10	-	-
15	15S	A	15	-	-
20	20S	A	20	-	-
24	24S	A	24	-	-
15	15	A or B	5	10	5 + 10
20	20	A or B	5	15	5 + 15
25	25	A or B	10	15	10 + 15
30	30	A or B	10	20	10 + 20
35	35	A or B	15	20	15 + 20
39	39	A, B, or C	15	24	15 + 24
50	50	B or C	15	15+15	15+15+10+10
60	60	B or C	10+10	20+20	10+10+20+20
75	75	B or C	20	20+15+20	20+15+20+20
88	88	B or C	24	20+24+20	20+24+20+24

10. Commissioning and Startup

10.1 General

NOTE: Redo cooling startup procedures when the cooling season begins.

Assumptions: All connections are made; actual startup is imminent. Site is clean; all excess supplies, scraps, and debris have been removed. Clean filters are in place. Doors are open for checks.

DANGER: To prevent injury or death due to electrocution or contact with moving parts, lock disconnect switch open when doing checks prior to startup. See Hazard Levels, page 2.

10.2 Checklist Prior to Startup

NOTE: If unit is equipped with a phase loss/phase reversal control and does not start, check the phase rotation of the electrical supply. See Paragraph 7 and **FIGURE 22**, page 34.

10.2.1 All Systems Checklist Prior to Startup:

- ☐ Check clearances. All clearances must be as illustrated in Paragraph 4.3.
- ☐ Verify the electrical supply matches voltage rating of the unit. (Refer to the rating plate.) Check for voltage imbalance; see Paragraph 7.2.
- ☐ Check the wiring for loose connections or damaged wire. Tighten connections. Replace damaged wiring. (See Paragraph 7 for replacement wiring requirements.)
- ☐ Check all field wiring against the wiring diagram. Be sure all field-installed controls are in place. Be sure that wire gauges are as required for the electrical load. All field wiring must be compliance with the National Electric Code and local regulations.
- ☐ Be certain that the electrical entrances are sealed against the weather.
- ☐ Check that fuses or circuit breakers are in place and sized correctly.
- ☐ Be certain optional manual reset controls (firestat and high gas pressure switch) are reset.
- ☐ If any changes are required to factory settings, be sure they have been made. (Refer to control instructions shipped with the unit.)
- ☐ **IMPORTANT - Before applying power, check blower pulley, blower wheel, and motor pulley to be sure they are secure to the shafts.**
Setscrew torque for pulley (sheave) is 110 in-lb minimum to 130 in-lb maximum.
Setscrew torque for bearing hub with 1-3/8 to 1-3/4" shaft is 165 in-lbs.
Socket setscrew size is 5/16".
Check blower and pulleys for free movement. Check belt tension and alignment. See Paragraph 6.4.
- ☐ Check free rotation of condenser fans.
- ☐ Remove compressor tiedowns and all other shipping supports and restraints.
- ☐ Verify that condensate drain is properly trapped and open. See Paragraph 6.2.
- ☐ If compressors have crankcase heaters, they must be allowed to warm up for at least 24 hours prior to startup. The primary cooling compressor on Models 059, 077, 109, and 139 is equipped with a bellyband type crankcase heaters. If actual startup of these models is scheduled in 24 hours, unlock the disconnect switch and turn on the electric.

10.2.2 Gas Heat Checklist Prior to Startup:

- ☐ Check gas piping for leaks and proper gas pressure. See Paragraph 9.2.2.1. Bleed gas lines of trapped air.
 - a) Turn manual shutoff valve to off position.
 - b) Turn gas supply on.

- c) Observe gas meter for movement, or
- d) Attach pressure gauge readable to 0.1" w.c. and after turning gas on for ten seconds, turn gas supply off. No change in pressure should occur over a three-minute period.
- e) If either c) or d) above indicate a leak, locate leak by brushing a soapy solution on all fittings. Bubbles will appear at the leak. Repair and repeat tests.

☐ Check to make sure that the combustion air inlet and flue discharge openings are free of obstructions.

When all checks are completed satisfactorily, close and secure all doors.

10.3 Checklist - Startup

Startup Cooling Sequence when ambient temperature is ABOVE 68°F/20°C

10.3.1 Startup Checklist for ALL Systems

Assumptions: All prior to startup checks have been completed satisfactorily. Compressors with crankcase heaters have been allowed to warm up for at least 24 hours.

Reference: See one-page Startup Form in Paragraph 10.5, page 57. Form is also available on line at www.RezSpec.com.

- ☐ If there is a furnace section, turn on the gas.
- ☐ Adjust the system controller so that a call for cooling exists. Observe for complete sequencing.

Sequence of Cooling Operation when ambient temperature is ABOVE 68°F/20°C (all Models):

NOTE: Outdoor ambient lockouts may prevent mechanical cooling or reheat. Temporarily override lockouts by lowering the oC1 programmable control setting to 58°F. To enable unit reheat functions, temporarily lower the DP1 setting to 50°F. When testing is complete, reset oC1 or DP1 as required by the application. (For instructions on changing settings on the programmable control, refer to the instruction sheet for the control system shipped either in the Literature Bag or with the Wiring Diagram.)

1. Set control switch at Auto position (closed).

- A) Energizing the blower motor and, if equipped, the damper motor.
- B) Air proving switch closes, allowing for heating, cooling, or reheat mode.

1) On temperature rise above outside air setting for cooling

a) Energizing the re-heat pump circuit after minimum time delay (RDA, RDDA, REDA).

b) Cooling rate is controlled by discharge air sensor.

c) On call for cooling, the corresponding compressors and condenser motors are energized.

d) On low humidity or abnormal temperature, the re-heat heat pump is de-energized (RDA, RDDA, REDA).

e) On abnormal temperature, the corresponding cooling circuit is de-energized.

2) On temperature drop below changeover setting, the cooling circuit is de-energized

2. For shutdown, set control switch at OFF position (open).

10. Commissioning and Startup (cont'd)

10.3 Checklist Startup (cont'd)

IMPORTANT:
All refrigeration checks must be made by a qualified refrigeration technician.

10.3.1 Startup Checklist for ALL Systems (cont'd)

SPECIAL Startup Cooling Sequence when ambient temperature is BELOW 68°F/20°C

Sequence of Cooling Operation when ambient temperature is BELOW 68°F/20°C (all Models):

NOTE: Outdoor ambient lockouts may prevent mechanical cooling or reheat. Temporarily override lockouts by lowering the oC1 programmable control setting to 58°F. To enable unit reheat functions, temporarily lower the DP1 setting to 50°F. If ambient conditions (below 58°F) still prevent mechanical cooling operation, the outside air sensor can be warmed by hand or replaced with a 14 watt, 1000 to 1200 Ohm resistor. When testing is complete, reset oC1 or DP1 as required by the application. (For instructions on changing settings on the programmable control, refer to the instruction sheet for the control system shipped either in the Literature Bag or with the Wiring Diagram.)

1. Set control switch at Auto position (closed).
 - A) Energizing the blower motor, and if equipped, the damper motor.
 - B) Air proving switch closes, allowing for heating, cooling, or reheat mode.
 - 1) On temperature rise above outside air changeover setting,
 - a) Energizing the re-heat heat pump circuit after minimum time delay (RDA, RDDA, REDA).
 - b) Cooling rate controlled by discharge air sensor.
 - c) On call for cooling, the corresponding compressors and condenser motors are energized.
 - d) On low humidity or abnormal temperature, the re-heat heat pump is de-energized (RDA, RDDA, REDA only).
 - e) On abnormal temperature, the corresponding cooling circuit is de-energized.
 - 2) On temperature drop below changeover setting, the cooling circuit is de-energized.
2. For shutdown, set control switch at OFF position (open).

- ☐ Verify that the blower and all condenser fans are rotating in the proper direction. If blower rotation is incorrect, change phase at the field line voltage connection. Compressor rotation is phase sensitive.

- ☐ Check the superheat and subcooling.

Superheat is the verification that the evaporator coil is properly using the refrigerant supplied. Too much superheat indicates that the coil is undercharged. Too little superheat indicates that the coil is overcharged and potentially flooding liquid refrigerant to the compressor.

Subcooling is the measurement of liquid refrigerant stored in the condenser coil. Too much subcooling indicates a system overcharge. Too little indicates a system undercharge and may not provide the thermal expansion valve with a full column of liquid refrigerant for proper operation.

Two important requirements before checking superheat and subcooling:

1) This unit has fully intertwined refrigerant circuits and each circuit **MUST be isolated** before measuring its temperature. Another active circuit will influence the reading and make it impossible to determine accurate superheat and subcooling.

2) If the circuit is equipped with an optional hot gas bypass valve, the valve must be disabled before measuring superheat and subcooling. Disable the hot gas bypass valve by removing the cover and adjusting the spring

tension counterclockwise until the spring tension is relieved. **Count and record the number of turns** required so that you can return the bypass valve to its original setting.

Instructions for Checking and Adjusting the Superheat of an Isolated Circuit:

Step 1) Measure and record the temperature (insulate probe from surrounding air temperature) and the pressure of the suction line at the compressor.

Step 2) From the Temperature/Pressure Conversion Chart in the **APPENDIX** on page 58, convert the pressure measured in **Step 1** to temperature.

Step 3) Subtract measured temperature in **Step 1** from the temperature taken from the Conversion Chart in **Step 2**. The answer is the degrees of superheat. **Recommended superheat range is 8-12°F (4.5-6.7°C).**

Step 4) Superheat is adjusted at the thermal expansion valve. To **reduce** superheat, turn the adjusting stem **counterclockwise**. To **increase** the superheat, turn the adjusting stem **clockwise**. Adjust and check until superheat is within the recommended range.

Step 5) Repeat **Steps 1-4** for each refrigeration circuit.

Instructions for Checking and Adjusting the Subcooling of an Isolated Circuit:

Step 1) Measure and record the temperature (insulate probe from surrounding air temperature) and the pressure of the liquid line at the condenser coil outlet.

Step 2) From the Temperature/Pressure Conversion Chart in the **APPENDIX** on page 58, convert the pressure measured in **Step 1** to temperature.

Step 3) Subtract measured temperature in **Step 1** from the temperature taken from the Conversion Chart in **Step 2**. The answer is the degrees of subcooling. **Recommended subcooling range is 18-22°F (10.1-12.3°C).**

Step 4) Subcooling is adjusted by the amount of refrigerant charge. To reduce subcooling, remove refrigerant. To increase subcooling, add refrigerant. Adjust refrigerant and check until subcooling is within the recommended range.

Step 5) Repeat **Steps 1-4** for each refrigeration circuit.

- ☐ Check the compressor suction and discharge pressures and compare them to the values in **FIGURE 4 or 5** graphs in the Operation/Maintenance/Service Manual, Form O-MAPS II, found in the owner's envelope.
- ☐ **RDA/RDDA/REDA only** - Check the re-heat heat pump circuit refrigerant subcooling and superheat. (Refer to the instructions above for checking superheat and subcooling.) Acceptable subcooling readings range from 18° to 25°F (10.1 to 14°C). Superheat should be in the 8° to 12°F (4.5 to 6.7°C) range.
- ☐ If the system is equipped with an optional hot gas bypass, check the valve. Follow the instructions in Paragraph 7.7, page 28.
- ☐ If the system is equipped with an optional dirty filter switch, set the switch. Follow the instructions in Paragraph 8.2, page 31.

10.3.2 Startup Checklist for Systems with Gas Heat Module

- ☐ Establish a call for heat. Observe for changeover and complete sequencing.

Sequence of Gas Heat Operation:

NOTE: Outdoor ambient lockouts will prevent mechanical gas heating. Temporarily override lockouts by raising the oC1 programmable control setting to 95°F and the heating setpoint (HSP) to 95°F. When testing is complete, reset oC1 and HSP as required by the application. (For instructions on changing

10. Commissioning and Startup (cont'd)

10.3 Checklist Startup (cont'd)

10.3.2 Startup Checklist for Systems with Gas Heat Module (cont'd)

settings on the programmable control, refer to the instruction sheet in the Literature Bag or with the Wiring Diagram.)

1. Set the discharge temperature heating control at its lowest setting.

a) Firing rate is controlled by the discharge sensor.

b) Blower motor operation is continuous.

2. On a call for gas heat

a) The venter motor is energized after 18-second (approximate) time delay.

b) Combustion air pressure switch switches from N.C. to N.O. contacts, firing unit. The sensing probe proves the presence of the flame at the 1st burner section.

3. If the flame is extinguished during burner operation, the ignition system circuit board closes the main valve and must be reset by interrupting the power to the control circuit (See Lighting Instructions on the furnace).

☐ Turn the unit off and on, pausing two minutes between each cycle.

Observe for smooth ignition. (**NOTE:** Spark ignition occurs at 1/3 burner section only.)

Manipulate discharge temperature setpoint up and down to see if furnace is sequencing or modulating properly. **NOTE:** Be sure control is returned to proper settings.

☐ Close all panels tightly. With the heater on, check limit control by completely blocking off distribution air. The limit control should open within a few minutes, shutting off the gas supply to the burner.

DANGER: The gas burner in the optional gas-fired heat section is designed to provide safe, complete combustion. However, if the installation does not permit the burner to receive the proper supply of combustion air, complete combustion may not occur. The result is incomplete combustion which produces carbon monoxide, a poisonous gas that can cause death. **NEVER RESTRICT OR OTHERWISE ALTER THE SUPPLY OF COMBUSTION AIR TO ANY HEATER.**

Safe operation of indirect-fired gas burning equipment requires a properly operating vent system which vents all flue products to the outside atmosphere. FAILURE TO PROVIDE PROPER VENTING WILL RESULT IN A HEALTH HAZARD WHICH COULD CAUSE SERIOUS PERSONAL INJURY OR DEATH.

10.4 Checklist After Startup:

Assumptions: All checks have been successfully performed and system is operating properly. All panels and doors are secure. The area has been cleared of any excess supplies, scraps, and debris.

☐ Place "Literature Bag" containing Limited Warranty information, this booklet, the operation/maintenance/service manual (Form O-MAPS), control instructions, and any information on optional controls in an accessible location. Comply with the instructions on the bag.

☐ **IMPORTANT - After at least 8 hours but no longer than a week of operation, recheck the blower wheel including all setscrews, the blower pulley, the motor pulley, and belt tension. Make any required adjustments.**

Setscrew torque for pulley (sheave) is 110 in-lb minimum to 130 in-lb maximum.

Setscrew torque for bearing hub with 1-3/8 to 1-3/4" shaft is 165 in-lbs.

Socket set screw size is 5/16".

APPENDIX

Cross-Reference by Model/Size and Cabinet Size A, B, or C

Model RCA and Model RDA

Model RCA	Cabinet Size
025	A
037	
059	
060	
077	
078	
090	
108	
109	
120	
139	
164	
166	B
176	A
184	B
198	B
226	
292	C
374	

Model RDA	Cabinet Size
102	A
114	
126	
144	
188	
220	B
234	
230	
280	C
346	
428	
446	

Model RDCA and Model RDDA by Gas Heat Section Size

Model RDCA	Gas Heat Section Size												
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
025	A	A	A	--	--	--	--	--	--	--	--	--	--
037	A	A	A	--	--	--	--	--	--	--	--	--	--
059	A	A	A	--	--	--	--	--	--	--	--	--	--
060	A	A	A	--	--	--	--	--	--	--	--	--	--
077	A	A	A	--	--	--	--	--	--	--	--	--	--
078	A	A	A	B	B	--	--	--	--	--	--	--	--
090	A	A	A	B	B	--	--	--	--	--	--	--	--
108	A	A	A	B	B	--	--	--	--	--	--	--	--
109	--	A	A	--	--	--	--	--	--	--	--	--	--
120	A	A	A	B	B	--	--	--	--	--	--	--	--
139	--	--	--	B	B	--	--	--	--	--	--	--	--
164	--	A	A	--	--	--	--	--	--	--	--	--	--
166	--	--	--	B	B	--	--	--	--	--	--	--	--
176	--	--	--	--	--	C	C	C	C	C	C	C	C
184	--	--	--	B	B	--	--	--	--	--	--	--	--
198	--	--	--	B	B	--	--	--	--	--	--	--	--
226	--	--	--	--	--	C	C	C	C	C	C	C	C
292	--	--	--	--	--	C	C	C	C	C	C	C	C
374	--	--	--	--	--	C	C	C	C	C	C	C	C

Model RDDA	Gas Heat Section Size												
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
102	A	A	A	B	B	--	--	--	--	--	--	--	--
114	A	A	A	B	B	--	--	--	--	--	--	--	--
126	A	A	A	B	B	--	--	--	--	--	--	--	--
144	--	A	A	B	B	--	--	--	--	--	--	--	--
188	--	--	--	B	B	--	--	--	--	--	--	--	--
220	--	--	--	B	B	--	--	--	--	--	--	--	--
230	--	--	--	--	--	C	C	C	C	C	C	C	C
234	--	--	--	B	B	--	--	--	--	--	--	--	--
280	--	--	--	--	--	C	C	C	C	C	C	C	C
346	--	--	--	--	--	C	C	C	C	C	C	C	C
428	--	--	--	--	--	C	C	C	C	C	C	C	C
446	--	--	--	--	--	C	C	C	C	C	C	C	C

Model RECA and Model REDA by Electric Heat Module

Model RECA	Electric Heat Module														
	-05S	-10S	-15S	-20S	-24S	-15	-20	-25	-30	-35	-39	-50	-60	-75	-88
025	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
037	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
059	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
060	A	A	A	A	A	A	A	A	A	A	A	--	--	--	--
077	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
078	--	A	A	A	A	A	B	A	A	B	A	B	B	B	--
090	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
108	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
109	--	--	--	--	--	--	A	A	A	A	A	--	--	--	--
120	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
139	--	--	--	--	--	--	B	B	B	B	B	B	B	B	B
164	--	--	A	A	A	A	A	A	A	A	A	--	--	--	--
166	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
176	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
184	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
198	--	--	--	--	--	--	B	B	B	B	B	B	B	B	B
226	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
292	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
374	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C

Model REDA	Electric Heat Module														
	-10S	-15S	-20S	-24S	-15	-20	-25	-30	-35	-39	-50	-60	-75	-88	
102	A	A	A	A	A	B	A	A	B	A	B	B	B	--	
114	A	A	A	A	A	B	A	A	B	A	B	B	B	B	
126	--	A	A	A	A	B	A	A	B	A	B	B	B	B	
144	--	A	A	A	A	B	A	A	B	A	B	B	B	B	
188	--	--	--	--	B	B	B	B	B	B	B	B	B	B	
220	--	--	--	--	--	B	B	B	B	B	B	B	B	B	
230	--	--	--	--	--	--	--	--	--	C	C	C	C	C	
234	--	--	--	--	--	B	B	B	B	B	B	B	B	B	
280	--	--	--	--	--	--	--	--	--	C	C	C	C	C	
346	--	--	--	--	--	--	--	--	--	C	C	C	C	C	
428	--	--	--	--	--	--	--	--	--	C	C	C	C	C	
446	--	--	--	--	--	--	--	--	--	C	C	C	C	C	

Technical Data - Applies to Makeup Air Cooling System in Models RCA, RDCA, and RECA

Cabinet Size	Model Size	Capacity Stages	Compressors		Condensers					Evaporator Coil			Condensate Drain Size
			Nominal Tons	Qty	Coils		Fans			Face Area (Ckt A/B)	Rows (A/B)	FPI (A/B)	
					Face Area	Rows	Qty	CFM	HP				
A	060	40/60/100	2.0/3.0	2	5.75	3	1	3490	3/4	5.2	3	14	1" MPT
A&B*	078	30/70/100	2.0/4.5	2	9.6	3	1	3992	3/4	7.3	3	13	1" MPT
A&B*	090	40/60/100	3.0/4.5	2	9.6	3	1	4496	3/4	7.3	3	14	1" MPT
A&B*	108	33/66/100	3.0/6.0	2	11.5	3	1	5000	3/4	7.3	4	13	1" MPT
A&B*	120	42/58/100	4.5/6.0	2	13.4	3	2	7479	3/4	7.3	4	13	1" MPT
A	164	33/66/100	4.5/3.0/6.0	3	17.25	3	2	8487	3/4	7.3 / 7.3	1 / 4	11 / 13	1" MPT
B	166	33/66/100	4.5/3.0/6.0	3	17.25	3	2	8487	3/4	7.3	6	13	1" MPT
C***	176	31/69/100	4.5/10.0	2	23	3	2	10000	1	18.3	3	13	1" MPT
B	184	30/70/100	4.5/4.5/6.0	3	19.1	3	2	8991	3/4	10.9	4	13	1" MPT
B	198	36/64/100	4.5/6.0/6.0	3	21.0	3	2	9475	3/4	10.9	6	13	1" MPT
C***	226	33/66/100	6.2t/6.2t/6.2	3	23	3	2	10000	1	18.3	4	13	1" MPT
C***	292	25/50/100	6.2t/6.2t/12	3	26.7	3	3	13500	1	18.3	5	13	1" MPT
C***	374	33/66/100	10/10/10	3	38.7	3	3	15000	1	18.3	6	13	1" MPT

Sizes (with odd Model number) below are specifically designed for a DRY CLIMATE.

Cabinet Size	Model Size	Capacity Stages	Compressors		Condensers					Evaporator Coil			Condensate Drain Size
			Nominal Tons	Qty	Coils		Fans			Face Area (Ckt A/B)	Rows (A/B)	FPI (A/B)	
					Face Area	Rows	Qty	CFM	HP				
A	025	100	2.0	1	5.75	3	1	3490	3/4	5.2	2	7	1" MPT
A	037	100	3.0	1	5.75	3	1	3490	3/4	5.2	2	10	1" MPT
A	059**	40/60/100	2.0/3.0	2	9.6	3	1	4496	3/4	5.2 / 5.2	2 / 2	6 / 6	1" MPT
A	077**	30/70/100	2.0/4.5	2	11.5	3	1	5000	3/4	5.2 / 5.2	2 / 2	7 / 9	1" MPT
A	109**	33/66/100	3.0/6.0	2	17.25	3	2	8487	3/4	5.2 / 5.2	2 / 2	9 / 10	1" MPT
B	139**	37/63/100	4.5/3.0/4.5	3	21.0	3	2	9475	3/4	7.3 / 7.3	2 / 2	12 / 11	1" MPT

* These sizes in cooling only or with an electric heat section are always Cabinet A. With gas heat, cabinet size depends on heating capacity. ** Models 059, 077, 109, and 139 are rated for up to 125°F 100% outside air.

*** Due to the larger size, do not attempt to move a "C" cabinet system with a fork lift; use the lifting lugs.

Technical Data - Applies to Makeup Air Cooling System and Re-Heat Pump Reheat Cycle in Models RDA, RDDA, and REDA

Cabinet Size	Model Size	Cooling Capacity Stages	Cooling Compressors		Cooling Condensers			Drain Size	Re-Heat Pump					
			Nominal Tons	Qty	Fans		Compressor(s)		Coil		Condenser			
					Qty	CFM	HP		Nominal Tons	Qty	Face Area	Rows	Face Area	Rows
A&B*	102	30/70/100	2.0/4.5	2	1	4300	3/4	1" MPT	2	1	7.3	1	7.5	1
A&B*	114	40/60/100	3.0/4.5	2	1	4300	3/4	1" MPT	2	1	7.3	1	7.5	1
A&B*	126	33/66/100	3.0/6.0	2	1	5000	3/4	1" MPT	2	1	7.3	1	7.5	1
A&B*	144	42/58/100	4.5/6.0	2	2	6400	3/4	1" MPT	2	1	7.3	1	7.5	1
B	188	33/66/100	4.5/3.0/6.0	3	2	8200	3/4	1" MPT	2	1	7.3	1	7.5	1
B	220	30/70/100	4.5/4.5/6.0	3	2	9300	3/4	1" MPT	3	1	10.9	1	11.3	1
B	234	36/64/100	4.5/6.0/6/0	3	2	9700	3/4	1" MPT	3	1	10.9	1	11.3	1
C***	230	31/69/100	4.5/10.0	3	2	10000	1	1" MPT	4.5	1	18.3	1	16.9	1
C***	280	33/66/100	6.2t/6.2t/6.2	3	2	10000	1	1" MPT	4.5	1	18.3	1	16.9	1
C***	346	25/50/100	6.2t/6.2t/12	3	3	13500	1	1" MPT	4.5	1	18.3	1	16.9	1
C***	428	33/66/100	10/10/10	3	3	15000	1	1" MPT	4.5	1	18.3	1	16.9	1
C***	446	33/66/100	10/10/10	3	3	15000	1	1" MPT	6.2	1	18.3	1	16.9	1

* These sizes in cooling and reheat only or with electric heat are always Cabinet A. With gas heat, cabinet size depends on heating capacity. *** Due to the larger size, do not move a "C" cabinet system with a fork lift; use the lifting lugs.

APPENDIX (cont'd)

The Option Codes for these electrical options are shown on the wiring diagram.

Wiring Diagram Option Identification

Option Code	Brief Description	Installed
AG55	3:1 Turndown Gas Control	Factory
AG57	6:1 Electronic Modulating Gas Control	Factory
AK5	208/3 Supply Voltage	Factory
AK6	230/3 Supply Voltage	Factory
AK7	460/3 Supply Voltage	Factory
AK8	575/3 Supply Voltage	Factory
AN2	Motor Contactor	Factory
AN10	Motor Starter	Factory
AR2A or B	Requires Energy Recovery module (field-installed)	Factory
AR2E or F	OA/RA Dampers with Economizer Controls	Factory
AR8	Horizontal Damper with two-Position (open/closed)	Factory
AR17	OA/RA Dampers with two-position motor (outside/return)	Factory
AR18	OA/RA Modulating Dampers with Potentiometer	Factory
AR23	OA/RA Modulating Dampers with Pressure Null Switch	Factory & Field
AR25	Modulating OA/RA Dampers w/customer supplied digital control	Factory & Field
AR27	Modulating OA/RA Dampers w/Pressure Null Switch	Factory & Field
AU25	Supplemental Reheat	Factory
AUC1	Hot Gas Bypass - 1st stage	Factory
AUC2	Hot Gas Bypass - 1st and 2nd stage	Factory
BA6	Unit flush mounted disconnect on/off switch	Factory
BC2	Convenience Outlet (requires separate power supply)	Factory & Field
BD5	Firestat, 200°F (field installed)	Field
BE9	Monitors Temperature from Main Evaporator Coil	Factory
BF14	Phase Loss and Voltage Under/Over Protection	Factory
BF15	Phase Loss Protection	Factory
BG9	Exhaust Fan Relay	Factory & Field
BHB1	Time Clock Card	Factory
BHB2	N2 Communication Plug-in Module	Factory
BHB3	Lon Communication Plug-in Module	Factory
CL47	Wall-Mounted Dehumidistat	Field
CL53	Wall-Mounted Temperature Sensor/Override	Field
CL67	Wall-Mounted Temperature Sensor/Setpoint	Field
CP__	Disconnect Switch	Field
D12	Space Temperature Control with D/A Reset using FX05	Factory & Field
D12A	Space Temperature or Neutral Air Control using FX06	Factory & Field
DR2	Adjustable Motor Sheave, Linked Belt(s)	Factory
DR4	Adjustable Motor Sheave, Solid V-Belt(s)	Factory
DT5	Outside Air Relative Humidity Transmitter	Field
ER__	Energy Recovery Module	Factory & Field
PE 1, 2, 3	Power Exhaust	Factory & Field
RB2A	Remote Module with Display, Controls, and Alarm Light	Field
RC__	Remote Console	Field
SA1	Duct Photoelectric Smoke Detector	Factory & Field

**Pressure/
Temperature Chart
for Checking
Superheat and
Subcooling**

Saturation Temperature		Pressure (psig)	
(°F)	(°C)	R-22	R-407C
0	-17.8	24	19.5
5	-15.0	28.2	23.6
10	-12.2	32.7	28.0
15	-9.4	37.7	32.7
20	-6.7	43	37.9
25	-3.9	48.7	43.6
30	-1.1	54.9	49.6
35	1.7	61.4	56.2
40	4.4	68.5	63.2
45	7.2	76	70.7
50	10.0	84	78.8
55	12.8	92.5	87.5
60	15.6	101.6	96.8
65	18.3	111	106.7
70	21.1	121.4	117.2
75	23.9	132	128.4
80	26.7	144	140.4
85	29.4	156	153.1
90	32.2	168.4	166.5
95	35.0	182	180.8
100	37.8	196	195.8
105	40.6	211	211.8
110	43.3	226.4	228.7
115	46.1	243	246.5
120	48.9	260	265.3
125	51.7	278.4	285.2
130	54.4	296.8	306.1
135	57.2	317	328.2
140	60.0	337.3	351.4
145	62.8	359	375.9

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WARNING:
All systems contain chlorodifluoromethane (HCFC-22) or a hydro-fluorocarbon blend (HFC-407C). HCFC-22 is believed to harm the public health and environment by destroying ozone in the upper atmosphere. Do not release HCFC-22 to the atmosphere. The U.S. Clean Air Act requires the recovery of any residual refrigerant.
IMPORTANT: Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.
WARNING:
Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and maintenance

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1.0 GENERAL

This booklet includes operation, maintenance, and service information. Before beginning any procedure, carefully review the information, paying particular attention to the warnings. Handling of refrigerant should only be performed by a certified HVAC technician in compliance with all codes and requirements of authorities having jurisdiction.

The instructions in this manual apply to the following MAPS® II models:

NOTE: Information on gas furnace maintenance and service also applies to MAPS II optional duct furnace curb, Model JHUP.

Model	Description
RCA	Makeup Air Cooling Packaged System, 800-10000 CFM
RDCA	Makeup Air Cooling Packaged System, 800-10000 CFM, with Gas Heat Section (100-700 MBH)
RECA	Makeup Air Cooling Packaged System with Electric Heat Section (5-88 kw)
RDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM
RDDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM, with a Gas Heat Section (100-700 MBH)
REDA	Makeup Air Cooling and Dehumidification Reheat Cycle Packaged System, 800-10000 CFM, with an Electric Heat Section (5-88 kw)

Definitions of Hazard Intensity Levels used in this Manual

There are warning labels on the unit and throughout this manual. For your safety, comply with all warnings during installation, operation, and service of this system. See definitions of Hazard Intensity Levels of warnings below.

HAZARD INTENSITY LEVELS

- 1. DANGER:** Failure to comply will result in severe personal injury or death and/or property damage.
- 2. WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
- 3. CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

2.0 Maintenance Requirements

This unit will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a system that is operating under normal conditions should be inspected according to the Maintenance Schedule listed below. If in an area where an unusual amount of dust or soot or other impurities are present in the air, more frequent inspection is recommended.

Refer to the illustration in **FIGURE 1A or 1B** and follow the instructions in the referenced paragraph to maintain this equipment. Maintenance requirements and procedures apply to all Models unless noted.

IMPORTANT: Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.

Maintenance Schedule

Monthly

- ☐ Inspect filters; clean or replace as needed. See Paragraph 3.
- ☐ Inspect and clean the condensate drain. See the installation manual, Form I-MAPS II, Paragraph 6.2.

Semi-Annually

- ☐ Inspect the unit blower belt for tension, wear, and alignment. Check set-screws. If required, lubricate bearings. See Paragraph 4. (NOTE: These procedures also apply to an optional power exhaust blower assembly.)

Annually

NOTE: Redo the cooling startup procedures when the cooling season begins. Refer to Startup instructions in the installation manual, Form I-MAPS II, Paragraph 10.

Beginning of the cooling season or more frequently in year-round cooling climate:

- ☐ Inspect the wiring for any damaged wire. Replace damaged wiring.
- ☐ Inspect the condensate drain pan. Clean the coil cabinet and fill the trap. See the installation manual, Form I-MAPS II, Paragraph 6.2.
- ☐ Inspect/clean all coils. See Paragraph 5.
- ☐ Check compressor operation. See Paragraph 7.
- ☐ Check refrigerant pressure and temperatures (superheat and subcool).

These checks are done when the system is in operation. See Paragraph 6.

2.0 Maintenance Requirements (cont'd)

Maintenance Schedule (cont'd)

Models RDCA & RDDA with a gas-fired heat section (beginning of the heating season) - See Paragraph 9.:

NOTE: If equipped with an optional Model JHUP curb duct furnace, these same maintenance procedures apply to the duct furnace.

- ☐ Clean all dirt and grease from the combustion air openings and venter assembly.
- ☐ Check the burner and heat exchanger for scale, dust, or lint accumulation. Clean as needed.
- ☐ Check the gas valves to ensure that gas flow is being shutoff completely.

Models RECA & REDA with an electric heat section (beginning of the heating season) - See Paragraph 10.

- ☐ Check the wiring connections.
- ☐ Check the heat section and elements for dust or lint accumulation. Carefully clean as needed.

NOTE: If replacement parts are required, use only factory-authorized parts. For information, call 800-695-1901 or go to www.RezSpec.com

WARNING: Turn off the power before performing all maintenance procedures (except to check refrigerant pressure and temperature). Lock disconnect switch in OFF position. If the system has a heat section, when you turn off the power supply, turn off the gas. See Hazard Levels, page 3.

TUBING SECTION

- Low Refrigerant Pressure Cutouts
- High Refrigerant Pressure Cutouts
- Filter Driers
- Liquid Line Service Gauge Ports

COMPRESSOR SECTION

- Ckt A Compressor
- Ckt B Compressor
- Ckt C Compressor
- Discharge & Suction Service Ports
- Optional Hot Gas Bypass Valve(s)

HIGH VOLTAGE ELECTRICAL COMPARTMENT

- 1) Blower Motor Contactor or Starter
- 2) Control Transformers (as required)
- 3) Dehumidification Compressor Contactor (RDA, RDDA, REDA)
- 4) Condenser/Compressor Contactor
- 5) Optional Phase Loss/Phase Reversal Control (optional beginning 10/05; standard prior to 10/05)
- 6) Optional Damper Motor Transformer
- 7) Optional Over/Under Voltage Control
- 8A&B) Condenser Motor Capacitors
- 9) Optional Convenience Outlet (requires separate supply line)

AUXILIARY COMPARTMENT

- 10) Digital Controller (FX05 or FX06)

- 11) Air Proving Pressure Switch
- 12&13) Optional Control Relays
- 14) Optional Dirty Filter Switch
- 15) Optional Time Clock or BAS Card
- 16) Humidity Input Converter

Models RDCA & RDDA With Gas Heat Section (FIGURE 20 only):

- 17) Combustion Air Pressure Switch
- 18) Ignition Control
- 19) Optional Power Signal Converter
- 20) Venter Motor Capacitor (line voltage)

BLOWER SECTION

- Blower Motor

Models RDCA & RDDA With Gas Heat Section (FIGURE 1A only):

- Limit Control (capillary type)

COIL SECTION

- Evaporator Coils
- Thermal Expansion Valves
- Froststat (one per cooling circuit)
- Optional Subcooling Valves (RCA/RDCA/RECA)

FILTER AND INLET AIR SECTION

- Inlet Air, Humidity, & Override Sensors
- Ckt D or Dh Compressor

- Optional Damper Motor
- Outside Air Relative Humidity Transmitter (Std RDA/ RDDA/REDA; Optional RCA/RDCA/RECA)

Models RDCA & RDDA With Gas Heat Section (FIGURE 1A only):

- 21) Venter Assembly
- 22) Single-Stage Gas Valves
- 23) Optional Modulating Gas Valve
- 24) Optional Low Gas pressure Switch
- 25) Optional High Gas Pressure Switch

Models RECA & REDA With Electric Heat Section (FIGURE 1B only):

- 26) Fuse Block/Fuses
- 27) Contactor
- 28) Low Voltage Terminals
- 29) Manual Reset Limit
- 30) Auto Reset Limit

FIELD INSTALLED

- Discharge Air Sensor (supply duct)
- Optional Return Air Firestat (duct)
- Optional Discharge Air Firestat (duct)
- Optional Smoke Detector (duct)
- Optional wall-mounted controls

FIGURE 1A - Models RCA, RDA, RDCA, RDDA - Locations of Standard and Optional Controls and Service Ports

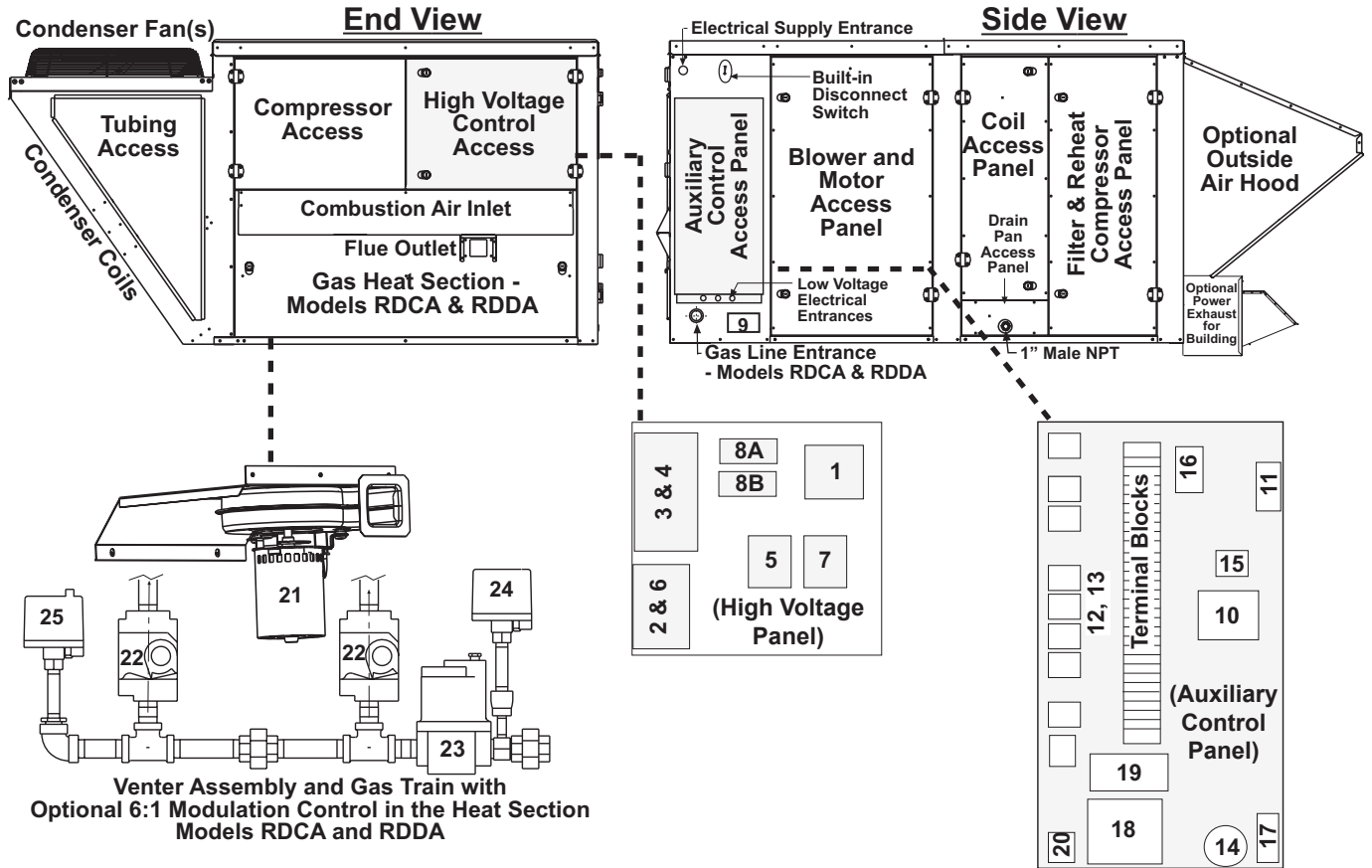
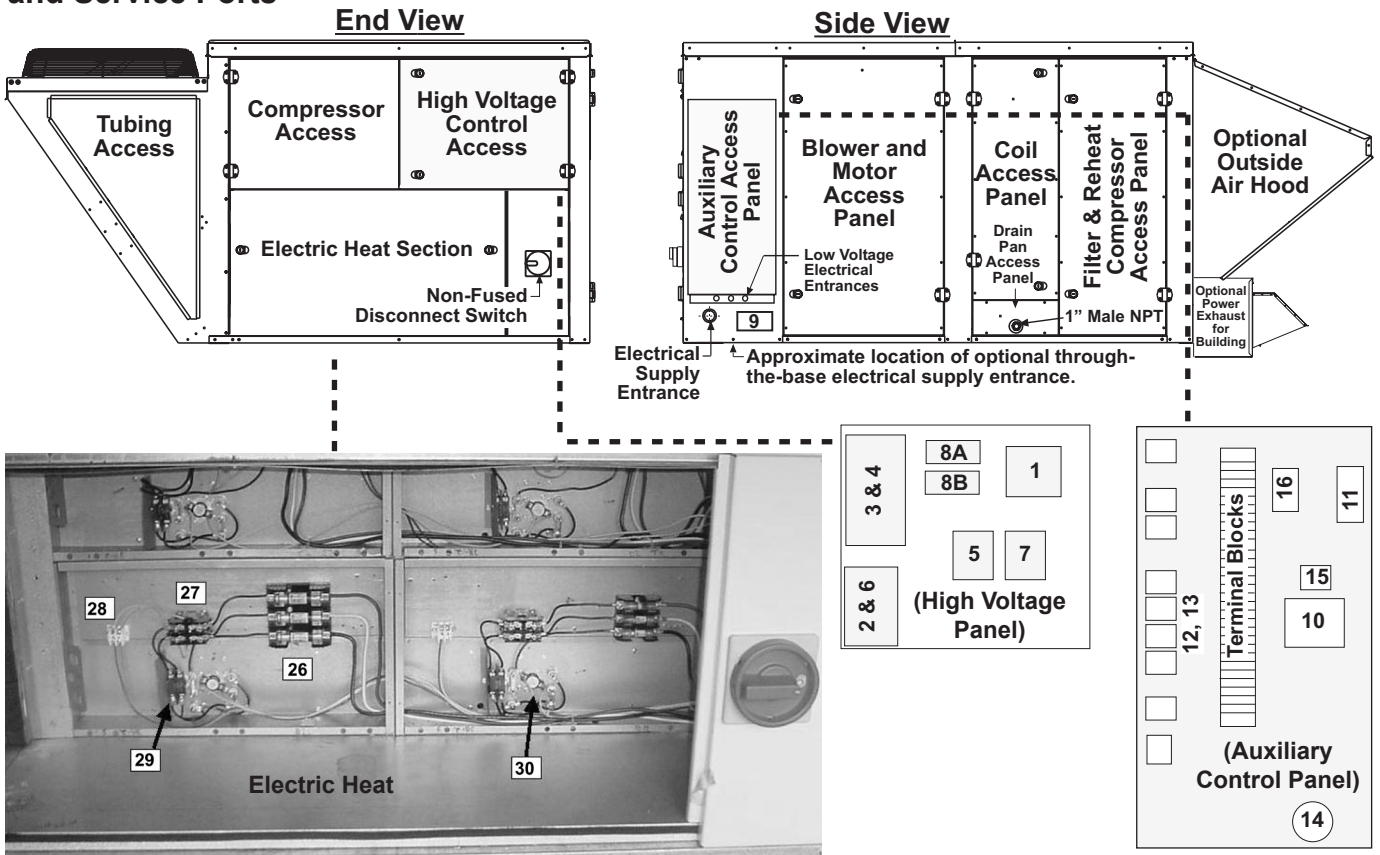


FIGURE 1B - Models RECA and REDA - Locations of Standard and Optional Controls and Service Ports



2.0 Maintenance Requirements (cont'd)

Cross-Reference by Model/Size and Cabinet Size A, B, or C

Because of the numerous model/size combinations, some items are categorized by Cabinet Size A, B, or C. Use these cross-reference charts to determine the cabinet size of your system.

Model RCA and Model RDA

Model RCA	Cabinet Size
025	A
037	
059	
060	
077	
078	
090	
108	
109	
120	
139	B
164	A
166	B
176	C
184	B
198	
226	C
292	
374	
374	

Model RDA	Cabinet Size
102	A
114	
126	
144	
188	
220	B
234	
230	C
280	
346	
428	
446	

Model RDCA and Model RDDA by Gas Heat Section Size

Model RDCA	Gas Heat Section Size												
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
025	A	A	A	--	--	--	--	--	--	--	--	--	--
037	A	A	A	--	--	--	--	--	--	--	--	--	--
059	A	A	A	--	--	--	--	--	--	--	--	--	--
060	A	A	A	--	--	--	--	--	--	--	--	--	--
077	A	A	A	--	--	--	--	--	--	--	--	--	--
078	A	A	A	B	B	--	--	--	--	--	--	--	--
090	A	A	A	B	B	--	--	--	--	--	--	--	--
108	A	A	A	B	B	--	--	--	--	--	--	--	--
109	--	A	A	--	--	--	--	--	--	--	--	--	--
120	A	A	A	B	B	--	--	--	--	--	--	--	--
139	--	--	--	B	B	--	--	--	--	--	--	--	--
164	--	A	A	--	--	--	--	--	--	--	--	--	--
166	--	--	--	B	B	--	--	--	--	--	--	--	--
176	--	--	--	--	--	C	C	C	C	C	C	C	C
184	--	--	--	B	B	--	--	--	--	--	--	--	--
198	--	--	--	B	B	--	--	--	--	--	--	--	--
226	--	--	--	--	--	C	C	C	C	C	C	C	C
292	--	--	--	--	--	C	C	C	C	C	C	C	C
374	--	--	--	--	--	C	C	C	C	C	C	C	C

Model RDDA	Gas Heat Section Size												
	-100	-150	-200	-250	-300	-350	-400	-450	-500	-550	-600	-650	-700
102	A	A	A	B	B	--	--	--	--	--	--	--	--
114	A	A	A	B	B	--	--	--	--	--	--	--	--
126	A	A	A	B	B	--	--	--	--	--	--	--	--
144	--	A	A	B	B	--	--	--	--	--	--	--	--
188	--	--	--	B	B	--	--	--	--	--	--	--	--
220	--	--	--	B	B	--	--	--	--	--	--	--	--
230	--	--	--	--	--	C	C	C	C	C	C	C	C
234	--	--	--	B	B	--	--	--	--	--	--	--	--
280	--	--	--	--	--	C	C	C	C	C	C	C	C
346	--	--	--	--	--	C	C	C	C	C	C	C	C
428	--	--	--	--	--	C	C	C	C	C	C	C	C
446	--	--	--	--	--	C	C	C	C	C	C	C	C

Model RECA and Model REDA by Electric Heat Module Size

Model RECA	Electric Heat Module														
	-05S	-10S	-15S	-20S	-24S	-15	-20	-25	-30	-35	-39	-50	-60	-75	-88
025	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
037	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
059	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
060	A	A	A	A	A	A	A	A	A	A	A	--	--	--	--
077	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
078	--	A	A	A	A	A	B	A	A	B	A	B	B	B	--
090	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
108	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
109	--	--	--	--	--	A	A	A	A	A	A	--	--	--	--
120	--	A	A	A	A	A	B	A	A	B	A	B	B	B	B
139	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
164	--	--	A	A	A	A	A	A	A	A	A	--	--	--	--
166	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
176	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
184	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
198	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
226	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
292	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
374	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C

Model REDA	Electric Heat Module														
	-10S	-15S	-20S	-24S	-15	-20	-25	-30	-35	-39	-50	-60	-75	-88	
102	A	A	A	A	A	B	A	A	B	A	B	B	B	B	--
114	A	A	A	A	A	B	A	A	B	A	B	B	B	B	B
126	--	A	A	A	A	B	A	A	B	A	B	B	B	B	B
144	--	A	A	A	A	B	A	A	B	A	B	B	B	B	B
188	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
220	--	--	--	--	--	--	B	B	B	B	B	B	B	B	B
230	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
234	--	--	--	--	--	B	B	B	B	B	B	B	B	B	B
280	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
346	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
428	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C
446	--	--	--	--	--	--	--	--	--	--	C	C	C	C	C

3.0 Filters

Inlet Air Filters Size, Type, and P/N

Cabinet	A	B	C
Filter Size	20x20	20x25	
Qty	4	4	6
2" Pleated	104111	104113	
4" Pleated	205790	205791	
2" Aluminum	101621	101623	

Permanent Filters in the Outside Air Hood

The filter section is equipped with either 2" permanent aluminum filters or 2" or 4" pleated disposable filters. If filters are replaced, use only these types of filters. **Do not use** flat disposable filters.

Filters are easily removed; open the door and slide out.

If equipped with permanent aluminum filters, remove the filters, wash, rinse, allow to dry, and slide them back in the cabinet.

If equipped with disposable filters, replace dirty filters. Exposure to humid makeup air can accelerate filter degradation. Systems with pleated disposable filters require more frequent filter inspection and replacement.

An outside air hood has 1" permanent, aluminum filters at the entrance of the hood. The filters act as a moisture eliminator and bird screen.

When inspecting the inlet air filters, inspect the outside air hood filters. If cleaning is needed, remove the filters, clean, rinse, dry and re-install.

FIGURE 2A - Removing Filters from Outside Air Hood

1" Permanent Aluminum Filters for Outside Air Hood are listed by Cabinet Size A, B, or C (see page 6)

*A - (4) 16 x 20, P/N 101607

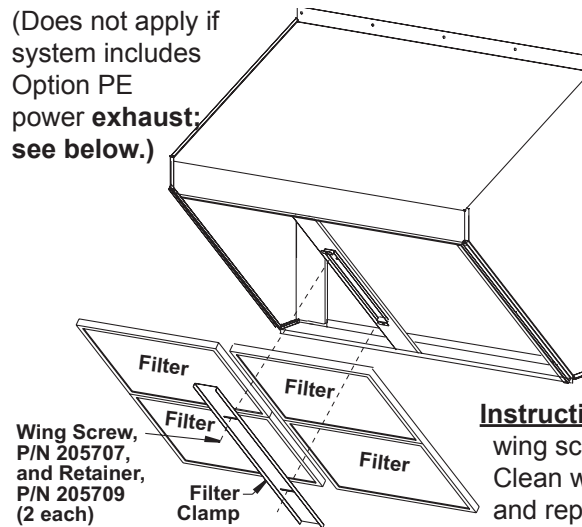
*B - (4) 16 x 25, P/N 101609

C - (3) 16 x 25, P/N 101609; (6) 16 x 20, P/N 101607

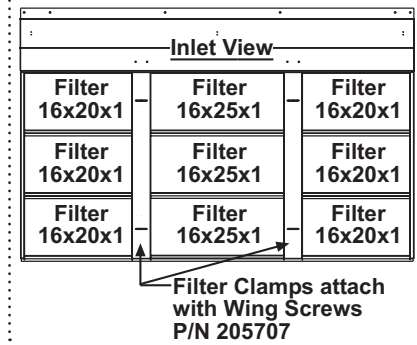
* Apply only to Cabinet Size A and B with outside air hood Option AS16.

Cabinet Sizes A and B with Option AS16 Outside Air Hood

(Does not apply if system includes Option PE power exhaust; see below.)



All Cabinet Size C with Outside Air Hood Option AS16 or AS19



Instructions: Remove filters by loosening the wing screws and sliding the filter clamp(s). Clean with soap and water, allow to dry, and replace. If it is more convenient to keep an extra clean set of filters, quantities, filter sizes, and part numbers are listed.

FIGURE 2B - Removing Filters from Option AS19 Outside Air Hood Installed on a Cabinet Size A or B with power exhaust Option PE1 or PE2

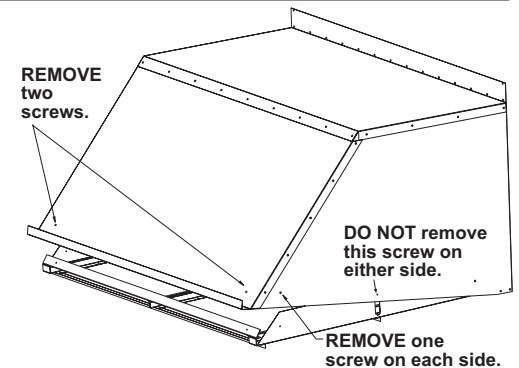
Instructions: 1) Remove the four screws as illustrated. Lower the tray.; 2) Pull out filters. Clean with soap and water. Allow to dry.; 3) Slide clean dry filters into tray.; 4) Re-position tray and replace screws.

1" Permanent Aluminum Filters

**A - (4) 18 x 20, P/N 194903

**B - (4) 20 x 25, P/N 101610

** Apply only to Cabinet Size A and B with outside air hood Option AS19.



4.0 Drive Components

CAUTION: If the blower is unused for more than three months, bearings with a grease fitting should be purged with new grease prior to start-up.

Bearings - Bearings with a grease fitting should be lubricated twice a year with a high temperature, moisture-resistant grease. (Type NLGI-1 or -2 standard grease is recommended.) Be sure to clean the grease fitting before adding grease. Add grease with a handgun until a slight bead of grease forms at the seal. Be careful not to unseat the seal by over lubricating. NOTE: If unusual environmental conditions exist (temperatures below 32°F or above 200°F; moisture; or contaminants), more frequent lubrication is required.

Setscrews - Check all of the setscrews (bearing/blower hubs and pulleys). Torque pulley setscrews a minimum of 110 in-lb to 130 in-lb maximum.

A bearing hub setscrew for a 1-3/8" to 1-3/4" shaft requires a 5/16" socket and a tightening torque of 165 in-lbs.

Belts - Check belt for proper tension and wear. Adjust belt tension as needed. Replace worn belts.

Blower systems are equipped with either Power Twist Plus® linked blower belt or a solid belt. The linked belts are designed in sections allowing for easy sizing and adjustment. The belt is sized at the factory for the proper tension. If the belt needs adjustment, the recommended method of shortening the belt length is to count the number of links and remove one link for every 24. (A link is made up of two joining sections of belt. For easier removal of links, turn the belt inside out. But be sure to turn it back before installing.)

If equipped with a solid belt, adjust the belt tension by turning the adjusting screw on the motor base until the belt can be depressed 3/4" (19mm). After correct tension is achieved, re-tighten the locknut on the adjustment screw.

4.0 Drive Components (cont'd)

The belt tension should be checked at regular maintenance inspections. Proper belt tension is important to the long life of the belt and motor.

Be sure the belt is aligned in the pulleys. If belt is removed or replaced, be sure to align directional arrows on the belt to the proper drive rotation.

5.0 Coil Maintenance

Inspect all cooling coils at the beginning of the cooling season or more often if needed.

Coil Access - The entering air side of the condenser coils is visible on the outside of the system. For additional inspection, remove the tubing access panel.

The evaporative coils can be accessed by opening the coil cabinet door (See **FIGURE 1**).

Coil Maintenance - Inspect coils for debris, dirt, grease, lint, pollen, mold, or any element which would obstruct heat transfer or airflow. Inspect coils and tubing for physical damage. Inspect feeders, piping connections, coil headers, and return bends for signs of fatigue, rubbing, and physical damage.

Clean the coils annually, or more often if needed. Use the proper tools and follow the instructions carefully to avoid damaging the coil. Use of a non-acid based coil cleaner is recommended. Due to possible damage to the coil, high pressure spray is not recommended.

Coils in the Cabinet (Evaporative Coils)

1. Verify that the electrical power has been turned off and the disconnect switch locked.
2. Open the access panels.
3. Use a soft brush to remove any dirt and debris from both sides of the coil.
4. Spray with cold or warm (not hot) water and a cleaning solution (non-acid based coil cleaner is recommended). Due to possible damage to the coil, high pressure spray is not recommended. First spray the leaving airflow side, then the inlet airflow side. As much as possible, spray the solution perpendicular to the face of the coil. Follow the instructions on the cleaning solution. When cleaning process is complete, rinse both sides with cool, clean water.
5. Replace the panels.

Coils on the Side of the Cabinet (Condenser Coils)

The entering airflow side of the condenser coils can be reached for cleaning without removing any components. Remove the access panel on the end of the condenser section to access leaving side and additional coils.

1. Verify that the electrical power has been turned off and the disconnect switch locked.
2. Use a soft brush to remove any dirt and debris from the coil.
3. Spray with cold or warm (not hot) water and a cleaning solution (non-acid based coil cleaner is recommended). Due to possible damage to the coil, high pressure spray is not recommended. Spray up through the coil. Follow the instructions on the cleaning solution. When clean, rinse with cool, clean water.

Condenser Coil Connections

If additional cleaning is required or if coils are removed for any reason, refer to **FIGURES 3A-3L** for making condenser coil connections.

FIGURE 3A - Two Single Circuits

Sizes	Ckt A	Ckt B
059, 060	3 ton	2 ton
077, 078, 102	4.5 ton	2 ton
090, 114	4.5 ton	3 ton
108, 126	6.2 ton	3 ton

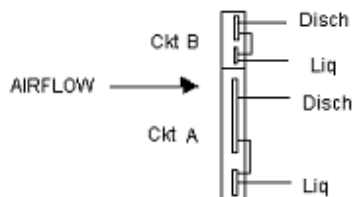


FIGURE 3B - One Twinned Circuit

Sizes	Ckt A
025 (bottom ckt only)	2 ton
037	3 ton

MODELS: 037, 025 (bottom circuit only)

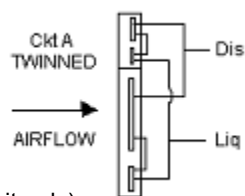
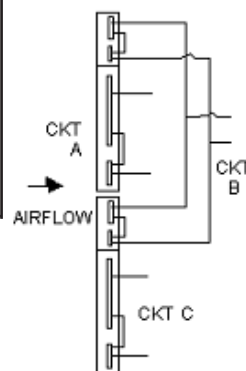
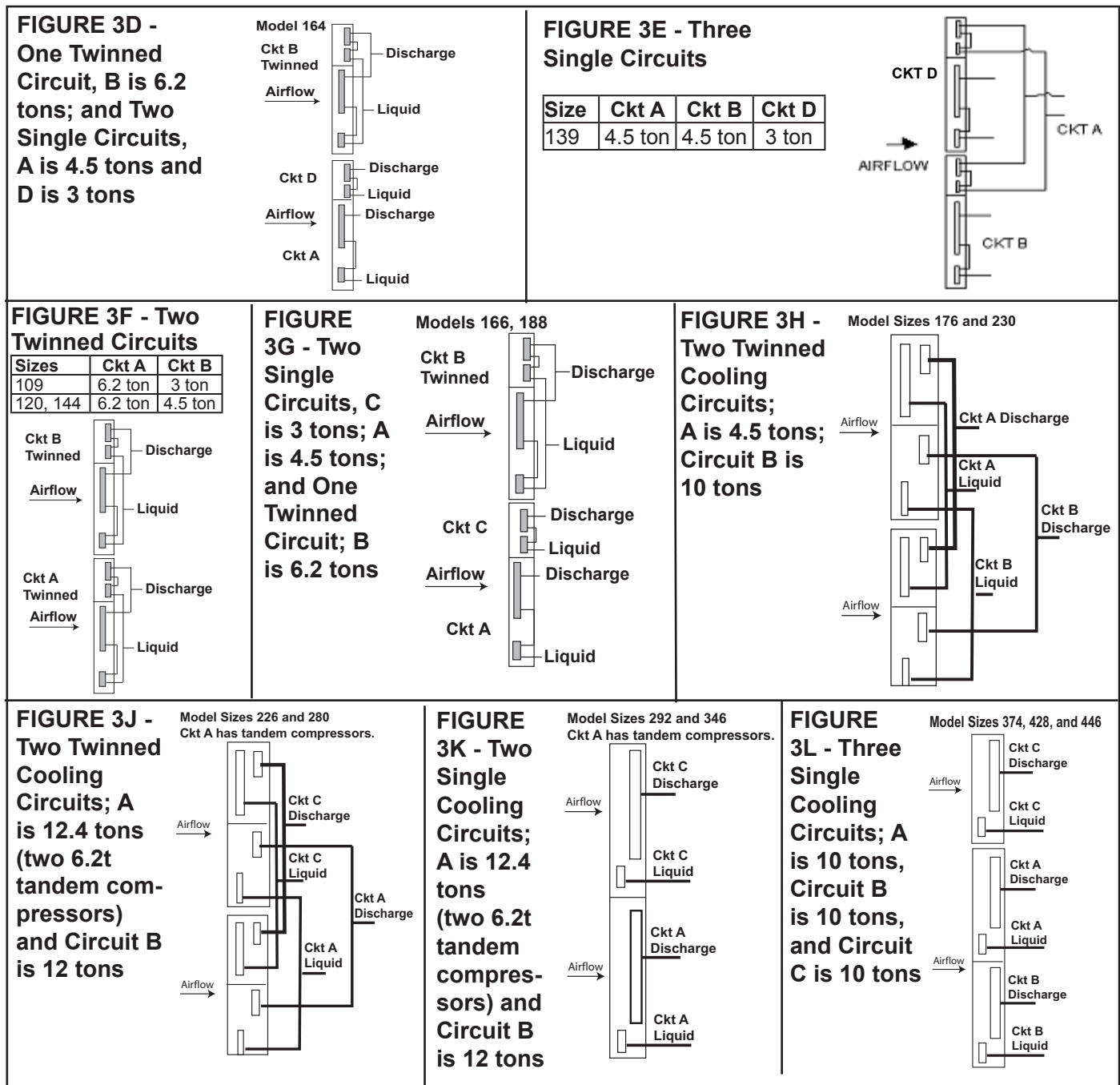


FIGURE 3C - Three Single Circuits

Sizes	Ckt A	Ckt B	Ckt C
184, 220	4.5 ton	6.2 ton	4.5 ton
198, 234	4.5 ton	6.2 ton	6.2 ton





6.0 Check Refrigerant Pressure and Temperatures

Check Refrigerant Pressure

IMPORTANT: Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the qualified HVAC service technician must comply with all federal, state or provincial, and local laws.

Refer to **FIGURE 4A or 4B** for required pressure for cooling systems designed for humid/temperature climates (Sizes 060, 078, 090, 108, 120, 164, 166, 184, and 198 and the cooling circuit in all systems with a reheat cycle).

Refer to **FIGURE 5A or 5B** for required pressure for cooling systems designed for a dry climate (Model RCA/RDCA/RECA 025, 037, 059, 077, 109, 139).

Refer to **FIGURE 6A or 6B** for the re-heat heat pump circuit pressure (All RDA/RDDA/REDA Models).

Connect the pressure gauge and check the pressures.

6.0 Check Refrigerant Pressure and Temperatures (cont'd)

Check Refrigerant Temperatures

Each circuit must be isolated for accurate temperature readings.

Check the cooling circuit superheat (temperature of the gaseous refrigerant in the suction line leaving the evaporator coil). Refer to Paragraph 6, Step 11 on page 15, for instructions on measuring superheat. Recommended superheat range is 8-12°F (4.5-6.7°C).

Check the cooling circuit refrigerant subcooling (temperature of the line on the leaving side of the condenser coil). Attach the sensor to the tubing. Acceptable subcooling readings range from 18-22°F (10.1-12.3°C). Refer to Paragraph 6, Step 11 on page 16, for instructions on measuring subcooling.

FIGURE 4A - Operating Discharge Head Pressure vs Outdoor Ambient Temperature for Model RCA/RDCA/RECA 060, 078, 090, 108, 120, 164, 166, 184, and 198 and the Cooling Circuit on All RDA/RDDA/REDA Models

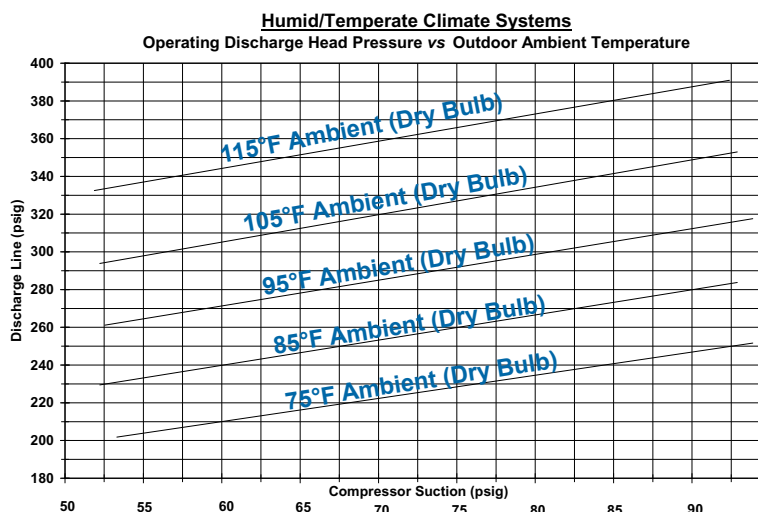
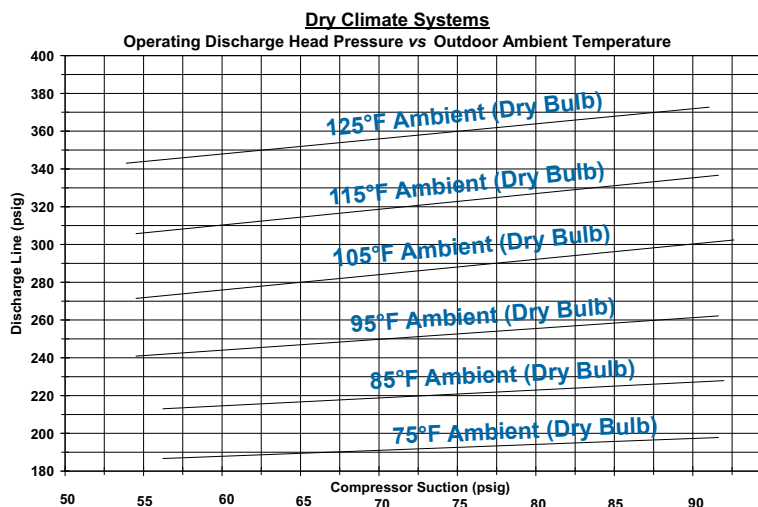


FIGURE 4B - Operating Discharge Head Pressure vs Outdoor Ambient Temperature for Model RCA/RDCA/RECA 059, 077, 109, and 139 (NOTE: Size 025 and 037 discharge gauge pressures are reduced approximately 10 pounds.)



Re-Heat Pump™ Heat Pump Refrigerant System - Models RDA, RDDA, and REDA

Re-Heat Pump Reheat Cycle Performance

Typical Stand-Alone Re-Heat Heat Pump Performance (subtract 8 psig for liquid line pressure)					Typical RDA Performance with 55°F Air Entering the Reheat Condenser (primary cooling enabled) (subtract 8 psig for liquid line pressure)				
Coil Condition	Outside Dry Bulb	Outside Relative Humidity	Suction PSIG	Discharge PSIG	Coil Condition	Outside Dry Bulb	Outside Relative Humidity	Suction PSIG	Discharge PSIG
Dry	65°F	30%	60	172	Dry	65°F	30%	59	165
Dry	75°F	30%	62	196	Dry	75°F	30%	62	168
Dry	80°F	30%	70	218	Dry	80°F	30%	65	170
Wet	75°F	70%	76	220	Wet	75°F	70%	73	178
Wet	80°F	70%	84	240	Wet	80°F	70%	80	184
Wet	85°F	70%	94	265	Wet	85°F	70%	90	191
					Wet	90°F	70%	96	193

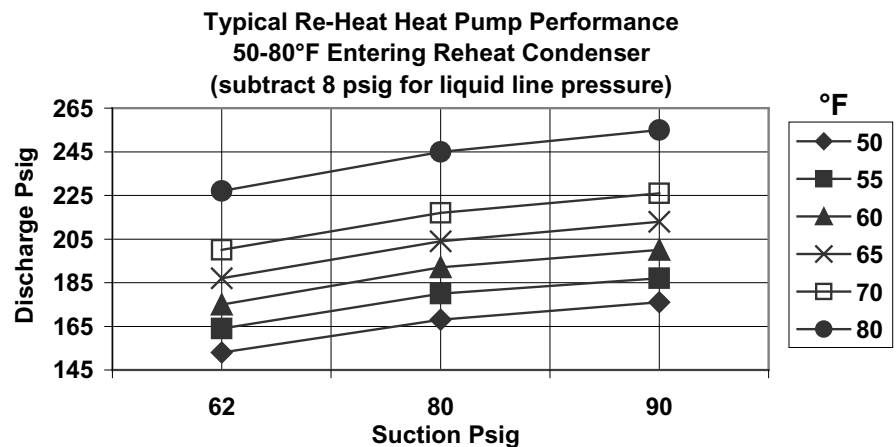
The re-heat heat pump refrigerant circuit is a closed system that includes the same components as the larger cooling circuits. The system is fully charged with either R22 or R407C refrigerant before it leaves the factory. For charging, see page 14.

Both the condenser coil and the compressor are located inside the coil cabinet downstream of the cooling evaporator coil. In this location, they act to raise the temperature (reheat) of the airstream after it has passed through the reheat evaporator coil.

The re-heat heat pump performance can be checked in a stand-alone mode or in conjunction with the primary refrigeration system. In general, suction line super heat should be in the 8 to 15°F (4.5 to 8.4°C) range, and liquid line sub-cooling should be in the 18 to 25°F (10.1 to 14°C) range.

When compared to conventional refrigeration performance, the re-heat suction pressures will tend to be higher and discharge pressures lower.

FIGURE 5 - Operating Head Pressure of the Compressor in the Re-Heat Heat Pump Circuit



7.0 Compressor Maintenance and Replacement

DANGER: The refrigeration circuits are high pressure systems. Hazards exist that could result in personal injury or death. It is therefore required that the removal and installation of a hermetic compressor be performed by qualified personnel only.

DANGER: Never use oxygen to pressurize a refrigeration system. Oxygen can explode on contact with oil and could result in personal injury or death. When using high pressure gas such as nitrogen for this purpose, **ALWAYS USE A PRESSURE REGULATOR** that can control the pressure down to 1 or 2 psig. Failure to use a regulator will result in extremely high pressure which could exceed the burst pressure of the compressor or other system components and result in personal injury or death.

WARNINGS: For your safety, wear eye protection and gloves when handling refrigerant or oil and when brazing. Have a fire extinguisher nearby when brazing tubing.

Do not lift compressor by copper tubing. To prevent internal damage, compressors must **ALWAYS** be held upright.

The following instructions include major points of consideration that will ensure proper installation and protect you from potential personal injury. Please use the following 13 steps as a checklist, taking each item in order before proceeding to the next. If more information is required, call the Reznor Service Department.

7.0 Compressor Maintenance and Replacement (cont'd)

Compressor Maintenance Checklist, Steps 1-13

Handling

FIGURE 6 - With disconnect switch off, remove the plug to disconnect compressor wiring.



Molded plug with wires attached

DANGER: To avoid electrical shock, power to the compressor(s) MUST REMAIN OFF during performance of Steps 1 through 9 below. LOCK DISCONNECT SWITCH OFF (open).

□ Step 1. Verify Proper Application

Verify that the replacement compressor is identical to the model being replaced. All system components are matched to the compressor. Replacing a compressor with a model other than the Thomas and Betts (Reznor) specified replacement will void the product warranty. See part numbers for R22 and R407C compressors on page 13.

□ Step 2. Determine Cause of Initial Failure and Remove the Compressor

In order to prevent a second failure, the cause of the original failure must be determined. Identify the cause and make the necessary repairs. Check fuses/breakers for correct sizing.

CAUTION: DO NOT LIFT compressor by copper tubing; damage will occur. Compressor must remain upright.

WARNING: Wear eye protection and gloves when handling refrigerant or oil and when brazing.

- BEFORE REMOVING THE FAULTY COMPRESSOR, remove refrigerant charge using proper recovery procedures. Call 1-800-441-9450 for the name of the nearest Dupont authorized distributor or 1-800-ASK-KLEA (IGI) for information on their refrigerant reclaim programs.
- Disconnect wires. All compressor wiring is connected using a black molded plastic plug. Remove the plug from the compressor.
- Open access ports so that pressure does not build up in the system. Before unbrazing stubs from the compressor, cut suction and discharge tubing with a tubing cutter.

WARNING: Have a fire extinguisher near. The compressor contains oil. There is a risk of fire when unbrazing stubs.

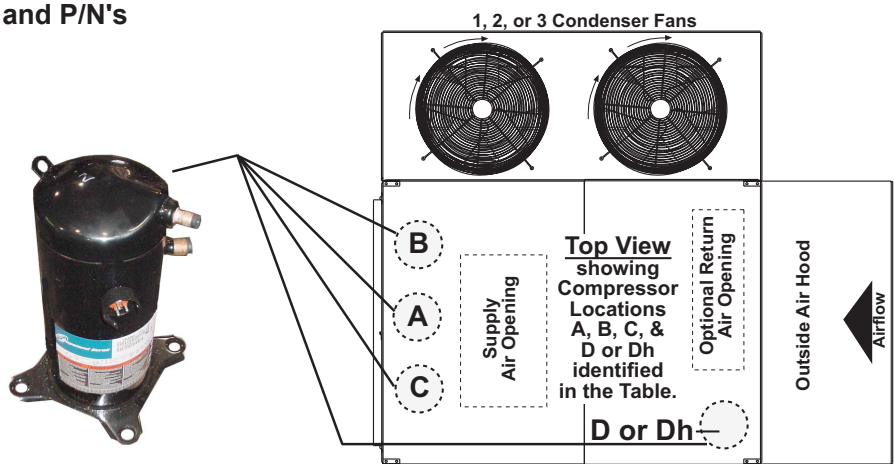
Use a high temperature torch to disconnect the suction line and the discharge line from the compressor.

- Remove the mounting bolts and the compressor. Save the mounting hardware to attach the grommets and sleeves shipped with the replacement compressor.

FIGURE 7 - Compressor Locations and P/N's

NOTE:

Compressors for RDCA and RECA are the same as for Model RCA. Compressors for RDDA and REDA are the same as for Model RDA.



RCA	RDA	Compressor P/N's by Refrigerant, Location, and Voltage - See FIGURE 7.																		
Compressor Location			A			B			C			D - RCA			Dh - RDA					
Voltage			208/230	460	575**	208/230	460	575**	208/230	460	575**	208/230	460	575**	208/230	460				
025	--	Tons	2.0		N/A	N/A			N/A			N/A			N/A					
		R22 P/N	205622	205609																
		R407C P/N	217244	220715																
037	--	Tons	3.0		N/A	N/A			N/A			N/A			N/A					
		R22 P/N	205610	205623													205624			
		R407C P/N	220375	216936													220716			
059	--	Tons	3.0		N/A	2.0		N/A	N/A			N/A			N/A					
		R22 P/N	205610	205623		205624														
		R407C P/N	220375	216936		220716														
060	--	Tons	3.0		N/A	2.0		N/A	N/A			N/A			N/A					
		R22 P/N	205610	205623		205609														
		R407C P/N	220375	216936		217244	220715													
077	--	Tons	4.5		N/A	2.0		N/A	N/A			N/A			N/A					
		R22 P/N	205611	205612		205625														
		R407C P/N	217246	216937		N/A	205622										205609	217244	220715	
078	102	Tons	4.5		N/A	2.0		N/A	N/A			N/A			2.0					
		R22 P/N	205611	205612		205622	205609													
		R407C P/N	217246	216937		217244	220715								205622	205609	217244	220715		
090	114	Tons	4.5		3.0			N/A	N/A			N/A			2.0					
		R22 P/N	205611	205612	205625	205610	205623								205624	205622	205609			
		R407C P/N	217246	216937	N/A	220375	216936								220716	217244	220715			
108	126	Tons	6.2		3.0			N/A	N/A			N/A			2.0					
		R22 P/N	205626	205613	205627	205610	205623								205624	205622	205609			
		R407C P/N	217245	216938	220717	220375	216936								220716	217244	220715			
109	--	Tons	6.2		3.0			N/A	N/A			N/A			N/A					
		R22 P/N	205626	205613	205627	205610	205623										205624			
		R407C P/N	217245	216938	220717	220375	216936										220716			
120	144	Tons	6.2		4.5			N/A	N/A			N/A			2.0					
		R22 P/N	205626	205613	205627	205611	205612								205625	205622	205609			
		R407C P/N	217245	216938	220717	217246	216937								N/A	217244	220715			
139	--	Tons	4.5		4.5			N/A	N/A			3.0			N/A					
		R22 P/N	205611	205612	205625	205610	205623					205624								
		R407C P/N	217246	216937	N/A	217246	216937					N/A	220375	216936			220716			
164	--	Tons	6.2		4.5			N/A	N/A			3.0			N/A					
		R22 P/N	205626	205613	205627	205611	205612					205625	205610	205623			205624			
		R407C P/N	217245	216938	220717	217246	216937					N/A	220375	216936			220716			
166	188	Tons	4.5		6.2			3.0			N/A			2.0						
		R22 P/N	205611	205612	205625	205626	205613	205627	205610	205623				205624	205622	205609				
		R407C P/N	217246	216937	N/A	217245	216938	220717	220375	216936				220716	217244	220715				
176	230	Tons	4.5		10.0			N/A			N/A			4.5						
		R22 P/N	205611	205612	205625	207351	207352							207353	205611	205612				
		R407C P/N	217246	216937	N/A	220712	216939							220718	217246	216937				
184	220	Tons	4.5		6.2			4.5			N/A			3.0						
		R22 P/N	205611	205612	205625	205626	205613	205627	205611	205612				205625	205610	205623				
		R407C P/N	217246	216937	N/A	217245	216938	220717	217246	216937				N/A	220375	216936				
198	234	Tons	4.5		6.2			6.2			N/A			3.0						
		R22 P/N	205611	205612	205625	205626	205613	205627	205626	205613				205627	205610	205623				
		R407C P/N	217246	216937	N/A	217245	216938	220717	217245	216938				220717	220375	216936				
226	280	Tons	6.2t		6.2t			6.2			N/A			4.5						
		R22 P/N	208/230V - 207354; 460V - 207355; 575V - 207356													205611	205612			
		R407C P/N	208/230V - 220714; 460V - 216941; 575V - 220720													217245	216937			
292	346	Tons	6.2t		6.2t			12.0			N/A			4.5						
		R22 P/N	208/230V - 207354; 460V - 207355; 575V - 207356													205611	205612			
		R407C P/N	208/230V - 220714; 460V - 216941; 575V - 220720													217246	216937			
374	428	Tons	10.0		10.0			10.0			N/A			4.5						
		R22 P/N	207351	207352	207353	207351	207352	207353	207351	207352				207353	205611	205612				
		R407C P/N	220712	216939	220718	220712	216939	220718	220712	216939				220718	217246	216937				
	446	Tons	10.0		10.0			10.0			N/A			6.2						
		R22 P/N	207351	207352	207353	207351	207352	207353	207351	207352				207353	205626	205613				
		R407C P/N	220712	216939	220718	220712	216939	220718	220712	216939				220718	217245	216938				
Voltage			208/230	460	575**	208/230	460	575**	208/230	460	575**	208/230	460	575**	208/230	460				
Compressor Location			A			B			C			D - RCA			Dh - RDA					
*Compressor D in Model RDA is the reheat pump compressor; **575V is available for Model RCA only and only in the sizes indicated.																				

*Compressor D in Model RDA is the reheat pump compressor; **575V is available for Model RCA only and only in the sizes indicated.

e) To test for acid and to assure that excess oil does not remain in the circuit, remove the oil from the failed compressor. Measure the amount of oil and compare to the appropriate table on page 14. (**NOTE:** The type of oil varies by refrigerant.)

If oil level is found to be significantly lower than the charge listed in the table for the compressor, the excess oil should be flushed from the system prior to installing the new compressor. Use a field-supplied flush kit designed for the type of refrigerant.

CAUTION: The compressor may contain harmful acids. Be sure to handle the removed compressor oil with extreme care using proper protective equipment.

7.0 Compressor Maintenance and Replacement (cont'd)

Compressor Maintenance Checklist, Steps 1-13 cont'd)

Oil Charge in R407C Compressors used on MAPS II Units

CAUTION: POE oil used with R407C refrigerant is irritating to skin and eyes. Gloves and safety glasses are essential.

Oil Charge in R22 Compressors used on MAPS II Units

Compressor (by P/N & Location; refer to FIGURE 7)			Oil Charge (each compressor)		Oil Type	Nominal Circuit Capacity
P/N's	Location	Mfr Designation	(cc)	(oz)		
Oil Charge - MAIN Cooling Circuit Compressors (A, B, C, D) with R22 Refrigerant						
205622 / 205609	A or B	ZR22	1124	38	Conventional White Oil (Sontex 200LT is recommended.)	2 tons
205610 / 205623 / 205624	A, B, C, or D	ZR36	1242	42		3 tons
205611 / 205612 / 205625	A, B, or C	ZR54	1952	66		4.5 tons
205626 / 205613 / 205627	A, B, or C	ZR72	1774	60		6.2 tons
207351 / 207352 / 207353	A, B, or C	ZR125	3253	110		10 tons
207348 / 207349 / 207350	C	ZR144	3253	110		12 tons
207356 / 207355	A or B	ZR144 (twin)	1774	60		12 tons
207354			3253	110		
Oil Charge - Re-heat Heat Pump Circuit Compressor (Dh) with R22 Refrigerant						
205622 / 205609	Dh	ZR22	1000	34	Conventional White Oil (Sontex 200LT is recommended.)	2 tons
205610 / 205623	Dh	ZR36	1064	36		3 tons
205611 / 205612	Dh	ZR54	1064	36		4.5 tons
205626 / 205613	Dh	ZR72	1064	36		6.2 tons

Compressor (by P/N & Location; refer to FIGURE 7.)			Oil Charge (each compressor)		Oil Type	Nominal Circuit Capacity
P/N's	Location	Mfr Designation	(cc)	(oz)		
Oil Charge - MAIN Cooling Circuit Compressors (A, B, C, D) with R407C Refrigerant						
217244 / 220715	A or B	ZR22	1124	38	Polyol Ester Oil (POE) - ULTRA 32CC is recommended.	2 tons
220375 / 216936 / 220716	A, B, C, or D	ZR36	1242	42		3 tons
217246 / 216937	A, B, or C	ZR54	1952	66		4.5 tons
217245 / 216938 / 220717	A, B, or C	ZR72	1774	60		6.2 tons
220712 / 216939 / 220718	A, B, or C	ZR125	3253	110		10 tons
220713 / 216940 / 220719	C	ZR144	3253	110		12 tons
2169410 / 220720	A or B	ZR144 (twin)	1774	60		12 tons
220714			3253	110		
Oil Charge - Re-heat Heat Pump Circuit Compressor (Dh) with R407C Refrigerant						
217244 / 220715	Dh	ZR22	1000	34	Polyol Ester Oil (POE) - ULTRA 32CC is recommended.	2 tons
220375 / 216936 / 220716	Dh	ZR36	1064	36		3 tons
217246 / 216937	Dh	ZR54	1064	36		4.5 tons
217245 / 216938 / 220717	Dh	ZR72	1064	36		6.2 tons

Use a field-provided acid test kit (be sure the kit is designed for the appropriate refrigerant) to check the oil for acid. If acid is found, beginning in **Step 4** follow the procedures indicated for burnout cleanup.

CAUTIONS: The compressor may contain harmful acids. Be sure to handle with extreme care using proper protective equipment. After testing for acid and checking the oil charge level, return the oil to the compressor being replaced. Braze the discharge and suction copper closed. Use an approved disposal method to dispose of the compressor and the oil.

FIGURE 8 - Install the new Mounting Grommets (isolators) shipped with the Replacement Compressor



□ **Step 3. Mount the Replacement Compressor**

Do not remove the dust cover or rubber shipping plugs until all other system connections are complete (i.e. new liquid line filter drier(s) installed and all tubing changes made - see Steps 4 and 5). The amount of time the compressor is open to the atmosphere should be kept to a minimum. Use the new mounting grommets and sleeves that are shipped with the compressor to mount it. The sleeves will prevent over compression of the grommets. Re-use the mounting bolts from the compressor that was removed. The mounting bolts will bottom out when tight.

□ **Step 4. Install New Filter Driers (Select the procedure that applies.)**

If the test for acid in **Step 2** did NOT indicate burnout, install a new liquid line filter drier. The filter drier must be the proper type and size for the circuit. Install a temporary field-supplied suction line filter drier.

If the test for acid in **Step 2** did indicate compressor burnout, do the following:

- a) Install an acid-removing liquid line filter drier. Size the acid-removing filter drier at least one capacity size larger than normally required for the circuit.
- b) Install a temporary filter drier in the suction line. The temporary suction line drier should be sized properly for the circuit and have a service access fitting to monitor pressure drop across the drier.

Step 12 includes the remaining procedures required for cleanup of a compressor burnout. Continue to **Step 5**.

☐ **Step 5. Braze on Suction and Discharge Lines**

Flow an inert gas, such as nitrogen (N₂), through the system at approximately 2 psig. This will reduce the possibility of oxidation inside the tubing. Braze on the suction and discharge lines and braze the process tube shut following the recommendations listed below. **NOTE: If the process tube is to be used for charging the system, it should be brazed shut after the system has been charged.**

WARNING: Wearing eye protection is recommended.

Brazing Recommendations and Procedures

COPPER TUBING: If additional copper tubing is required, use only clean, dehydrated refrigeration grade tubing with sealed ends.

BRAZING ALLOYS: CAUTION: Do not use 95/5, 50/50 or 40/60 soft solder for brazing. Use Sil-Fos or Phos Copper, or similar brazing alloys with high tensile strength on copper welds only. Weld steel to copper only with silver brazing alloys.

BRAZING PROCEDURE: Comply with applicable code requirements and follow safe brazing procedures. The manufacturer recommends the following steps:

- a) Exercise extreme care when cutting and forming tubes to keep dirt, filings, and other contaminants out of the system.
- b) Do not use excessive amounts of brazing alloy as some of the excess may penetrate the joint and enter the system.
- c) If flux must be used, take necessary precautions to ensure that the flux does not enter the system.
- d) Use damp cloths or other heat absorbent material to ensure that the factory brazed joints on the compressor do not become damaged. If damp cloths are used, take care not to allow moisture to enter the system.

CAUTION: Do not leave system open to the atmosphere any longer than minimum required. This applies to all refrigerants but is more critical with R407C which uses POE oil. POE oil is extremely susceptible to moisture absorption.

- e) Do not overheat brazed joints as excess heat will cause formation of copper oxide on the inside wall of the tubing. To aid in avoiding the formation of copper oxide, flow an inert gas through the system, as explained above.

☐ **Step 6. Check System for Leaks**

After installation is complete, pressurize the system to approximately 75 psig using nitrogen and a few ounces of refrigerant. Check for leaks using a halide torch, soap bubbles, or an electronic halogen leak detector. When all connections test satisfactorily, release pressure using proper recovery procedures, then proceed to the next step.

7.0 Compressor Maintenance and Replacement (cont'd)

Compressor Maintenance Checklist, Steps 1-13 (cont'd)

☐ **Step 7. Evacuate the System**

Use a vacuum pump rated for a minimum capacity of 6 cfm. Vacuum must be pulled on both the discharge (high) and suction (low) sides of the system. **Evacuate to 500 microns or lower.**

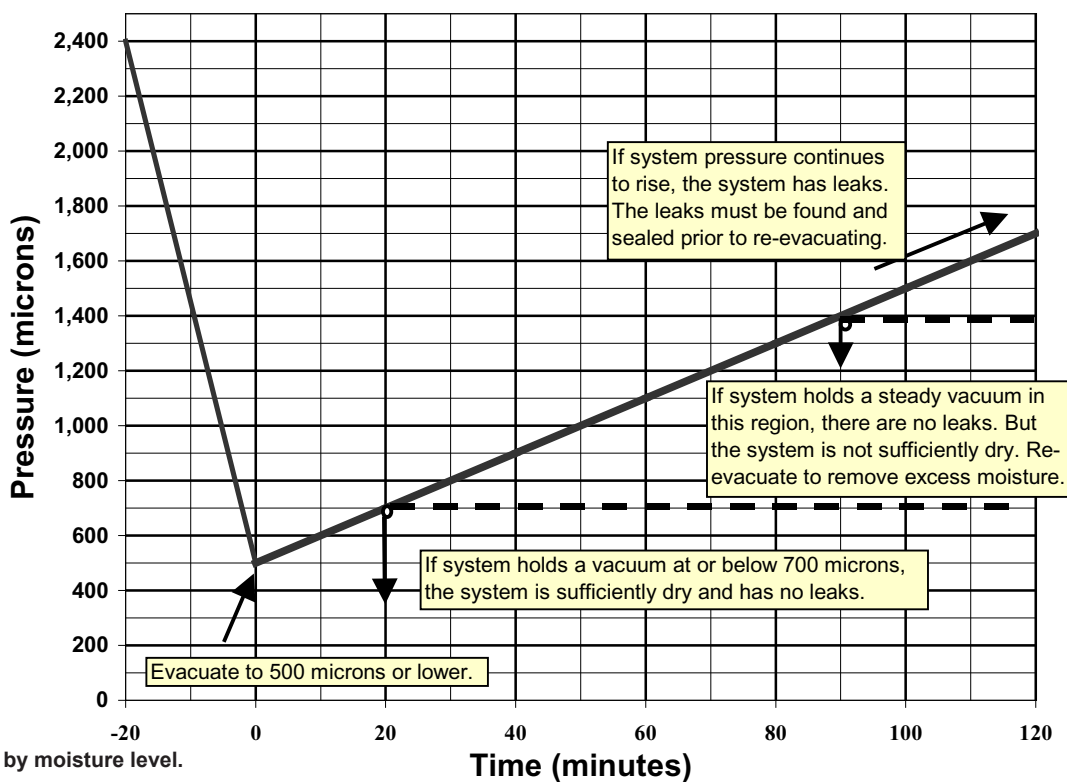
Moisture and air are harmful to the system because they increase the condensing temperature, raise the discharge gas temperature, cause formation of acids, and cause oil breakdown.

CAUTION: Do not use the replacement compressor as an evacuation assist and *never* apply voltage to a compressor while it is in a vacuum.

Acids are corrosive to the components in the refrigeration system. This includes the piping, refrigerant specialties, and the compressor's mechanical and electrical components. The elevated temperatures can cause copper plating resulting in premature mechanical failure of the compressor. To establish that the unit is leak-free and moisture-free, a standing vacuum test is recommended. The maximum allowable rise over a 18-minute period is 200 microns. If the rise exceeds this, either there is a leak or moisture still exists in the system. See the chart in **FIGURE 9**.

FIGURE 9 - Pressure Rise vs Time

IMPORTANT NOTE:
Always check gauge hose connections for leaks prior to evacuation.



☐ **Step 8. Check the Electrical System**

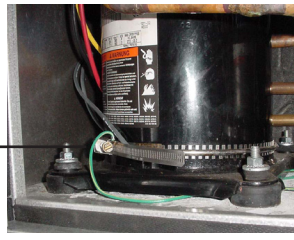
While the system is being evacuated, connect the electrical plug to the compressor. It is a normal practice to replace all starting components any time a compressor is changed.

WARNING: Voltage should not be applied to the compressor when the terminal plug is removed as personal injury could result.

If there is a crankcase heater, connect it. The crankcase heater is energized continuously and is extremely important to proper compressor operation and long life.

**FIGURE 10 -
Compressor
Crankcase Heater**

"Bellyband"
Crankcase Heater



Crankcase Heater (FIGURE 10) - The primary cooling compressor on Sizes 059, 077, 109, and 139 is equipped with a crankcase heater that must be energized for at least 24 hours before starting the unit or after a power outage of more than 8 hours.

The belly band type crankcase heater is an external heater attached to the lower portion of the compressor. These external band heaters require a ground wire to the unit.

□ **Step 9. Charge the System**

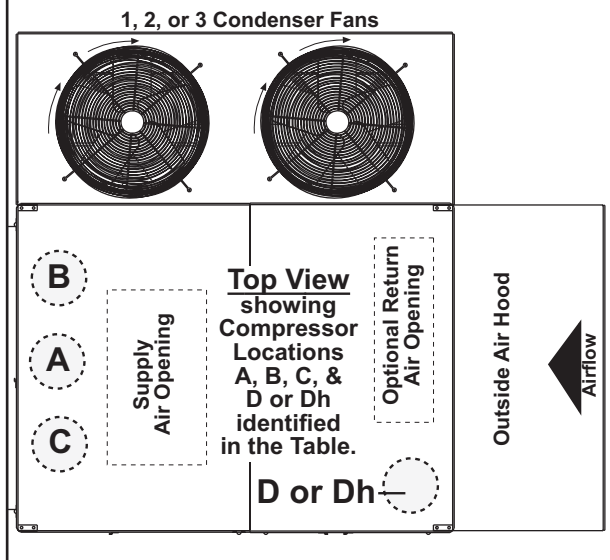
When a vacuum of at least 500 microns is reached, close gauge valve, remove vacuum pump, and break the vacuum using system refrigerant VAPOR. **LIQUID *can be used to break the vacuum if it is connected to the liquid line ONLY.***

Charge the system according to the weights given in the table below. Be sure to compensate the charge for the addition of the suction line filter drier. The preferred subcooling should be **18-22°F (10.1-12.3°C)** at the liquid line, but may vary based on ambient conditions (See **Step 11**).

NOTE : Weighing in the system charge to the specifications will help point out system faults that may still exist. **IMPORTANT: R407C refrigerant MUST always be charged as a liquid.**

**Refrigerant Charge by Model Size
and Compressor for each Circuit**

FIGURE 11 - Compressor Locations



NOTE: Compressor charges for RDCA and RECA are the same as for Model RCA. Compressor charges for RDDA and REDA are the same as for Model RDA.

Compressor Location (See FIGURE 11)		RCA										RDA	
		A		B		C		D		Dh*			
Model RCA	Model RDA	Capacity (tons) and Charge (lbs)											
		Tons	Lbs	Tons	Lbs	Tons	Lbs	Tons	Lbs	Tons	Lbs	Tons	Lbs
25	--	2	5.4	N/A		N/A		N/A		N/A		N/A	
37	--	3	6.1	N/A		N/A		N/A		N/A		N/A	
59	--	3	6.1	2	5.1	N/A		N/A		N/A		N/A	
60	--	3	5.1	2	3.5	N/A		N/A		N/A		N/A	
77	--	4.5	7.6	2	5.1	N/A		N/A		N/A		N/A	
78	102	4.5	7.3	2	3.7	N/A		N/A		2	3.4		
90	114	4.5	7.3	3	5.1	N/A		N/A		2	3.4		
108	126	6.2	8.7	3	5.1	N/A		N/A		2	3.4		
109	--	6.2	8.9	3	6.2	N/A		N/A		N/A			
120	144	6.2	8.7	4.5	7.3	N/A		N/A		2	3.4		
139	--	4.5	8.3	4.5	7.3	N/A		3	6.0	N/A			
164	--	6.2	8.7	4.5	7.3	N/A		3	5.1	N/A			
166	188	4.5	8.2	6.2	9.2	3	5.8	N/A		2	3.4		
184	220	4.5	6.8	6.2	8.5	4.5	6.8	N/A		3	4.5		
198	234	4.5	7.5	6.2	9.5	6.2	9.5	N/A		3	4.5		
176	230	4.5	7.6	10	14.5	N/A		N/A		3	9.2		
226	280	12 tons / 19 lbs				6.2	9.5	N/A		3	9.2		
292	346	12 tons / 27.8 lbs				12	9.5	N/A		3	9.2		
374	446	10	15.6	10	15.6	10	15.6	N/A		3	10.1		
	428	10	15.6	10	15.6	10	15.6	N/A		3	10.1		
Compressor Location (See FIGURE 11)		RCA										RDA	
		A		B		C		D		Dh*			

* Reheat pump compressor

Model RCA with Option AU25	Capacity (tons) and Charge (lbs)							
	Tons	Lbs	Tons	Lbs	Tons	Lbs	Tons	Lbs
60	3	7.1	2	5.5	N/A		N/A	
78	4.5	9.3	2	5.7	N/A		N/A	
90	4.5	9.3	3	7.1	N/A		N/A	
108	6.2	10.7	3	7.1	N/A		N/A	
120	6.2	10.7	4.5	9.3	N/A		N/A	
164	4.5	9.3	6.2	10.7	N/A		3	5.1
Compressor Location (See FIGURE 11)	RCA with Option AU25							
	A		B		C		D	

7.0 Compressor Maintenance and Replacement (cont'd)

Compressor Maintenance Checklist, Steps 1-13 (cont'd)

Saturation Temperature		Pressure (psig)	
(°F)	(°C)	R-22	R-407C
0	-17.8	24	19.5
5	-15.0	28.2	23.6
10	-12.2	32.7	28.0
15	-9.4	37.7	32.7
20	-6.7	43	37.9
25	-3.9	48.7	43.6
30	-1.1	54.9	49.6
35	1.7	61.4	56.2
40	4.4	68.5	63.2
45	7.2	76	70.7
50	10.0	84	78.8
55	12.8	92.5	87.5
60	15.6	101.6	96.8
65	18.3	111	106.7
70	21.1	121.4	117.2
75	23.9	132	128.4
80	26.7	144	140.4
85	29.4	156	153.1
90	32.2	168.4	166.5
95	35.0	182	180.8
100	37.8	196	195.8
105	40.6	211	211.8
110	43.3	226.4	228.7
115	46.1	243	246.5
120	48.9	260	265.3
125	51.7	278.4	285.2
130	54.4	296.8	306.1
135	57.2	317	328.2
140	60.0	337.3	351.4
145	62.8	359	375.9

□ Step 10. System Startup

Assure voltage to compressor does not drop below minimum allowable voltage (eg. 187 volts for 230/208-3-60, 415 volts for 460/3/60, 518 volts for 575/3/60) during the period the compressor is trying to start. **If a low voltage or voltage imbalance condition exists, the electrical problem must be determined and corrected prior to operating the unit.**

Voltage Imbalance - Voltage imbalance is becoming a more common problem. In a 3-phase system, excessive voltage imbalance between phases will cause motors to overheat and compressors to fail. Maximum allowable imbalance is 2%. To determine voltage imbalance, measure and record the voltage of all three phases. Take the measurements at the compressor terminals with the compressor operating.

Voltage Imbalance Formula:

Key:	V1, V2, V3 = line voltages as measured $V_A (\text{average}) = \frac{(V1 + V2 + V3)}{3}$ $V_D = \text{Line voltage (V1, V2, or V3) that deviates farthest from average (V}_A\text{)}$
Formula:	$\% \text{ Voltage Imbalance} = \frac{[100 \times (V_A - V_D)]}{V_A}$

If the imbalance is within the 2% tolerance, voltage imbalance is not a problem and the system may be operated. If the imbalance exceeds the 2% tolerance, follow the procedures below.

Solutions to Voltage Imbalance - The cause for a voltage imbalance problem can originate at the power company or can be caused inside the building. Try the following on-site solution to determine if the problem can be easily resolved.

Roll the connections at the compressor terminals one forward. Connect the wire now on Terminal 1 to Terminal 2, 2 to 3, and 3 to 1. Re-measure and re-calculate the voltage imbalance. If the imbalance is within 2%, the system may be operated.

If the imbalance is not within tolerance, roll the connections one more forward. Re-measure and re-calculate the voltage imbalance. If the imbalance is within 2%, the system may be operated. If the voltage imbalance still exceeds 2%, do not start the system. Contact the building owner or person responsible to have an electrician analyze the buildings's power supply and load distribution.

□ Step 11. Check Superheat and Subcooling

Superheat is the verification that the evaporator coil is properly using the refrigerant supplied. Too much superheat indicates that the coil is undercharged. Too little superheat indicates that the coil is overcharged and potentially flooding liquid refrigerant to the compressor.

Subcooling is the measurement of liquid refrigerant stored in the condenser coil. Too much subcooling indicates a system overcharge. Too little subcooling indicates a system undercharge and may not provide the thermal expansion valve with a full column of liquid refrigerant for proper operation.

Two important requirements before checking superheat/subcooling:

- 1) This unit has fully intertwined refrigerant circuits and each circuit **MUST** be isolated before measuring its temperature. Another active circuit will influence the reading and make it impossible to determine accurate superheat and subcooling.
- 2) If the circuit is equipped with an optional hot gas bypass valve, the valve must be disabled before measuring superheat and subcooling. Disable the hot gas bypass valve by removing the cover and adjusting the spring

IMPORTANT:
Do not release refrigerant to the atmosphere! If required service procedures include the adding or removing of refrigerant, the qualified HVAC service technician must comply with all federal, state or provincial, and local laws.

tension counterclockwise until the spring tension is relieved. **Count and record the number of turns** required so that you can return the bypass valve to its original setting.

Instructions for Checking and Adjusting the Superheat of an Isolated Circuit:

Step 1) Measure and record the temperature (insulate probe from surrounding air temperature) and the pressure of the suction line at the compressor.

Step 2) From the Temperature/Pressure Conversion Chart on the left, convert the pressure measured in **Step 1** to temperature.

Step 3) Subtract measured temperature in **Step 1** from the temperature taken from the Conversion Chart in **Step 2**. The answer is the degrees of superheat. **Recommended superheat range is 8-12°F (4.5-6.7°C).**

Step 4) Superheat is adjusted at the thermal expansion valve. To **reduce** superheat, turn the adjusting stem **counterclockwise**. To **increase** the superheat, turn the adjusting stem **clockwise**. Adjust and check until superheat is within the recommended range.

Step 5) Repeat **Steps 1-4** for each refrigeration circuit.

Instructions for Checking and Adjusting the Subcooling of an Isolated Circuit:

Step 1) Measure and record the temperature (insulate probe from surrounding air temperature) and the pressure of the liquid line at the condenser coil outlet.

Step 2) From the Temperature/Pressure Conversion Chart on the previous page, convert the pressure measured in **Step 1** to temperature.

Step 3) Subtract measured temperature in **Step 1** from the temperature taken from the Conversion Chart in **Step 2**. The answer is the degrees of subcooling. **Recommended subcooling range is 18-22°F (10.1-12.3°C).**

Step 4) Subcooling is adjusted by the amount of refrigerant charge. To reduce subcooling, remove refrigerant. To increase subcooling, add refrigerant. Adjust refrigerant and check until subcooling is within the recommended range.

Step 5) Repeat **Steps 1) - 4)** for each refrigeration circuit.

□ **Step 12.**

If the acid test in Step 2 indicated a compressor burnout, do the following:

a) Operate the unit for several hours. Check the pressure drop through the temporary suction line filter drier. If the pressure drop exceeds 8 psig, recover the refrigerant, replace the suction line filter drier with the same type as removed, replace the liquid line filter drier, evacuate the circuit, and re-charge with the recovered refrigerant.

Continue to monitor the pressure drop through the suction line filter drier and repeat the process above until the pressure does not exceed 8 psig after several hours of operation.

b) Allow the system to operate for 4-8 hours. Recover the refrigerant and take an oil sample. Retest the oil for acid.

c) If the test for acid is negative, remove the suction line filter drier, replace the liquid line drier, evacuate, and re-charge the system with the recovered refrigerant.

If the test indicates acid, replace both the liquid line filter drier and the suction line filter drier and repeat b) and c).

d) Verify subcooling and superheat (Refer to **Step 11.**).

e) When the system is operating properly, remove the gauges.

7.0 Compressor Maintenance and Replacement (cont'd)

Checklist, Steps 1-13 (cont'd)

□ Step 12. (cont'd)

If the acid test in **Step 2** did not indicate a compressor burnout, remove the temporary suction line filter drier.

CAUTION: Before returning to normal operation, remove the temporary suction line filter drier. See Hazard Levels, pg 3.

□ Step 13. Review Steps 1 through 12 to ensure that nothing was overlooked.

8.0 Thermal Expansion Valves

IMPORTANT: Thermostatic expansion valve P/N's listed here are for use with R22 refrigerant only. If the system is charged with R407C refrigerant (check the rating plate), contact your distributor or the factory service department for replacement information.

NOTE: Thermostatic expansion valves for RDCA and RECA are the same as for Model RCA. Thermostatic expansion valves for RDDA and REDA are the same as for Model RDA.

Model		Thermostatic Expansion Valves (R22 Refrigerant)			Connection Sizes Inlet/Outlet
RCA	RDA	Compressor - Ckt	P/N	Sporlan Model	
025	--	ZR22 - CKT A	204800	BBIVE-2-GA	1/2 / 5/8
037	--	ZR36 - CKT A	204799	BBIVE-3-GA	1/2 / 5/8
059	--	ZR36 - CKT A	204799	BBIVE-3-GA	1/2 / 5/8
		ZR22 - CKT B	204800	BBIVE-2-GA	1/2 / 5/8
060	--	ZR36 - CKT A	204799	BBIVE-3-GA	1/2 / 5/8
		ZR22 - CKT B	204800	BBIVE-2-GA	1/2 / 5/8
077	--	ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR22 - CKT B	204800	BBIVE-2-GA	1/2 / 5/8
078	102	ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR22 - CKT B	204800	BBIVE-2-GA	1/2 / 5/8
090	114	ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR36 - CKT B	204799	BBIVE-3-GA	1/2 / 5/8
108	126	ZR72 - CKT A	178509	BBIVE-6-GA	1/2 / 7/8
		ZR36 - CKT B	204799	BBIVE-3-GA	1/2 / 5/8
109	--	ZR72 - CKT A	178509	BBIVE-5-GA	1/2 / 7/8
		ZR36 - CKT B	204799	BBIVE-3-GA	1/2 / 5/8
120	144	ZR72 - CKT A	178509	BBIVE-6-GA	1/2 / 7/8
		ZR54 - CKT B	204801	BBIVE-5-GA	1/2 / 7/8
139	--	ZR54 - CKT A	204801	BBIVE-3-GA	1/2 / 5/8
		ZR54 - CKT B	204801	BBIVE-5-GA	1/2 / 7/8
		ZR36 - CKT D	204799	BBIVE-3-GA	1/2 / 5/8
164	--	ZR36 - CKT D	177381	BBIVE-3-GA	1/2 / 1/2
		ZR54 - CKT B	204801	BBIVE-5-GA	1/2 / 7/8
		ZR72 - CKT A	178509	BBIVE-6-GA	1/2 / 7/8
166	188	ZR36 - CKT C	204799	BBIVE-3-GA	1/2 / 5/8
		ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR72 - CKT B	178509	BBIVE-6-GA	1/2 / 7/8

Model		Thermostatic Expansion Valves (R22 Refrigerant)			Connection Sizes Inlet/Outlet
RCA	RDA	Compressor - Ckt	P/N	Sporlan Model	
184	220	ZR54 - CKT C	204801	BBIVE-5-GA	1/2 / 7/8
		ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR72 - CKT B	178509	BBIVE-6-GA	1/2 / 7/8
198	234	ZR72 - CKT C	178509	BBIVE-6-GA	1/2 / 7/8
		ZR54 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR72 - CKT B	178509	BBIVE-6-GA	1/2 / 7/8
176	230	ZR72 - CKT A	204801	BBIVE-5-GA	1/2 / 7/8
		ZR72 - CKT B	207801	EBSVE-11-GA	5/8 / 1-1/8
226	280	ZR72 - CKT C	178509	BBIVE-6-GA	1/2 / 7/8
		ZRT144 - CKT A&B	207801	EBSVE-11-GA	5/8 / 1-1/8
292	346	ZR72 - CKT C	207801	EBSVE-11-GA	5/8 / 1-1/8
		ZRT144 - CKT A&B	207801	EBSVE-11-GA	5/8 / 1-1/8
374	428	ZR125 - CKT C	207801	EBSVE-11-GA	5/8 / 1-1/8
		ZR125 - CKT A	207801	EBSVE-11-GA	5/8 / 1-1/8
		ZR125 - CKT B	207801	EBSVE-11-GA	5/8 / 1-1/8
	446	ZR125 - CKT C	207801	EBSVE-11-GA	5/8 / 1-1/8
		ZR125 - CKT A	207801	EBSVE-11-GA	5/8 / 1-1/8
		ZR125 - CKT B	207801	EBSVE-11-GA	5/8 / 1-1/8

Re-Heat Pump - Model RDA	Thermostatic Expansion Valves (R22 Refrigerant)			Connection Sizes Inlet/Outlet
	Compressor - Ckt	P/N	Sporlan Model	
102	ZR22 - CKT Dh	177381	BBIVE-3-GA	1/2 / 1/2
114	ZR22 - CKT Dh	177381	BBIVE-3-GA	1/2 / 1/2
126	ZR22 - CKT Dh	177381	BBIVE-3-GA	1/2 / 1/2
144	ZR22 - CKT Dh	177381	BBIVE-3-GA	1/2 / 1/2
188	ZR22 - CKT Dh	177381	BBIVE-3-GA	1/2 / 1/2
220	ZR36 - CKT Dh	179306	BBIVE-5-GA	1/2 / 1/2
230	ZR36 - CKT Dh	178509	BBIVE-6-GA	
234	ZR36 - CKT Dh	179306	BBIVE-5-GA	1/2 / 1/2
280	ZR36 - CKT Dh	179306	BBIVE-5-GA	1/2 / 1/2
346	ZR36 - CKT Dh	178509	BBIVE-6-GA	
428	ZR36 - CKT Dh	178509	BBIVE-6-GA	
446	ZR36 - CKT Dh	194153	BBIVE-8-GA	

9.0 Gas Heat Section Maintenance - Models RDCA and RDDA

This gas heater will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season. If the heater is operating in an area where an unusual amount of dust or soot or other impurities are present in the air, more frequent maintenance is recommended.

When any service is completed, be careful to reassemble correctly to ensure that no unsafe conditions are created. When re-lighting, always follow the lighting instructions on the furnace.

WARNING: Turn off the power before performing maintenance procedures. Lock disconnect switch in OFF position. When you turn off the power supply, turn off the gas at the external manual valve. See Hazard Levels, page 3.

NOTE: If the installation includes a **Model JHUP curb duct furnace**, the procedures described in Paragraph 9 also apply to the duct furnace. For illustration of a curb duct furnace, see Form I-MAPS II, Paragraph 9.4.

Gas-fired Heat Exchanger Maintenance

This gas heat section is equipped with a T_{CORE}²® style heat exchanger. The outside of the heat exchanger is accessible by opening the blower section door and sliding the blower out of the unit. Remove any external dirt or dust accumulation. Visually check the heat exchanger for cracks or holes. If a crack or hole is observed, replace the heat exchanger.

NOTE: Inspection of the lower portion of the heat exchanger is done with the burner removed. See the Burner Service section below for information on inspecting the lower portion of the heat exchanger.

Burner Maintenance

This furnace is equipped with a T_{CORE}²® style burner.

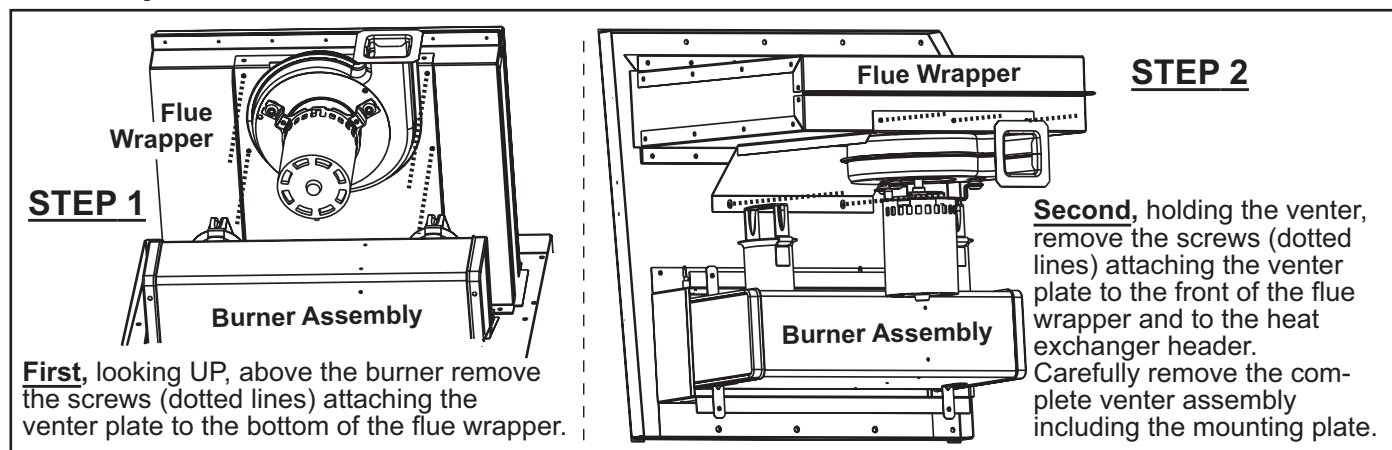
Inspect the gas heat section annually to determine if cleaning is necessary. If there is an accumulation of dirt, dust, and/or lint, clean the compartment and follow the instructions below to remove and clean the burner.

CAUTION: Use of eye protection is recommended.

Burner Removal Instructions (Refer to FIGURES 12A and 12B)

FIGURE 12A - Remove the Venter Assembly

1. Shut off the gas supply.
2. Turn off electric supply.
3. Remove the gas heat section access panel.
4. Remove the venter assembly. Disconnect the tubing. Mark and disconnect the three venter motor wires at the DSI control, capacitor wires at the capacitor (if applicable), and ground screw (located on the control panel). Follow procedure in **FIGURE 12A, STEPS 1 and 2, removing the whole assembly including the large mounting plate.**



5. **Disconnect the Gas Train** - At the gas valves, mark and disconnect the wires. Disconnect the gas supply line at the connection outside the furnace. Carefully remove the burner orifices and orifice adapter locking nuts. Remove the manifold brackets. Slide the complete gas train including valves and optional pressure switches out of the unit.
6. **Remove Burner Assembly** - Remove the screws above and below the burner assembly. Carefully pull the burner assembly out of the cabinet.

Inspect and Clean the Burner

With the burner assembly removed, shine a flashlight on the burner ribbons. Look for carbon buildup, scale, dust, lint, and/or anything that might restrict flow through the spaces between the burner ribbons. Holding the burner assembly so that any foreign material will fall away from the burner, use a stiff bristle brush to loosen and remove any foreign material(s). If the burner is excessively

9.0 Gas Heat Maintenance (cont'd)

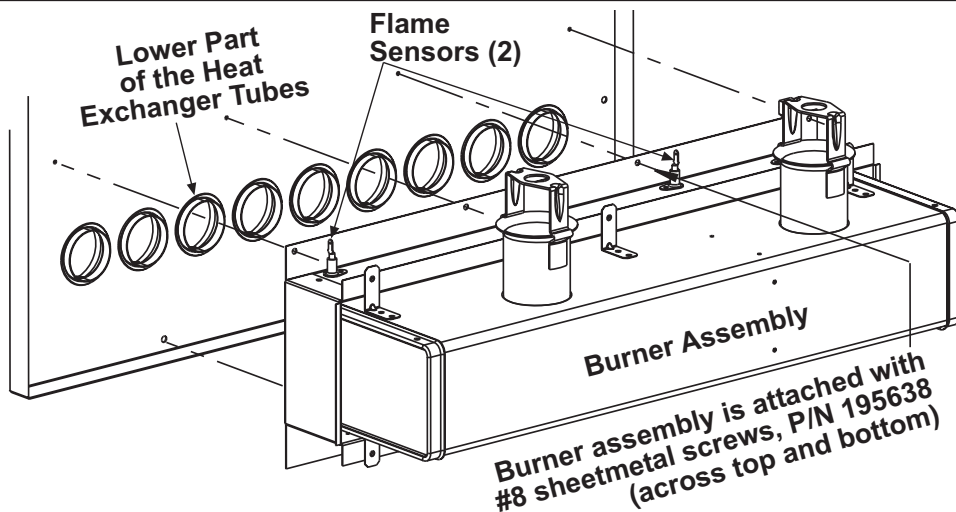
Inspect and Clean the Burner (cont'd)

dirty, remove both of the burner end caps. Remove the screws that hold the end caps to the burner housing. Lightly tap end caps to remove.

Clean all foreign material from the burner and venturi. After the burner is thoroughly cleaned, replace the end caps making certain that they are tight against the burner housing. **NOTE:** If any of the burner components are damaged or deteriorated, replace the burner assembly.

FIGURE 12B - Remove the Burner Assembly

(Venter motor and gas train are already removed in this illustration.)



Inspect the Lower Portion of the Heat Exchanger (with burner assembly removed)

Burner Orifices

At the burner flame entrance of each tube, shine a bright light into each heat exchanger section. With the light shining into the heat exchanger, observe the outside for visible light. (The outside of the heat exchanger is visible with the blower door open and the blower mounting plate slid out.) Repeat this procedure with each heat exchanger section. If any light is observed, replace the heat exchanger.

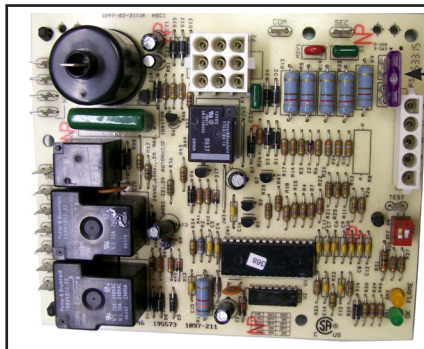
Burner orifices usually only need to be replaced when converting gas from natural to propane or propane to natural. If ordering a replacement orifice only, give BTUH content and specific gravity of gas, as well as the model and serial number of the unit and the orifice size. Each burner has two venturi and each venturi takes a different size of orifice. When removing or replacing the burner orifices be careful not to damage the venturi tubes and/or the brackets.

Ignition System

DSI Integrated Control Module (ignition system circuit board) - See **FIGURE 13**. The module monitors the operation of the gas heater including ignition. The only replaceable component is the 3 amp Type ATC or ATO fuse. If the fuse is blown, the problem is most likely an external overload. Correct the problem and replace the fuse.

FIGURE 13 - DSI Integrated Control Module (Ignition System Circuit Board)

CAUTION: Due to high voltage on the spark wire and electrode, do not touch when energized. See **Hazard Levels, page 3**.



Only replaceable part is a Type ATC or ATO 3 amp fuse (Color Code Violet), P/N 201685.

Do not attempt to disassemble the control module. However, each heating season check the lead wires for insulation deterioration and good connections. Proper operation of the direct spark ignition system requires a minimum flame signal of 1.0 microamps as measured by a microampmeter.

For further information and check out procedure on the direct spark ignition system, refer to Installation Manual (Form I-MAPS II), Paragraph 19 and the Gas Heat Section Troubleshooting Chart in Paragraph 11.

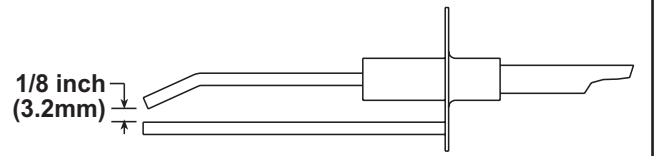
Ignitor - Locate the ignitor. Disconnect the wire; remove the screw and the ignitor. Clean the ignitor assembly with an emery cloth.

Spark gap must be maintained to 1/8". See **FIGURE 14**.

IMPORTANT: When re-assembling, the brown ground wire must remain attached to the ignitor.



**FIGURE 14 -
Ignitor showing
required Spark Gap
Measurement**



Flame Sensor - Refer to **FIGURE 12B** and locate the flame sensors (one on each burner section). Disconnect the wires; remove the screws and the flame sensor. Clean with an emery cloth.

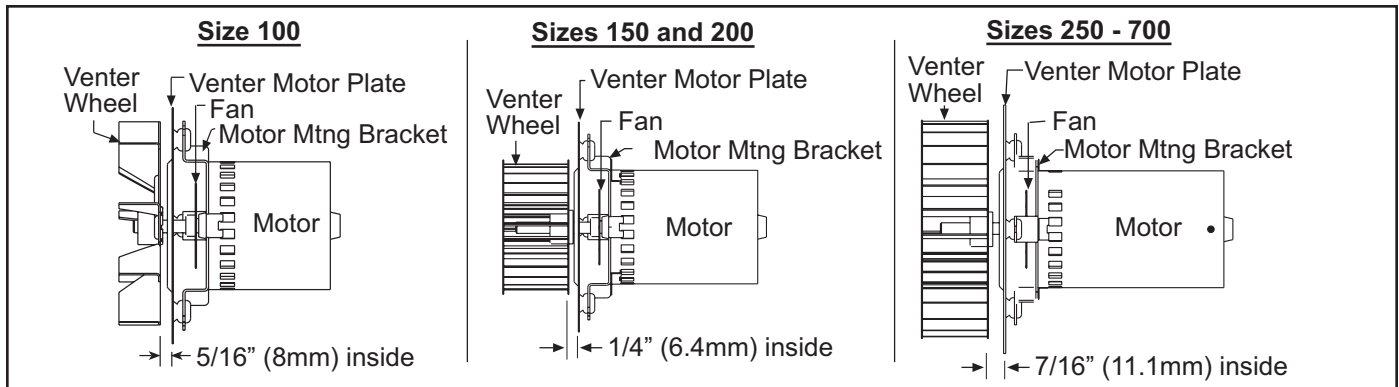
Venter Motor and Wheel

Replacement Instructions

Remove dirt and grease from the motor casing, the venter housing, and the venter wheel. Venter motor bearings are permanently lubricated. Follow these instructions for replacement of the venter motor and wheel assembly. Keep all hardware removed to be used in re-assembling and installing the replacement parts.

1. Turn off the gas and disconnect the electric power.
2. Open the gas heat section access panel and the electrical access panel below the disconnect switch.
3. Disconnect the three venter motor wires at the DSI control, capacitor wires at the capacitor (if applicable), and ground screw (located on the control panel).
4. Holding the venter motor, remove the three or four screws that attach the venter motor mounting plate to the venter housing. Remove the motor and wheel assembly from the gas heater.
5. Re-assemble with the replacement venter motor and wheel assembly. See **FIGURE 15**, for proper spacing.

FIGURE 15 - Venter Wheel Position on Shaft



6. Follow the wiring diagram to re-connect the venter wires.
7. Close the access panel. Restore power to the gas heater and turn on the gas. Check for proper operation.

Re-Assemble the Heat Section Gas Train, Burner, and Venter

Instructions to Re-Assemble the Gas Heat Section (Refer to FIGURES 12A and 12B, pages 21 and 22.)

1. **Attach the Burner Assembly** - Slide the entire burner assembly into position. Insert all of the screws along the top and the bottom.
2. **Attach the Gas Train** - Position the gas train so that the orifice adapters are through the brackets. Attach the manifold to the manifold brackets.

9.0 Gas Heat Section Maintenance (cont'd)

Gas Valves

Single-Stage Gas Valve

(Side View and Top View)



1/8" Outlet Pressure Tap

Re-Assemble the Heat Section Gas Train, Burner, & Venter (cont'd)

Install the orifice adapter nuts and the gas orifices being careful not to damage the venturi tubes and/or the brackets. Re-connect the wires to the gas valves.

3. Re-attach the venter assembly. (If replacing venter parts, follow instructions above.) Re-connect the tubing and wires.
4. Close the access panel.
5. Reconnect the gas supply at the union outside of the cabinet. Leak test the connection with leak detecting solution.
6. Turn on the electric and the gas. Check for proper operation.

WARNING: The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting to the unit to ensure positive closure. See Hazard Levels, page 3.

Carefully remove external dirt accumulation from the valve and check wiring connections.

The combination gas valves must be checked annually to ensure that each valve is shutting off gas flow completely.

Instructions:

- 1) Locate the 1/8" NPT pressure tap on the first combination valve (see illustration on the left).

- 2) Turn the manual valve OFF to prevent flow to the manifold. Connect a manometer to the 1/8" outlet pressure tap of the first single-stage valve.

NOTE: A manometer (fluid-filled gauge) with an inches water column scale is recommended.

Turn the manual valve ON and the heater off.

- 3) Use your finger to fully block the burner orifice. Continue blocking the orifice for several seconds and observe the manometer. If any pressure is indicated, the gas valve is leaking. A leaking gas valve must be replaced before the heater is put back in operation.

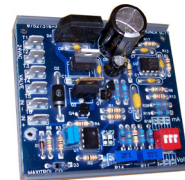
- 4) Repeat the test with each single-stage gas valve.

CAUTION: DO NOT bottom out the gas valve regulator adjusting screw. This can result in unregulated manifold pressure causing excess overfire and heat exchanger failure.

Modulating/Regulating Valve in Optional 6:1 Gas Control



Units with optional 6:1 turndown (Option AG57) include a modulating/regulating valve in addition to the two single-stage valves. The modulating/regulating valve is controlled by a signal conditioner responding to the system controller to provide the modulated gas flow for 6:1 turndown. The only field maintenance to the modulating gas valve is to carefully remove dirt accumulation and to check wiring connections.



P/N 131470

Maxitrol Signal Conditioner used in Control Option AG57

Combustion Air Pressure Switch



See **FIGURE 1A**, page 5, Item 17, for location. If it is determined that the pressure switch needs replacing, use only the factory-authorized replacement part that is designed for the model and size of gas heater being serviced.

Limit Control



The limit control is located in the blower compartment with the capillary extending across the heat exchanger. (**NOTE:** For Model JHUP curb duct furnace, see Form I-MAPS, Paragraph 9.4 for location.)

If it is determined that the limit control needs replacing, use only a factory-authorized replacement part that is designed for the size of heater.

10.0 Electric Heat Section Maintenance - Models REDA and RECA

DANGER: Turn off the power locking the disconnect switch. Allow the heating elements to cool.

CAUTION: Wearing eye protection is recommended when cleaning the heating elements and cabinet.

Check the heating elements at the beginning of the heating season. Carefully clean all dust and dirt from the heating elements using a brush or steel wool. With a vacuum or air hose, clean the inside of the cabinet especially the bottom and sides where dirt and dust will accumulate.

11.0 Troubleshooting

IMPORTANT: *Do not release refrigerant to the atmosphere!* If required service procedures include the adding or removing of refrigerant, the service technician must comply with all federal, state and local laws. The procedures discussed in this manual should only be performed by a qualified HVAC technician.

General Refrigeration Circuit

NOTE: Unit is equipped with a phase loss/phase reversal control. If system does not start, check phase of electrical supply.

General Refrigeration Circuit		
SYMPTOM	POSSIBLE CAUSE	REMEDY
A. Compressor will not start.	1. Power off, loose electrical connections or fuse open.	1. Check disconnect switch, fuses and wiring. Replace parts or repair as necessary
	2. Compressor contactor not closing.	2. Check voltage to contactor coil, transformer, slave relay, system. Replace parts as necessary.
	3. Internal compressor thermal overload open.	3. If compressor is hot, allow 2 hours to cool. See D. below.
	4. Compressor defective.	4. Check compressor for electrical failure. Compressor may be seized; check refrigerant. If necessary, replace compressor.
	5. High or low pressure switch open or defective.	5. If manual reset (high pressure), reset switch. (Switch opens at 400 psi and will not reset above 250 psi.) If auto reset (low pressure) does not reset and everything else is OK, replace switch.
B. Compressor starts but cuts out on low pressure (low pressure switch activates at 8 psig.)	1. Low refrigerant charge.	1. Check refrigerant pressures.
	2. Airflow restricted.	2. Check for dirty evaporator coil, dirty filters, dampers closed, iced evaporator coil, improper belt, check motor amps, check duct design.
	3. Restriction in refrigerant line.	3. Check refrigerant pressure, check and adjust thermal expansion valve. If not functioning properly, check for pressure drop across the filter drier.
	4. Defective low pressure switch.	4. Check calibration of switch.
C. Compressor starts but cuts out on high pressure switch.	1. Refrigerant overcharge.	1. Check pressures, charge by sub cooling.
	2. Condenser fan motor defective.	2. Check fan motor.
	3. Condenser coil inlet obstructed or dirty.	3. Check coil and inlet clearances and for possible air recirculation.
	4. Air or non-condensables in system.	4. Check high side equalized pressure reading with equivalent outdoor temperature.
	5. Defective high pressure switch.	5. Check calibration of switch.
	6. Restriction in discharge or liquid line.	6. Check refrigerant line pressures, check thermal expansion valves.
D. Compressor cuts out on thermal overload.	1. Low voltage.	1. Check voltage.
	2. Sustained high discharge pressure.	2. Check running amperage and conditions described in I.
	3. High suction and discharge pressures.	3. Check thermal expansion valve setting, check for air in system.
	4. Defective compressor overload.	4. If compressor is hot, allow compressor to cool for two hours. Recheck for open circuit.
	5. Defective run capacitor.	5. Check run capacitor for compressor and fan motor.
	6. Improper refrigerant charge.	6. Check subcooling.
	7. Bearings or pistons too tight.	7. Check for low oil level.
	8. Allow time for compressor to cool.	8. Check dome temperature of the compressor.
E. Noisy compressor.	1. Refrigerant overcharge.	1. Check pressures and subcooling.
	2. Liquid floodback.	2. Check thermal expansion valve setting. Check for refrigerant overcharge.
	3. Tubing rattle.	3. Dampen tubing vibration by taping or clamping. Carefully bend tubing away from contact where possible.
	4. Compressor defective.	4. Check internal parts; replace.
F. Noisy unit operation.	1. Blower rotational noise.	1. Check blower, motor and drive for faulty adjustment or noisy bearings, loose parts, and/or blower out of balance.
	2. Air noise.	2. Check ductwork. Air velocity too high.
	3. Chattering contactor.	3. Check for adequate control voltage, check for shorts or breaks, check thermostat, check contact points.
	4. Tubing rattle.	4. Dampen by taping or clamping, carefully bend tubing away from contact when possible.

(continued)

11.0 Troubleshooting (cont'd)

General Refrigeration Circuit (cont'd)		
SYMPTOM	POSSIBLE CAUSE	REMEDY
G. High suction pressure	1. Excessive load on evaporator coil.	1. Check for high entering wet bulb temperature. Check for excessive air.
	2. Compressor is unloaded.	2. Check head pressure, check thermal expansion valve if not functioning properly, check pressure drop across filter drier.
	3. Expansion valve not secured to suction line or valve defective.	3. Check the thermal expansion valve, ensure bulb is insulated.
H. High discharge pressure.	1. Thermal expansion valve setting.	1. Check thermal expansion setting and calibrate superheat.
	2. Air inlet to condenser dirty or obstructed.	2. Check for proper clearances and possible air recirculating.
	3. Condenser fan motor defective.	3. Check condenser fan motor and capacitor.
I. Suction pressure is too low.	1. Refrigerant undercharge.	1. Check pressures and subcooling.
	2. Blower running backward.	2. Interchange any two wires from 3 phase disconnect.
	3. Loose blower, pulley or belts.	3. Check drive pulley alignment, belt tension.
	4. Defective or improperly adjusted expansion valve.	4. Check superheat and adjust thermal expansion valve.
	5. Dirty filter.	5. Check filter and evaporator coil.
	6. Too little air flow or low entering air temperature.	6. Check airflow and entering air wet bulb conditions.
	7. Restriction in suction or liquid line.	7. Check refrigerant circuit for restriction.
J. Head pressure too low.	1. Insufficient refrigerant charge.	1. Check subcooling, check for leak.
	2. Defective or improperly adjusted expansion valve.	2. Check superheating and adjust thermal expansion valve.
	3. Low suction pressure.	3. See "suction pressure too low" above.
	4. Defective compressor.	4. See "high suction pressure" above.
K. Compressor short cycles.	1. Thermostat location or malfunction.	1. Check thermostat, check heat anticipator setting.
	2. Improper refrigerant charge.	2. Check subcooling, verify superheat.
	3. Defective high or low pressure control.	3. Check high or low pressure switch.
	4. Liquid floodback.	4. Possible tight bearings, see above.
	5. Defective expansion valve.	5. Check thermal expansion valve and superheat.
	6. Poor air distribution.	6. Check ductwork for recirculating.
	7. High discharge pressure.	7. See "high discharge pressure" above.
	8. Leaking discharge valves in compressor.	8. See "high suction pressure" above.
L. Running cycle is too long or unit operates continuously.	1. Refrigeration undercharged.	1. Check subcooling.
	2. Dirty filter or evaporator coil.	2. Check filter, coil and airflow.
	3. Dirty or clogged condenser coil.	3. Check coil and airflow.
	4. Air or other non-condensables in system.	4. Check equalized high side pressure with equivalent outdoor temperature.
	5. Defective compressor.	5. See "high suction pressure" above.
	6. Restriction in suction and liquid line.	6. Check for restrictions in refrigerant circuit.
	7. Control contacts stuck.	7. Check wiring.
M. Supply air temperature is too high.	1. Refrigerant undercharge or leak in system.	1. Check subcooling and check for leaks.
	2. Evaporator plugged with dirt or ice.	2. Check evaporator, airflow and filter.
	3. Improperly adjusted or defective expansion valve.	3. Check superheat & adjust thermal expansion valve, check bulb.
	4. Defective compressor.	4. Check compressor for proper operation.
	5. High discharge pressure.	5. See "high discharge pressure" above.
	6. Airflow is too high.	6. Check external static pressure.
N. Supply air temperature is too low.	1. Airflow is too low.	1. Check evaporator coil; check filters, check for closed dampers or grills, check drive for loose parts, belts, or misalignment; check external static pressure.
	2. Return air temperature too low.	2. Check entering air wet bulb conditions.
O. Liquid line is too hot.	1. Refrigerant undercharge.	1. Adjust the charge by subcooling.
	2. High discharge pressure.	2. See I. above.

Troubleshooting Gas Heat Section - Model RDCA, Model RDDA, and an Optional Model JHUP Duct Furnace

Check the Lights on the DSI Integrated Control Module (Ignition System Circuit Board)

The ignition system circuit board monitors the operation of the heater and includes two LED signal lights that indicate normal operation and various abnormal conditions. If the heater fails to operate properly, check this signal to determine the cause and/or to eliminate certain causes. See operating sequence on the wiring diagram.

Control Status - Green LED Codes

Steady ON Normal Operation, No call for heat
 Fast Flash Normal Operation, Call for heat
 1 Flash System Lockout, Failed to detect or sustain flame
 2 Flashes Pressure Switch Did Not Close within 30 Seconds of Venter Motor
 3 Flashes High Limit or Flame Rollout Switch Open
 4 Flashes Pressure Switch is Closed Before Venter Motor is Energized
 Steady OFF Blown fuse, No Power, or Defective Board

Flame Status - Yellow LED Codes

Steady ON Flame is sensed
 Slow Flash Weak flame (current below 1.0 microamps $\pm$ 50%)
 Fast Flash Undesired Flame (valve open and no call for heat)

Do not attempt to repair the DSI integrated control module (circuit board); the only field replaceable component is the fuse. **IMPORTANT:** When using a mul-

timer to troubleshoot the 24 volt circuit, place the meter's test leads into the 5 or 9 pin connectors located on the ignition control. Do not remove connectors or terminals from the electrical components. Doing so can result in misinterpreted readings due to the ignition control board's fault mode monitoring circuits.

Troubleshooting - Gas Heat Section and Optional Curb Duct Furnace

PROBLEM	PROBABLE CAUSE	REMEDY
Venter motor will not start	1. No power to unit.	1. Turn on power; check supply fuses or main circuit breaker.
	2. No 24 volt power to ignition system circuit board.	2. Turn up thermostat; check control transformer output.
	3. Integrated circuit board fuse blown.	3. Correct cause. Replace fuse (type ATC or ATO, 32VDC, 3A).
	4. No power to venter motor.	4. Tighten connections at circuit board and/or motor terminals.
	5. Integrated circuit board defective.	5. Replace integrated circuit board.
	6. Defective venter motor.	6. Replace venter motor. See Paragraph 9.
Burner will not light	1. Manual valve not open.	1. Open manual valve.
	2. Air in the gas line.	2. Bleed gas line (initial startup only).
	3. Gas pressure too high or too low.	3. See installation manual, Form I-MAPS II, Paragraph 9.3.
	4. No Spark:	4.
	a) Loose wire connections.	a) Be certain all wire connections are solid.
	b) Transformer failure.	b) Be sure 24 volts is available.
	c) Incorrect spark gap.	c) Maintain spark gap at 1/8".
	d) Spark cable shorted to ground.	d) Replace worn or grounded spark cable.
	e) Spark electrode shorted to ground.	e) Replace if ceramic spark electrode is cracked or grounded.
	f) Burner not grounded.	f) Make certain circuit board is grounded to ignitor.
	g) Ignition system circuit board not grounded.	g) Make certain circuit board is grounded to furnace chassis.
	h) Unit not properly grounded.	h) Make certain unit is properly field grounded to earth ground and properly phased (L1 to hot lead L2 to neutral).
	i) Ignition system circuit board fuse blown.	i) Correct cause. Replace fuse (type ATC or ATO, 32VDC, 3A).
	j) Faulty circuit board.	j) If 24 volt is available to the circuit board and all other causes have been eliminated, replace board.
	5. Lockout device interrupting control circuit by above causes.	5. Reset lockout by interrupting control.
	6. Combustion air proving switch not closing	6a) Remove obstructions from vent. 6b) Replace faulty tubing to pressure switch..
	7. Faulty combustion air proving switch.	7. Replace combustion air proving switch.
	8. Valve not operating.	8.
	a) Defective valve.	a) If 24 volt is measured at the valve connections and valve remains closed, replace valve.
	b) Loose wire connections	b) Check and tighten all wiring connections.
	9. Circuit board does not power valves.	9.
	a) Loose wire connections.	a) Check and tighten all wiring connections.
	b) Flame sensor grounded.	b) Be certain flame sensor lead is not grounded or insulation or ceramic is not cracked. Replace as required.
	c) Incorrect gas pressure.	c) See installation manual, Form I-MAPS II, Paragraph 9.3.
	d) Cracked ceramic at sensor.	d) Replace sensor.
Burner cycles on and off	1. Gas pressure too high or too low.	1. See installation manual, Form I-MAPS II, Paragraph 9.3.
	2. Burner not grounded	2. Make certain integrated circuit board is grounded to ignitor.
	3. Circuit board not grounded.	3. Make certain integrated circuit board is grounded to furnace chassis.
	4. Faulty integrated circuit board	4. If 24 volt is available to the circuit board and all other causes have been eliminated, replace board.
	5. Combustion air proving switch not closing.	5. a) Make sure unit is properly vented. b) Remove obstructions from vent. c) Replace faulty tubing to pressure switch.
	6. Faulty combustion air proving switch.	6. Replace combustion air proving switch.
	7. Flame sensor grounded.	7. Be certain flame sensor lead is not grounded or insulation or ceramic is not cracked. Replace as required.
	8. Cracked ceramic at sensor.	8. Replace sensor.
	9. Incorrect polarity.	9. Reverse line volt leads to integrated circuit board.
No heat (Heater Operating)	1. Incorrect valve outlet pressure or orifice.	1. Check valve outlet pressure. See Rating plate for manifold pressure.
	2. Cycling on limit control.	2. Check air throughput.
Venter motor will not run	1. Circuit open.	1. Check wiring and connections.
	2. Defective integrated circuit board.	2. Replace board.
	3. Defective motor.	3. Replace motor.
Venter motor cuts out on overload	1. Low or high voltage supply.	1. Correct electric supply.
	2. Defective motor.	2. Replace motor.

11.0 Troubleshooting (cont'd)

Troubleshooting the Electric Heat Section - Models REDA and RECA

PROBLEM	PROBABLE CAUSE	REMEDY
Unit does not operate	1. No power to unit	1. Turn on power; check supply fuses or main circuit breaker.
	2. Blown fuses	2. Check and replace if necessary.
	3. Defective or incorrect wiring.	3. Check wiring and connections. Refer to wiring diagram provided with unit.
	4. Defective or burned out control transformer	4. Check secondary voltage with voltmeter. Replace if necessary.
Fan operates but element does not heat	1. Dirty filters	1. Check filters and clean or replace if necessary.
	2. Defective air proving switch	2. Check and replace if necessary.
	3. Blown element fuses	3. Check and replace element fuses if necessary.
Insufficient heat	1. Burned out element	1. Turn off power and check element resistance with ohmmeter. Replace if open.
	2. Blown fuses	2. Check and replace if necessary.
	3. Cycling on limit control	3.
		a) Check air throughput (temperature rise).
		b) Check motor rpm against nameplate rating. Replace motor if speed is too slow.
		c) Defective limit control. Check wiring and connections. Check continuity through control and replace if necessary.
	4. Defective or incorrect wiring.	4. Check wiring and connections. Refer to wiring diagram provided with unit.

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INSTALLATION RECORD (TO BE COMPLETED BY INSTALLER)

Model	Serial No.	Date of Installation	Notes
	Installer	Distributor	
Name			
Company			
Address			
Phone No.			

For more information on Reznor HVAC products:

- Contact your local Reznor representative at 1-800-695-1901
- Refer to the technical specifications, manuals, and consumer materials found at www.reznorhvac.com

