



# RN SERIES

(11-25 & 30 tons)

Horizontal Packaged Rooftop Units, Heat Pumps,  
& Outdoor Air Handling Units



## Installation, Operation, & Maintenance



### WARNING

#### FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury, death or property damage.

Be sure to read and understand the installation, operation, and service instructions in this manual.

Improper installation, adjustment, alteration, service, or maintenance can cause serious injury, death, or property damage.

A copy of this IOM must be kept with the unit.

### WARNING

- Do not store 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.
- Startup and service must be performed by a Factory Trained Service Technician.



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# AAON® RN Series Horizontal Configuration

## Features and Options Introduction

### Energy Efficiency

- Direct Drive Backward Curved Plenum Supply Fans
- Variable Capacity R-410A Scroll Compressors
- Airside Economizers
- Factory Installed AAONNAIRE® Energy Recovery Wheels
- Double Wall Rigid Polyurethane Foam Panel Construction, R-13 Insulation
- Modulating Natural Gas Heaters
- Modulating/SCR Electric Heaters
- Premium Efficiency Motors
- Variable Speed Supply/Return/Exhaust Fans
- Water-Cooled Condensers
- Air-Source, Water-Source and Geothermal Heat Pumps

### Indoor Air Quality

- 100% Outside Air
- Constant Volume Outside Air Control
- Economizer CO<sub>2</sub> Override
- High Efficiency Filtration
- Double Wall Rigid Polyurethane Foam Panel Construction, R-13 Insulation
- Interior Corrosion Protection

### Humidity Control

- High Capacity Cooling Coils
- Variable Capacity Compressors
- Factory Installed AAONNAIRE Total Energy Recovery Wheels
- Mixed/Return Air Bypass
- Modulating Hot Gas Reheat

### Safety

- Burglar Bars
- Freeze Stats
- Electric Preheat
- Phase and Brown Out Protection
- Supply/Return Smoke Detectors
- Supply/Return Firestats

### Installation and Maintenance

- Clogged Filter Switch
- Color Coded Wiring Diagram
- Compressors in Isolated Compartment
- Compressor Isolation Valves
- Convenience Outlet
- Direct Drive Supply Fans
- Hinged Access Doors with Lockable Handles
- Magnehelic Gauge
- Service Lights
- Sight Glass

### System Integration

- Chilled Water Cooling Coils
- Controls by Others
- Electric/Natural Gas/LP Heating
- Hot Water/Steam Heating Coil
- Non-Compressorized DX Coils
- Water-Cooled Condensers

### Environmentally Friendly

- Airside Economizers
- Factory Installed AAONNAIRE Energy Recovery Wheels
- Mixed/Return Air Bypass
- R-410A Refrigerant

### Extended Life

- 5 Year Compressor Warranty
- 15 Year Aluminized Steel Heat Exchanger Warranty
- 25 Year Stainless Steel Heat Exchanger Warranty
- Condenser Coil Guards
- Interior Corrosion Protection
- Polymer E-Coated Coils - 5 Year Warranty
- Stainless Steel Coil Casing
- Stainless Steel Drain Pans

## Safety

Attention must be paid to the following statements:

**NOTE** - Notes are intended to clarify the unit installation, operation, and maintenance.

**⚠ CAUTION** - Caution statements are given to prevent actions that may result in equipment damage, property damage, or personal injury.

**⚠ WARNING** - Warning statements are given to prevent actions that could result in equipment damage, property damage, personal injury or death.

**⚠ DANGER** - Danger statements are given to prevent actions that will result in equipment damage, property damage, severe personal injury or death.

### **⚠ WARNING**

#### **ELECTRIC SHOCK, FIRE OR EXPLOSION HAZARD**

Failure to follow safety warnings exactly could result in dangerous operation, serious injury, death or property damage.

Improper servicing could result in dangerous operation, serious injury, death, or property damage.

- Before servicing, disconnect all electrical power to the furnace. More than one disconnect may be provided.
- When servicing controls, label all wires prior to disconnecting. Reconnect wires correctly.
- Verify proper operation after servicing. Secure all doors with key-lock or nut and bolt.

### **⚠ CAUTION**

#### **WHAT TO DO IF YOU SMELL GAS**

- Do not try to turn on unit.
- Shut off main gas supply.
- Do not touch any electric switch.
- Do not use any phone in the building.
- Never test for gas leaks with an open flame.
- Use a gas detection soap solution and check all gas connections and shut off valves.

### **⚠ WARNING**

Electric shock hazard. Before servicing, shut off all electrical power to the unit, including remote disconnects, to avoid shock hazard or injury from rotating parts. Follow proper Lockout-Tagout procedures.



 **WARNING**

**FIRE, EXPLOSION OR CARBON MONOXIDE POISONING HAZARD**

Failure to replace proper controls could result in fire, explosion, or carbon monoxide poisoning. Failure to follow safety warnings exactly could result in serious injury, death or property damage. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this appliance.

 **WARNING**

**CARBON MONOXIDE POISONING HAZARD**

Failure to follow instructions could result in severe personal injury or death due to carbon-monoxide poisoning, if combustion products infiltrate into the building.

Check that all openings in the outside wall around the vent (and air intake) pipe(s) are sealed to prevent infiltration of combustion products into the building.

Check that furnace vent (and air intake) terminal(s) are not obstructed in any way during all seasons.

 **WARNING**

During installation, testing, servicing, and troubleshooting of the equipment it may be necessary to work with live electrical components. Only a qualified licensed electrician or individual properly trained in handling live electrical components shall perform these tasks.

Standard NFPA-70E, an OSHA regulation requiring an Arc Flash Boundary to be field established and marked for identification of where appropriate Personal Protective Equipment (PPE) be worn, must be followed.

 **WARNING**

**ROTATING COMPONENTS**

Unit contains fans with moving parts that can cause serious injury. Do not open door containing fans until the power to the unit has been disconnected and fan wheel has stopped rotating.

**! WARNING**

**GROUNDING REQUIRED**

All field installed wiring must be completed by qualified personnel. Field installed wiring must comply with NEC/CEC, local and state electrical code requirements. Failure to follow code requirements could result in serious injury or death. Provide proper unit ground in accordance with these code requirements.

**! WARNING**

**VARIABLE FREQUENCY DRIVES**

Do not leave VFDs unattended in hand mode or manual bypass. Damage to personnel or equipment can occur if left unattended. When in hand mode or manual bypass mode VFDs will not respond to controls or alarms.

**! CAUTION**

Electric motor over-current protection and overload protection may be a function of the Variable Frequency Drive to which the motors are wired. Never defeat the VFD motor overload feature. The overload ampere setting must not exceed 115% of the electric motor's FLA rating as shown on the motor nameplate.

**! WARNING**

**UNIT HANDLING**

To prevent injury or death lifting equipment capacity shall exceed unit weight by an adequate safety factor. Always test-lift unit not more than 24 inches high to verify proper center of gravity lift point to avoid unit damage, injury or death.

**! CAUTION**

Failure to properly drain and vent coils when not in use during freezing temperature may result in coil and equipment damage.

**! CAUTION**

Rotation must be checked on all **MOTORS AND COMPRESSORS** of 3 phase units at startup by a qualified service technician. Scroll compressors are directional and can be damaged if rotated in the wrong direction. Compressor rotation must be checked using suction and discharge gauges. Fan motor rotation must be checked for proper operation. Alterations must only be made at the unit power connection

**! WARNING**

Do not use oxygen, acetylene or air in place of refrigerant and dry nitrogen for leak testing. A violent explosion may result causing injury or death.

**! WARNING**

**WATER PRESSURE**

Prior to connection of condensing water supply, verify water pressure is less than maximum pressure shown on unit nameplate. To prevent injury or death due to instantaneous release of high pressure water, relief valves must be field supplied on system water piping.

**! WARNING**

Always use a pressure regulator, valves and gauges to control incoming pressures when pressure testing a system. Excessive pressure may cause line ruptures, equipment damage or an explosion which may result in injury or death.

**! CAUTION**

To prevent damage to the unit, do not use acidic chemical coil cleaners. Do not use alkaline chemical coil cleaners with a pH value greater than 8.5, after mixing, without first using an aluminum corrosion inhibitor in the cleaning solution.

**! WARNING**

Some chemical coil cleaning compounds are caustic or toxic. Use these substances only in accordance with the manufacturer's usage instructions. Failure to follow instructions may result in equipment damage, injury or death.

**! CAUTION**

Do not clean DX refrigerant coils with hot water or steam. The use of hot water or steam on refrigerant coils will cause high pressure inside the coil tubing and damage to the coil.

**! CAUTION**

Door compartments containing hazardous voltage or rotating parts are equipped with door latches to allow locks. Door latch are shipped with nut and bolts requiring tooled access. If you do not replace the shipping hardware with a pad lock always re-install the nut & bolt after closing the door.

**! CAUTION**

Cleaning the cooling tower or condenser water loop with harsh chemicals such as hydrochloric acid (muriatic acid), chlorine or other chlorides, can damage the refrigerant-to-water heat exchanger. Care must be taken to avoid allowing chemicals to enter the refrigerant-to-water heat exchanger. See Appendix A - Heat Exchanger Corrosion Resistance for more information.

**! WARNING**

**OPEN LOOP APPLICATIONS**

Failure of the condenser as a result of chemical corrosion is excluded from coverage under AAON Inc. warranties and the heat exchanger manufacturer's warranties.

**! WARNING**

**WATER FREEZING**

Failure of the condenser due to freezing will allow water to enter the refrigerant circuit and will cause extensive damage to the refrigerant circuit components. Any damage to the equipment as a result of water freezing in the condenser is excluded from coverage under AAON warranties and the heat exchanger manufacturer warranties.

**! WARNING**

**COMPRESSOR CYCLING**

**3 MINUTE MINIMUM OFF TIME**

To prevent motor overheating compressors must cycle off for a minimum of 5 minutes.

**5 MINUTE MINIMUM ON TIME**

To maintain the proper oil level compressors must cycle on for a minimum of 5 minutes.

The cycle rate must not exceed 7 starts per hour.

1. Startup and service must be performed by a Factory Trained Service Technician.
2. Use only with type of the gas approved for the furnace. Refer to the furnace rating plate.
3. The unit is for outdoor use only. See General Information section for more information.
4. Provide adequate combustion ventilation air to the furnace. If a vent duct extension is used, a class III approved vent is required. See the Locating Units and Gas Heating sections of the Installation section of the manual.
5. Always install and operate furnace within the intended temperature rise range and duct system external static pressure (ESP) as specified on the unit nameplate.
6. The supply and return air ducts must be derived from the same space. It is recommended ducts be provided with access panels to allow inspection for duct tightness. When a down flow duct is used

with electric heat, the exhaust duct must be an L shaped duct.

7. Clean furnace, duct and components upon completion of the construction setup. Verify furnace operating conditions including input rate, temperature rise and ESP.
8. Every unit has a unique equipment nameplate with electrical, operational, and unit clearance specifications. Always refer to the unit nameplate for specific

ratings unique to the model you have purchased.

9. READ THE ENTIRE INSTALLATION, OPERATION AND MAINTENANCE MANUAL. OTHER IMPORTANT SAFETY PRECAUTIONS ARE PROVIDED THROUGHOUT THIS MANUAL.
10. Keep this manual and all literature safeguarded near or on the unit.

## RN Series Feature String Nomenclature

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B									
RN	A	- 011	- C	- 0	- 3	- A	A	A	0	2	- B	0	1	B	0	:	0	1	- D	Q	0	J	- E	0	0	- 0	0	0	0	- 0	0	0	0	- D	A	- A	0	A	A	- A	0								
						B	0	- G	- 0	0	0	- 4	A	- E	A	0	0	- 0	0	- 5	W	0	- B	F	0	Q	A	0	- A	0	0	0	0	0	0	- 0	0	0	0	0	0	X							
						11A	11B		12		13A	13B	13C		14	15	16A	16B	16C	16D		17A	17B		18A	18B	18C		19	20	21	22	23	24		25	26	27	28	29	30		31	32	33	34	35	36	37

### MODEL OPTIONS

#### SERIES AND GENERATION

RN

#### MAJOR REVISION

A

#### UNIT SIZE

011= 11 ton Capacity

013= 13 ton Capacity

016 = 16 ton Capacity

018 = 18 ton Capacity

020 = 20 ton Capacity

025 = 25 ton Capacity

030 = 30 ton Capacity

#### SERIES

C = C Series

#### MINOR REVISION

0

#### VOLTAGE

2 = 230V/3Φ/60Hz

3 = 460V/3Φ/60Hz

4 = 575V/3Φ/60Hz

6 = 380V/3Φ/50Hz

8 = 208V/3Φ/60Hz

### Model Option A: COOLING/HEAT PUMP

#### A1: COMPRESSOR STYLE

0 = No Compressor

A = R-410A Scroll Compressor

C = R-410A Variable Speed Scroll Compressor

D = R-410A Variable Capacity Scroll Compressor

#### A2: CONDENSER STYLE

0 = No Condenser

A = Microchannel Air-Cooled Condenser

F = Water-Cooled Condenser

J = Air-Source Heat Pump

L = Water-Source Heat Pump

N = DX Air Handling Unit

#### A3: INDOOR COIL CONFIGURATION

0 = No Cooling Coil

A = Standard Evaporator

B = 6 Row Evaporator

E = 4 Row Chilled Water Coil

F = 6 Row Chilled Water Coil

#### A4: COOLING HEAT EXCHANGER CONSTRUCTION

0 = Standard

A = Polymer E-Coated Cooling Coil

B = Stainless Steel Cooling Coil Casing

D = Option A + B

E = Polymer E-Coated Cond. Coil

J = Polymer E-Coated Evap. And Cond. Coil

N = SMO 254 Corrosion Resistant Refrigerant-to-Water Heat Exchanger

P = Polymer E-Coated Evap. Coil + SMO 254 Corrosion Resistant Refrigerant-to-Water Heat Exchanger

Q = Stainless Steel Evap. Coil Casing + SMO 254 Corrosion Resistant Refrigerant-to-Water Heat Exchanger

T = Option B + J

#### A5: COOLING STAGING

0 = No Cooling

A = 1 Variable Capacity Comp + 1 On/Off Comp

A = 1 Variable Speed Comp + 2-Stage Comp

B = 2 Variable Capacity Comp

F = Single Serpentine 8 FPI

G = Half Serpentine 8 FPI

H = Single Serpentine 10 FPI

J = Half Serpentine 10 FPI

K = Single Serpentine 12 FPI

L = Half Serpentine 12 FPI

N = DX Air Handler with 2 Refrigeration Circuits

2 = 2 Stage

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B		
RN	A	- 011	- C	- 0	- 3	- A	A	A	0	2	- B	0	1	B	0	:	0	1	- D	Q	0	J	- E	0	0	- 0	0	0	0	- 0	0	0	0	0	- D	A	- A	0	A	A	- A	0
						B	0	- G	- 0	0	0	- 4	A	- E	A	0	0	- 0	0	- 5	W	0	- B	F	0	Q	A	0	- A	0	0	0	0	0	0	- 0	0	0	0	0	0	X
						11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

### Model Option B: HEATING

#### B1: HEAT TYPE

- 0 = No Heat
- B = Electric Heat
- D = Natural Gas
- G = LP Gas
- K = Hot Water Coil
- M = Steam Distributing Coil

#### B2: HEAT CONSTRUCTION

- 0 = Standard
- A = Aluminized Heat Exchanger
- B = Stainless Steel Heat Exchanger
- C = High Altitude Aluminized Heat Exchanger
- D = High Altitude Stainless Steel Heat Exchanger
- G = Polymer E-Coated Heating Coil

#### B3: HEAT DESIGNATION

- 0 = No Heat
- 1 = 20 kW
- 2 = 40 kW
- 3 = 60 kW
- 4 = 80 kW
- 5 = 100 kW
- 6 = 120 kW
- 1 = 270 MBH
- 2 = 405 MBH
- 3 = 540 MBH
- A = 1 Row
- E = 2 Row

#### B4: HEAT STAGING

- 0 = No Heat
- A = 1 Stage
- B = 2 Stage
- C = 3 Stage
- D = 4 Stage
- E = 5 Stage
- F = 6 Stage
- G = 7 Stage
- H = 8 Stage
- K = Modulating Gas Heat
- L = High Turndown Modulating Gas Heat
- M = Modulating SCR Electric with Potentiometer Control
- N = Modulating SCR Electric with External 0-10 VDC
- P = Single Serpentine 8 FPI
- Q = Half Serpentine 8 FPI
- R = Single Serpentine 10 FPI
- S = Half Serpentine 10 FPI
- T = Single Serpentine 12 FPI
- U = Half Serpentine 12 FPI

## RN Series Feature String Nomenclature

GEN	MJREV	SIZE	SERIE	MINRE	VLTT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B				
RN	A	- 011-	C	- 0	- 3	- A	A	A	0	2	- B	0	1	B	0	:	0	1	- D	Q	0	J	- E	0	0	- 0	0	0	0	- 0	0	0	0	- D	A	- A	0	A	A	- A	0			
						B	0	- G	- 0	0	0	- 4	A	- E	A	0	0	- 0	0	- 5	W	0	- B	F	0	Q	A	0	- A	0	0	0	0	0	- 0	0	0	0	0	0	0	X		
						11A	11B		12		13A	13B	13C		14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37

### **B5: HEAT PUMP AUX HEATING**

- 0 = No Heat Pump
- A = Aux Heat 1 for Heat Pump 1 Stage
- B = Aux Heat 2 for Heat Pump 1 Stage
- C = Aux Heat 3 for Heat Pump 1 Stage
- D = Aux Heat 4 for Heat Pump 1 Stage
- E = Aux Heat 5 for Heat Pump 1 Stage
- F = Aux Heat 6 for Heat Pump 1 Stage
- K = Aux Heat 1 for Heat Pump 2 Stage
- L = Aux Heat 2 for Heat Pump 2 Stage
- M = Aux Heat 3 for Heat Pump 2 Stage
- N = Aux Heat 4 for Heat Pump 2 Stage
- P = Aux Heat 5 for Heat Pump 2 Stage
- Q = Aux Heat 6 for Heat Pump 2 Stage
- U = Aux Heat 1 for Heat Pump 4 Stage
- V = Aux Heat 2 for Heat Pump 4 Stage
- W = Aux Heat 3 for Heat Pump 4 Stage
- Y = Aux Heat 4 for Heat Pump 4 Stage
- Z = Aux Heat 5 for Heat Pump 4 Stage
- 1 = Aux Heat 6 for Heat Pump 4 Stage

### **1: UNIT ORIENTATION**

- 0 = Standard Access - Hinged Access Doors with Lockable Handles

### **2: SUPPLY & RETURN LOCATIONS**

- V = End Supply--No Return
- Z = End Supply--Right Return
- 1 = Horizontal Configuration- End Supply--End Return
- W = Horizontal Configuration - End Supply - Bottom Return

### **Feature 3: SUPPLY FAN OPTIONS**

#### **3A: SUPPLY FAN CONFIGURATION**

- 0 = 1 Fan
- D = 1 Fan + Factory Installed VFD
- N = 1 Fan + Field Installed VFD

#### **3B: SUPPLY FAN**

- L = 22" Direct Drive Backward Curved Plenum- 100% Width Aluminum
- N = 24" Direct Drive Backward Curved Plenum- 100% Width Aluminum
- P = 24" Direct Drive Backward Curved Plenum- 70% Width Aluminum
- Q = 27" Direct Drive Backward Curved Plenum- 100% Width Aluminum
- R = 27" Direct Drive Backward Curved Plenum- 70% Width Aluminum

#### **3C: SUPPLY FAN MOTOR TYPE**

- 0 = High Efficiency Motor (1,200 nominal rpm)
- A = High Efficiency Motor (1,800 nominal rpm)
- R = High Efficiency TEFC Motor (1,200 nominal rpm)
- S = High Efficiency TEFC Motor (1,800 nominal rpm)

#### **3D: SUPPLY FAN MOTOR SIZE**

- E = 1 hp
- G = 2 hp
- H = 3 hp
- J = 5 hp
- K = 7.5 hp
- L = 10 hp
- M = 15 hp
- N = 20 hp



## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B			
RN	A	-011	-C	-0	-3	-A	A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	0	-0	0	0	0	0	0	0	0	-D	A	-A	0	A	A	-A	0
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	0	0	0	0	0	0	0	X
						11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37		

### **Feature 4: RETURN/OUTSIDE AIR OPTIONS**

#### **4A: OUTSIDE AIR SECTION**

- 0 = 100% Outside Air
- A = 100% Outside Air with Motorized Dampers
- B = Manual Outside Air + Return Air Opening
- C = Motorized Outside Air Dampers + Return Air Opening
- D = 100% Return Air
- E = Economizer
- G = Econ + Power Exhaust
- H = Econ + Power Return
- K = Econ + Energy Recovery
- Q = Econ + Energy Recovery + Bypass Damper

#### **4B: ENERGY RECOVERY TYPE**

- 0 = No Energy Recovery
- A = Energy Recovery Wheel
- B = Energy Recovery Wheel + 1% Purge

#### **4C: ENERGY RECOVERY SIZE**

- 0 = No Energy Recovery
- A = Low CFM Enthalpy
- B = High CFM Enthalpy
- E = Low CFM Sensible
- F = High CFM Sensible
- J = Low CFM Enthalpy + Exhaust Filters
- K = High CFM Enthalpy + Exhaust Filters
- N = Low CFM Sensible + Exhaust Filters
- P = High CFM Sensible + Exhaust Filters

### **Feature 5: RETURN FAN OPTIONS**

#### **5A: RETURN FAN CONFIGURATION**

- 0 = Standard
- A = 1 Fan
- B = 2 Fans
- C = 1 Fan + Factory Installed VFD
- D = 2 Fans + 1 Factory Installed VFD
- E = 2 Fans + 2 Factory Installed VFD's
- G = 1 Fan + Field Installed VFD
- H = 2 Fans + 1 Field Installed VFD
- J = 2 Fans + 2 Field Installed VFD's

#### **5B: RETURN FANS**

- 0 = Standard
- B = 22" Direct Drive Axial Flow Fan

#### **5C: RETURN FAN MOTOR TYPE**

- 0 = Standard
- A = High Efficiency Motor (1,200 nominal rpm)
- B = High Efficiency Motor (1,800 nominal rpm)
- N = High Efficiency TEFC Motor (1,200 nominal rpm)
- P = High Efficiency TEFC Motor (1,800 nominal rpm)

#### **5D: RETURN MOTOR SIZE**

- 0 = Standard
- E = 1 hp
- G = 2 hp
- H = 3 hp
- J = 5 hp
- K = 7.5 hp
- L = 10 hp
- M = 15 hp
- N = 20 hp

## RN Series Feature String Nomenclature

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B		
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	-0	0	0	0	0	-D	A	-A	0	A	A	-A	0
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	-0	0	0	0	0	0	0	X
						11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

### **Feature 6: EXHAUST FAN OPTIONS**

#### **6A: EXHAUST FAN CONFIGURATION**

0 = Standard  
 A = 1 Fan  
 C = 1 Fan + Factory Installed VFD  
 G = 1 Fan + Field Installed VFD

#### **6B: EXHAUST FAN**

0 = Standard  
 L = 22" Backward Curved Plenum Fan - 100% Width Aluminum  
 T = 22" Backward Curved Plenum Fan - 70% Width Aluminum

#### **6C: EXHAUST FAN MOTOR TYPE**

0 = Standard  
 B = High Efficiency Motor (1,800 nominal rpm)  
 P = High Efficiency TEFC Motor (1,800 nominal rpm)

#### **6D: EXHAUST MOTOR**

0 = Standard  
 E = 1 hp  
 G = 2 hp  
 H = 3 hp  
 J = 5 hp  
 K = 7.5 hp  
 L = 10 hp  
 M = 15 hp  
 N = 20 hp

### **7: O/A CONTROL**

0 = Standard  
 A = 3 Position Actuator - Sensible Limit  
 B = 3 Position Actuator - Enthalpy Limit  
 C = Fully Modulating Actuator - Sensible Limit  
 D = Fully Modulating Actuator - Enthalpy Limit  
 E = DDC Actuator  
 F = Constant Volume Outside Air  
 G = Options A + F  
 H = Options B + F  
 J = Options C + F  
 K = Options D + F  
 L = Options E + F  
 M = 3 Pos. Act. - Sensible Limit + CO2 Override  
 N = 3 Pos. Act. - Enthalpy Limit + CO2 Override  
 P = Fully Mod. Act. - Sensible + CO2 Override  
 Q = Fully Mod. Act. - Enthalpy + CO2 Override  
 R = DDC Actuator + CO2 Override  
 S = Dual Minimum Position Potentiometers + Fully Mod. Act. - Sensible Limit  
 T = Dual Minimum Position Potentiometers + Fully Mod. Act. - Enthalpy Limit  
 U = 2 Position Actuator  
 V = Fault Detection and Diagnostics Controller (FDD) Sensible Limit  
 W = FDD Enthalpy Limit  
 Y = Option V + CO2 Override  
 Z = Option W + CO2 Override

### **8: EXHAUST DAMPERS & RA BYPASS**

0 = No Return Opening  
 A = Standard Return Opening without EA Dampers  
 C = Standard Barometric Relief EA Dampers  
 G = Standard Barometric without EA Dampers + RA Bypass  
 J = Standard Barometric Relief EA Dampers + RA Bypass

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B			
RN	A	-011	-C	-0	-3	-A	A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	0	-0	0	0	0	-D	A	-A	0	A	A	-A	0
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	-0	0	0	0	0	0	0	X	
						11A	11B		12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

### **Feature 9: FILTER OPTIONS**

#### **9A: UNIT FILTER TYPE**

- 0 = 2" Pleated - 30% Eff. - MERV 8
- A = 4" Pleated - 30% Eff. - MERV 8
- B = 2" Pleated MERV 8 + 4" Pleated MERV 11
- C = 2" Pleated MERV 8 + 4" Pleated MERV 13
- D = 2" Pleated MERV 8 + 4" Pleated MERV 14

#### **9B: PRE FILTER BOX SIZE/LOCATION**

- 0 = Standard Filters in Standard Position
- B = High Efficiency Filters in Standard Position

#### **9C: FINAL FILTER TYPE**

- 0 = No Final Filters
- A = 12" Cartridge MERV 13
- D = 12" Cartridge MERV 14
- U = 4" Pleated MERV 13
- Y = 4" Pleated MERV 14

#### **9D: FILTER OPTIONS**

- 0 = None
- A = Clogged Filter Switch - Unit Filters
- B = Clogged Filter Switch - Unit + Energy Recovery Filters
- C = Clogged Filter Switch - Unit + Final Filters
- D = Clogged Filter Switch - Unit + Energy Recovery + Final Filters
- E = Magnehelic Gauge - Unit Filters
- F = Magnehelic Gauge - Unit + Energy Recovery Filters
- G = Magnehelic Gauge - Unit + Final Filters
- H = Magnehelic Gauge - Unit + Energy Recovery + Final Filters
- J = CFS + Magnehelic Gauge - Unit Filters
- K = CFS + Magnehelic Gauge - Unit + Energy Recovery Filters
- L = CFS + Magnehelic Gauge - Unit + Final Filters
- M = CFS + Magnehelic Gauge - Unit + Energy Recovery + Final Filters

### **Feature 10: REFRIGERATION CONTROL**

#### **10A: REFRIGERATION CONTROL**

- 0 = None
- A = 5 Minute Compressor Off Timer and 20 Second Compressor Stage Delay
- D = Adjustable Compressor Lock Out
- E = Freeze Stats (each circuit)
- H = Option A + D
- J = Option A + E
- M = Adjustable Fan Cycling with Adjustable Compressor Lockout
- P = Option D + E
- T = Option M + E
- V = Option A + M + E
- W = Option A + D + E

#### **10B: BLANK**

- 0 = None

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B				
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	-0	0	0	0	-D	A	-A	0	A	A	-A	0			
						<b>B</b>	<b>0</b>	<b>-G</b>	<b>-0</b>	<b>0</b>	<b>0</b>	<b>-4</b>	<b>A</b>	<b>-E</b>	<b>A</b>	<b>0</b>	<b>0</b>	<b>-0</b>	<b>0</b>	<b>-5</b>	<b>W</b>	<b>0</b>	<b>-B</b>	<b>F</b>	<b>0</b>	<b>Q</b>	<b>A</b>	<b>0</b>	<b>-A</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>X</b>		
						<b>11A</b>	<b>11B</b>		<b>12</b>		<b>13A</b>	<b>13B</b>	<b>13C</b>		14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37

### **Feature 11: REFRIGERATION OPTIONS**

#### **11A: REFRIGERATION OPTIONS**

- 0 = None
- A = Hot Gas Bypass Lead Stage
- B = Hot Gas Bypass Lead and Lag Stages
- C = On/Off Hot Gas Reheat
- D = Hot Gas Bypass Non-Variable Compressor Circuits
- E = Modulating Hot Gas Reheat
- G = Options A + C
- H = Options B + C
- J = Options A + E
- K = Options B + E
- L = Options D + C
- M = Options D + E
- P = Polymer E-Coated On/Off Hot Gas Reheat
- Q = Polymer E-Coated Modulating Hot Gas Reheat
- R = Options A + P
- S = Options B + P
- T = Options A + D
- U = Options B + Q
- V = Options D + P
- W = Options D + Q

#### **11B: BLANK**

0 = None

#### **12: REFRIGERATION ACCESSORIES**

- 0 = None
- A = Sight Glass
- B = Compressor Isolation Valves
- C = Option A + B
- D = One Circuit 0°F Low Ambient
- E = Option A + D
- F = Option B + D
- G = Option A + B + D

### **Feature 13: POWER OPTIONS**

#### **13A: UNIT DISCONNECT TYPE**

- 0 = Single Point Power - Standard Power Block
- A = Single Point Power - Non-fused Disconnect Power Switch
- B = Single Point Power - Circuit Breaker

#### **13B: DISCONNECT 1 SIZE**

- A = 15 amps
- B = 20 amps
- C = 25 amps
- D = 30 amps
- E = 35 amps
- F = 40 amps
- G = 45 amps
- H = 50 amps
- J = 60 amps
- K = 70 amps
- L = 80 amps
- M = 90 amps
- N = 100 amps
- P = 110 amps
- Q = 125 amps
- R = 150 amps
- S = 175 amps
- T = 200 amps
- U = 225 amps
- V = 250 amps
- W = 300 amps
- Y = 350 amps
- Z = 400 amps
- 3 = 600 amps

#### **13C: BLANK**

0 = None

## RN Series Feature String Nomenclature

GEN	MJREV	SIZE	SERIES	MNREV	VL	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B									
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	0	0	-D	A	-A	0	A	A	-A	0										
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	0	0	0	0	X									
						11A	11B		12		13A	13B	13C		14	15	16A	16B	16C	16D		17A	17B		18A	18B	18C		19	20	21	22	23	24		25	26	27	28	29	30		31	32	33	34	35	36	37

### 14: SAFETY OPTIONS

- 0 = None
- A = Return and Supply Air Firestat
- B = Return Air Smoke Detector
- C = Supply Air Smoke Detector
- E = Remote Safety Shutdown Terminals
- F = Option A + B
- G = Option A + C
- J = Option A + E
- K = Option B + C
- M = Option B + E
- P = Option C + E
- R = Option A + B + C
- T = Option A + B + E
- V = Option A + C + E
- Z = Option B + C + E
- 4 = Option A + B + C + E

### 15: ACCESSORIES

- 0 = None
- A = Low Limit Controls
- B = Phase & Brown Out Protection
- C = Cooling Coil UV Lights
- E = Compressor Sound Blankets
- F = Option A + B
- G = Option A + C
- J = Option A + E
- K = Option B + C
- M = Option B + E
- P = Option C + E
- R = Option A + B + C
- T = Option A + B + E
- V = Option A + C + E
- Z = Option B + C + E
- 4 = Option A + B + C + E

### Feature 16: UNIT CONTROLS

#### 16A: CONTROL SEQUENCE

- 0 = Standard Terminal Block for Thermostat
- A = Terminal Block for Thermostat + Isolation Relays
- B = Single Zone VAV Unit Controller - VAV Cool + CAV Heat
- C = Single Zone VAV Unit Controller - VAV Cool + VAV Heat
- D = VAV Unit Controller - VAV Cool + CAV Heat
- E = Constant Air Volume Unit Controller - CAV Cool + CAV Heat
- F = Makeup Air Unit Controller
- G = Single Zone VAV Heat Pump Unit Controller - VAV Cool + VAV Heat
- H = Constant Air Volume Heat Pump Unit Controller - CAV Cool + CAV Heat
- J = Makeup Air Heat Pump Unit Controller - CAV Cool + CAV Heat
- K = PAC - Precise Air Controller (No VCC)
- L = D-PAC - Digital Precise Air Controller
- M = Field Installed DDC Controls by Others
- N = Field Installed DDC Controls + Installation Relays
- P = Factory Installed DDC Controls by Others + Installation Relays

#### 16B: CONTROL SUPPLIER

- 0 = None
- C = AAON VCB-X
- J = AAON Touchscreen Controller
- K = AAON VCC-X

#### 16C: CONTROL SUPPLIER OPTIONS

- 0 = None

#### 16D: BMS CONNECTION & DIAGNOSTICS

- 0 = None
- A = BACnet IP
- B = BACnet MSTP
- C = Modbus IP
- D = Modbus RTU
- E = Lontalk

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B			
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	-0	0	0	0	-D	A	-A	0	A	A	-A	0		
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	-0	0	0	0	0	0	0	X	
						11A	11B		12		13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37

### **Feature 17: PREHEAT OPTIONS**

#### **17A: PREHEAT CONFIGURATION**

- 0 = Standard
- A = Modulating Electric Preheat - Outside Air
- D = Hot Water Preheat Coil - Mixed Air
- E = Steam Distributing Preheat Coil - Mixed Air
- K = Polymer E-Coated Hot Water Preheat Coil - Mixed Air
- L = Polymer E-Coated Steam Distributing Preheat Coil - Mixed Air

#### **17B: PREHEAT SIZING**

- 0 = Standard
- A = Heat Qty A
- B = Heat Qty B
- C = Heat Qty C
- D = Heat Qty D
- E = Heat Qty E
- F = Heat Qty F
- G = Heat Qty G
- H = Heat Qty H
- J = Heat Qty J
- K = Heat Qty K
- L = Heat Qty L
- M = Heat Qty M

### **Feature 18: OPTION BOXES**

#### **18A: BOX QUANTITY & LOCATION**

- 0 = None
- 5 = Empty Energy Recovery Wheel Option Box

#### **18B: BOX SIZE**

- 0 = None
- W = Empty Energy Recovery Wheel Option Box

#### **18C: BOX ACCESSORIES**

- 0 = None

### **19: OUTSIDE AIR ACCESSORIES**

- 0 = No Outside Air Hood - 100% Return Air
- A = Outside Air Hood
- B = Outside Air Hood with Metal Mesh Filters
- C = Option A + Airflow Measuring Station Size A
- D = Option A + Airflow Measuring Station Size B
- G = Option B + Airflow Measuring Station Size A
- H = Option B + Airflow Measuring Station Size B

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B		
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	0	0	0	0	-D	A	-A	0	A	A	-A	0	
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	-0	0	0	0	0	0	0	X
						11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

### 20: CABINET OPTIONS

0 = None

A = Base Insulation

B = SA & RA Burglar Bars

F = Option A + B

### 21: BLANK

0 = None

### 22: MAINTENANCE ACCESSORIES

0 = None

A = Factory Wired 115V Convenience Outlet

B = Field Wired 115V Convenience Outlet

C = Service Lights

D = Remote Start/Stop contacts

E = Supply Fan Auxiliary Contacts

F = Option A + C

G = Option A + D

H = Option A + E

J = Option B + C

K = Option B + D

L = Option B + E

M = Option C + D

N = Option C + E

P = Option D + E

Q = Option A + C + D

R = Option A + C + E

S = Option A + D + E

T = Option B + C + D

U = Option B + C + E

V = Option B + D + E

W = Option C + D + E

Y = Option A + C + D + E

Z = Option B + C + D + E

### 23: CODE OPTIONS

0 = Standard - ETL U.S.A. Listing

A = Chicago Code

B = ETL U.S.A. + Canada Listing

### 24: SHIPPING SPLITS

0 = Standard

### 25: AIR COOLED CONDENSER ACCESSORIES

0 = Standard

A = Cond Coil Guards

C = ECM Condenser Fan Head Pressure Control

D = Low Sound Condenser Fan Head Pressure Control

E = VFD Condenser Fan Head Pressure Control

G = Cond Coil Guards + ECM Condenser Fan Head Pressure Control

H = Cond Coil Guards + Low Sound Condenser Fan Head Pressure Control

J = Cond Coil Guards + VFD Cond Fan Head Pressure Control

### 26: Blank

0 = None

## RN Series Feature String Nomenclature

GEN	MREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	1	2	3A	3B	3C	3D	4A	4B	4C	5A	5B	5C	5D	6A	6B	6C	6D	7	8	9A	9B	9C	9D	10A	10B		
RN	A	-011	-C	-0	-3	-A	A	A	0	2	-B	0	1	B	0	:	0	1	-D	Q	0	J	-E	0	0	-0	0	0	0	-0	0	0	0	-D	A	-A	0	A	A	-A	0	
						B	0	-G	-0	0	0	-4	A	-E	A	0	0	-0	0	-5	W	0	-B	F	0	Q	A	0	-A	0	0	0	0	0	-0	0	0	0	0	0	0	X
						11A	11B	12	13A	13B	13C	14	15	16A	16B	16C	16D	17A	17B	18A	18B	18C	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	

### **27: WATER - COOLED CONDENSER**

#### **ACCESSORIES**

0 = None (No Water Condenser)

A = Balancing Valves

B = Water Flow Switch

D = Motorized Shut-off Valve

E = Head Pressure Control

F = Option A + B

H = Option A + D

J = Option A + E

L = Option B + D

M = Option B + E

R = Option A + B + D

S = Option A + B + E

### **28: ENERGY RECOVERY WHEEL**

#### **ACCESSORIES**

0 = None

A = Energy Recovery Wheel Defrost - Start/Stop

B = Energy Recovery Wheel Rotation Detection

F = Option A + B

### **29: VFD Options**

0 = None

A = Shaft Grounding kit on all SA, RA, EA motors

### **30: Miscellaneous Options**

0 = Standard

A = High Condensate Level Switch

### **31: BLANK**

0 = Standard

### **32: BLANK**

0 = Standard

### **33: BLANK**

0 = Standard

### **34: BLANK**

0 = Standard

### **35: WARRANTY**

0 = Standard Warranty

A = 2 Year Parts Warranty

B = 5 Year Parts Warranty

C = 10 Year Parts Warranty

### **36: CABINET MATERIAL**

0 = Galvanized Cabinet – Double Wall + R-13 Foam Insulation

### **37: SPECIALS & PAINT**

B = Premium AAON Gray Paint Exterior Paint

C = Premium AAON Gray Paint Exterior Paint + Interior Corrosion Protection

E = Premium Gray Paint Exterior Paint + Shrink Wrap

F = Premium Gray Paint Exterior Paint + Interior Corrosion Protection + Shrink Wrap

X = SPA + Premium AAON Gray Paint Exterior Paint

Y = SPA + Premium AAON Gray Paint Exterior Paint + Interior Corrosion Protection

1 = SPA + Premium AAON Gray Paint Exterior Paint + Shrink Wrap

2 = SPA + Premium AAON Gray Paint Exterior Paint + Interior Corrosion Protection + Shrink Wrap

4 = SPA + Special Exterior Paint Color

5 = SPA + Special Exterior Paint Color + Interior Corrosion Protection

7 = SPA + Special Exterior Paint Color + Shrink Wrap

8 = SPA + Special Exterior Paint Color + Interior Corrosion Protection + Shrink Wrap




## General Information

RN Series packaged rooftop units, heat pumps and outdoor air handling units have been designed for outdoor installation only. Units are assembled, wired, charged and run tested at the factory.

Startup and service must be performed by a Factory Trained Service Technician.

 **WARNING**

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician. A copy of this IOM must be kept with the unit.

 **CAUTION**

These units must not be used for heating or cooling at any time during any phase of construction. Very low return air temperatures, harmful vapors, and misplacement of the filters will damage the unit and its efficiency.

### Certification of Gas Heat Models

- a. AAON gas heat exchangers have successfully completed 10,000 burner operation cycles and corrosion resistance as specified per test standard ANSI 21.47. All gas heat exchangers used in AAON appliances are certified for use downstream of evaporator or cooling coils.
- b. Certified as a Category III forced air furnace with or without cooling.

- c. Certified for outdoor installation only.
- d. Certified for installation on a combustible roof with a minimum of 12" high curb.

### Certification of Steam or Hot Water Heat Models

- a. Certified as a forced air heating system with or without cooling.
- b. Certified for outdoor installation only.
- c. Certified for installation on a combustible roof with a minimum of 12" high curb.

### Certification of Electric Heat Models

- a. Certified as an electric warm air furnace with or without cooling.
- b. Certified for outdoor installation only.
- c. Certified for installation on a combustible roof with a minimum of 12" high curb.

### Certification of Cooling Models

- a. Certified as a commercial central air conditioner with or without electrically operated compressors.
- b. Certified for outdoor installation only.
- c. Certified for installation on a combustible roof with a minimum of 12" high curb.
- d. Certified with refrigerant R-410A coils or with chilled water cooling coils.

### Codes and Ordinances

RN Series units have been tested and certified, by ETL, in accordance with UL Safety Standard 1995/CSA C22.2 No. 236, ANSI Safety Standard Z21.47b-2008/CSA 2.3b-2008, and ANSI Safety Standard Z83.8-2006/CSA 2.6-2006.

System must be sized in accordance with the American Society of Heating, Refrigeration and Air Conditioning Engineers Handbook.

Installation of RN Series units must conform to the ICC standards of the International Mechanical Code, the International Building Code, and local building, plumbing and waste water codes. In the absence of local

codes installation must conform to the current (United States) National Fuel Gas Code ANSI-Z223.1/NFPA 54 or the current (Canada) National Fuel & Propane Installation Code CSA B149.1 or B149.2, and Mechanical Refrigeration Code CSA B52. All appliances must be electrically grounded in accordance with local codes, or in the absence of local codes, the current National Electric Code, ANSI/NFPA 70 or the current Canadian Electrical Code CSA C22.1.

**! CAUTION**

The Clean Air Act of 1990 bans the intentional venting of refrigerant as of July 1, 1992. Approved methods of recovery, recycling, or reclaiming must be followed.

**! WARNING**

Coils and sheet metal surfaces present sharp edges and care must be taken when working with equipment.

**! WARNING**

Failure to observe the following instructions will result in premature failure of your system and possible voiding of the warranty.

**Receiving Unit**

When received, check the unit for damage that might have occurred in transit. If damage is found, note it on the carrier's freight bill. A request for inspection by carrier's agent must be made in writing at once. Check nameplate to ensure the correct model sizes and voltage s

have been received to match the job requirements.

If repairs must be made to damaged goods, then notify the factory before any repair action is taken in order to protect the warranty. Certain equipment alteration, repair, and manipulation of equipment without the manufacturer's consent may void the product warranty. Contact the AAON Warranty Department for assistance with handling damaged goods, repairs, and freight claims: (918) 382-6450.

**Note:** Upon receipt check shipment for items that ship loose such as filters and remote sensors. Consult order and shipment documentation to identify potential loose-shipped items. Loose-shipped items may have been placed inside unit cabinet for security. Installers and owners must secure all doors with locks or nuts and bolts to prevent unauthorized access.



Figure 1 - Lockable Handle

**Storage**

If installation will not occur immediately following delivery, store equipment in a dry protected area away from construction traffic and in the proper orientation as marked on the packaging with all internal packaging in place. Secure all loose-shipped items.

## Packaged Direct Expansion (DX) Units

### **WARNING**

#### COMPRESSOR CYCLING

##### 3 MINUTE MINIMUM OFF TIME

To prevent motor overheating compressors must cycle off for a minimum of 5 minutes.

##### 5 MINUTE MINIMUM ON TIME

To maintain the proper oil level compressors must cycle on for a minimum of 5 minutes.

The cycle rate must not exceed 7 starts per hour.

All DX refrigeration systems are factory assembled, leak tested, charged with refrigerant, and run tested.

All refrigerant systems include an evaporator, condenser, liquid line filter driers, thermal expansion valves (TXV) and scroll compressors. Compressors are equipped with a positive pressure forced lubrication system.

### **CAUTION**

#### CRANKCASE HEATER OPERATION

Some units are equipped with compressor crankcase heaters, which must be energized at least 24 hours prior to cooling operation, to clear any liquid refrigerant from the compressors.

Never cut off the main power supply to the unit, except for servicing, emergency, or complete shutdown of the unit. When power is cut off from the unit crankcase heaters

cannot prevent refrigerant migration into the compressors. This means the compressor will cool down and liquid refrigerant may accumulate in the compressor. The compressor is designed to pump refrigerant gas and damage may occur when power is restored.

If power to the unit must be off for more than an hour, turn the thermostat system switch to "OFF", or turn the unit off at the control panel, and leave the unit off until the main power switch has been turned on again for at least 24 hours for units with compressor crankcase heaters. This will give the crankcase heater time to clear any liquid accumulation out of the compressor before it is started.

Always control the unit from the thermostat, or control panel, never at the main power supply, except for servicing, emergency or complete shutdown of the unit.

During the cooling season, if the air flow is reduced due to dirty air filters or any other reason, the cooling coils can get too cold which will cause excessive liquid to return to the compressor. As the liquid concentration builds up, oil is washed out of the compressor, leaving it starved for lubrication.

The compressor life will be seriously shorted by reduced lubrication and the pumping of excessive amounts of liquid oil and refrigerant.

#### **Note:** Low Ambient Operation

Air-cooled DX units without a low ambient option, such as condenser fan cycling or the 0°F low ambient option, will not operate in the cooling mode of operation properly when the outdoor temperature is below 55°F. Low ambient and/or economizer options are recommended if cooling operation below 55°F is expected.

**! CAUTION**

Polyolester (POE) and Polyvinylether (PVE) oils are two types of lubricants used in hydrofluorocarbon (HFC) refrigeration systems. Refer to the compressor label for the proper compressor lubricant type.

**Note:** Multiple Units with Multiple Thermostats

When several heating and cooling units are used to condition a space all unit thermostat switches must be set in either heating mode, cooling mode or off. Do not leave part of the units switched to the opposite mode. Cooling only units must be switched off at the thermostat during the heating season.

**Gas or Electric Heating**

The unit is designed to heat a given amount of air while operating. If this amount of air is greatly reduced, approximately 1/3 during the heating season, the gas heat exchanger or

electric heating coil may overheat, and may cut the burner or heater off entirely by action of the safety high temperature limit devices which are factory mounted at the heat exchanger and supply fan areas.

Adjust airflow after installation to obtain an air temperature rise within the range specified on the unit rating plate at the required external static pressure.

Should overheating occur with a gas heat exchanger, or the gas supply fail to shut off, shut off the manual gas valve to the furnace before shutting off the electrical supply.

Prolonged overheating of the heat exchanger will shorten its life.

If unit has not been selected as a 100% outside air unit (makeup air unit) the return air duct must be sealed to the unit and the return air temperature must be maintained between 55°F and 80°F.

Table 1 - Electric and Gas Heating Capacities

Model Option B3	Gas Heat		Electric Heat	
	Input Capacity	Output Capacity	Capacity	
	MBH	MBH	kW (208V)	kW (230V, 380V, 460V, 575V)
<b>1</b> = Heat 1	270.0	218.7	15.0	20
<b>2</b> = Heat 2	405.0	328.1	30.0	40
<b>3</b> = Heat 3	540.0	432.0	45.1	60
<b>4</b> = Heat 4			60.1	80
<b>5</b> = Heat 5			75.1	100
<b>6</b> = Heat 6			90.1	120

**Wiring Diagrams**

Unit specific wiring diagrams are laminated and affixed inside the controls compartment door.

**Condensate Drain Pan**

Unit requires drain traps to be connected to the condensate drain pan of the unit. The 11, 13, 16-25 and 30 ton units include one drain

pan connection. P-traps must be field provided and installed. See Installation section of this manual for more information.

If codes require a condensate drain line, the line must be the same pipe size or larger than the drain connection, include a p-trap, and pitch downward toward drain. Use an air break with long runs of condensate lines.

 <b>CAUTION</b>
Unit must not be operated without a p-trap. Failure to install a p-trap may result in overflow of condensate water.


## Installation


AAON equipment has been designed for quick and easy installation.

### Locating Units

The curb must be mounted first and must be located so that duct connections will be clear of structural members of the building.

Verify rooftop or foundation can support the total unit weight, including accessory weights.

 <b>WARNING</b>
When locating gas fired units, it is recommended the unit be installed so that the flue discharge vents are located at least 120 inches away from any opening through which combustion products could enter the building.

 <b>WARNING</b>
Distances from adjacent public walkways, adjacent buildings, operable windows and building openings, shall conform to local codes and/or the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the National Gas & Propane Code, CSA B149.1

Do not position flue opening to discharge into a fresh air intake of any other piece of equipment. Install the unit so that the flow of combustion intake air is not obstructed from reaching the furnace.

Vent opening must not be blocked by snow. A minimum 12" curb must be used or the vent outlet shall be greater than 12" off the ground/roof.

Flue gas is dangerously hot and contains contaminants. The user is responsible for determining if vent gases may degrade building materials.

The National Gas and Propane Installation Code, B149.1 specifies a 6 ft. horizontal vent terminal clearance to gas and electric meters and relief devices.

Local codes may supersede or further place restrictions on vent termination locations.

Table 2 - C Cabinet Unit Clearances

Location	Unit Size
	11, 13,16-25 and 30 tons
Front - (Supply Air)	6"
Back - (Outside Air)*	20"**
Left Side	60"
Right Side	60"
Top	Unobstructed
*Clearance is measured from the end of the outside air rain hood.	
**Units with an energy recovery wheel require 48" of clearance. Units with power exhaust or power return require 30" of clearance.	



Figure 2 - RN Series C Cabinet, 11, 13, 16-25 and 30

**Setting the Curb**

Make openings in roof decking large enough to allow for duct penetration and workspace only. Do not make openings larger than necessary. Set the curb to coincide with the openings. Make sure the curb is level. Unit must be level in both horizontal axes to support the unit and reduce noise and vibration.

**! CAUTION**

All roofing work must be performed by competent roofing contractors to avoid any possible leakage.

**! CAUTION**

Where the supply or warm air duct passes through a combustible roof, a clearance of 1 inch must be maintained between the outside edges of the duct and combustible material in accordance with National Fire Protection Association Standard No. 90A. Provide flashings or enclosure between structure and roof and all joints must be sealed with mastic roofing to ensure a watertight seal.

**! CAUTION**

Incorrect lifting can cause damage to the unit.

**Forklifting the Unit (11, 13 and 16-30 ton)**

11, 13 and 16-30 ton units can be lifted using a forklift. 11-25 and 30 ton units must have forks 72" in length or the forks must have 72" fork extensions. 11, 13, and 16-30 ton units with Energy Recovery wheels cannot be lifted using a forklift. Standard units can be lifted from all sides except the condenser side. Units with power exhaust can be lifted from the controls side or the access (right) side.

Forks must be perpendicular to the unit and they must be in far enough that the back of the forks are no more than 6" away from the edge of the unit.

**! CAUTION**

**FORKLIFTING**  
11-25 AND 30 TON UNITS

Forks or Fork Extensions must be 72" in length.

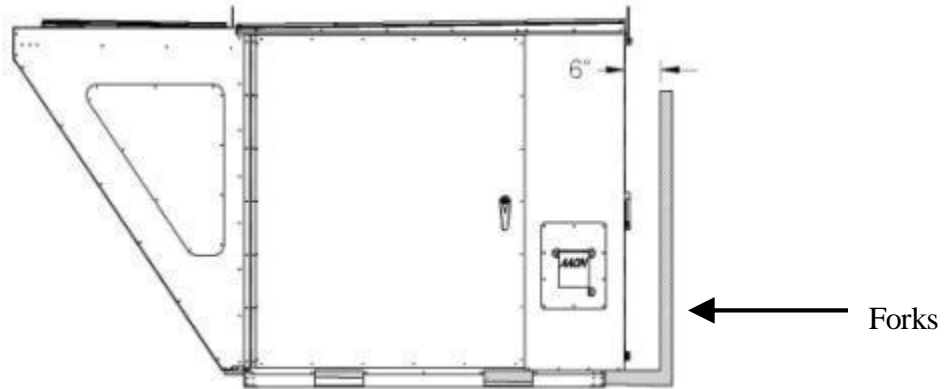


Figure 3 - Forklifting an RN Series C Cabinet, 11, 13 and 16-30 tons

**Lifting the Unit**

If cables or chains are used to hoist the unit they must be the same length. Minimum cable length is 99" for 11, 13 and 16-30 ton units. Care must be taken to prevent damage to the cabinet, coils, and condenser fans.

It is recommended to lift the unit with the outside air hood in the downward shipping position. However, the unit may be lifted with the outside air hood in the open position.

Before lifting unit, be sure that all shipping material has been removed from unit. Secure

hooks and cables at all lifting points / lugs provided on the unit.

Hoist unit to a point directly above the curb and duct openings. Be sure that the gasket material has been applied to curb.

Carefully lower and align the unit with utility and duct openings. Lower the unit until the unit skirt fits around the curb. Some units are designed to overhang the curb. Take care that any recessed base rails fit around the curb. Make sure the unit is properly seated on the curb and is level.

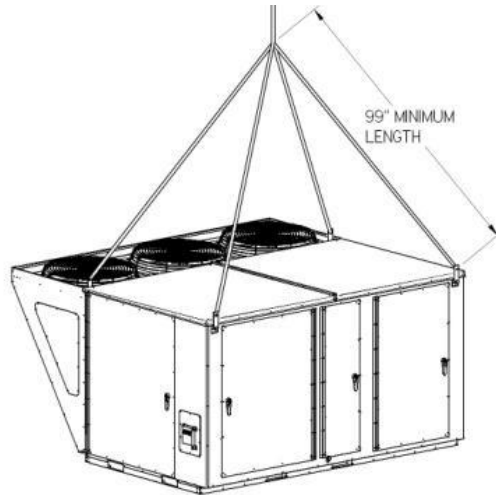


Figure 4 - Lifting Details of a 11, 13 and 16-30 ton tons ton Standard or Power Exhaust Unit

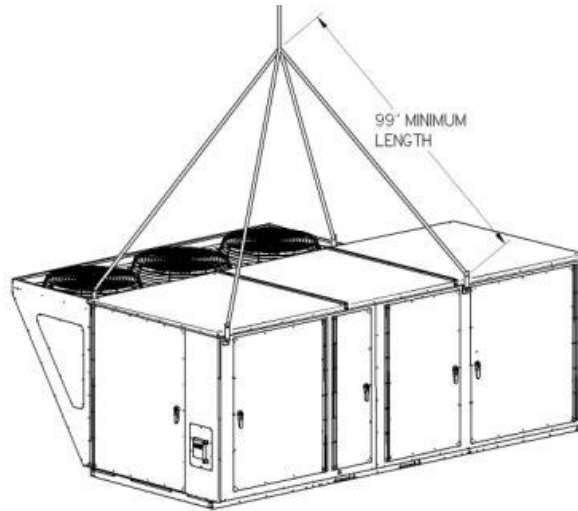


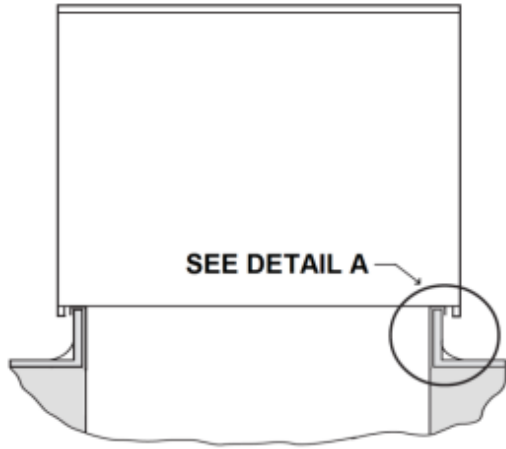
Figure 5 - Lifting Details of a 11, 13 and 16-30 ton tons Energy Recovery Wheel or Power Return Unit



### Duct Connection

There to be a minimum of a 12" straight duct off of the supply duct with no size reduction and then a limitation of no more than a 45° transition for the next 24", this is to insure proper performance of the heaters. Air quantity and temperature stagnation could still be effected depending on how branch take-offs are taken off the main supply plenum.

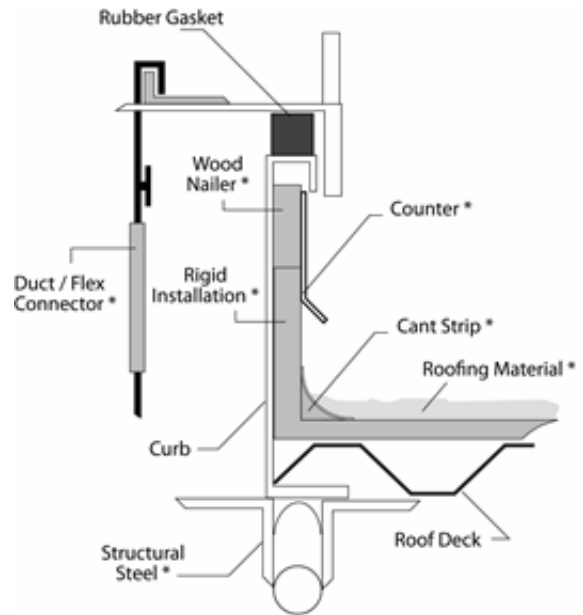
**Note:** If outside air will be in contact with the air tunnel base of a C cabinet unit (11, 13 and 16-30 ton tons), the unit must include the base insulation option or the base must be field insulated.



SECTIONAL VIEW OF UNIT ON ROOF CURB

**CAUTION**

Do not drill or punch holes in the base of the unit, from inside the unit or from below the unit to attach ductwork. Leaking may occur if unit base is punctured.



**Detail A**  
Unit Base Connection  
\* Field Supplied

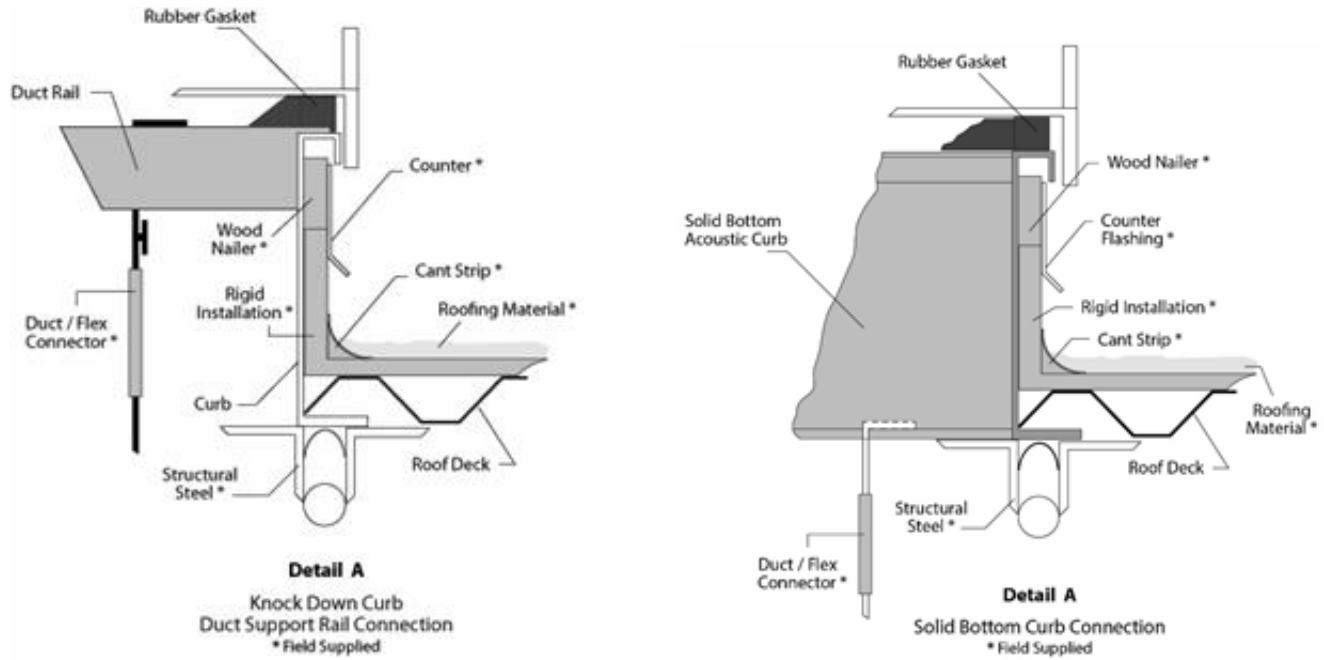


Figure 6 - Duct Connection

### Outside Air Rain Hood

Rain hood must be opened before startup of the unit. Fresh air intake adjustments must be made according to building ventilation of local code requirements.

#### 11, 13 and 16-30 ton Units

Remove the two screws at the bottom of the rain hood that secure it in the shipping position. Remove the screws that attach the side pieces of the hood to the top of the hood.

Rotate the side pieces so that the holes along one edge line up with the holes on the top piece and the flange is on the inside of the rain hood.

Attach the side pieces to the top of the hood using the provided screws and attached the side pieces to the end of the unit through the flange.

Apply silicon caulking along the top and both sides of the rain hood. Take care to seal the

top corners where the rain hood attaches to the unit.

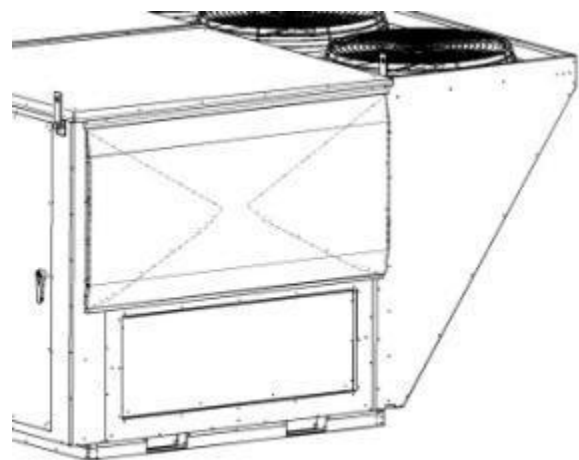


Figure 7 - 11, 13 and 16-30 ton Closed Rain Hood

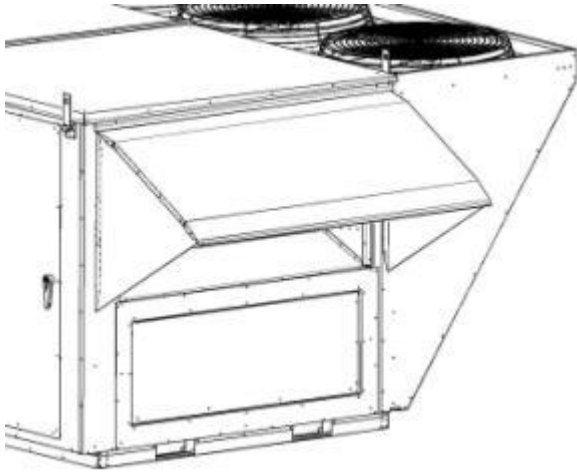


Figure 8 - 11, 13 and 16-30 ton Open Rain Hood

**! CAUTION**

In order to prevent water leakage into the roof curb, the factory provided sheet metal flashings **MUST BE** attached to the unit base to cover the shipping slots at both ends of the unit.

**Metal Mesh Filters (11, 13 and 16-30 ton)**  
Metal mesh outside air filters require installation of the filter rack on the intake of the rain hood.

Clips which hold the metal mesh filters in the filter rack must face outward.

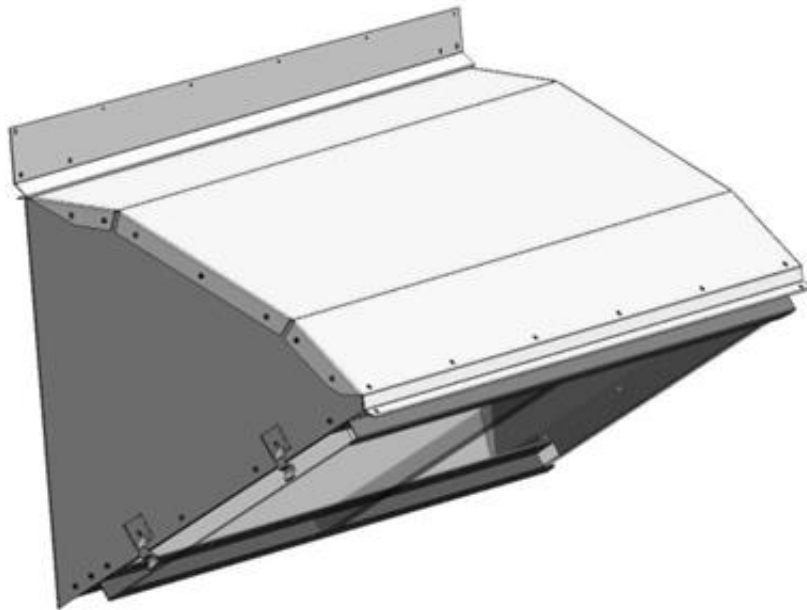


Figure 9 - Rain Hood with Metal Mesh Filter Rack Installation

**Electrical**


Verify the unit nameplate agrees with power supply. Connect power and control wiring to the unit as shown in Figure 11 and in the unit specific wiring diagram, which shows factory and field wiring and is attached to the inside of the door of the controls compartment.

Table 3 - Nameplate Voltage Markings & Tolerances

Hz	Nameplate Voltage	Nominal System Voltage	Operating Voltage Range <sup>1</sup>		Acceptable Performance Range <sup>2</sup>	
			Min	Max	Min	Max
60	115	120	104	127	108	126
	208/230	208/240	187	254	187	252
	208	208	187	228	187	228
	230	240	208	254	216	252
	265	277	240	293	249	291
	460	480	416	508	432	504
	575	600	520	635	540	630
50	230	230	198	254	208	254
	400	400	344	440	360	440


Notes:

1. Operating voltage is the min and max voltage for which the unit can function. Never operate outside of this min and max voltage.
2. The Acceptable Performance Range is the min and max voltage for which the unit performance is designed and rated to give acceptable performance.

 **WARNING**

Electric shock hazard. Before attempting to perform any installation, service, or maintenance, shut off all electrical power to the unit at the disconnect switches. Unit may have multiple power supplies. Failure to disconnect power could result in dangerous operation, serious injury, death, or property damage.

unit (compressor compartment). See unit drawing for specific location.

 **CAUTION**

Installing Contractor is responsible for proper sealing of the electrical and gas entries into the unit. Failure to seal the entries may result in damage to the unit and property.

Route power and control wiring, separately, through the utility entry in the base of the unit. Do not run power and control signal wires in the same conduit. The utility entry on 11, 13 and 16-30 ton units is located in the unit base in the front right hand corner of the

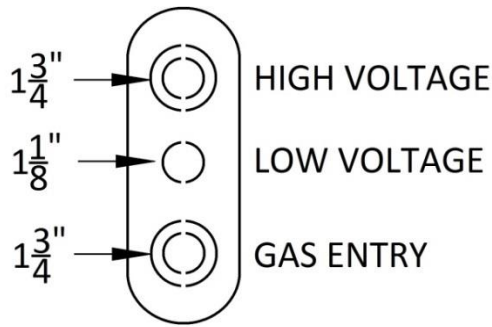


Figure 10 - Unit Utility Entry

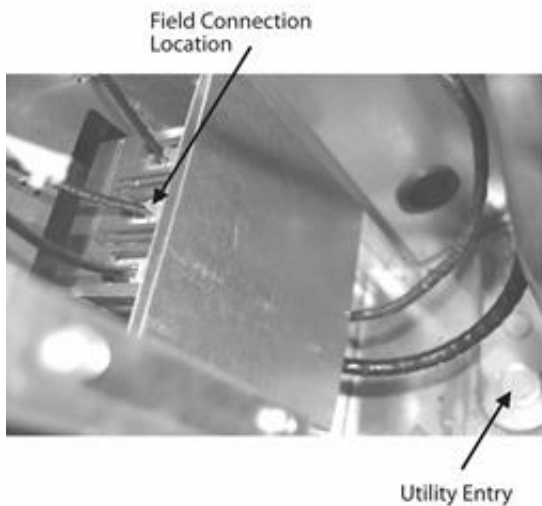


Figure 11 - Back View of Power Switch from Compressor and Control Compartment (11, 13 and 16-30 ton Units)

Size supply conductors based on the unit MCA rating. Supply conductors must be rated a minimum of 75°C.

Protect the branch circuit in accordance with code requirements. The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, the current National Electric Code, ANSI/NFPA 70 or the current Canadian Electrical Code CSA C22.1.

**Note:** All units are factory wired for 208V, 230V, 380V, 460V, or 575V. The transformer configuration must be checked by a qualified technician prior to service,

especially if unit is to be connected to a 208V or 230V supply. For 208V service interchange the yellow and red conductor on the low voltage control transformer.

Red-Black for 208V  
Yellow-Black for 230V

Wire power leads to the unit's terminal block or main disconnect. All wiring beyond this point has been completed by the manufacturer and cannot be modified without effecting the unit's agency/safety certification.

Supply voltage must be within the min/max range shown on the unit nameplate. Available short circuit current must not exceed the short circuit current rating (SCCR) shown on the unit nameplate.

**⚠ CAUTION**

Three phase voltage imbalance will cause motor overheating and premature failure.


Three phase voltage imbalance will cause motor overheating and premature failure. The maximum allowable imbalance is 2%.

Voltage imbalance is defined as 100 times the maximum deviation from the average voltage divided by the average voltage.


Example:  
 $(221V+230V+227V)/3 = 226V$ , then  
 $100*(226V-221V)/226V = 2.2\%$ , which exceeds the allowable imbalance.

Check voltage imbalance at the unit disconnect switch and at the compressor terminal. Contact your local power company for line voltage corrections.

Installing contractor must check for proper motor rotation and check blower motor amperage listed on the motor nameplate is not exceeded. Motor overload protection may be a function of the variable frequency drive and must not be bypassed.

 **CAUTION**


Rotation must be checked on all **MOTORS AND COMPRESSORS** of three phase units. Supply fan, exhaust fan, return fan, and condenser fan motors must all be checked by a qualified service technician at startup and any wiring alteration must only be made at the unit power connection.

 **CAUTION**

Scroll compressors are directional and will be damaged by operation in the wrong direction. Low pressure switches on compressors have been disconnected after factory testing. Rotation must be checked by a qualified service technician at startup using suction and discharge pressure gauges and any wiring alteration must only be made at the unit power connection.

Wire control signals to the unit's low voltage terminal block located in the controls compartment.

If any factory installed wiring must be replaced, use a minimum 105°C type AWM insulated conductors.

 **CAUTION**

No variable speed compressor shall operate below 35 Hz. Operating variable speed compressors outside the frequency range specified in this manual voids all warranties and may result in compressor failure.

*Thermostat Control Wiring*

If a thermostat is used for unit control, locate the thermostat on an inside wall 4-5 feet above the floor where it will not be subjected to drafts, sun exposure, or heat from electrical fixtures of appliances. Control wiring must deliver adequate voltage to components to assure proper operation. Control voltage returning from controller circuit must be a minimum of 21 VAC. To assure proper wiring use the following chart to determine the allowable wiring distances.

Table 4 - Control Wiring

Wire Size (Stranded) - Copper Conductors Only	Total Wire Distance Allowable
20 AWG	200 ft
18 AWG	350 ft
16 AWG	500 ft
14 AWG	750 ft
12 AWG	1250 ft

Total Wire Distance Allowable =  
 (Quantity of Control Wires) x  
 (Control Wire Distance)

Take the total wire distance allowable and divide by the quantity of wires to be connected. This indicates the distance allowable for that size wire. The wiring to the unit must not exceed the total wire distance allowable. If the voltage at the connectors is less than 21 VAC, isolation relays must be

installed. If under external control 21 VAC must be field verified.


All external devices must be powered via a separate external power supply.

Example:

A total of 8 wires must be pulled 75ft to a control the unit. What size wire must be used?

According to the Table 4, 16 AWG allows for 63ft (500 ft/8 wires) and 14 AWG allows for 94ft (750 ft/8 wires). Thus, 14 AWG must be used.

### Gas Heating

 <b>WARNING</b>
<b>FOR YOUR SAFETY</b>
<p>Read the entire gas heating installation section of this manual before beginning installation of the gas heating section.</p> <p>If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.</p>

Verify the unit nameplate agrees with the proper gas supply type and amount.

Gas piping shall be installed in accordance with local codes, or in the absence of local codes, installation shall conform to the current (United States) National Fuel Gas Code ANSI-Z223.1/NFPA 54 or the current (Canada) National Fuel & Propane Installation Code CSA B149.1 or B149.2.

Table 5 -11, 13, 16-25 and 30 ton Gas Connections

Model Option B3	Input MBH	Connections	
		Quantity	Size
1	270	1	3/4" NPT
2	405		1" NPT
3	540		

After verifying gas inlet pressure and manifold pressure the service technician shall time the gas flow rate through the gas meter with a stopwatch to verify the gas input rate.

Unit nameplate input rate value has been calculated at the altitude where the unit was shipped. Above 2,000 ft the input rate is adjusted 4% for every 1,000 ft.



Figure 12 - RN Series Gas Heat Exchanger

Table 6 - Natural Gas (ft<sup>3</sup>/hr) Maximum Piping Capacities  
 Specific Gravity = 0.6, Supply Pressure ≤ 0.5 psi, Pressure Drop = 0.5" w.c.

Pipe Size	Length of Pipe				
	20 ft	50 ft.	100 ft.	150 ft.	200 ft.
1/2"	120	73	50	40	35
3/4"	250	151	103	84	72
1"	465	285	195	160	135
1-1/4"	950	580	400	325	280
1-1/2"	1460	900	620	500	430
2"	2750	1680	1150	950	800
2-1/2"	4350	2650	1850	1500	1280

Table 7 - Propane (kBtu/hr) Maximum Piping Capacities  
 Specific Gravity = 1.52, Supply Pressure = 11" w.c., Pressure Drop, 0.5" w.c.

Pipe Size	Length of Pipe				
	20 ft	50 ft.	100 ft.	150 ft.	200 ft.
1/2"	189	114	78	63	55
3/4"	393	237	162	132	112
1"	732	448	307	252	213
1-1/4"	1496	913	630	511	440
1-1/2"	2299	1417	976	787	675
2"	4331	2646	1811	1496	1260

Do not use gas piping smaller than unit gas connections. Natural gas pipe runs longer than 20 feet and propane gas pipe runs longer than 50 feet may require a larger supply pipe than the unit connection size. Some utility companies may also require pipe sizes larger than the minimum sizes listed.

*Piping Sizing Examples*

A 100 ft pipe run is needed for a 1080 MBH natural gas heater. The natural gas has a rating of 1000 Btu/ft<sup>3</sup> and a specific gravity of 0.6 (Obtain these values from the local gas supplier.)

$$1080 \text{ MBH} \times \frac{\text{ft}^3}{1000 \text{ BTU}} = 1080 \text{ ft}^3/\text{hr}$$

From the natural gas maximum capacities table, at 100 ft and 1080 ft<sup>3</sup>/hr the required minimum pipe size is 2".

A 100 ft pipe run is needed for a 270 MBH propane gas heater.

$$270 \text{ MBH} = 270 \text{ kBtu/hr}$$


From the propane gas maximum capacities table, at 100 ft and 270 kBtu/hr the required minimum pipe size is 1".

*Inlet and Manifold Pressures*

For natural gas units, the minimum inlet gas pressure to the unit is 6" w.c. and maximum inlet gas pressure to the unit is 10.5" w.c. For propane units, the minimum inlet gas pressure to the unit is 11" w.c. and the maximum inlet gas pressure to the unit is 13" w.c. A field provided 1/8" NPT pressure tap is required to be installed in the piping just upstream of the shutoff valve for test gage connection to allow checking of the gas supply pressure at the unit.



A factory installed pressure tap on the outlet end of the gas valve can be used to verify a manifold pressure of 3.5" w.c. for natural gas, or 10.5" w.c. for propane.

 <b>CAUTION</b>
Heater must be disconnected from the gas supply piping during pressure testing of the supply piping system with pressures in excess of ½ psi. Gas valves can be damaged if subjected to more than ½ psi.

*Gas Pressure Regulator & Overpressure Protection Device*

A gas pressure regulator shall be installed if natural gas supply pressure to the unit is greater than 10.5" w.c. and less than 2 psi (55.4" w.c.) and if propane gas supply pressure is greater than 13" w.c. and less than 2 psi (55.4" w.c.). Regulators shall comply with the latest edition of the Standard for Line Pressure Regulators, ANSI Z21.80/CSA 6.22.

Both a gas pressure regulator and overpressure protection device (OPD) shall be installed if gas supply pressure to the unit is greater than 2 psi (55.4" w.c.) and less than 5 psi (138.4" w.c.), in compliance with ANSI Z21.80/CSA 6.22. For proper heater operation, pressure to the regulator SHALL NOT be greater than 5 psi (138.4" w.c.).

*Piping Supports*

Gas supply piping shall be supported directly at the connection to the unit and at intervals listed in the following table with metal straps, blocks, or hooks. Piping shall not be strained or bent.

Table 8 - Gas Piping Supports

Pipe Size	Support Intervals
1/2" to 3/4"	Every 6 ft
3/4" to 1"	Every 8 ft
1-3/4" or Larger (Horizontal)	Every 10 ft
1-1/4" or Larger (Vertical)	Every Floor

*Additional Gas Piping Considerations*

Local codes will usually require a field provided and installed manual main shutoff valve and union external to the unit. Label the main shutoff valve. Install a drip leg near the unit connection to trap sediment and condensate. Pipe joint compounds used on all gas piping connections shall be resistant to liquid petroleum gases. If flexible gas piping to the unit, or in the unit, must be replaced connectors cannot be reused, only new connectors may be used.

Heat exchanger comes equipped with a condensate drain which shall be plumbed to the appropriate drain according to the (United States) National Fuel Gas Code ANSI-Z223.1/NFPA 54 or the current (Canada) National Fuel & Propane Installation Code CSA B149.1 or B149.2, the International Building Code, and any applicable local and regional codes and regulations.

The condensate drain connection is located next to the gas entry location. For 11, 13, 16-25 and 30, the heat exchanger condensate drain connection from the unit is a 5/8" barbed nylon elbow connection.

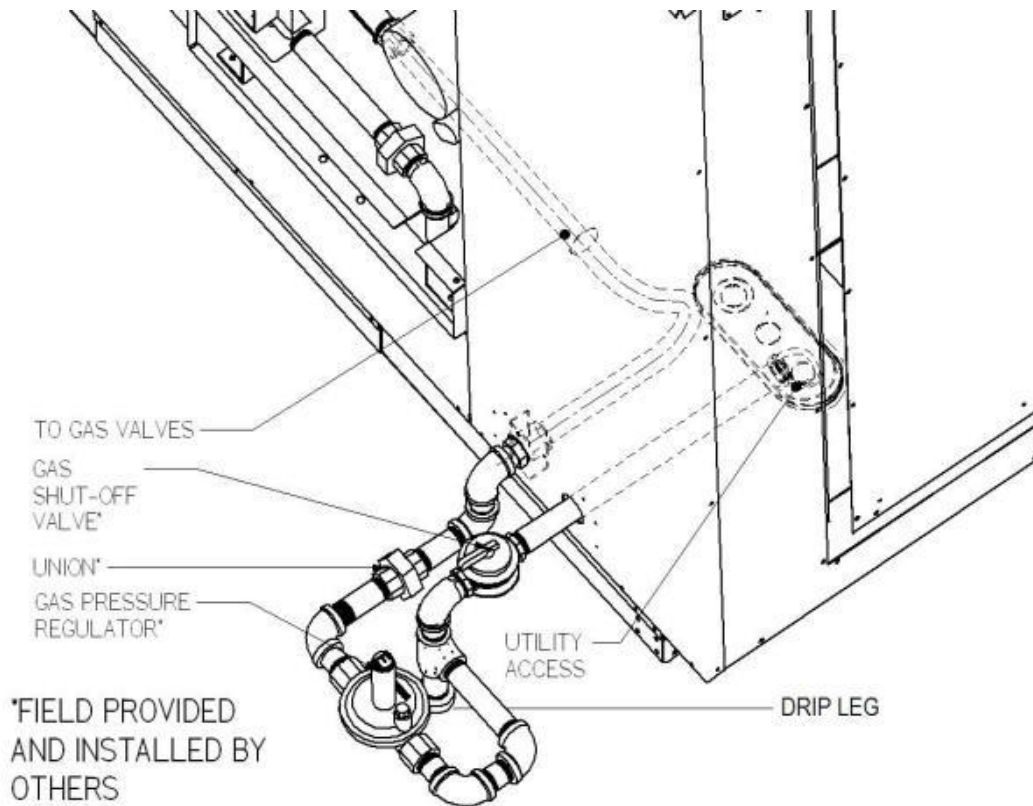



Figure 13 - Example 11, 13, 16-25 and 30 ton through the Base Gas Piping

*Leak Testing*

All components of gas supply system, including manual shut off valves and the piping in the interior of the unit, shall be leak tested with a soap solution before operating the appliance and at least on an annual basis thereafter.

 <b>DANGER</b>
<b>LEAK CHECK GAS PIPE</b>
<p>The gas pipe in the unit shall be checked for leaks before startup. Leak checking is the responsibility of the installing contractor. All connections shall be checked for leaks annually after installation. Failure to leak check could result in fire, explosion, or other hazardous situations.</p>

**! DANGER**

Do not use open flame or other source of ignition for leak testing. Fire or explosion could result causing property damage, personal injury, or death.

**! CAUTION**

Some soaps used for leak detection can be corrosive to certain metals. Rinse piping thoroughly after leak test has been completed.

All gas fired heat exchangers are completely tested at the factory before shipment. This will remove nearly all of the oils that have been used in the manufacturing process. However, trace amounts may remain. When performing the initial startup at the jobsite, it is highly recommended that people or any other living animals, which may be sensitive to the residual odors or gases, NOT be present in the conditioned space during the startup. In all cases, including the initial factory firing and testing, any of the gases will be under the acceptable level of concentration for human occupancy.

**! WARNING**

Those sensitive to odors or gases from trace amounts of residual oils must NOT be present in the conditioned space during the startup of a gas fired installation.

**Refrigerant-to-Water Heat Exchanger**  
Condenser water pump, condenser water piping, cooling tower or geothermal loop, pressure gauges, strainers, piping insulation

and all components of the waterside piping must be field installed.

*Water-Source Heat Pump Applications*  
Water-source heat pump units using 100% outside air must have electric preheat if the application has a potential for operation with air entering the indoor coil below 43°F with a water loop temperature of 70°F.

**! CAUTION**

**WATER-SOURCE HEAT PUMP APPLICATIONS**

Water-source heat pump units using 100% outside air must have electric preheat if the application has a potential for heat pump heating operation with air entering the indoor coil below 43°F with an entering water loop temperature of 70°F.

*Open Loop Applications*  
This product contains one or more refrigerant-to-water heat exchangers made of 316 Stainless Steel. 316 Stainless Steel is subject to severe corrosion and failure when exposed to chlorides.

**! WARNING**

**OPEN LOOP APPLICATIONS**

Failure of the condenser as a result of chemical corrosion is excluded from coverage under AAON Inc. warranties and the heat exchanger manufacturer's warranties.

Do not allow water containing any form of chlorides to enter this heat exchanger.

Common forms of chlorides include:

1. Sea water mist entering an open cooling tower system.
2. Contaminated makeup water containing salt water.
3. Disinfecting the water loop with solutions containing sodium hypochlorite.

Chlorides will result in a premature failure of the condenser.

Failure of the condenser as a result of chemical corrosion is excluded from coverage under AAON warranties and the heat exchanger manufacturer warranties.

Failure of the condenser will allow water to enter the refrigerant circuit and will cause extensive damage to the refrigerant circuit components. Any damage to the equipment as a result of condenser failure from chemical corrosion due to the fluid in the condenser is excluded from coverage under AAON warranties and the heat exchanger manufacturer warranties.

 **WARNING**

**OPEN LOOP APPLICATIONS**

SMO 254 brazed plated refrigerant-to-water heat exchangers are recommended with all open loop applications. Failure to use a SMO 254 heat exchanger may result in premature failure of your system and possible voiding of the warranty.

 **CAUTION**

Cleaning the cooling tower or condenser water loop with harsh chemicals such as hydrochloric acid (muriatic acid), chlorine or other chlorides, can damage the refrigerant-to-water heat exchanger. Care must be taken to avoid allowing chemicals to enter the refrigerant-to-water heat exchanger. See Appendix A - Heat Exchanger Corrosion Resistance for more information.

*Freezing Water in the Heat Exchanger*

This product contains one or more refrigerant-to-water heat exchangers. A refrigerant-to-water heat exchanger contains refrigerant in one passage and water in another passage. Water is subject to freezing at 32°F. When water freezes in a heat exchanger significant forces are exerted on the components of the heat exchanger where the water is confined.

 **WARNING**

**WATER FREEZING**

Failure of the condenser due to freezing will allow water to enter the refrigerant circuit and will cause extensive damage to the refrigerant circuit components. Any damage to the equipment as a result of water freezing in the condenser is excluded from coverage under AAON warranties and the heat exchanger manufacturer warranties.

Failure of the condenser due to freezing will allow water to enter the refrigerant circuit and will cause extensive damage to the refrigerant circuit components. Any damage to the equipment as a result of water freezing in the condenser is excluded from coverage under AAON warranties and the heat exchanger manufacturer warranties.

Unit is capable of operating with Entering Water Temperatures (EWT) as low as 57°F, during the cooling mode, without the need for head pressure control. If the EWT is expected to be lower than 57°F or a more stable operation is desired, a factory provided head pressure control water valve option is available.

Glycol solution must be used if ambient temperatures are expected to fall below freezing or if the loop entering water temperature to the unit is below 50°F while operating in the heating mode (heat pump units only). Adding glycol to condenser water causes an increase in pressure drop and also results in a decrease in unit performance. A minimum concentration of 20% glycol solution is recommended.

Table 9 - Glycol Freezing Points


% Glycol	Ethylene Glycol	Propylene Glycol
20	18°F	19°F
30	7°F	9°F
40	-7°F	-6°F
50	-28°F	-27°F

Water loop piping runs through unheated areas or outside the building must be insulated.

*Water Piping*

Installing contractor must ensure a differential pressure switch or water flow switch is installed between the condenser water supply and return connections. This

sensor provides a signal to the unit controller that water flow is present in the refrigerant-to-water heat exchanger and the unit can operate without damaging unit components.

 **WARNING**

**WATER PRESSURE**

Prior to connection of condensing water supply, verify water pressure is less than maximum pressure shown on unit nameplate. To prevent injury or death due to instantaneous release of high pressure water, relief valves must be field supplied on water piping. Supply water connection may require a backflow preventer to prevent supply makeup water from backing up into the public water system.

Table 10 - Standard Brazed Plate Heat Exchanger Water Connections

Model (RNA-)	Supply and Return Connection Size
011, 013, 016, 018, 020	1 1/2" NPT
025, 030	2" NPT

Only use approved water pipe material. Avoid using galvanized material for water lines/fittings as the material is corrosive and may cause fouling of the water system.

Condenser water pump must be field sized and installed between the cooling tower/geothermal loop and self-contained unit. System must be sized in accordance with the ASHRAE Handbook.

Use engineering guidelines to maintain equal distances for supply and return piping and limit bend radiuses to maintain balance in the

system. Balancing valves, permanent thermometers and gauges may be required. Before connection to the unit, flush the condenser water system to remove foreign material that could cause condenser fouling. Install a screen strainer with a minimum of 20 Mesh ahead of the condenser inlet to prevent condenser fouling and internal tube damage.

Mineral content of the condenser water must be controlled. All makeup water has minerals in it and as the water is evaporated in the cooling tower, these minerals remain. As the mineral content of the water increases, the conductivity of the water increases.

 **CAUTION**

**WATER PIPING**

Follow national and local codes when installing water piping. Connections to the unit must incorporate vibration eliminators to reduce noise and vibration and shutoff valves to facilitate servicing. Supply and return water piping must be at least as large as the unit connections and larger depending on length of runs, rise and bends.

Field provided and installed water treatment program must be compatible with stainless steel, copper, aluminum, ABS plastic, and PVC. Batch feed processes must never be used as concentrated chemicals can cause corrosion. Never use hydrochloric acid (muriatic acid) or chlorine as it will corrode stainless steel.

 **CAUTION**

PVC (Polyvinyl Chloride) and CPVC (Chlorinated Polyvinyl Chloride) are vulnerable to attack by certain chemicals. Polyolester (POE) oils used with R-410A and other refrigerants, even in trace amounts, in a PVC or CPVC piping system will result in stress cracking of the piping and fittings and complete piping system failure.

 **CAUTION**

Each heat exchanger is equipped with a refrigerant pressure relief device to relieve pressure should excessive condensing pressures (>675 psig) occur. Codes may require installing contractor to connect and route relief piping outdoors. The relief valve has a 5/8" male flare outlet connection.

**NOTE:** Install ball valves in the condenser water supply and return lines for unit isolation and water flow balancing. All manual flow valves must be of the ball valve design. Globe or gate valves must not be used due to high pressure drops and poor throttling characteristics.

Pressure and temperature ports are recommended in condenser water supply and return lines for system balancing. These openings must be 5 to 10 pipe diameters from the unit water connections. To allow for mixing and temperature stabilization, wells in the water piping must extend at least 1/2 pipe diameter into the pipe.

**! CAUTION**

Installing contractor is responsible for properly sizing and installing water system components. Improper fluid flow due to valves, piping, or improper pump operation may result in unacceptable unit operation and void warranty.

Piping systems must not exceed 10 ft/sec fluid velocity to ensure tube wall integrity and reduce noise.

### Condensate Drain Piping

11, 13, 16-25 and 30 ton units are equipped with one condensate drain pan connection, on the right side of the unit. P-traps must be field provided and installed.

All drain connections must be used and individually trapped to ensure a minimum amount of condensate accumulation in the drain pans. Use ABS type cement to join the drain pipe connections.

**Note:** The drain pan connections are 1.5” MPT fitting.

Drainage of condensate directly onto the roof may be acceptable in certain areas, refer to local codes. If condensate is to drain directly onto the roof, place a small drip pad below the drain to protect the roof from possible damage.

If condensate is piped into the building drainage system, the drain pipe must penetrate the roof external to the unit itself. Pitch the drain line away from the unit at least 1/8 inch per foot. On longer runs, use an air break to ensure proper drainage.

**! CAUTION**

Unit must not be operated without a p-trap. Failure to install a p-trap may result in overflow of condensate water into the unit.

Draw-through cooling coils will have a negative static pressure in the drain pan area. This will cause an un-trapped drain to back up due to air being pulled up through the condensate drain piping.

Condensate drain trapping and piping must conform to all applicable governing codes.

### Draw-Through Coils

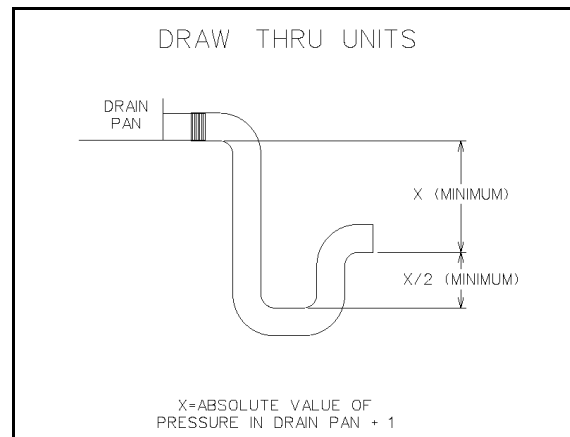


Figure 14 - Draw-Through Drain Trap

The X dimension on the draw-through trap must be at least equal to the absolute value of the negative static pressure in the drain pan plus one inch. To calculate the static pressure at the drain pan add the pressure drops of all components upstream of the drain pan, including the cooling coil, and add the return duct static pressure. Include the dirt allowance pressure drop for the filters to account for the worst-case scenario.

The height from top of the bottom bend of the trap to the bottom of the leaving pipe must be at least equal to one half of the X dimension.

This ensures that enough water is stored in the trap to prevent losing the drain seal during unit startup

**Note:** The absolute value of the fan inlet pressure will always be greater than or equal to the absolute value of the static pressure in the drain pan on draw-through units, so the fan inlet pressure is a safe value to use for the drain pan static pressure.

Table 11 - Draw-Through Drain Trap Dimensions

Draw-Through		
Drain Pan Pressure	Trap Dimensions	
Negative Static (inches of water)	X (inch)	X/2 (inch)
-0.50	1.50	0.75
-1.00	2.00	1.00
-1.50	2.50	1.25
-2.00	3.00	1.50
-2.50	3.50	1.75
-3.00	4.00	2.00
-3.50	4.50	2.25
-4.00	5.00	2.50
-4.50	5.50	2.75
-5.00	6.00	3.00
-5.50	6.50	3.25
-6.00	7.00	3.50
-6.50	7.50	3.75
-7.00	8.00	4.00
-7.50	8.50	4.25
-8.00	9.00	4.50

 <b>CAUTION</b>
All condensate drains must be trapped individually before they are connected to a common line.

 <b>CAUTION</b>
All condensate drain connections must be used. Drain pans are sloped towards connections.

### Heating Coils

One or two row hot water and steam heating and preheating coils can be factory installed. All valve controls for heating operation are field supplied and field installed. Hot water and steam coil connections are spun copper tube.

Water coils must not be subjected to entering air temperatures below 38°F to prevent coil freeze-up. If air temperature across the coil is going to be below this value, use a glycol solution to match the coldest air expected.

Table 12 - Steam Coil Connection Sizes

Model (RNA-)	Steam Coil Connection Size
011, 013, 016-025 and 030	2 1/8"

Table 13 - Hot Water Coil Connection Sizes

Model (RNA-)	Hot Water Coil Connection Size
011, 013, 016, 018, 020, 025, 030	1 5/8"

### Chilled Water Coil

Four or six row chilled water cooling coils can be factory installed. All valve controls for cooling operation are field supplied and field installed. Chilled water coil connections are spun copper tube.

Table 14 - Chilled Water Coil Connection Sizes

Model (RNA-)	Chilled Water Coil Connection Size
011, 013	1 5/8"
016, 018, 020, 025, 030	2 1/8"



**! WARNING**

Piping shall be in accordance with national and local codes. Pressure limiting devices, backflow preventers and all other safety requirements are the sole responsibility of the installing contractor.

**! CAUTION**

Installing Contractor is responsible for proper sealing of the water piping entries into the unit. Failure to seal the entries may result in damage to the unit and property.

**Electric Preheat**

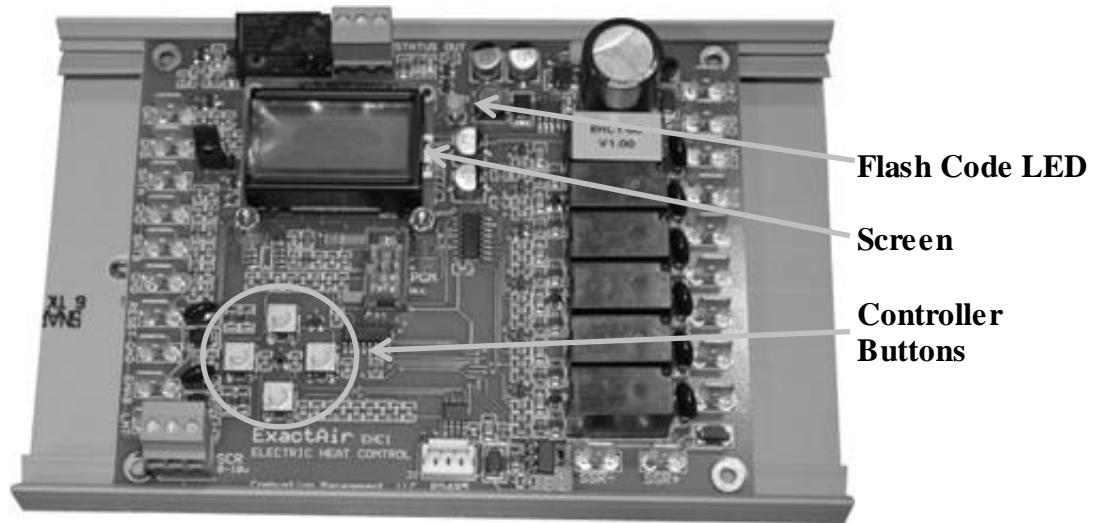


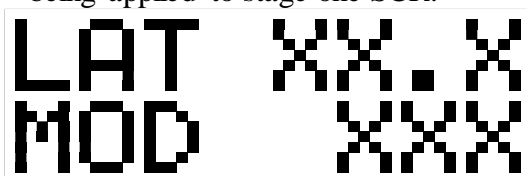
Figure 15 - Preheat Controller

The electric preheat controller is factory installed within the preheat cabinet. The following details are for EHC1 version 1.10 of the preheat controller.

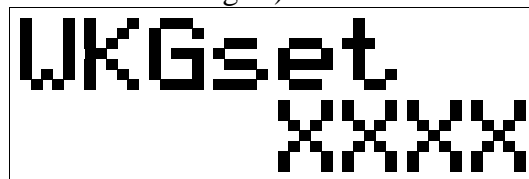
*Status Display Screens*

These screens are accessed by pressing either the left or right controller buttons and scrolling through the following displays.

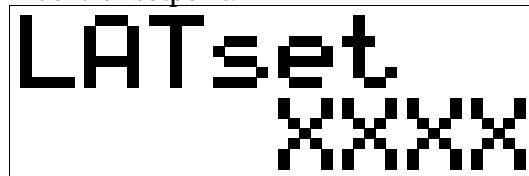
1. **LAT** - Measured leaving air temperature (LAT), average of LAT A and B probes.  
**MOD** - Modulation rate % currently being applied to stage one SCR.



2. **WKGset** - "Working" LAT setpoint (°F) (LATset >> RESETset as adjusted by 0-10V RESET signal).



3. **LATset** - Leaving air temperature (°F) control setpoint.



4. **RESETset** - "Reset" air temperature (°F) control setpoint.

```

RESETset
      XXXXX
  
```

5. **OATset** - Outside air temperature (°F) control setpoint, measured outside temperature must be less to enable preheat.

```

OATset
      XXXXX
  
```

6. **LLTset** - "Low Limit Time" temperature (°F) setpoint. If this temperature is not reached at full output, relay will pull in.

```

LLTset
      XXXXX
  
```

7. **Stage** - Current operating stage 1-6.

```

Stage
  X of X
  
```

8. **Stage** - Current operating stage 1-6.  
**MOD** - Modulation rate % being applied to stage one heat strip SCR.

```

Stage  X
MOD   XX
  
```

9. **OAT** - Outside air inlet temperature (°F).

```

OAT
      XXXX.X
  
```

10. **LATA** - Leaving air probe "A" temperature (°F).

```

LATA
      XX.X
  
```

11. **LATB** - Leaving air probe "B" temperature (°F).

```

LATB
      XX.X
  
```

12. **ManSTG** - Manual override stage for system testing. Any override automatically cancels after ten minutes; 0 indicates normal operation, 1-6 corresponds to stages 1-6 being forced on. Stage 1, the SCR, is forced to 50%.

```

ManSTG
      X
  
```

### System Setting Screens

These screens are access by pressing the up button and then entering the technician password **2425**. The screens are scrolled through by pressing either right or left buttons on the controller. Adjustment is made by pressing the up and down buttons. After a short time of inactivity, the screen will go back to the Status Display Screens.

1. **StartDly** - Seconds of delay after the 'Enable' call before heating starts. This is to allow the Supply Fan to come up to speed. Supply Fan VFD's have a 45 second ramp up time. Range = 1sec-60sec, and the default is 15sec.

```
StartDly
0015
```

2. **BelowLLT** - "Below Low Limit Time". Range = 10sec-1800sec, and the default is 10sec. If 'LLTset' temperature is not reached within 'BelowLLT' after reaching full output, the status relay will operate.

```
BelowLLT
0010
```

3. **Stages** - Number of stages. Range = 1-6, and the default is 1. The number of stages can be determined using Table 15.

```
Stages
0001
```

Table 15 - Stages of Electric Preheat

Tonnages	Feature 14B	Stages
C Cabinet RN 11, 13, 16-25 and 30 tons	A= 10 kW	1
	B= 20 kW	
	C = 30 kW	
	D = 40 kW	2
	E = 50 kW	
	F = 60 kW	3
	G = 70 kW	
	H = 80 kW	
	J = 90 kW	5
	K = 100 kW	
	L = 110 kW	
	M = 120 kW	6

4. **LATset** - Leaving air temperature setpoint. Range = 35°F-80°F, and the default is 50°F.

```
LATset
0050
```

5. **OATset** - Outside air temperature setpoint. Range = 35°F-60°F, and the default is 35°F.

```
OATset
0035
```

6. **LLTset** - "Low Limit Time" temperature setpoint. Range = 35°F-50°F, and the default is 35°F. If 'LLTset' temperature is not reached within 'BelowLLT' time after reaching full output, the status relay will operate.

```
LLTset
0035
```

7. **RESETset** - "Reset Setpoint" temperature. Range = 35°F-80°F, and the default is 50°F.

```
RESETset
0050
```

8. **ManSTG** - Temporary manual override a specified stage testing, 0=normal operation, 1-6 to override corresponding stages. Range = 0-6, and the default is 0. The manual override may be used for unit testing of each stage. Stage 1 will be at 50% to test SCR and stages 2-6 will be full capacity. A manual override will expire in ten minutes if not manually cancelled by resetting 'ManSTG' back to zero.

```
ManSTG
0000
```

### LED Flash Alarm Codes

The flashing red LED will be to the right of the screen. The number of blinks is described below. The LCD screen will also display the screens.

1 = LATA probe open/short

```
FLT: LAT
Probe A
```

2 = LATB probe open/short

```
FLT: LAT
Probe B
```

3 = OAT sensor open/short

```
FLT: OAT
Probe
```

4 = Leaving air temp over limit

```
FLT: LAT
Hi Limit
```

5 = Cooling down after hi limit' event

```
Hi LAT
Cooldown
```

6 = LAT below low limit

```
LATbelow
Lo Limit
```

7 = Stage 1 only recovery after mechanical limit

```
Mech Lmt
Recovery
```

8 = Shutdown after too many hi limit events

```
Mech Lmt
Shutdown
```

9 = Short or overload on the 0-10VDC analog signal output

```
FLT: SCR
0-10 Sig
```

### Operation

Controller receives 24VAC preheat enable

Controller evaluates if outside air temperature "OAT" is below setpoint 'OATset'

If  $OAT < 'OATset'$ , controller will delay heating startup by time setpoint 'STARTDLY', then stage up preheat to maintain the setpoint 'LATset' to a maximum number of stages set in setpoint 'Stages'.

If a safety is reached with the controller's safety sensors then the electric preheat will be de-energized for a period of 2 minutes. Electric preheat will turn on stage one at 100% for 3 minutes to test if fault conditions still exist after the cool down period. The controller will repeat this and if 3 trips are recorded in 60 minutes then the controller will lockout and require manually cycling power to reset.

The modulating electric preheat option is designed to temper the incoming outside air to the unit based on an enable control signal and the outside air conditions.

A 24VAC enable signal must be provided to the [PHE] terminal to enable the operation of the electric preheat. Once the preheat controller is enabled it will monitor the outside air temperature to determine if any capacity of preheat is needed. If the outside air temperature falls below the outside air temperature setpoint the electric preheat will be started up and maintain the leaving air temperature setpoint with both SCR controlled and staged electric preheat. Both setpoints are set with push button LCD interface on the preheat controller. Outside air temperature sensors and preheat discharge supply air temperature sensors are factory installed and wired to the preheat controller. Electric preheat has maximum operating outside air temperature of 60°F and a maximum preheat discharge air temperature of 80°F.

[COM], [PHO] & [PHC] feedback terminals are provided to communicate if the electric preheat is in operation. PHO is a normally open contact, PHC is a normally closed contact, and COM is the common. These terminals are not required to be connected. [PHE] is the electric preheat operation enable. [PH+] and [PH-] are the preheat set point reset terminals.

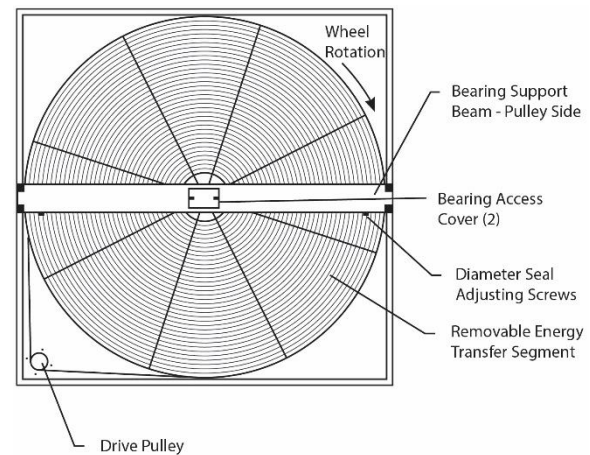
## Energy Recovery Units

### WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

### General Information

AAONAIRE® units have been equipped with an energy recovery wheel. This section is provided to assure the energy recovery feature will be properly setup to perform in accordance with the job specifications for your particular application.



Energy Recovery Wheel

The Energy Recovery Cassette consists of a frame wheel, wheel drive system, and energy transfer segments. Segments are removable for cleaning or replacement. The segments rotate through counter flowing exhaust and outdoor air supply streams where they transfer heat and/or water vapor from the warm, moist air stream to the cooler and/or drier air stream.

The initial setup and servicing of the energy recovery wheel is very important to maintain proper operation efficiency and building occupant comfort.

Normal maintenance requires periodic inspection of filters, the cassette wheel, drive belts, air seals, wheel drive motor, and its electrical connections.

Wiring diagrams are provided with each motor. When wired according to wiring diagram, motor rotates clockwise when viewed from the shaft/pulley side.

By carefully reviewing the information within this section and following the instructions, the risk of improper operation and/or component damage will be minimized.

It is important that periodic maintenance be performed to help assure trouble free operation.

### **Initial Mechanical Check and Setup**

Outdoor units equipped with outside air intake will have an outside air hood. The outside air hood must be opened prior to unit operation.

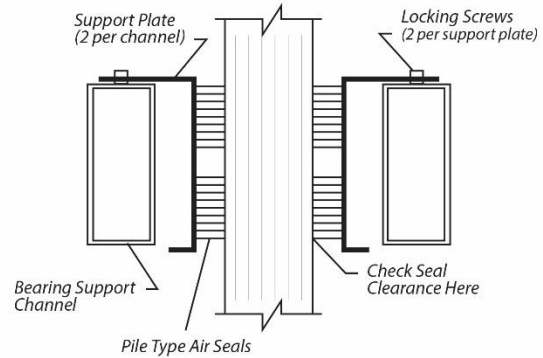
Make outdoor air intake adjustments according to building ventilation, or local code requirements.

After the unit installation is complete, open the cassette access door and determine that the energy wheel rotates freely when turned by hand. Apply power and observe that the wheel rotates at approximately 30 RPM. If the wheel does not rotate when power is applied, it may be necessary to readjust the “diameter air seals”.

### **Air Seal Adjustments**

Pile type air seals across both sides of the energy wheel diameter are factory adjusted to provide close clearance between the air seal and wheel. Racking of the unit or cassette during installation, and/or mounting of the

unit on a non-level support or in other than the factory orientation can change seal clearances. Tight seals will prevent rotation.



Cross Section of Air Seal Structure

### **Wheel to Air Seal Clearance**

To check wheel to seal clearance; first disconnect power to the unit, in some units the energy recovery wheel assembly can be pulled out from the cabinet to view the air seals. On larger units, the energy recovery wheel may be accessible inside the walk-in cabinet.

A business card or two pieces of paper can be used as a feller gauge, (typically each .004” thick) by placing it between the face of the wheel and pile seal.

Using the paper, determine if a loose slip fit exist between the pile seal and wheel when the wheel is rotated by hand.

To adjust air seal clearance, loosen all seal plate retaining screws holding the separate seal retaining plates to the bearing support channels and slide the seals plates away from the wheel. Using the paper feeler gauge, readjust and retighten one seal plate at a time to provide slip fit clearance when the wheel is rotated by hand.

Confirm that the wheel rotates freely. Apply power to the unit and confirm rotation.

### Airflow Balancing and Checking

High performance systems commonly have complex air distribution and fan systems. Unqualified personnel must not attempt to adjust fan operation, or air circulation, as all systems have unique operations characteristics. Professional air balance specialists must be employed to establish actual operating conditions, and to configure the air delivery system for optimal performance.

### Controls

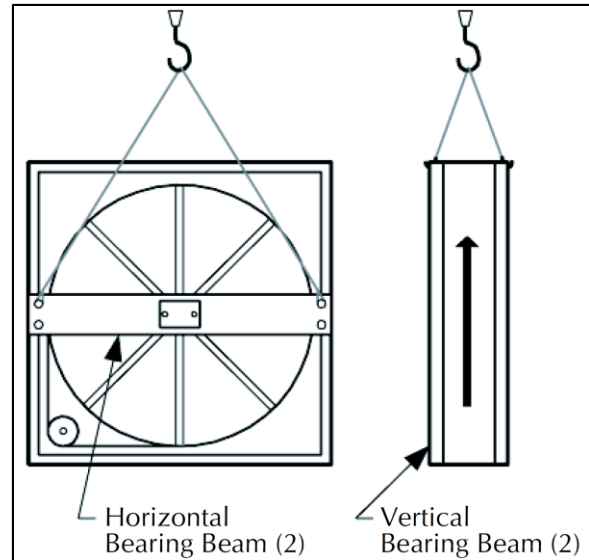
A variety of controls and electrical accessories may be provided with the equipment. Identify the controls on each unit by consulting appropriate submittal, or order documents, and operate according to the control manufacturer's instructions. If you cannot locate installation, operation, or maintenance information for the specific controls, then contact your sales representative, or the control manufacturer for assistance.

### WARNING

Do not alter factory wiring. Deviation from the supplied wiring diagram will void all warranties, and may result in equipment damage or personal injury. Contact the factory with wiring discrepancies.

### Routine Maintenance and Handling

Handle cassettes with care. Lift all cassettes by the bearing support beam. Holes are provided on both sides of the bearing support beams to facilitate rigging as shown in the following illustration.



Lifting Hole Locations

Routine maintenance of the Energy Recovery Cassettes includes periodic cleaning of the Energy Recovery Wheel as well as inspection of the Air Seals and Wheel Drive Components as follows:


### Cleaning

The need for periodic cleaning of the energy recovery wheel will be a function of operating schedule, climate and contaminants in the indoor air being exhausted and the outdoor air being supplied to the building.

The energy recovery wheel is “self-cleaning” with respect to dry particles due to its laminar flow characteristics. Smaller particles pass through; larger particles land on the surface and are blown clear as the flow direction is reversed. Any material that builds up on the face of the wheel can be removed with a brush or vacuum. The primary need for cleaning is to remove oil based aerosols that have condensed on energy transfer surfaces. A characteristic of all dry desiccants, such films can close off micron sized pores at the surface of the desiccant material, reducing the efficiency by which the desiccant can adsorb and desorb moisture and also build up so as to reduce airflow.

In a reasonably clean indoor environment such as a school or office building, measurable reductions of airflow or loss of sensible (temperature) effectiveness may not occur for several years. Measurable changes in latent energy (water vapor) transfer can occur in shorter periods of time in applications such as moderate occupant smoking or cooking facilities. In applications experiencing unusually high levels of occupant smoking or oil based aerosols such as industrial applications involving the ventilation of machine shop areas for example, annual washing of energy transfer may be necessary to maintain latent transfer efficiency. Proper cleaning of the energy recovery wheel will restore latent effectiveness to near original performance.

To clean, gain access to the energy recovery wheel and remove segments. Brush foreign material from the face of the wheel. Wash the segments or small wheels in a 5% solution of non-acid based coil cleaner or alkaline detergent and warm water.

 <b>CAUTION</b>
<b>Do not use acid based cleaners, aromatic solvents, steam or temperatures in excess of 170°F; damage to the wheel may occur!</b>

Soak in the solution until grease and tar deposits are loosened (Note: some staining of the desiccant may remain and is not harmful to performance). Before removing, rapidly run finger across surface of segment to separate polymer strips for better cleaning action. Rinse dirty solution from segment and remove excess water before reinstalling in wheel.

### **Air Seals**

Four adjustable diameter seals are provided on each cassette to minimize transfer of air between the counter flowing airstreams.

To adjust diameter seals, loosen diameter seal adjusting screws and back seals away from wheel surface. Rotate wheel clockwise until two opposing spokes are hidden behind the bearing support beam. Using a folded piece of paper as a feeler gauge, position paper between the wheel surface and diameter seals.

Adjust seals towards wheel surface until a slight friction on the feeler gauge (paper) is detected when gauge is moved along the length of the spoke. Retighten adjusting screws and recheck clearance with “feeler” gauge.

### **Wheel Drive Components**

The wheel drive motor bearings are pre-lubricated and no further lubrication is necessary.

The wheel drive pulley is secured to the drive motor shaft by a combination of either a key or D slot and set screw.

The set screw is secured with removable loctite to prevent loosening. Annually confirm set screw is secure. The wheel drive belt is a urethane stretch belt designed to provide constant tension through the life of the belt. No adjustment is required. Inspect the drive belt annually for proper tracking and tension. A properly tensioned belt will turn the wheel immediately after power is applied with no visible slippage during start-up.



### Installation Considerations

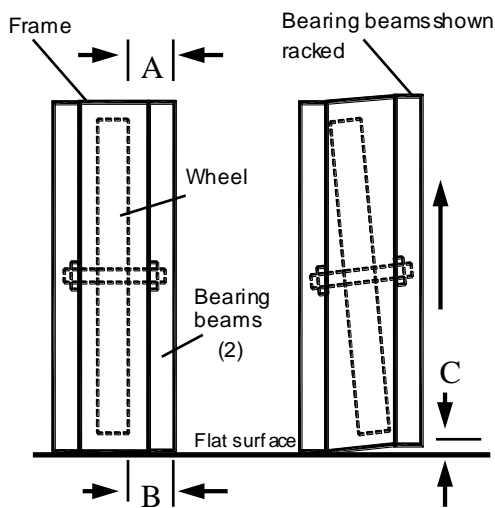
Energy recovery cassettes are incorporated within the design of packaged units, packaged air handlers and energy recovery ventilators. In each case, it is recommended that the following considerations be addressed:

### Accessibility

The cassette and all its operative parts; i.e.: motor, belt, pulley, bearings, seals and energy transfer segments must be accessible for service and maintenance. This design requires that adequate clearance be provided outside the enclosure. Where cassettes are permanently installed in a cabinet, access to both sides of the cassette must be provided.

### Orientation & Support

The Energy Recovery Cassette may be mounted in any orientation. However, Care must be taken to make certain that the cassette frame remains flat and the bearing beams are not racked.



Avoid Racking of Cassette Frame

To verify, make certain that the distance between wheel rim and bearing beam is the same at each end of the bearing beam, to within 1/4 of an inch (dimension A & B).

This amount of racking can be compensated for by adjusting the diameter seals.

If greater than 1/4 inch (dimension C), racking must be corrected to ensure that drive belt will not disengage from wheel.

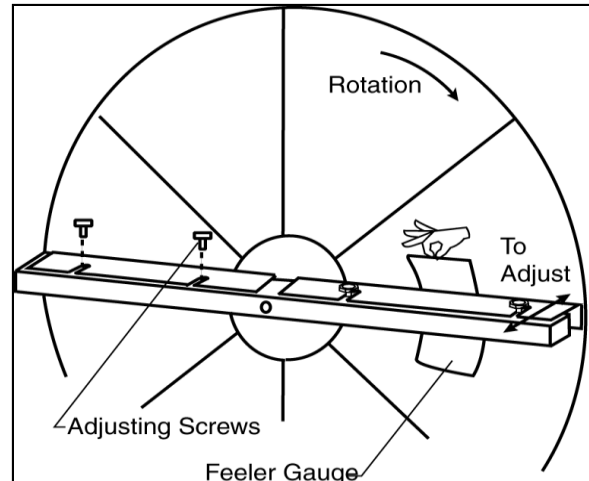
## Operation



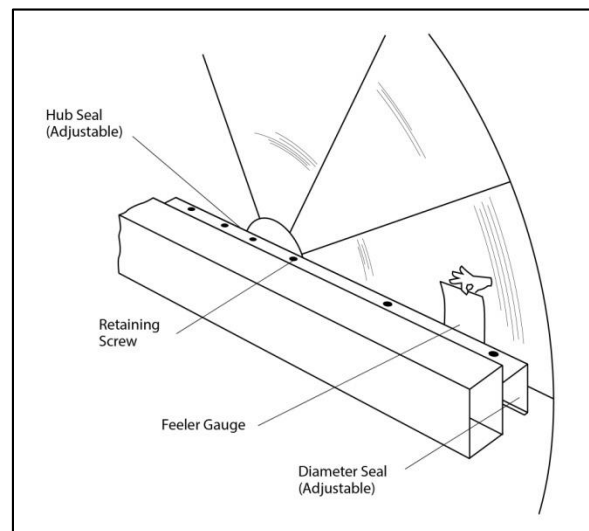
Keep hands away from rotating wheel!  
Contact with rotating wheel can cause physical injury.

## Startup Procedure

1. By hand, turn wheel clockwise (as viewed from the pulley side), to verify wheel turns freely through 360° rotation.
2. Before applying power to drive motor, confirm wheel segments are fully engaged in wheel frame and segment retainers are completely fastened. (See Segment Installation Diagram).
3. With hands and objects away from moving parts, activate unit and confirm wheel rotation. Wheel rotates clockwise (as viewed from the pulley side).
4. If wheel has difficulty starting, turn power off and inspect for excessive interference between the wheel surface and each of the four (4) diameter seals. To correct, loosen diameter seal adjusting screws and back adjustable diameter seals away from surface of wheel, apply power to confirm wheel is free to rotate, then re-adjust and tighten hub and diameter seals, as shown in hub seal adjustment diagram.
5. Start and stop wheel several times to confirm seal adjustment and to confirm belt is tracking properly on wheel rim (approximately 1/4" from outer edge of rim).



Diameter Seal Adjustment



Hub Seal Adjustment

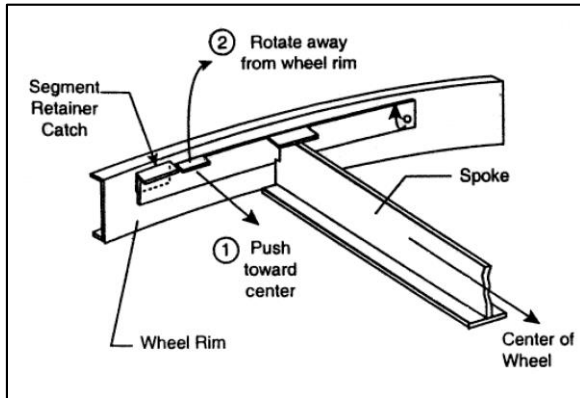
## Service



Disconnect electrical power before servicing energy recovery cassette. Always keep hands away from bearing support beam when installing or removing segments. Failure to do so could result in severe injury to fingers or hand.

## Segment Installation & Replacement

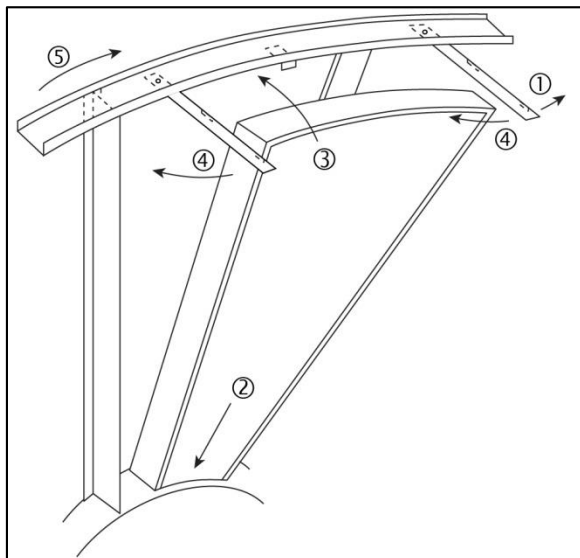
Wheel segments are secured to the wheel frame by a Segment Retainer which pivots on the wheel rim and is held in place by a Segment Retaining Catch.



Segment Retainer

To install wheel segments follow steps one through five below. Reverse procedure for segment removal.

1. Unlock two segment retainers (one on each side of the selected segment opening).
2. With the embedded stiffener facing the motor side, insert the nose of the segment between the hub plates.



Segment Installation

3. Holding segment by the two outer corners, press the segment towards the center of the wheel and inwards against the spoke flanges. If hand pressure does not fully seat the segment, insert the flat tip of a screw driver between the wheel rim and outer corners of the segment and apply downward force while guiding the segment into place.
4. Close and latch each Segment Retainer under Segment Retaining Catch.
5. Slowly rotate the wheel 180°. Install the second segment opposite the first for counterbalance. Rotate the two installed segments 90° to balance the wheel while the third segment is installed. Rotate the wheel 180° again to install the fourth segment opposite the third. Repeat this sequence with the remaining four segments.

## Wheel Drive Motor and Pulley Replacement

1. Disconnect power to wheel drive motor.
2. Remove belt from pulley and position temporarily around wheel rim.
3. Loosen set screw in wheel drive pulley using a hex head wrench and remove pulley from motor drive shaft.
4. While supporting weight of drive motor in one hand, loosen and remove (4) mounting bolts.
5. Install replacement motor with hardware kit supplied.
6. Install pulley to dimension as shown and secure set screw to drive shaft.
7. Stretch belt over pulley and engage in groove.
8. Follow start-up procedure.

## Belt Replacement


1. Obtain access to the pulley side bearing access plate if bearing access plates are provided. Remove two bearing access plate retaining screws and the access plate.
2. Using hexagonal wrench, loosen set screw in bearing locking collar. Using light hammer and drift (in drift pin hole) tap collar in the

direction of wheel rotation to unlock collar. Remove collar.

3. Using socket wrench with extension, remove two nuts which secure bearing housing to the bearing support beam. Slide bearing from shaft. If not removable by hand, use bearing puller.

4. Form a small loop of belt and pass it through the hole in the bearing support beam. Grasp the belt at the wheel hub and pull the entire belt down.

**Note:** Slight hand pressure against wheel rim will lift weight of wheel from inner race of bearing to assist bearing removal and installation.

**CAUTION**

Protect hands and belt from possible sharp edges of hole in Bearing Support Beam.

5. Loop the trailing end of the belt over the shaft (belt is partially through the opening).

6. Reinstall the bearing onto the wheel shaft, being careful to engage the two locating pins into the holes in the bearing support beam. Secure the bearing with two self-locking nuts.

7. Install the belts around the wheel and pulley according to the instructions provided with the belt.

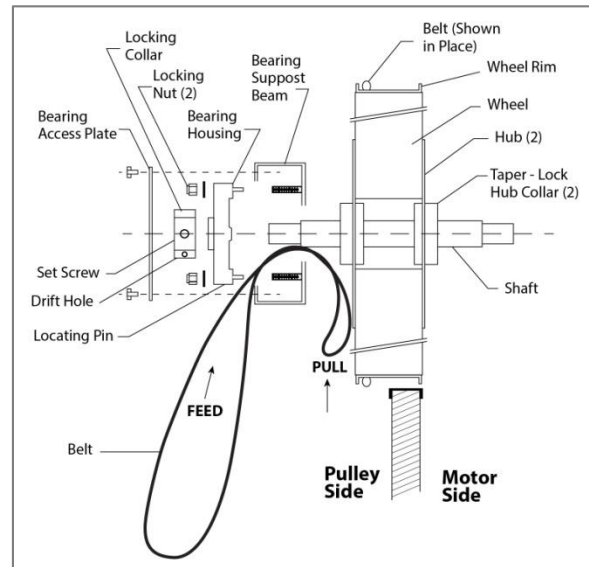
8. Reinstall diameter seals or hub seal and tighten retaining screws. Rotate wheel in clockwise direction to determine that wheel rotates freely with slight drag on seals.

9. Reinstall bearing locking collar. Rotate collar by hand in the direction the wheel rotates (see label provided on each cassette for wheel rotation).

10. Lock in position by tapping drift pin hole with hammer and drift. Secure in position by tightening set screw.

11. Reinstall Bearing Access Cover.

12. Apply power to wheel and ensure that the wheel rotates freely without interference.



Belt Replacement

## Startup

(See back of the manual for startup form.)

### **WARNING**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

### **WARNING**

Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

During startup, it is necessary to perform routine checks on the performance of the unit. This includes checking the air flow, air filters, condenser water flow, dampers, heaters, and refrigerant charge.

### Supply Fans

RN Series units are equipped with direct drive backward curved plenum fan assemblies that are selected to deliver the air volume specified according to unit size and job requirements. This is either done with air volume bands in the blower wheels or with variable frequency drives. Field airflow adjustment may be required at startup.

Air volume bands for the wheels are sized according to the unit's air delivery specifications and can also be ordered from the factory for field installation. Wheels come standard with a 10% air volume band, as a safety factor, in case additional air volume is required from the unit.

### *Air Flow Adjustment*

If reduced air volume is required an air volume band or larger air volume band can be installed within the blower wheel to reduce the amount of air delivered by the wheel.

If the unit is factory equipped with the air volume band and additional air volume is required, the band can be removed from the wheel.

Use fan program in AAON ECat to determine the new band size for the required cfm and static pressure.

The following photos of a wheel are provided for practical guidelines only in order to identify the air band location in the wheel. Actual field installation of the air band into the wheel will require access into and through the blower wheel venture, which may require removal of the blower motor and wheel.

Air volume bands are made of aluminum, sized and equipped with easy bend tabs that are to be inserted into pre-punched slots provided on the wheel. Once the band has been inserted into the slots, it **MUST BE** secured by bending the tabs over from the back side of the wheel and also **MUST BE** secured from the inside by connecting the ends together with a pop-rivet in the holes provided on the ends of the band.

If the band is field installed, a hand held pop-rivet tool is recommended for connecting the band ends together. Caution must be taken to assure that the band is tightly installed and no damage, denting or alteration to the wheel or blades occurs during the installation.

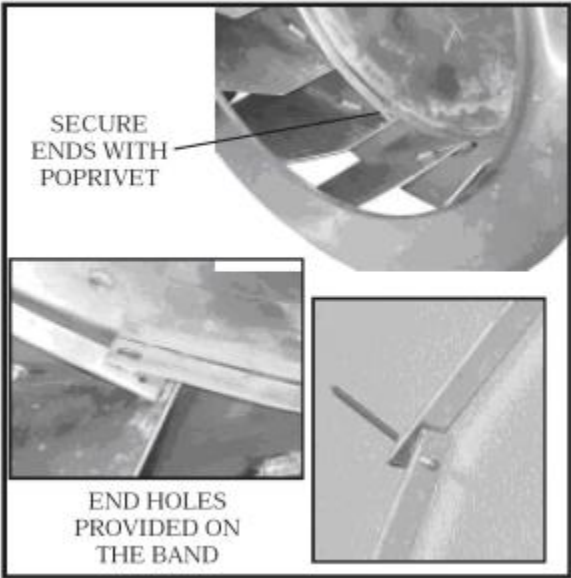
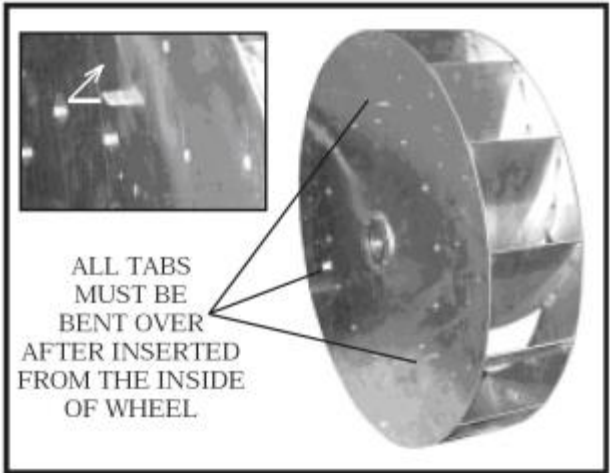
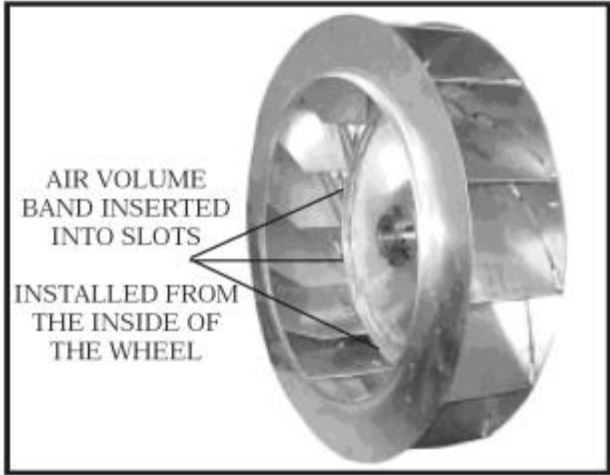


Figure 16 - Supply Fan Banding

For single set screw applications, tighten the set screw to the required torque setting (Table 16) using a calibrated torque wrench. For double set screw applications, tighten one set screw to half of the required torque setting (Table 16) using a calibrated torque wrench. Tighten the second set screw to the full required torque setting then tighten the first set screw to the full required torque setting.

Table 16 - Plenum Fan Set Screw Specifications

SET SCREW DIAMETER	TORQUE (IN-LBS)
1/4"	80
5/16"	126
3/8"	240

The gap tolerances that are allowed between the blower and the inlet cone for the plenum fan blowers are shown in Figure 17. The inlet cone can be moved as necessary to center the cone in relation to the blower. The blower can be moved on the motor shaft to set the correct overlap. These tolerances are critical to the performance of the blower.

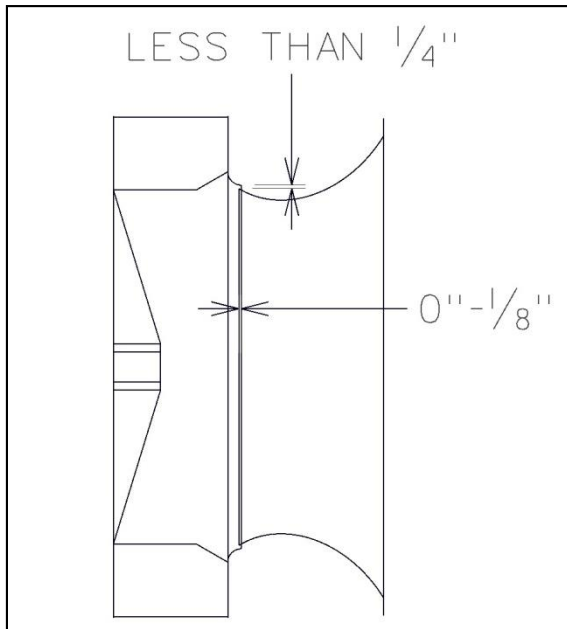


Figure 17 - Plenum Fan Gap Tolerances

### Power Return Axial Flow Fans (16-25 and 30 tons)

#### Blade Pitch Angle Setting Instructions

*Step 1: Determine the new required pitch for the fan blades*

Use the fan program in AAON ECat.

*Step 2: Maintain the balance of fan*

Mark the HUB/RET castings across a single joint, so the fan can be reassembled in the same orientation.

Mark the location of any balancing weight. Balancing weight will be on the outer bolt circle, in the form of washers, and/or longer bolts, or an additional balancing nut.

Number the blades and blade sockets, so that they can be replaced into their original positions.

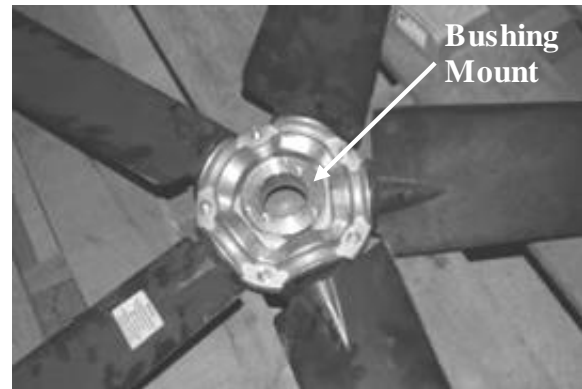


Figure 18 - Fan with the HUB on the Top and RET on the Bottom

*Step 3: Determine the direction of rotation*

Right, R, is clockwise when facing the discharge side of the fan and Left, L, is counterclockwise when facing the discharge side of the fan.

*Step 4: Determine the bushing mount location*

The bushing mount is the center section of the hub through which the fan is mounted to the shaft, and typically contains either setscrews or a center-tapered hole where the bushing inserts.

Location A is with the bushing mount on air inlet side of the fan.

Location B is with the bushing mount on air discharge side of the fan.

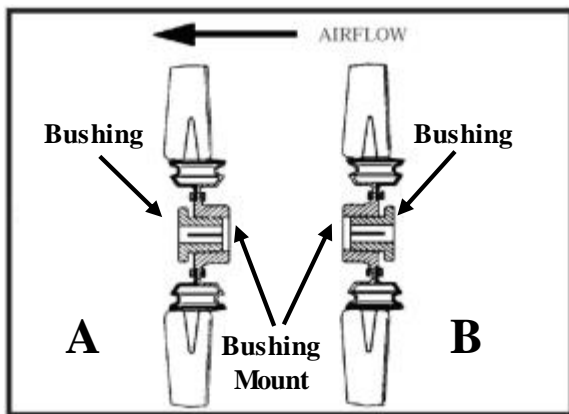


Figure 19 - Bushing Mount Location

*Step 5: Determine the pin location groove*

Disassemble fan on a flat surface and note in which groove the pin is located.

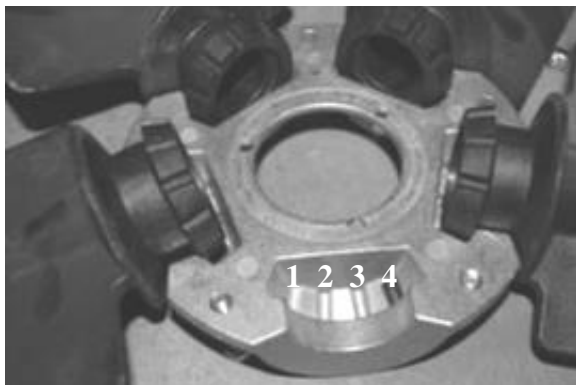
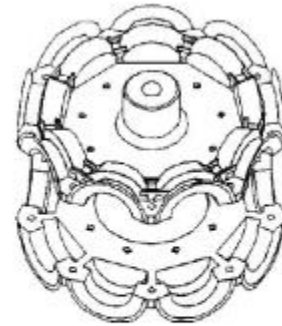


Figure 20 - RET with Pin in Groove 4  
*Step 6: Determine whether the pin is in the HUB or RET*



Top half is the HUB.  
Bottom half is the RET  
or retainer ring.

Figure 21 - Fan HUB and RET Castings



Step 7: Determine the current blade pitch and the pin location for the new blades

Table 17 - Pin Location

Type	Bushing Mount	Blade Pitch Angle									
		20°	25°	28°	30°	33°	35°	38°	40°	45°	50°
5Z	A	-	RET	-	RET	RET	RET	HUB	HUB	HUB	HUB
	B	-	HUB	-	HUB	HUB	HUB	RET	RET	RET	RET

Table 18 - Pin Groove Location


Type	Rot.	Blade Pitch Angle									
		20°	25°	28°	30°	33°	35°	38°	40°	45°	50°
5Z	R	-	4	-	3	2	1	4	3	2	1
	L	-	1	-	2	3	4	1	2	3	4

Step 8: Replace fan blades in the new pin location and reassemble the fan

Replace the blades with the pin in the 1, 2, 3, or 4 groove position of either the HUB or RET. Assemble the fan making sure to place the blades in their previous blade sockets, to match up the previous orientation of HUB and RET and to replace any balancing weights in their previous locations. Tighten bolts in a cross pattern to 5-6 ft-lbs. of torque.

### Filters

Do not operate the unit without filters in place. Check unit for correct filter placement during startup. Operation of the equipment without filters will result in a clogged evaporator coil.

 <b>CAUTION</b>
<p>Before completing startup and leaving the unit a complete operating cycle must be observed to verify that all components are functioning properly.</p>

## Adjusting Refrigerant Charge

Adjusting the charge of a system in the field must be based on determination of liquid sub-cooling and evaporator superheat. On a system with a TXV liquid sub-cooling is more representative of the charge than evaporator superheat but both measurements must be taken.

### CAUTION

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

### Before Charging

Unit being charged must be at or near full load conditions before adjusting the charge.

Units equipped with hot gas reheat must be charged with the hot gas reheat valves closed while the unit is in cooling mode to get the proper charge. After charging, operate the unit in reheat (dehumidification) mode to check for correct operation.

Charge units equipped with heat pump options in heating mode to get the proper charge. After charging, operate the unit in cooling mode to check for correct charge. Charge may need to be adjusted for cooling mode. If adjustments are made in the cooling mode, heating mode must be rerun to verify proper operation.

After adding or removing charge the system must be allowed to stabilize, typically 10-15 minutes, before making any other adjustments.

The type of unit and options determine the ranges for liquid sub-cooling and evaporator superheat. Refer to the table below when determining the proper sub-cooling.

### Checking Liquid Sub-Cooling

Measure the temperature of the liquid line as it leaves the condenser coil.

Read the gauge pressure at the liquid line close to the point where the temperature was taken. You must use liquid line pressure as it will vary from discharge pressure due to condenser coil pressure drop.

Convert the pressure obtained to a saturated temperature using the appropriate refrigerant temperature-pressure chart.

Subtract the measured liquid line temperature from the saturated temperature to determine the liquid sub-cooling.

Compare calculated sub-cooling to the table below for the appropriate unit type and options.

### Checking Evaporator Superheat

Measure the temperature of the suction line close to the compressor.

Read gauge pressure at the suction line close to the compressor.

Convert the pressure obtained to a saturated temperature using the appropriate refrigerant temperature-pressure chart.


Subtract the saturated temperature from the measured suction line temperature to determine the evaporator superheat.

Compare calculated superheat to the table below for the appropriate unit type and options.

Table 19 - Acceptable Refrigeration  
Circuit Values

<b>Air-Cooled Cond./ Air-Source Heat Pump</b>	
Sub-Cooling	8-15°F / 2-4°F (HP)*
Sub-Cooling with Hot Gas Reheat	8-15°F / 2-6°F (HP)*
Superheat	8-15°F
<b>Water-Cooled Cond./Water Source Heat Pump</b>	
Sub-Cooling	4-8°F
Superheat	8-15°F

\*In cooling mode operation


 **CAUTION**

Thermal expansion valve must be adjusted to approximately 8-15°F of suction superheat. Failure to have sufficient superheat will damage the compressor and void the warranty.

Adjusting Sub-cooling and Superheat  
Temperatures

The system is overcharged if the sub-cooling temperature is too high and the evaporator is fully loaded (low loads on the evaporator result in increased sub-cooling) and the evaporator superheat is within the temperature range as shown in the table above (high superheat results in increased sub-cooling).

Correct an overcharged system by reducing the amount of refrigerant in the system to lower the sub-cooling.

 **CAUTION**

**DO NOT OVERCHARGE!**

Refrigerant overcharging leads to excess refrigerant in the condenser coils resulting in elevated compressor discharge pressure.

The system is undercharged if the superheat is too high and the sub-cooling is too low

Correct an undercharged system by adding refrigerant to the system to reduce superheat and raise sub-cooling.

If the sub-cooling is correct and the superheat is too high, the TXV may need adjustment to correct the superheat.

Table 20 - R-410A Refrigerant Temperature-Pressure Chart

	PSIG		PSIG		PSIG		PSIG		PSIG
(°F)	R-410A	(°F)	R-410A	(°F)	R-410A	(°F)	R-410A	(°F)	R-410A
<b>20</b>	78.3	<b>50</b>	142.2	<b>80</b>	234.9	<b>110</b>	364.1	<b>140</b>	540.1
<b>21</b>	80.0	<b>51</b>	144.8	<b>81</b>	238.6	<b>111</b>	369.1	<b>141</b>	547.0
<b>22</b>	81.8	<b>52</b>	147.4	<b>82</b>	242.3	<b>112</b>	374.2	<b>142</b>	553.9
<b>23</b>	83.6	<b>53</b>	150.1	<b>83</b>	246.0	<b>113</b>	379.4	<b>143</b>	560.9
<b>24</b>	85.4	<b>54</b>	152.8	<b>84</b>	249.8	<b>114</b>	384.6	<b>144</b>	567.9
<b>25</b>	87.2	<b>55</b>	155.5	<b>85</b>	253.7	<b>115</b>	389.9	<b>145</b>	575.1
<b>26</b>	89.1	<b>56</b>	158.2	<b>86</b>	257.5	<b>116</b>	395.2	<b>146</b>	582.3
<b>27</b>	91.0	<b>57</b>	161.0	<b>87</b>	261.4	<b>117</b>	400.5	<b>147</b>	589.6
<b>28</b>	92.9	<b>58</b>	163.8	<b>88</b>	265.4	<b>118</b>	405.9	<b>148</b>	596.9
<b>29</b>	94.9	<b>59</b>	166.7	<b>89</b>	269.4	<b>119</b>	411.4	<b>149</b>	604.4
<b>30</b>	96.8	<b>60</b>	169.6	<b>90</b>	273.5	<b>120</b>	416.9	<b>150</b>	611.9
<b>31</b>	98.8	<b>61</b>	172.5	<b>91</b>	277.6	<b>121</b>	422.5		
<b>32</b>	100.9	<b>62</b>	175.4	<b>92</b>	281.7	<b>122</b>	428.2		
<b>33</b>	102.9	<b>63</b>	178.4	<b>93</b>	285.9	<b>123</b>	433.9		
<b>34</b>	105.0	<b>64</b>	181.5	<b>94</b>	290.1	<b>124</b>	439.6		
<b>35</b>	107.1	<b>65</b>	184.5	<b>95</b>	294.4	<b>125</b>	445.4		
<b>36</b>	109.2	<b>66</b>	187.6	<b>96</b>	298.7	<b>126</b>	451.3		
<b>37</b>	111.4	<b>67</b>	190.7	<b>97</b>	303.0	<b>127</b>	457.3		
<b>38</b>	113.6	<b>68</b>	193.9	<b>98</b>	307.5	<b>128</b>	463.2		
<b>39</b>	115.8	<b>69</b>	197.1	<b>99</b>	311.9	<b>129</b>	469.3		
<b>40</b>	118.1	<b>70</b>	200.4	<b>100</b>	316.4	<b>130</b>	475.4		
<b>41</b>	120.3	<b>71</b>	203.6	<b>101</b>	321.0	<b>131</b>	481.6		
<b>42</b>	122.7	<b>72</b>	207.0	<b>102</b>	325.6	<b>132</b>	487.8		
<b>43</b>	125.0	<b>73</b>	210.3	<b>103</b>	330.2	<b>133</b>	494.1		
<b>44</b>	127.4	<b>74</b>	213.7	<b>104</b>	334.9	<b>134</b>	500.5		
<b>45</b>	129.8	<b>75</b>	217.1	<b>105</b>	339.6	<b>135</b>	506.9		
<b>46</b>	132.2	<b>76</b>	220.6	<b>106</b>	344.4	<b>136</b>	513.4		
<b>47</b>	134.7	<b>77</b>	224.1	<b>107</b>	349.3	<b>137</b>	520.0		
<b>48</b>	137.2	<b>78</b>	227.7	<b>108</b>	354.2	<b>138</b>	526.6		
<b>49</b>	139.7	<b>79</b>	231.3	<b>109</b>	359.1	<b>139</b>	533.3		

## Gas Heater Instructions

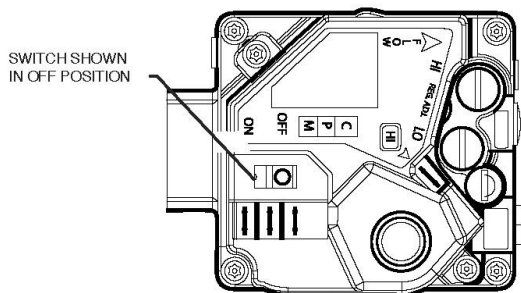
### FOR YOUR SAFETY READ BEFORE OPERATING

**WARNING: IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.**

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- WHAT TO DO IF YOU SMELL GAS**
- Do not try to light any appliance.
  - Do not touch any electric switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to move the on/off switch.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

### OPERATING INSTRUCTIONS

1. STOP! Read the safety information above this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Remove control access panel.
6. Move the on/off switch to the "OFF" position.
7. WAIT five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Move the on/off switch to the "ON" position.
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas to Appliance" and call your service technician or gas supplier.



### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Move the on/off switch to the "OFF" position.
5. Replace control access panel.

Direct Ignition • P72570

Figure 22 - Gas Heater Instructions

**Condenser Fan Electronically Commutated Motor (ECM) Startup**

The fan cycling option uses a fan cycle switch to switch between one of the discrete speed inputs (see Table 21) on the motor thus cycling between two preset speeds based upon discharge pressure of the unit. By connecting 24VAC to a single or combination of the yellow, white, or orange wires, the motor will run at the discrete speeds in Table 21.

With Customer Provided Unit Controls or AAON Unit Controls the AAON Condenser Head Pressure Module is used for variable speed control of the motor to maintain a head

pressure. The motor is factory wired to the PWM outputs of the AAON Condenser Head Pressure Module. See AAON literature for further information.

(<https://www.aaon.com/Controls>)

*Note*

High voltage wires out of the motor:  
Black & Brown - 1 Phase Line Voltage  
Green - Ground

Low control voltage wires out of the motor:  
Blue - Common  
Yellow - Variable Speed Control

Table 21 - ECM Condenser Fan Cycling Options

Color	Terminal	Customer Connection	Option 1	Option 2	Option 3	Option 4	Option 5
Black	0.50 BWS	L1	208-230 VAC	208-230 VAC	208-230 VAC	208-230 VAC	208-230 VAC
Brown	0.50 BWS	L2	208-230 VAC	208-230 VAC	208-230 VAC	208-230 VAC	208-230 VAC
Green	#10 EYELET	Ground	GND	GND	GND	GND	GND
Blue	0.50 BWS	Common	Common	24 VAC	24 VAC	24 VAC	24 VAC
Yellow	0.50 BWS	Signal	PWM		24 VAC		24 VAC
White	0.50 BWS	Signal				24 VAC	24 VAC
Orange	0.50 BWS	Signal		24 VAC		24 VAC	
RPM			300-1100	300	500	850	1100
Rotation			CCW	CCW	CCW	CCW	CCW
ECM Toolbox ID			Variable	Speed 4	Speed 3	Speed 2	Speed 1
20% PWM RPM			300				
100% PWM RPM			1100				

### **VFD Controlled Condenser Fan Startup**

With Customer Provided Unit Controls the VFD's are factory provided and factory programmed. VFD's receives input from pressure transducers on each refrigerant circuit and vary the fan speed based on the pressure inputs to maintain a discharge (head) pressure. Standard pressure setpoint is 340 psi for standard air-cooled systems and 400 psi for modulating hot gas reheat air-cooled systems.

With AAON Unit Controls the AAON Condenser Head Pressure Module is used to maintain a discharge pressure. The VFD is factory wired to the outputs of the AAON Condenser Head Pressure Module. See AAON literature for additional information. (<https://www.aon.com/Controls>).

## Adjustable Fan Cycling Switch Procedure



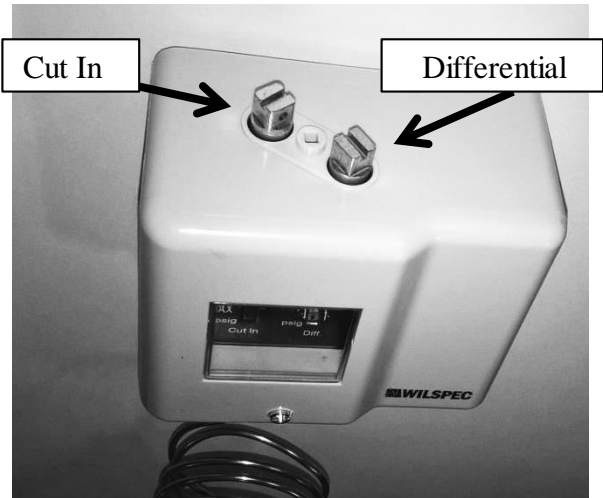
### Recommended Settings

The switch will come factory set to cut-in at 425psi (+/- 5psi) and a differential of 155psi (or open at 270psi (+/- 5psi)).

To adjust the fan cycle switch you will need a flathead screwdriver.

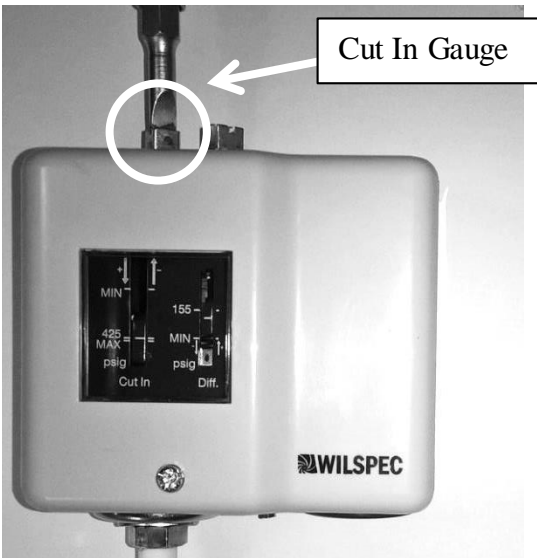


Settings for CUT IN and DIFFERENTIAL PRESSURE are indicated with two slider gauges.

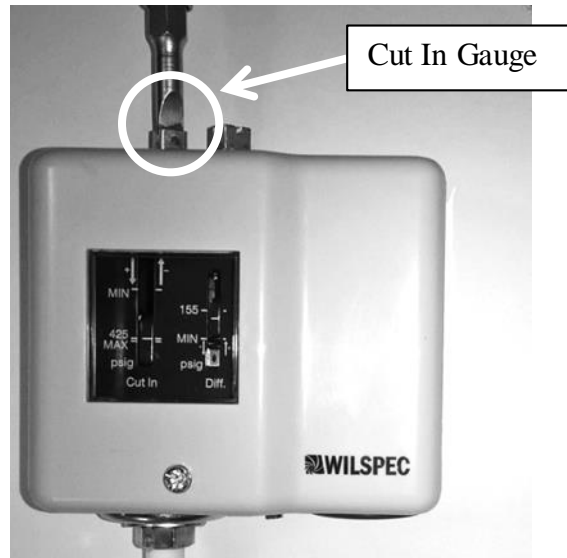


Each adjustment screw sits above the setting that it controls.

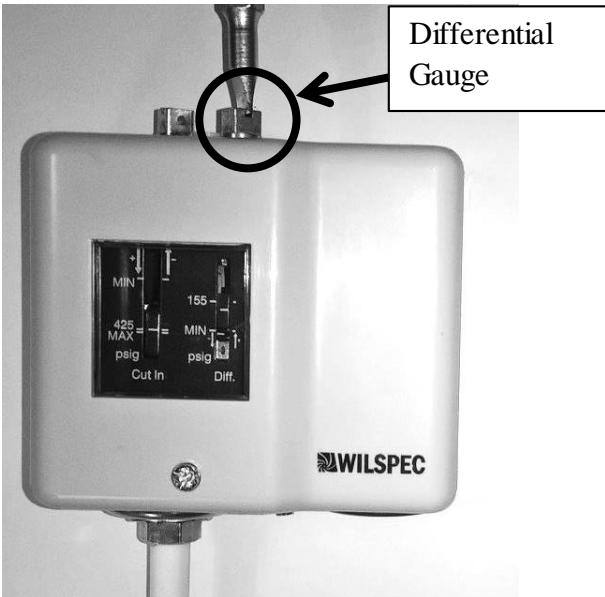




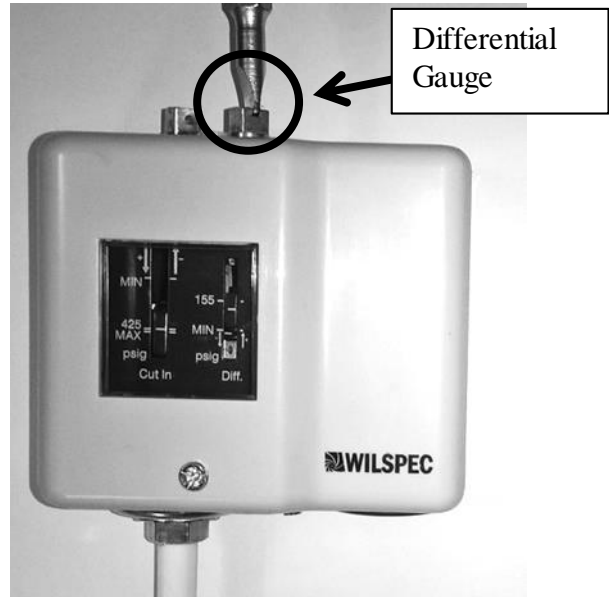
To lower the pressure set point for the **CUT IN** gauge, turn the adjustable screw clockwise.



To raise the pressure set point for the **CUT IN** gauge, turn the adjustable screw counter clockwise.



To raise the pressure set point for the **DIFFERENTIAL** Gauge, turn the adjustable screw clockwise.



To lower the pressure set point for the **DIFFERENTIAL** Gauge, turn the adjustable screw counter clockwise.

**NOTE:** Verify the pressure values on the gauge with gauges on the refrigerant line. The gauge scale is for illustration purposes only.

## Operation

Unit operations must be controlled with thermostat, or unit controller, never at the main power supply, except for servicing, emergency, or complete shutdown of the unit.

### Themostat Operation

#### Heating

Thermostat system switch - "Heat"  
Thermostat fan switch - "Auto" or "On"  
Thermostat temperature set to desired point.

#### Cooling

Thermostat system switch - "Cool"  
Thermostat fan switch - "Auto" or "On"  
Thermostat temperature set to desired point.

#### Air Circulation

Thermostat system switch - "Off"  
Thermostat fan switch - "Auto" or "On"  
No change of the thermostat temperature.  
With these settings, the supply blower will run continuously but the supply air will not be heated, cooled, or dehumidified.

#### System Off

Thermostat system switch - "Off"  
Thermostat fan switch - "Auto"  
No change of the thermostat temperature.  
With these settings the system is shut down, with the exception of control system power.

#### Night and Weekend Unoccupied Operation

To reduce the operating time of the unit when the space is unoccupied, such as nights and weekends, it is recommended that the temperature setting be raised about 5°F while unoccupied during the cooling season and lowered about 10°F during the heating season.

## Package d DX Cooling Operation and Control

When a call for cooling (G and Y1, Y2, etc.) is made the supply blower motors and compressors will energize.

### **WARNING**

#### **COMPRESSOR CYCLING**

**3 MINUTE MINIMUM OFF TIME**  
To prevent motor overheating compressors must cycle off for a minimum of 5 minutes.

**5 MINUTE MINIMUM ON TIME**  
To maintain the proper oil level compressors must cycle on for a minimum of 5 minutes.

The cycle rate must not exceed 7 starts per hour.

**Note:** When using field controls any variable capacity compressors must run at 100% for 1 minute when starting.

### **Gas Heater Operation**

When heat (G and W1, W2, etc.) is called for the combustion motor starts and the ignition control is energized. The control sends 24 VAC to the main gas valve and high voltage to the igniter. If a burner flame has been detected within 10 seconds, the spark is extinguished and the flame continues. If a flame has not been detected after 10 seconds, the gas valve closes, the spark ceases and the induced draft blower continues to purge the heat exchanger. After 45 seconds of purge, the ignition system will attempt to light the burners again. Should no flame be detected after 3 tries, the ignition control will lock out the system. Power to the ignition control must be cycled to reset the heater control.

On a fault the gas train is shut down by a main limit located in the heat exchanger area or by an auxiliary limit mounted in the supply fan compartment.

### **Electric Heating Operation**

When a call for heating (G and W1, W2, etc.) is made the supply blower motors and electric resistance heaters will energize. Heating is accomplished by passing electrical current through a specified amount of resistance heaters which will produce the required heat.

On a fault condition the main limit located in the supply air or the auxiliary limit located downstream the supply blower will remove power from all contactors.

### **Steam or Hot Water Preheating and Heating Operation**

Valve control for steam and hot water heating coils are by others. Heating is accomplished by passing steam or hot water through the steam or hot water coil assembly.

### **Modulating Electric Preheat**

Electric preheat is used to temper the incoming outside air to the unit based on an enable control signal and outside air conditions. Electric preheat has a maximum operation outside air temperature of 60°F and a maximum preheat discharge air temperature of 80°F.

### **Chilled Water or Non-Compressorized DX Cooling Operation**

Controls for chilled water cooling coils and non-compressorized DX coil are by others.

### **Maintenance**

(See back of the manual for maintenance log)

At least once each year, a trained, qualified service technician must check out the unit. Inspect fans, evaporator coils, and filters at least monthly.

### **Gas Heating**



#### **WARNING**

Once a year, before the unit is in operation for the heating season, a qualified service technician shall inspect all flue product carrying areas of the furnace and main burners for continued safe operation.



#### **DANGER**

#### **LEAK CHECK GAS PIPE**

The gas pipe in the unit shall be checked for leaks before startup. Leak checking is the responsibility of the installing contractor. All connections shall be checked for leaks annually after installation. Failure to leak check could result in fire, explosion, or other hazardous situations.

Make sure all gas supply lines have been purged of air before turning on the electrical power switch. Turn the gas valve to the on position (see startup instructions). Turn the main electrical power on and set the controls to the heating mode of operation.

The combustion ventilation motor should operate. The control will automatically supply energy to the igniter and the gas valve after the heating call is made.

The flame sensing probe detects the presence of the flame. Should no flame be detected in 10 seconds, the ignition system will recycle. If no flame is detected after 3 tries, ignition system will lockout.

Remove the call for heating. The main gas valves should be extinguished.

The supply fans are controlled by the ignition system. In the fan "Auto" mode the fan comes on 45 seconds after the flame is proved

and goes off 120 seconds after the heating call is removed.

Check furnace combustion ventilation air and flue openings annually for debris and obstructions. If vent extensions are used they shall meet category III requirements.

This appliance contains a wire screen at the vent outlet. Each heating season, prior to placing the appliance in heat mode maintenance check that no debris or foreign matter has accumulated in the vent outlet. A good practice is to check for debris each time the air filters are changed.


In the event the vent outlet becomes blocked do not attempt to start the appliance in heat mode until the entire vent opening is cleared.


In the event the unit shut down because the vent was blocked a qualified technician or service agency shall monitor the unit prior to re-starting.

The gas burner and heat exchanger should never require cleaning. If cleaning is necessary, this indicates faulty operation of the unit. Cleaning shall only be done by a qualified service agency and only after consultation with an AAON service representative.

If induced draft blower/motor assembly has to be replaced, care must be taken to provide an airtight seal between the blower housing and the burner box.

### Gas Heat Exchanger Removal

 <b>WARNING</b>
Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

 <b>DANGER</b>
<b>LEAK CHECK GAS PIPE</b>
The gas pipe in the unit shall be checked for leaks before startup. Leak checking is the responsibility of the installing contractor. All connections shall be checked for leaks annually after installation. Failure to leak check could result in fire, explosion, or other hazardous situations.

*Removal*  
Disconnect all wiring on the heat exchanger.

Disconnect flex gas lines and pull out of the way.

Remove screws around the perimeter of the heat exchanger face plate that connect it to the unit. Only remove the outermost screws.

Pull the heat exchanger straight back and out of the unit. It may be necessary to remove some of the control door jambs.

*Reinstallation*  
Ensure that the neoprene isolator is installed around the perimeter of the heat exchanger. Insert heat exchanger into opening so that the back of the main plate is against the unit bulkhead.



Figure 23 - Gas Heat Exchanger

Attach the heat exchanger to the bulkhead using the holes around the perimeter.

Connect flex gas lines to the piping on the heat exchanger. If flexible gas piping in the unit must be replaced connectors cannot be reused, only new connectors may be used.

Connect wiring per the wiring diagram on the controls compartment door.

Purge gas lines to the gas valves at the unit.

### **DX Cooling**

Set unit controls to cooling mode of operation with supply fans on. Check the fan for correct operating direction, amperage and voltage. Check compressor operation, rotation, amperage and voltage to the unit nameplate (check the amperage on the load side of the compressor contactor).

### **Condenser Fans (6-25 and 30 ton)**

Condenser fans and motors can be removed and reinstalled as individual assemblies.

## **⚠ WARNING**

Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

## **⚠ WARNING**

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Startup and service must be performed by a Factory Trained Service Technician.

### *Removal*

Take off the fan grill by removing the screws that attach it to the orifice.

The condenser fan motor wires can then be accessed and disconnected.

Remove the screws that attach the orifice to the condenser assembly. The screws are located on the top of the orifice around the perimeter, and in some cases, through the side of the condenser assembly into the orifice.

With the wires disconnected and the screws removed, the fan, motor and orifice assembly can be lifted off the unit.



Figure 24 - Removal of a Condenser Fan Assembly

*Reinstallation*

Set the condenser fan, motor and orifice assembly back into the condenser assembly with the motor wires on the side closest to the control panel.

Attach the orifice to the condenser assembly using all of the points where screws were removed.


Reconnect the fan motor wires.

Attach the fan grill at all of the points where screws were removed.

**Condensate Drain Pans**

Drain pans will have moisture present and require periodic cleaning to prevent microbial growth. Cleaning of the drain pans will also prevent any possible plugging of the drain lines and overflow of the pan itself. Cleaning of the drain pans and inside of the unit must be done only by qualified service technician.

**Evaporator Coil (6-25 and 30 ton)**

 <b>WARNING</b>
<p>Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.</p>

*Removal*

Evacuate refrigerant from the systems.

Remove the TXV bulbs from the suction lines. Disconnect the suction and liquid line copper connections to the evaporator coil.

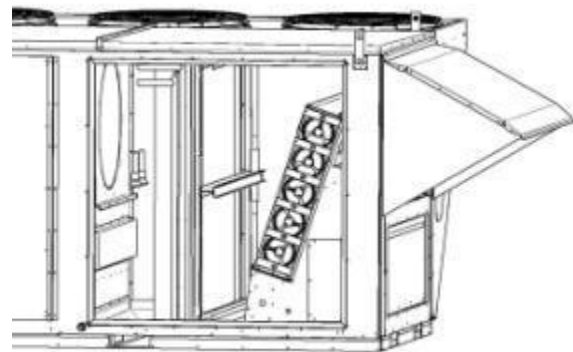


Figure 25 - Evaporator Coil Access

Remove the screws attaching the filter rack to the evaporator coil blank-off panels at the door opening and along the top of the coil.

Remove the screws attaching the filter rack to the back wall. Angle filter rack away from coil so it fits through the door opening. It may be necessary to remove economizer damper assembly.

Remove screws attaching access side, back, and top blank-off panels to the evaporator coil and the unit.

Angle the coil so that it fits through the door opening.

Remove the evaporator coil.

### *Reinstallation*

Install the coil in the unit drain pan. There should be about a 1/4" gap between the upstream side of the coil and the back of the drain pan.

Secure the coil to the back wall of the unit with the blank-off panel. Attach the top and access side blank-off panels to the coil.

Attach the filter rack to the back, top, and access side coil blank-off panels upstream of the coil. Reinstall economizer damper assembly if necessary.

Connect the suction and liquid copper connections to the evaporator coil. Reinstall the TXV bulbs on the suction lines.

Evacuate the refrigerant systems. Weigh in the nameplate refrigerant charge.

See Adjusting Refrigerant Charge section to check for proper sub-cooling and superheat of the refrigerant systems.

### **Brazed Plate Heat Exchanger Cleaning**

Because of a normally high degree of turbulence in brazed plate heat exchangers, for many applications the heat exchanger channels are self cleaning. For applications that are not self cleaning (i.e. hard water at high temperatures, etc.) or applications where additional cleaning is desired, it is possible to clean the brazed plate heat exchanger by circulating a cleaning liquid.

Use a tank with weak acid, 5% phosphoric acid (H<sub>3</sub>PO<sub>4</sub>) or, if the exchanger is frequently cleaned, 5% oxalic acid (H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>). Pump the cleaning liquid through the exchanger. For optimum cleaning, the cleaning solution flow rate must be a minimum of 1.5 times the normal flow rate, preferably in a back-flush mode. After cleaning, the heat exchanger must be rinsed with clean water. A solution of 1-2% sodium hydroxide (NaOH) or sodium bicarbonate

(NaHCO<sub>3</sub>) before the last rinse ensures that all acid is neutralized.

### **E-Coated Coil Cleaning**

Documented routine cleaning of e-coated coils is required to maintain coating warranty coverage for fin and tube and microchannel coils. See the AAON E-Coated Coil Maintenance Record sheet.

## **WARNING**


Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

Surface loaded fibers or dirt must be removed prior to water rinse to prevent restriction of airflow. If unable to back wash the side of the coil opposite of the coils entering air side, then surface loaded fibers or dirt must be removed with a vacuum cleaner. If a vacuum cleaner is not available, a *soft non-metallic* bristle brush may be used. In either case, the tool must be applied in the direction of the fins. Coil surfaces can be easily damaged (fin edges bent over) if the tool is applied across the fins.

Use of a water stream, such as a garden hose, against a surface loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface loaded fibers must be completely removed prior to using low velocity clean water rinse.


A *monthly* clean water rinse is recommended for coils that are applied in coastal or industrial environments to help to remove chlorides, dirt, and debris. It is very important when rinsing, that water temperature is less than 130°F and pressure is less than 100 psig to avoid damaging the fin edges. An elevated water temperature (not to exceed 130°F) will reduce surface

tension, increasing the ability to remove chlorides and dirt.

 <b>CAUTION</b>
High velocity water from a pressure washer or compressed air must only be used at a very low pressure to prevent fin and/or coil damages. The force of the water or air jet may bend the fin edges and increase airside pressure drop. Reduced unit performance or nuisance unit shutdowns may occur.

*Quarterly cleaning is essential to extend the life of an e-coated coil and is required to maintain coating warranty coverage.*

Coil cleaning shall be part of the unit's regularly scheduled maintenance procedures. Failure to clean an e-coated coil will void the warranty and may result in reduced efficiency and durability.

 <b>CAUTION</b>
Harsh chemicals, household bleach, or acid cleaners must not be used to clean outdoor or indoor e-coated coils. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion and attack the e-coating. If there is dirt below the surface of the coil, use the recommended coil cleaners.

For routine quarterly cleaning, first clean the coil with the below approved coil cleaner. After cleaning the coils with the approved cleaning agent, use the approved chloride remover to remove soluble salts and revitalize the unit.

### ***Recommended Coil Cleaner***

The following cleaning agent, when used in accordance with the manufacturer's directions on the container for proper mixing and cleaning, has been approved for use on e-coated coils to remove mold, mildew, dust, soot, greasy residue, lint, and other particulate:

Enviro-Coil Cleaner: AAON PN: V82540

GulfClean™ Coil Cleaner; AAON PN: G074480

### ***Recommended Chloride Remover***

GulfClean Salt Reducer™; AAON PN: G074490

GulfClean Salt Reducer™ is used to remove soluble salts from the e-coated coil, follow the manufacturer's instructions. This product is not intended for use as a degreaser. Any grease or oil film must first be removed with GulfClean™ Coil Cleaner.

**Remove Barrier** - First ensure the power to the unit is off and locked out. Clean the area around the unit if needed to ensure leaves, grass or loose debris will not be blown into the coil. Soluble salts adhere themselves to the substrate. For the effective use of this product, the product must be able to come in contact with the salts. These salts may be beneath any soils, grease or dirt; therefore, these barriers must be removed prior to application of this product. As in all surface preparation, the best work yields the best results.

**Application** - Apply GulfClean™ Coil Cleaner directly onto the substrate. Sufficient product must be applied uniformly across the substrate to thoroughly wet out surface, with no areas missed. This may be accomplished by use of a pump-up sprayer or conventional spray gun. Apply the cleaner to unit interior air exiting side coil



surfaces first. Work in sections/panels moving side to side and from top to bottom. Allow the cleaning solution to soak for 5 to 10 minutes. Then move on to the exterior using the same method.

Rinse - Using pressurized potable water such as a garden hose, (< 100 psi), rinse the coils and continue to always work in sections/panels.

Continue until all coil areas on the inside of the unit have been rinsed. **Note: Coils must always be cleaned / back flushed, opposite of airflow to prevent impacting the dirt into the coil.**

Repeat these steps with GulfClean™ Salt Reducer. When finished replace all panels and tops that were removed.

### **Microchannel Coil Cleaning**

Cleaning microchannel coils is necessary in all locations. In some locations it may be necessary to clean the coils more or less often than recommended. Condenser coil must be cleaned at a minimum of once a year. In locations where there is commonly debris or a condition that causes dirt/grease build up it may be necessary to clean the coils more often. Proper procedure must be followed at every cleaning interval. Using improper cleaning technique or incorrect chemicals will result in coil damage, system performance fall off, and potentially leaks requiring coil replacement.

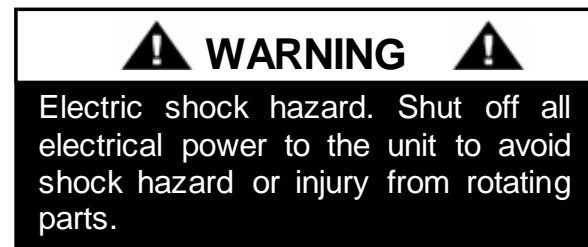
Documented routine cleaning of microchannel coils with factory provided e-coating is required to maintain coating warranty coverage. Use the E-Coated Coil Cleaning section for details on cleaning e-coated coils.

Field applied coil coatings are not recommended with microchannel coils.

### **Allowed Chemical Cleaners and Procedures**

AAON recommends certain chemicals that can be used to remove buildup of grime and debris on the surface of microchannel coils. These chemicals have been tested for performance and safety and are the only chemicals that AAON will warrant as correct for cleaning microchannel coils.

There are two procedures that are outlined below that will clean the coils effectively without damage to the coils. Use of any other procedure or chemical may void the warranty to the unit where the coil is installed. **With all procedures make sure the unit is off before starting.**



The water pressure used to clean must not exceed 100 psi, from no closer than 6 inches from the coils, and with the water aimed perpendicular to the coils.

### **#1 Simple Green**

Simple Green is available from AAON Parts and Supply (Part# T10701) and is biodegradable with a neutral 6.5 pH. A 4 to 1 solution is recommended. Use the following procedure.

1. Rinse the coil completely with water. Use a hard spray but be careful not to bend or damage the fins. A spray that is too hard will bend the fins. Spray from the fan side of the coil.
2. With a pump sprayer filled with a mix of 4 parts water to one part Simple Green spray the air inlet face of the coil. Be sure to cover all areas of the face of the coil.
3. Allow the coil to soak for 10-15 minutes.

4. Rinse the coil with water as in step one.
5. Repeat as necessary.

### **#2 Water Flush**

This procedure can be used when the only material to cause the coil to need cleaning is debris from plant material that has impinged the coil face.

1. Rinse the coil completely with water. Use a hard spray but be careful not to bend or damage the fins. A spray that is too hard will bend the fins. Spray from the fan side of the coil.
2. Spray and rinse the coil from the face.

### **CAUTION**

Use pressurized clean water, with pressure not to exceed 100 psi. Nozzle must be 6" and perpendicular to the coil face. Failure to do so could result in coil damage.

### **Application Examples**

The two procedures can be used to clean microchannel coils. They will fit with the application depending on the area. In some areas where the spring/summer has a large cottonwood bloom #2 might work fine if the unit is installed on an office building and no other environmental factors apply.

Generally the best and broadest based procedure is #1. The grease cutting effect of the Simple Green is good for restaurant applications.

### **Other Coil Cleaners**

There are many cleaners on the market for condenser coils. Before using any cleaner that is not covered in this section you must get written approval from the AAON warranty and service department. Use of unapproved chemicals will void the warranty.

AAON testing has determined that unless a chemical has a neutral pH (6-8) it must not be used.

Beware of any product that claims to be a foaming cleaner. The foam that is generated is caused by a chemical reaction to the aluminum fin material on tube and fin coils and with the fin, tube, and coating material on microchannel coils.

Microchannel coils are robust in many ways, but like any component they must be treated correctly. This includes cleaning the coils correctly to give optimal performance over many years.

### **Roofing**

The cleaning procedures outlined here use relatively benign ingredients. When working with a rooftop unit care must be taken to make sure the chemicals will not adversely affect the roof coating. Checking with the roofing supplier/manufacturer is the best way to proceed. If the roofing supplier/manufacturer is not available testing of the chemicals on the roof coating is recommended.

Commercial roofing material manufacturers using PVC and EPDM have been contacted and indicate that there should be no problem with any of the procedures outlined above.

### **Supply Fans**

### **WARNING**

Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

**! CAUTION**

Blower wheels and bands must be inspected for excessive dust build up periodically and cleaned if required. Excessive dust build up on blower wheels may cause an unbalanced state; leading to vibration and/or component failure. Damages due to excessive dust build up will not be covered under factory warranty.

*Lubrication*

All original fan motors and bearings are furnished with factory lubrication. Some applications will require that bearings be re-lubricated periodically. The schedule will depend on the operating duty, temperature variations or other severe atmospheric conditions.

Bearings must be re-lubricated when at normal operating temperatures, but not running. Rotate the fan shaft by hand and add only enough grease to purge the seals. **DO NOT OVERLUBRICATE.**

Recommended greases are:  
SHELL OIL - DOLIUM R  
CHEVRON OIL - SRI No. 2  
TEXACO INC. - PREMIUM RB

*Removal (6-25 and 30 tons)*

Remove fan access panel. Panel is attached with eight 3/8" bolts.

Remove the wire connections from Auxiliary Limit Switch (if applicable) which is mounted in the brace at the fan opening.

Remove the brace located at the fan opening.

Remove the six bolts that connect the motor mount to the blower frame. Two bolts are on the angle on the back of the motor mount box, two are on the bottom inside the motor mount box and two are on the inside front of the motor mount box.



Figure 26 - 9-25 and 30 ton Supply Fan

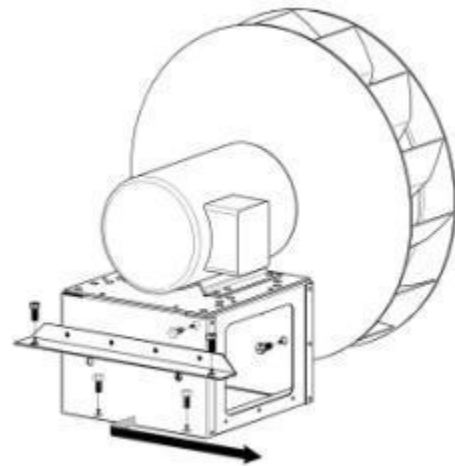


Figure 27 - Bolts which Connect Motor Mount to Blower Fan

Slide the motor mount back away from the air inlet, so that the blower wheel is clear of the inlet. A screw driver or crowbar can be used to help accomplish this. Use the pry slots on the back side of the motor mount.

Pull the motor mount to the edge of the blower frame at the opening.

Remove the motor mount with the motor and blower wheel attached. Large motors will require more than one person.

Care must be taken not to damage the compressors or refrigerant lines when removing the motor and fan assembly.

## Phase and Brownout Protection Module



The DPM is a Digital Phase Monitor that monitors line voltages from 200VAC to 240VAC 1 $\phi$  and 200VAC to 600VAC 3 $\phi$ . The DPM is 50/60 Hz self-sensing. Wire the DPM according to unit specific wiring diagram include in the control compartment.

When the DPM is connected to the line voltage, it will monitor the line and if everything is within the setup parameters, the output contacts will be activated. If the line voltages fall outside the setup parameters, the output relay will be de-energized after the trip delay.

Once the line voltages recover, the DPM will re-energize the output relay after the restart time delay. All settings and the last 4 faults are retained, even if there is a complete loss of power.

### DPM Setup Procedure

With the supply voltage active to the module, you can setup all of the DPM's settings without the line voltage connected.

To change the setpoint parameters use the right arrow key to advance forward through

the setpoint parameters and the left arrow to backup if needed. When each parameter is displayed use the up/down keys to change and set the parameter.

After adjustments are made or if no adjustments are made it will take 2 to 4 minutes before the DPM energizes the output relay unless there is an out of tolerance issue with the incoming line voltage.

### Recommended Default Set-up

Line Voltage	460VAC, 3 $\phi$
Over & Undervoltage	$\pm$ 10%
Trip Time Delay	5 Seconds
Re-Start Time Delay	2 Minutes
Phase Imbalance	5%



Phase and brownout module may be this type on some products (as seen in the above picture). No setup is needed with this module version, other than checking that the voltage jumper voltage matches the unit voltage

## Screens

### Manufacturer's Screen

R-K Electronics

DPM v0.0.00

### Average Voltage Screen

VAvg	Imb	Hz	
460	0	60	off

**Default – the default screen shows the real time voltage detected in each of the 3 phases:**

A-B	B-C	C-A	
460	459	461	ON

### Voltage Selection Screen (Vertical Format) Default = 460V, 3Ø

200, 1Ø;	208, 1Ø;	220, 1Ø;	230, 1Ø;	240, 1Ø;					
200, 3Ø;	208, 3Ø;	220, 3Ø;	230, 3Ø;	240, 3Ø;	380, 3Ø;	415, 3Ø;	440, 3Ø;		
		460, 3Ø;	480 3Ø;	575, 3Ø;	600, 3Ø;				

### Over/Under voltage Percentage Screen (Vertical Format) Default = 10%

7% 8% 9% 10% 11% 12% 13% 14% & 15%

### Trip Time Delay Screen (Vertical Format) Default = 5 sec

2S, 3S, 4S, 5S, 6S, 27S, 8S, 9S & 10S

### Re-Start Time Delay Screen (Vertical Format) Default = 2 sec

Manual, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 30S, 1M, 2M, 3M & 4M

### Phase Imbalance Percentage Screen (Vertical Format) Default = 5%

3% 4% 5% 6% 7% 8% 9% & 10%

### Fault Screen (Vertical Format)

“0” most recent faults, “1” previous fault “2” third oldest fault & “3” fourth oldest fault.

### Fault Words:

“Phase a Loss”	(There is no voltage sensed on 3-L1/S)
“Voltage Low”	(Average line voltage is less than selected Undervoltage Percentage)
“Voltage High”	(Average line voltage is more than selected Overvoltage Percentage)
“Imbalance”	(One phase is lower than the average voltage by more than the Imbalance percentage)
“Phase Loss	(One phase is more than 30% below the Line Voltage selection)
“Bad Rotation”	(The phase rotation sequence is reversed)
“Bad Freq”	(Line frequency out of allowable range of 45 to 65 Hz)

## Variable Capacity Compressor Controller

Units with variable capacity scroll compressors may include the following compressor controller. The following is an explanation of the terminals and troubleshooting alert flash codes of the controller. For more information on the compressor controller, see Emerson Climate Bulletin AE8-1328.

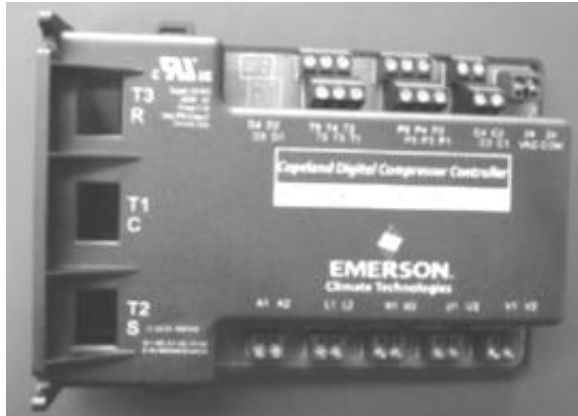


Figure 28 - Variable Capacity Compressor Controller

**Note:** When using field controls any variable capacity compressors must run at 100% for 1 minute when starting.

**⚠ WARNING**

To avoid damaging the Compressor Controller do not connect wires to terminals C3, C4, T3, T4, T5, or T6.

## Low Voltage Terminals

24COM	Module Common
24VAC	Module Power
C1 & C2	Demand Input – & +
P1	Pressure Common
P2	Pressure Input
P3	Pressure Power 5VDC
P4	Pressure Shield
P5 & P6	Pressure Output – & +
T1 & T2	Discharge Temperature Sensor

## High Voltage Terminals

A1 & A2	Alarm Relay Out
M1 & M2	Contractor
L1	Control Voltage N
L2	Control Voltage L
U1 & U2	Digital Unloader Solenoid
V1 & V2	Vapor Injection Solenoid

The compressor controller modulates the compressor unloader solenoid in an on/off pattern according to the capacity demand signal of the system. The following table shows the linear relationship between the demand signal and compressor capacity modulation. The compressor controller protects the compressor against high discharge temperature. Refer to Appendix B for the relationship between thermistor temperature readings and resistance values.

Table 22 - Demand Signal vs. Compressor Capacity Modulation


Demand Signal (VDC)	Loaded %	Unloaded %	Time Loaded	Time Unloaded	% Compressor Capacity
1.00	Off	Off	Off	Off	0%
1.44	10%	90%	1.5 sec	13.5 sec	10%
3.00	50%	50%	7.5 sec	7.5 sec	50%
4.20	80%	20%	12 sec	3 sec	80%
5.00	100%	0%	15 sec	0 sec	100%

LED Descriptions	Troubleshooting ALERT Flash Codes
Green LED - 24VAC Power	Code 1 Reserved for future use
Yellow LED - Unloader Solenoid On	Code 2 High Discharge Temperature Discharge thermistor above trip set point or thermistor short circuited. Resets after 30 minutes and motor cools down. If 5 events occur within 4 hours, the compressor is locked out.
Red LED - ALERT Flash Code	Code 3 Compressor Protector Trip No compressor current is detected when compressor should be running. Resets when compressor current is detected.
<ul style="list-style-type: none"> <li>Flashing Green LED indicates anti-short cycle timer active</li> <li>All LEDs flashing at same rate indicates 24VAC supply too low for operation</li> <li>All LEDs solid at same time indicates controller failure</li> <li>Reset ALERT code or lockout by removing 24VAC supply to module</li> <li>All ALERTs close alarm relay contacts</li> <li>All ALERTs deenergize contactor and solenoids except Code 6</li> <li>Compressor always unloads for 0.1 second at startup</li> <li>Compressor only starts when Demand signal input is above 1.45 VDC and no ALERTs are present</li> </ul>	Code 4 Locked Rotor Locked rotor condition is detected. Compressor is locked out.
	Code 5 Demand Signal Loss Demand input signal is below 0.5VDC. Resets after demand input signal rises above 1.0VDC.
	Code 6 Discharge Thermistor Fault Thermistor is not connected. Reset by reconnecting thermistor.
	Code 7 Reserved for future use
	Code 8 Compressor Contactor Fault Compressor current is detected when compressor should be off. Resets when current is no longer detected.
	Code 9 Low 24VAC Supply Supply voltage to module has dropped below 18.5VAC. Resets after voltage rise above 19.5VAC.

Figure 29 - Compressor Controller Flash Code Details

### Filter Replacement

Monthly air filter inspection is required to maintain optimum unit efficiency.


WARNING

Electric shock hazard. Shut off all electrical power to the unit to avoid shock hazard or injury from rotating parts.

It is strongly recommended that filter media be replaced monthly. Filters are located upstream of the evaporator coil in the filter and economizer section. Open access door and pull filters straight out to inspect all of the filters. Replace filters with the size indicated on each filter or as shown in the tables below. Arrow on the replacement filters must point towards the blower. (RAB = Return Air Bypass, PE = Power Exhaust and PR = Power Return)

# Filter Information

(RAB = Return Air Bypass, PE = Power Exhaust, PR = Power Return)

Table 23 - RN Series 11, 13, 16-25 and 30 ton Pre Filters

Feature 9A	Quantity / Size	Type
0	No Pre Filters	
B,C,D	6 / 20" x 25" x 2"	Pleated, 30% Eff, MERV 8
Feature 19	Quantity / Size	Type
B	3 / 20" x 25" x 1"	Metal Mesh, Outside Air
	With PE and PR, Feature 4A=G,H 2 / 18" x 25" x 1" & 2 / 18" x 30" x 1"	

Table 24 - RN Series 11, 13, 16-25 and 30 ton Unit Filters

Feature 9A	Quantity / Size	Type
0	6 / 20" x 25" x 2"	Pleated, 30% Eff, MERV 8
	with RAB, Feature A2 = Q, R 9 / 16" x 20" x 2"	
A	6 / 20" x 25" x 4"	Pleated, 30% Eff, MERV 8
	with RAB, Feature A2 = Q, R 9 / 16" x 20" x 4"	
B	6 / 20" x 25" x 4"	Pleated, 65% Eff, MERV 11
C		Pleated, 85% Eff, MERV 13
D		Pleated, 95% Eff, MERV 14

Table 25 - RN Series 11, 13, 16-25 and 30 ton Energy Recovery Wheel Filters

Feature 4A	Quantity / Size	Type
K,Q	With Energy Recovery Wheel Exhaust Air Filters, Feature 4C = J,K,N,P OA - 6 / 20" x 16" x 2" EA - 4 / 14" x 25" x 2"	Pleated, 30% Eff, MERV 8
	With V-Bank Outside Air Filters OA - 6 / 20" x 16" x 2"	

Table 26 - RN Series 11, 13, 16-25 and 30 ton Final Filters

Feature 9C	Quantity / Size	Type
0	No Final Filters	
A	6 / 24" x 20" x 12"	Pleated, 85% Eff, MERV 13
D	6 / 24" x 20" x 12"	Pleated, 95% Eff, MERV 14
U	6 / 24" x 20" x 4"	Pleated, 85% Eff, MERV 13
Y	6 / 24" x 20" x 4"	Pleated, 95% Eff, MERV 14



25x20	25x20	25x20
25x20	25x20	25x20

Figure 30 - RN Series 11, 13, 16-25 and 30 ton Units ton Standard Filter Layouts

*All dimensions are in inches and are height x length.  
Layouts are viewed from the upstream side of the cooling coil.*

**Replacement Parts**

Parts for AAON equipment may be obtained from your local AAON representative. Reference the unit serial number and part number when ordering parts.

**AAON**

**Warranty, Service and Parts Department**

2425 S. Yukon Ave.

Tulsa, OK 74107

Ph: 918-382-6450

[techsupport@aaon.com](mailto:techsupport@aaon.com)

[www.aaon.com](http://www.aaon.com)

**Note:** Before calling, technician must have model and serial number of the unit available for the service department to help answer questions regarding the unit.

## Appendix A - Heat Exchanger Corrosion Resistance

### Corrosion Resistance of Copper and Stainless Steel in Brazed Plate Heat Exchangers - Points to Measure and Check in a Water Analysis

The resistance guide provides the corrosion resistance of stainless steel type AISI 316 and pure Copper (99.9%) in water, to a number of important chemical factors. The actual corrosion is a very complex process influenced by many different factors in combination.

Explanations: + Good resistance under normal conditions  
 0 Corrosion problems may occur especially when more factors are valued 0  
 - Use is not recommended

Water Containing	Concentration (mg/l or ppm)	Time Limits - Analyze Before	AISI 316	SMO 254	Copper Alloy	Nickel Alloy
Alkalinity (HCO <sub>3</sub> <sup>-</sup> )	< 70	Within 24 Hours	+	+	0	+
	70-300		+	+	+	+
	> 300		+	+	0/+	+
Sulfate (SO <sub>4</sub> <sup>2-</sup> )	< 70	No Limit	+	+	+	+
	70-300		+	+	0/-	+
	> 300		0	0	-	+
HCO <sub>3</sub> <sup>-</sup> / SO <sub>4</sub> <sup>2-</sup>	> 1.0	No Limit	+	+	+	+
	< 1.0		+	+	0/-	+
Electrical Conductivity	< 10µS/cm	No Limit	+	+	0	+
	10-500 µS/cm		+	+	+	+
	> 500 µS/cm		+	+	0	+
pH	< 6.0	Within 24 Hours	0	0	0	+
	6.0-7.5		0/+	+	0	+
	7.5-9.0		+	+	+	+
	> 9.0		+	+	0	+
Ammonium (NH <sub>4</sub> <sup>+</sup> )	< 2	Within 24 Hours	+	+	+	+
	2-20		+	+	0	+
	> 20		+	+	-	+
Chlorides (Cl)*	< 300	No Limit	+	+	+	+
	> 300		0	+	0/+	+
Free Chlorine (Cl <sub>2</sub> )	< 1	Within 5 Hours	+	+	+	+
	1-5		+	+	0	+
	> 5		0/+	+	0/-	+
Hydrogen Sulfide (H <sub>2</sub> S)	< 0.05	No Limit	+	+	+	+
	> 0.05		+	+	0/-	+
Free (aggressive) Carbon Dioxide (CO <sub>2</sub> )	< 5	No Limit	+	+	+	+
	5-20		+	+	0	+
	> 20		+	+	-	+

\*See Chloride Content Table

Water Containing	Concentration (mg/l or ppm)	Time Limits - Analyze Before	AISI 316	SMO 254	Copper Alloy	Nickel Alloy
Total Hardness (°dH)	4.0-8.5	No Limit	+	+	+	+
Nitrate (NO <sub>3</sub> )	< 100	No Limit	+	+	+	+
	> 100		+	+	0	+
Iron (Fe)	< 0.2	No Limit	+	+	+	+
	> 0.2		+	+	0	+
Aluminum (Al)	< 0.2	No Limit	+	+	+	+
	> 0.2		+	+	0	+
Manganese (Mn)	< 0.1	No Limit	+	+	+	+
	> 0.1		+	+	0	+

#### Chloride Content

Chloride Content	Maximum Temperature			
	60°C (140°F)	80°C (176°F)	120°C (248°F)	130°C (266°F)
= 10 ppm	SS 304	SS 304	SS 304	SS 316
= 25 ppm	SS 304	SS 304	SS 316	SS 316
= 50 ppm	SS 304	SS 316	SS 316	Ti / SMO 254
= 80 ppm	SS 316	SS 316	SS 316	Ti / SMO 254
= 150 ppm	SS 316	SS 316	Ti / SMO 254	Ti / SMO 254
= 300 ppm	SS 316	Ti / SMO 254	Ti / SMO 254	Ti / SMO 254
> 300 ppm	Ti / SMO 254	Ti / SMO 254	Ti / SMO 254	Ti / SMO 254

## Appendix B - Thermistor Temperature vs. Resistance Values

Deg C	Deg F	Resistance (kOhms)
-40	-40	2889.6
-35	-31	2087.22
-30	-22	1522.20
-25	-13	1121.44
-20	-4	834.72
-15	5	627.28
-10	14	475.74
-5	23	363.99
0	32	280.82
5	41	218.41
10	50	171.17
15	59	135.14
20	68	107.44
25	77	86.00
30	86	69.28
35	95	56.16
40	104	45.81
45	113	37.58
50	122	30.99
55	131	25.68
60	140	21.40
65	149	17.91

Deg C	Deg F	Resistance (kOhms)
70	158	15.07
75	167	12.73
80	176	10.79
85	185	9.20
90	194	7.87
95	203	6.77
100	212	5.85
105	221	5.09
110	230	4.45
115	239	3.87
120	248	3.35
125	257	2.92
130	266	2.58
135	275	2.28
140	284	2.02
145	293	1.80
150	302	1.59
155	311	1.39
160	320	1.25
165	329	1.12
170	338	1.01
175	347	0.92
180	356	0.83

## RN Series Startup Form

Date: _____	
Job Name: _____	
Address: _____	
Model Number: _____	
Serial Number: _____	Tag: _____
Startup Contractor: _____	
Address: _____	Phone: _____

<b>Pre Startup Checklist</b>		
Installing contractor must verify the following items.		
1. Is there any visible shipping damage?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. Is the unit level?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3. Are the unit clearances adequate for service and operation?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4. Do all access doors open freely and are the handles operational?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5. Have all electrical connections been tested for tightness?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6. Does the electrical service correspond to the unit nameplate?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. On 208/230V units, has transformer tap been checked?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
8. Has overcurrent protection been installed to match the unit nameplate requirement?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9. Have all set screws on the fans been tightened?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10. Do all fans rotate freely?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
11. Is all copper tubing isolated so that it does not rub?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
12. Has outside air rain hood been opened?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
13. Have the damper assemblies been inspected?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
14. Are the air filters installed with proper orientation?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
15. Have condensate drain and p-trap been connected?	Yes <input type="checkbox"/>	No <input type="checkbox"/>

<b>Supply Fan Assembly</b>				
Alignment <input type="checkbox"/>		Check Rotation <input type="checkbox"/>		Nameplate Amps _____
Number	hp	L1	L2	L3
1				
2				
Band Size _____		VAV Controls _____		
VFD Frequency _____				

<b>Energy Recovery Wheel Assembly</b>				
Wheel(s) Spin Freely <input type="checkbox"/>		Check Rotation <input type="checkbox"/>		FLA_____
Number	hp	L1	L2	L3
1				
2				

<b>Power Return/Exhaust Assembly</b>				
Alignment <input type="checkbox"/>		Check Rotation <input type="checkbox"/>		Nameplate Amps_____
Number	hp	L1	L2	L3
1				
2				

<b>Outside Air/Economizer Dampers</b>
Operation Check <input type="checkbox"/>
Damper Actuator Type:
Economizer Changeover Type and Operations:
Damper Wiring Check <input type="checkbox"/>
Gears Check <input type="checkbox"/>

<b>Ambient Temperature</b>	
Ambient Dry Bulb Temperature _____°F	Ambient Wet Bulb Temperature _____°F

<b>Unit Configuration</b>	
Water-Cooled Condenser <input type="checkbox"/>	Air-Cooled Condenser <input type="checkbox"/>
No Water Leaks <input type="checkbox"/>	
Condenser Safety Check <input type="checkbox"/>	
Water Flow _____GPM	
Water Inlet Temperature _____°F	
Water Outlet Temperature _____°F	

<b>Compressors / DX Cooling</b>						
Number/stage	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

<b>Refrigeration System 1 – Cooling Mode</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 2 – Cooling Mode</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 3 – Cooling Mode</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 4 – Cooling Mode</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 1 – Heating Mode (Heat Pump only)</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 2 – Heating Mode (Heat Pump only)</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A
<b>Refrigeration System 3 – Heating Mode (Heat Pump only)</b>					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 – Heating Mode (Heat Pump only)					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser					
Alignment <input type="checkbox"/>		Check Rotation <input type="checkbox"/>		Nameplate Amps _____	
Number	hp	L1	L2	L3	
1					
2					
3					
4					
5					
6					

Water/Glycol System		
1. Has the entire system been flushed and pressure checked?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
2. Has the entire system been filled with fluid?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
3. Has air been bled from the heat exchangers and piping?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
4. Is the glycol the proper type and concentration (N/A if water)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
5. Is there a minimum load of 50% of the design load?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
6. Has the water piping been insulated?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
7. What is the freeze point of the glycol (N/A if water)? _____		

Gas Heating			
Natural Gas <input type="checkbox"/>		Propane <input type="checkbox"/>	
Purge Air from Lines <input type="checkbox"/>		Verify Pilot Spark <input type="checkbox"/>	
Stage	Manifold Pressure (w.c.)	Stage	Manifold Pressure (w.c.)
1		3	
2		4	

Electric Heating			
Stages _____			
Limit Lockout <input type="checkbox"/>		Aux. Limit Lockout <input type="checkbox"/>	
Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Pre heating
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# Maintenance Log (E-Coated Coil)

## AAON E-COATED COIL MAINTENANCE RECORD

Installation Site \_\_\_\_\_ Installation Date \_\_\_\_\_  
 Unit Model # \_\_\_\_\_ Unit Location \_\_\_\_\_  
 Unit Serial # \_\_\_\_\_ Customer \_\_\_\_\_

Year 20__	Ambient Temp (°F)	Surface Debris Removed	Coil Cleaned	Approved Cleaner Used	Potable Water Backwash Rinse	Potable Water Frontwash Rinse	Chlorides Removed	Comments
Jan								
Feb								
Mar								
Apr								
May								
Jun								
Jul								
Aug								
Sep								
Oct								
Nov								
Dec								

The following cleaning agents have been approved for use on AAON E-Coated Coils to remove mold, mildew, dust, soot, greasy residue, lint and similar particulate without harming the coated surfaces.

CLEANING AGENT	RESELLER	PART NUMBER	RECOMMENDED CHLORIDE REMOVER
GulfClean™ Coil Cleaner or Enviro-Coil Cleaner	Rectorseal 2601 Spenwick Drive, Houston, Texas 77055 (P): 713-263-8001	G074480 / 80406 or V82540	Rectorseal 2601 Spenwick Drive, Houston, Texas 77055 (P): 713-263-8001
GulfClean Salt Reducer™	" "	G074490 / 80408	

## Literature Change History

### April 2016

Added *Adjustable Fan Cycling Switch Procedure* section.

### July 2016

Updated Neoprene statements and *E-Coated Cleaning* section. Updated *Table 19 - Acceptable Refrigeration Circuit Values*.

### January 2017

Updated *Feature String Nomenclature* for newly added features: Feature 2: *Supply & Return Locations* – Option W; Feature 10: *Refrigeration Control* - Option W; Feature 16B: *Control Supplier* – Option J & Option K.

### June 2017

Removed JENEsys and Mini Controller options. Updated Feature 10A: *Refrigeration Control*.

### July 2017

Added *Shaft Grounding* option; Feature 29. Added *Airflow Monitoring* options; Feature 19. Added *Shrink Wrap* options; Feature 37. Added *High Condensate Level Switch*; Feature 30. Added *High Turndown Modulating Gas Heat* option; Feature B4.

### August 2017

Added *Compressor Sound Blankets* and *UV Lights* options; Feature 15. Removed *VCM-X* option; Feature 16B. Added *Fault Detection and Diagnostics* options; Feature 7.

### November 2017

Updated Supply Fan Motor Type options; Feature 3C. Updated Return Fan Motor Type options; Feature 5C.

### June 2018

Removed *Warranty Card* statement.

### January 2019

Added *Low Sound Condenser Fan Head Pressure Control* options; Feature 25. Updated *E-Coated Coil Cleaning* section.

### April 2019

Added Nameplate Voltage Markings & Tolerances table.

### February 2021

Changed minimum off time to 3 minutes. Added variable speed scroll compressor under Model Option A1. Added stainless steel coil casing under model Option A4. Added circuit breaker under Feature 13A. Updated the Nameplate Voltage Markings & Tolerances table. Updated the E-coated and Microchannel coil cleaning sections, and added e-coating maintenance log. Updated condensate drain pan section showing p-traps are no longer factory provided.

**June 2021**

Replaced “should” with “must”.

**January 2022**

Updated the cabinet unit clearance value for the left side of the unit and added the note that units with power exhaust or power return require 30” of clearance. Changed the LEAK CHECK GAS PIPE Danger wording from must to shall. Updated the hot water coil connection size for size 11 and 13 ton units.









**AAON**  
**2425 South Yukon Ave.**  
**Tulsa, OK 74107-2728**  
**www.AAON.com**

**RN Series Horizontal**  
**Installation, Operation &**  
**Maintenance**  
**V76270 · Rev. C · 220113**

**Factory Technical Support: 918-382-6450**

**Note:** Before calling Technical Support, please have the model and serial number of the unit available.

**Parts:** For replacement parts please contact your local AAON Representative.

It is the intent of AAON to provide accurate and current product information. However, in the interest of product improvement, AAON reserves the right to change pricing, specifications, and/or design of its product without notice, obligation, or liability.