

AAON[®]

RM SERIES HEATING • COOLING & COMBINATION ROOFTOP UNITS

USERS INFORMATION MANUAL



7-2003



WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

- EXTINGUISH ANY OPEN FLAME.
- DO NOT TOUCH ANY ELECTRICAL SWITCH.
- DO NOT TRY TO LIGHT ANY APPLIANCE.
- 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.

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! IMPORTANT

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.

! WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Owner should pay particular attention to the words: NOTE, CAUTION AND WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert owner that personal injury and/or equipment damage may result if installation procedure is not handled properly.

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

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The units are designed as self-contained heating, cooling or combination units for outdoor installation only, using the refrigerant shown on the rating plate, chilled water, natural or propane gas, electric resistance, steam or hot water heating.

WARNING

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

DIRECT EXPANSION (DX) COOLING UNITS

Never cut off the main power supply to the unit, except for complete shutdown. When power is cut off from the unit, compressors with crankcase heaters cannot prevent refrigerant migration. The compressor will cool down, and liquid refrigerant will accumulate in the compressor. The compressor is designed to pump only refrigerant gas and damage may occur when power is restored.

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

Always control the system from the thermostat, or control panel, never at the main power supply (except in an emergency or complete shutdown of the system).

During the cooling season, if the air flow is reduced due to dirty air filters or other reasons, the cooling coils will get too cold and result in excessive liquid return to the compressor. As the liquid concentration accumulates, oil is washed out of the compressor, leaving it starved for lubrication.

The compressors must be on a minimum of 4 minutes and off for a minimum of 5 minutes. The cycle rate must not exceed 8 starts per hour.

THE COMPRESSOR LIFE WILL BE SERIOUSLY SHORTENED BY RESULTING REDUCED LUBRICATION, AND THE PUMPING OF EXCESS AMOUNTS OF LIQUID OIL AND REFRIGERANT.

GAS OR ELECTRIC HEATING

The system is designed to heat a given amount of air each minute it operates. If the amount of air heated is greatly reduced (approximately 1/3 capacity), the heat exchanger / heater coil temperature will increase above acceptable level and result in shut down by a high temperature safety switch incorporated either in the heat exchanger or the heater area.

GAS HEAT UNITS - WARNING: If, due to safety switch shut off or gas supply shut off failure; **ALWAYS CLOSE MANUAL GAS VALVE TO UNIT PRIOR TO ANY ELECTRICAL SERVICE.**

PROLONGED OVERHEATING OF THE HEAT EXCHANGER WILL SHORTEN ITS LIFE.

OWNER'S INFORMATION



WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit to OFF at disconnect switch(es). Unit may have multiple power supplies.

AIRFLOW IS TO BE ADJUSTED AFTER INSTALLATION TO OBTAIN AN AIR TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE RATING PLATE.

DUE TO JOB SPECIFICATION REVISIONS, IT MAY BE NECESSARY TO ADJUST OR CHANGE THE SHEAVE OR PULLEY TO OBTAIN THE DESIRED AIRFLOW AT THE TIME OF INSTALLATION.



CAUTION

START-UP TECHNICIAN MUST CHECK BLOWER MOTOR AMPERAGE TO ENSURE THAT THE AMPERAGE LISTED ON THE MOTOR NAMEPLATE IS NOT EXCEEDED.

CAUTION: While the following incorrect operations may not cause damage to the system, they will impair the performance, and may cause the built-in safety devices to cut the system off completely.

1. LOW AMBIENT OPERATION

The cooling section of a direct expansion (DX) unit will not operate properly when the outdoor temperature is below 55°F. Outside air intake options are necessary if operation below 55°F is expected.

2. MULTIPLE UNIT OPERATION

When several units are used in conditioning the space, and any are combination heating-cooling units, all system thermostat switches must be set at either heating, cooling, or set at "off". Do not run part of a system switched to an opposite mode. Cooling only units should be switched to "off" at the thermostat during the heating season.

WIRING DIAGRAMS

A complete set of unit specific wiring diagrams in both ladder and point-to-point form are laminated in plastic and located inside the control compartment door.

CONDENSATE PIPING

A drain trap is to be connected to the drainpan. If codes require a condensate drain line, it should be the same pipe size as the drain nipple and should pitch downward toward drain.

The condensate drain pipe ("P" trap) is factory supplied and shipped in the control access compartment for field installation. An air break should be used with long runs of condensate lines.

OWNERS INFORMATION continued



WARNING

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

IMPORTANT NOTICE:

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 start-up at the jobsite, it is highly recommended that people or any other living animals, that may be sensitive to the residual odors or gases, NOT be present in the conditioned space during the start-up. 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.

NOTE: In case emergency shut down is required, turn off the main manual gas shut-off valve and disconnect main electrical power to unit. These devices should be properly labeled by the installer.

HEATING & COOLING SYSTEMS

NORMAL OPERATION

HEATING

Set the thermostat system switch to "HEAT".
Set the thermostat fan switch to "AUTO" or "ON".
Set the thermostat temperature at the desired point.

COOLING

Set the thermostat system switch to "COOL".
Set the thermostat fan switch to "AUTO" or "ON".
Set the thermostat temperature at the desired point.

AIR CIRCULATION

Set the thermostat system switch to "OFF".
Set the thermostat fan switch to "ON".
Do not change temperature setting.
With these settings, the air circulating blower will run continuously but the air will not be heated or cooled.

SYSTEM OFF

Set the thermostat system switch to "OFF".
Set the thermostat fan switch to "AUTO".
Do not change temperature setting.
With these settings, the system is shut down, with the exception of the control system power (24 Vac), and the crankcase heater of the compressor (approx. 60W).

DO NOT TURN OFF THE MAIN POWER SWITCH.

NIGHT AND VACANT WEEKEND OPERATION

To reduce the operation time during low load periods, it is recommended that the temperature setting be increased five degrees during these periods of the cooling season, and decreased ten degrees during the heating season.

GAS HEATING SYSTEM

The heating section is for use with natural gas supply pressure of 6" to 10.5" Water Column. The unit may also utilize propane gas with a supply pressure to the valve of 11" to 12" Water Column. The rating plate on the furnace must be inspected to make sure the unit is stamped for proper gas. A 1/8" pressure tap should be field supplied by the installer in the piping just ahead of the gas valve. The pressure tap on the outlet end of the gas valve can be checked to verify manifold pressure of 3.2" to 3.5" for natural gas.

Combustion air is supplied by a centrifugal blower which draws in outside air through a protected opening. This induced draft blower introduces the air to the burner tubes which assures even primary and secondary air flow.

All heating system and related safety controls are 100% tested on each unit prior to shipment.

The units are equipped with a direct spark ignition system which proves the burner operation during each call for heat. Power to the ignition control is 24 Vac to reduce hazards. Burner ignition is by a high intensity spark.

When heat is called for, the cooling system is inoperable except for the indoor blower motor. Heating is accomplished by firing gas into the heat exchanger assembly.



GAS UNIT LIGHTING INSTRUCTIONS

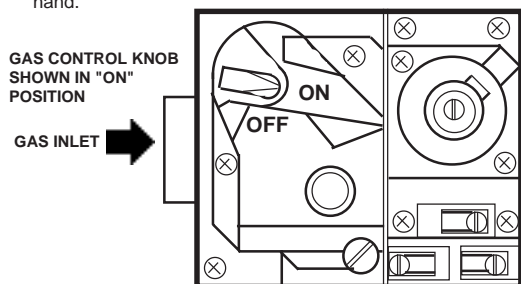
FOR YOUR SAFETY READ BEFORE OPERATING

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 pilot 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.
- C. If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- 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 pilot by hand.
5. Open control access panel.
6. Push in gas control knob slightly and turn clockwise  to "OFF". NOTE: Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.
7. WAIT five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise  to "ON".
9. Close 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. Open control access panel.
4. Push in gas control knob slightly and turn clockwise  to "OFF". Do not force.
5. Close control access panel.

ELECTRIC HEATING SYSTEM

Heating is accomplished by passing electrical current through a specified amount of resistance heaters which produce the required heat. The indoor blower motor energizes at the same time as the heaters.

STEAM OR HOT WATER HEATING SYSTEM

Heating is accomplished by passing steam or hot water through the steam or hot water coil assembly.

COOLING SECTION • DX

All direct expansion refrigeration systems are factory assembled, charged with refrigerant, tested and operated. On all units 8 ton and larger the refrigerant system includes multiple circuit evaporator and condenser coils providing two or more stages of cooling. These systems are provided with liquid line filter driers, expansion valves and fully hermetic compressors. Compressors are equipped with a positive pressure forced lubrication system.

The air cooled condenser coil(s) are constructed of copper tubes and mechanically bonded aluminum fins and air pulled through by propeller fans. The evaporator coil is draw through type constructed of copper tubes and mechanically bonded aluminum fins.

The refrigeration section of these appliances has been found acceptable with applicable provisions of "ANSI / UL 1995" and current "C.S.A. Standard C22.2" by E.T.L.

NOTE: Crankcase Heater Operation

Some units are equipped with a compressor crankcase heater, which should be energized at least 24 hours prior to setting the thermostat for cooling operation.

COOLING SECTION • CHILLED WATER or NON-COMPRESSORIZED UNIT

Chilled water or non-compressorized units have factory installed coils. Systems are provided with internal header connections for field piping. Coils are constructed of copper tubes and mechanically bonded aluminum fins.

PERIODIC INSPECTION PROCEDURES

GAS HEATING UNITS

1. The flow of combustion and ventilating cannot be obstructed in any way. The indoor blower, evaporator coil and filters must be inspected monthly.

2. Once each year, prior to the heating season, a qualified technician must inspect all flue product carrying areas of the furnace and main burners for continued safe operation.

WARNING: At least once each year, a qualified service technician should check out all of the items listed under the servicing and trouble shooting and maintenance section of this manual.

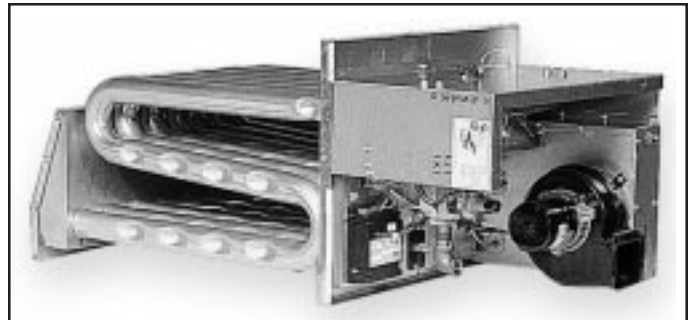
3. If the induced draft blower/motor assembly requires replacement, an airtight seal between the blower housing and the burner box must be restored. High temperature silicone sealant must be used to ensure a good seal.

4. **GAS BURNERS**
THE BURNERS SHOULD NEVER REQUIRE CLEANING.

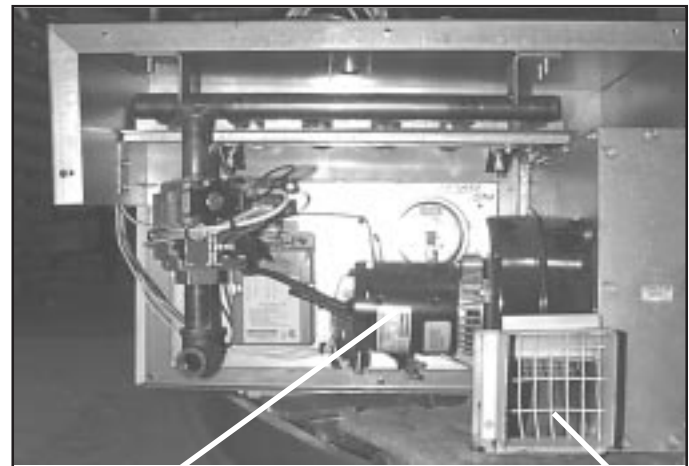
If cleaning is necessary, it indicates faulty operation of the unit. The cleaning should be done only by a qualified service agency after consultation with an AAON Service Representative.

It is recommended that if the gas burners require cleaning, call an AAON Service Engineer at (918) 583-2266.

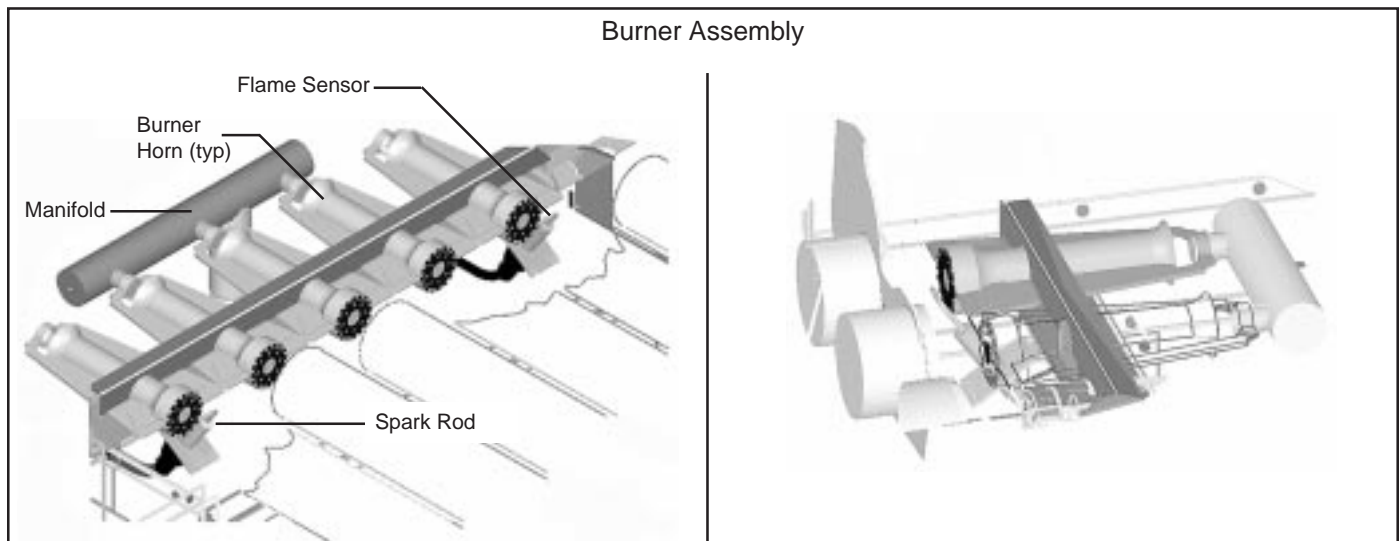
5. **HEAT EXCHANGER**
The necessity for cleaning the exchanger could indicate faulty operation and should only be checked by a qualified service agency after they have discussed the problem with a Service Representative.



Heat Exchanger prior to installation in unit.
Note dimple construction.



Combustion Motor Flue Outlet



PERIODIC INSPECTION PROCEDURES Continued



WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit to OFF at disconnect switch(es). Unit may have multiple power supplies.

COOLING

1. Main Power Switches are on and power is to the unit.
2. Set thermostat in cooling mode and place the "fan" switch to on. Check blower for correct operating direction, amperage and voltage.
3. PACKAGED UNITS - Check compressor(s) operation. Check the amperage and compare to the nameplate data (check amperage load side of the compressor contactor).
4. DX COIL UNITS - If applicable check remote condenser as per the manufacturer's recommendations.
5. CHILLED WATER UNITS - Check remote chiller operations as per the manufacturer's instructions. Check coolant flow valves for correct operation and settings.

HEATING • NATURAL GAS

1. Before turning on the main electrical power switch, be sure that all gas supply lines have been purged of air.
2. Turn gas valve to "ON" position.
3. Turn main electrical power switch to "ON" and set the thermostat to call for heat. The vent motor should operate. The control will automatically supply energy to the spark gap and the gas valve after the thermostat contact closes.
4. The 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 in 3 tries, the ignition system will lockout.)
5. Adjust thermostat to a low temperature setting to open contacts. The main gas flames should be extinguished.

NOTE: The evaporator blower is controlled by the ignition system. In the fan "Auto" mode the blower comes on 45 seconds after flame is proved and goes off 120 seconds after the thermostat opens.

HEATING • ELECTRIC

1. Set thermostat in the heat mode.
2. Set thermostat to call for heat to engage all electric heat strips. Check blower for proper rotation and voltage.
3. Measure the amperage and voltage. Compare them to the nameplate data.

HEATING • STEAM OR HOT WATER

1. Set thermostat in the heat mode.
2. Check supply blower for proper rotation and voltage.
3. Check boiler or hot water operations according to the manufacturer's instructions and recommendations.
4. Check control flow valves for correct operation and settings according to the manufacturer's instructions and recommendations.

ELECTRIC, STEAM, HOT WATER, COOLING & CHILLED WATER UNITS

1. Blower, coils and filters should be inspected monthly.
2. Once a year, before unit is turned on for the heating season, a qualified service technician should inspect the unit for proper operation.
3. All valves and steam traps should be inspected according to the manufacturer's instructions and recommendations.

WARNING: All of the items listed under the service, trouble shooting and maintenance section of this manual should be performed once a year.

SERVICING, TROUBLE SHOOTING & MAINTENANCE

LUBRICATION

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

Bearings should be re-lubricated when at normal operating temperatures, but not during operation. Rotate the fan shaft manually and add minimum lubricant required to purge the seals. **DO NOT OVERLUBRICATE.**

Recommended lubricants are:

SHELL OIL - DOLIUM R
CHEVRON OIL - SRI No. 2
TEXACO INC. - PREMIUM RB

SERVICE

If the unit does not function properly and service is required, service technicians qualified and experienced in both gas, electric heating and air conditioning are permitted to provide service to keep warranties in effect. The service technician should call the factory if assistance is required.

SERVICE TECHNICIAN MUST PROVIDE THE MODEL AND SERIAL NUMBER OF THE SPECIFIC UNIT TO CUSTOMER SERVICE TO ASSURE A CORRECT DIAGNOSIS.

AAON, Inc.

Phone: 918-583-2266
Fax: 918-382-6364
Customer Service Department

COMMON CAUSES OF REDUCED AIR FLOW

A. DIRTY FILTERS - Filters must be inspected and replaced on a regular basis. It is strongly recommended that the media be replaced monthly. Clean filters are your best protection against premature system breakdown.

Do not operate the unit without the filters in place. Operation of the unit without filters will result in a clogged evaporator coil - a very expensive service problem to resolve.

B. OBSTRUCTION TO AIR FLOW - Supply and return air grilles must be kept clear so air can be freely discharged from and drawn into the system.



WARNING

ELECTRIC SHOCK HAZARD.
Shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

CLEANING

Inspect unit interior at the beginning of each heating and cooling season and as operating conditions require.

COILS

Evaporator coil(s) should be inspected and cleaned annually to ensure there is no obstruction to air flow.

Condenser coil(s) should be inspected monthly. Clean condenser coils annually or as required by location and outdoor air conditions.

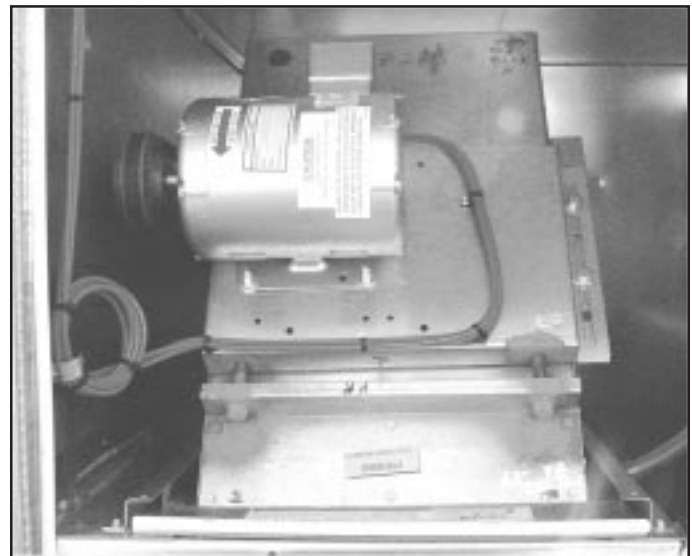
CONDENSATE DRAIN

Check and clean annually at start of cooling season.

BLOWER

Inspect blower and blower section to keep free of dust or debris.

TURN OFF POWER BEFORE ATTEMPTING TO CLEAN BLOWER WHEEL.



Typical slide-out blower section

FILTER INSTALLATION / REPLACEMENT

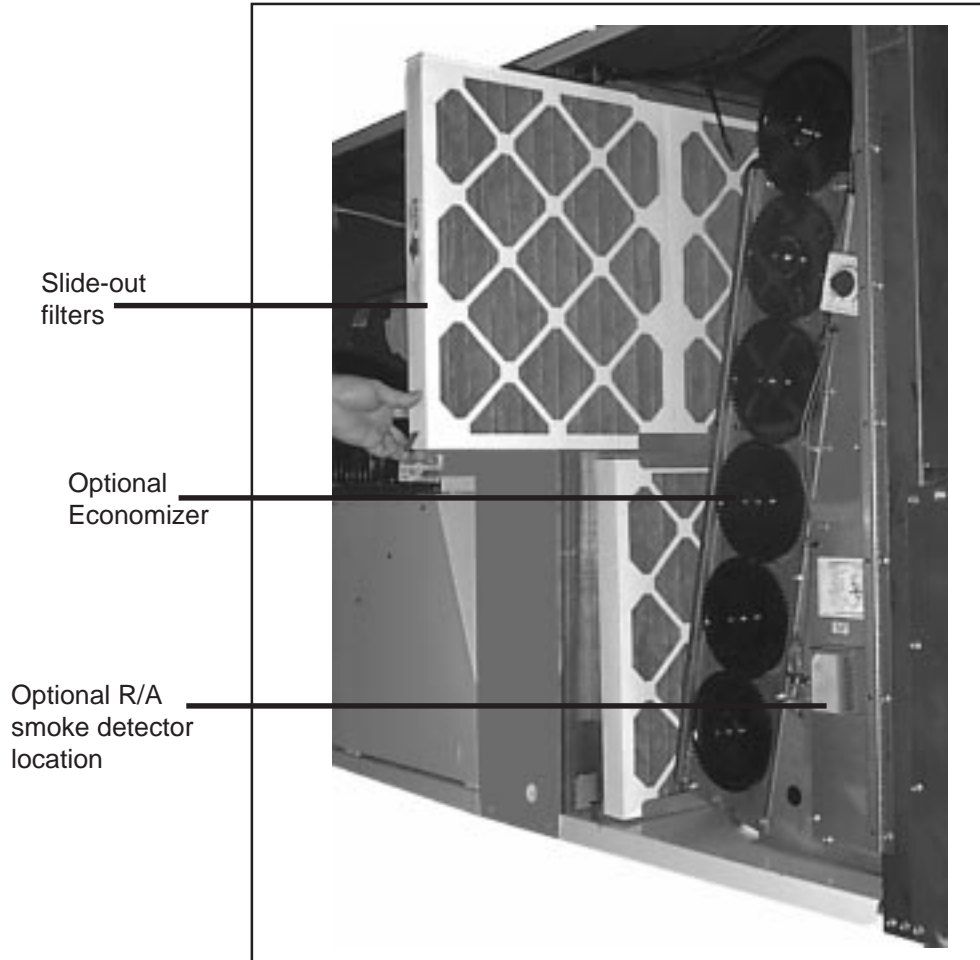


WARNING

Before attempting to perform any service or maintenance, turn the electrical power to unit to OFF at disconnect switch(es). Unit may have multiple power supplies.

Before inspecting or replacing the filters, be sure the unit IS NOT operating. The filters are located in the filter access section of the unit. Open filter access door, and pull filters straight out to inspect. Inspect ALL filters each time. Replace filters with the size indicated on each filter or as shown in the filter chart below. Arrow on replacement filters must point towards the blower. Monthly inspection is required to maintain optimum efficiency.

IT IS IMPORTANT TO KEEP COILS, BLOWER AND FILTERS CLEAN !



NOTE: CHART REFLECTS STANDARD FACTORY SUPPLIED FILTERS AND SIZES. CONTACT FACTORY FOR SPECIAL OPTIONAL FILTER PACKAGES.

FILTERS					
FILTER SIZE	UNIT SIZE				
	2 - 5	6 & 7	8 & 10	13 & 15	16 - 30
16" x 20" Standard 2" Throwaway	4		6		
16" x 20" Optional 2" or 4" Pleated	4	4	6	6	
20" x 25" Optional 2" or 4" Pleated					6

FILTERS SHOULD BE REPLACED EVERY 30 DAYS OR AS REQUIRED.

SERVICING

TROUBLE	POSSIBLE CAUSE
ELECTRIC HEATING	
SYSTEM OFF	<ol style="list-style-type: none">1. Check power at line side of contactor(s).2. Thermostat not set for heating.
EVAPORATOR MOTOR WILL NOT RUN	<ol style="list-style-type: none">1. Overload relay tripped.2. Heater Relay not energized.3. Blower Contactor not energized.4. Capacitor shorted or open (PSC motors only).
BLOWER DOESN'T DELIVER AIR	<ol style="list-style-type: none">1. Blower running backwards.2. Dirty air filters.3. Dirty coils.4. Duct obstruction.5. Belts loose (if applicable).
BLOWER COMES ON, BUT LITTLE OR NO HEAT	<ol style="list-style-type: none">1. One or more heater contactors are open.2. Limit switches are open.3. Heater relay open.4. Heat strips burned out.
GAS HEATING	
SYSTEM OFF	<ol style="list-style-type: none">1. Check power and gas supply.2. Check thermostat switches and settings.3. Check 24 volt power to ignition control.
BURNER WON'T COME ON	<ol style="list-style-type: none">1. Check for power at main gas valve.2. Defective gas valve.3. Loose or broken connection to gas valve.4. Check limit controls for open.5. Check continuity of differential pressure switch with motor turning. If open, replace differential pressure switch.6. Defective ignition control.
COMBUSTION AIR BLOWER WON'T RUN	<ol style="list-style-type: none">1. Thermostat not calling for heat.2. Relay not closing. (No power to motor)3. Motor stuck or winding open.4. Internal motor overload open.
BURNER GOES "OFF" ON HIGH LIMIT	<ol style="list-style-type: none">1. Unit blower not coming on. (Check fan control)2. Blower motor running backward.3. Filters dirty.4. Ducts obstructed or dampers closed.5. Manifold gas pressure too high.
IGNITION ON, BURNER WON'T LIGHT	<ol style="list-style-type: none">1. Hand valve "off" (turn to on)(main gas valve).2. Gas off or very low pressure.3. Check for power at main gas valve.4. Check continuity of differential pressure switch with motor turning. If open, replace differential pressure switch.5. Sparker sensor out of adjustment.6. Main orifice blocked.
SUPPLY FAN BLOWER WON'T RUN	<ol style="list-style-type: none">1. Defective Ignition Control.2. Refer to cooling trouble shooting page.

SERVICING Continued

TROUBLE	POSSIBLE CAUSE
STEAM AND HOT WATER HEATING	
SYSTEM OFF	<ol style="list-style-type: none"> 1. Check power at line side of contactor(s). 2. Thermostat not set for heating.
BLOWER MOTOR WILL NOT RUN	<ol style="list-style-type: none"> 1. Overload relay tripped. 2. Heater Relay not energized. 3. Blower Contactor not energized.
BLOWER DOESN'T DELIVER AIR	<ol style="list-style-type: none"> 1. Blower running backwards. 2. Dirty air filters. 3. Dirty coils. 4. Duct obstruction. 5. Belts loose (if applicable).
BLOWER COMES ON, BUT LITTLE OR NO HEAT	<ol style="list-style-type: none"> 1. Check steam traps, valves, and steam or hot water supply in accordance with manufactures instructions. 2. Faulty thermostat.
COOLING PACKAGE and UNITS with REMOTE CONDENSERS	
SYSTEM OFF	<ol style="list-style-type: none"> 1. Check power at lineside of contactor(s). 2. Thermostat not set for cooling. 3. High pressure control tripped. 4. Low pressure switch open (loss of charge).
CONDENSER FAN WILL NOT RUN	<ol style="list-style-type: none"> 1. Overload thermal protector open in motor. 2. Motor run capacitor open or shorted. 3. Motor failed. 4. Fan or shaft stuck.
EVAPORATOR BLOWER WILL NOT RUN	<ol style="list-style-type: none"> 1. Overload thermal protector open in motor. 2. Relay not closing. 3. Motor failed. 4. Capacitor shorted or open (PSC motors only). 5. Stuck shaft or blower wheel.
COMPRESSOR SHORT CYCLES	<ol style="list-style-type: none"> 1. Check for low refrigeration charge. 2. Compressor overload setting. 3. Ambient temperature too low. 4. Filters dirty or air flow restricted. 5. Evaporator blower not running.
FAN MOTOR RUNS HOT AND CUTS OUT	<ol style="list-style-type: none"> 1. Line voltage too high.
COMPRESSOR WILL NOT START	<ol style="list-style-type: none"> 1. Line voltage too low. 2. Limit switches are open. 3. Overload or pressure control tripped.
BLOWER DOES NOT DELIVER AIR	<ol style="list-style-type: none"> 1. Blower running backwards. 2. Dirty filters. 3. Duct obstruction. 4. Belts loose (if applicable).

SERVICING Continued

TROUBLE	POSSIBLE CAUSE
COOLING - CHILLED WATER	
SYSTEM OFF	<ol style="list-style-type: none">1. Check power at line side of contactor(s).2. Thermostat not set for cooling.
EVAPORATOR BLOWER WILL NOT RUN	<ol style="list-style-type: none">1. Overload thermal protector open in motor.2. Contactor not closing.3. Motor failed.
FAN MOTOR RUNS HOT AND CUTS OUT	<ol style="list-style-type: none">1. Line voltage too high.
BLOWER DOES NOT DELIVER AIR	<ol style="list-style-type: none">1. Blower running backwards.2. Dirty air filters.3. Duct obstruction.4. Belt loose (if applicable).
BLOWER COMES ON, BUT LITTLE OR NO COOLING	<ol style="list-style-type: none">1. Check supply water and temperature.2. Check water control valves operation.3. Check water temperature rise entering and leaving unit to determine if adequate water is flowing.

ROOFTOP UNIT REPLACEMENT PARTS

Replacement parts for AAON equipment may be obtained from AAON. When ordering parts, always reference the unit model number, serial number and part number.

AAON, Inc.

Customer Service Department

2425 South Yukon Ave • Tulsa, Oklahoma 74107

Phone: 918-583-2266 • Fax: 918-382-6364

ALWAYS USE AAON SPECIFIED PARTS

SEQUENCE OF OPERATIONS

I. GENERAL INFORMATION

A. HEATING

1. Natural Gas

When the thermostat calls for heating, W1 makes R to the heat relay (HR). All N.O. (Normally open) contacts close and all N.C. (normally closed) contacts open. The combustion motor starts and as the pressure decreases in the flue outlet box the ignition control is energized. The control sends 24 VAC to the main gas valve and high voltage to the ignitor. If a burner flame has been detected after 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 attempts, the ignition control locks out the system.

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 air fan housing.

2. LP (Propane) Gas

The sequence for LP Gas is the same as above but upon non-proof of burner the gas train will enter a 100% lockout condition.

3. Electric

When the thermostat calls for heat 'W1' makes 'R' to the heat relay 'HR'. All N.O. contacts close, and all N.C. contacts open. The heat relay makes 'R' to the first stage of electric heat.

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

If additional heating is required a second set of elements can be turned on by 'W2'.

OPTIONAL - When available the electric heat can be sequenced to provide a constant discharge air temperature.

4. Steam or Hot Water

This option adds a steam coil down stream of the cooling coil (if supplied). Connections and controls are provided by others.

B. COOLING

1. Packaged Units

When the thermostat calls for cooling from the space, 'Y1' makes 'R' to 'CC1' through the LPS (low pressure switch), HPS (high pressure switch) and optional GOT (guarantee off timer).

2. DX Only - Coil Units

When the thermostat calls for cooling from the space, the condensing unit is energized (refer to manufacturers instructions for sequence of operation). The evaporator blower contactor is energized simultaneously with the condensing section.

3. Chilled Water Coil Units

The blower contactor is energized to provide supply air on a signal from the space thermostat. All other controls are by others.

C. OPTIONAL ECONOMIZER

When cooling is called for and the unit has the economizer option installed, temperature switch ECS (or Enthalpy) allows the economizer operation when the outside air reaches the required setpoint. (Some options use dry bulb sensing and some options use enthalpy sensing to determine the outside air (O.A.) condition).

When the economizer is in operation 'Y1' controls the opening and closing of the dampers, 'Y2' is then able to control the compressors which 'Y1' normally controls. A modulating economizer is also available. The operation is the same as the standard economizer except that the motor modulates the damper position to maintain a preset mixed air temperature.

SEQUENCE OF OPERATIONS Continued

II. VAV (Variable Air Volume) SYSTEMS

NOTE: VAV BOXES AND CONTROLS ARE SUPPLIED BY OTHERS FOR FIELD INSTALLATION.

When a call for cooling is received, the controller board stages on compressors to maintain a field set supply air temperature. As different zones become satisfied their VAV boxes will close. This in turn causes the supply duct pressure to rise. The VAV controller board senses this increase in pressure and modulates the supply fan speed to maintain the required field set supply air pressure setpoint.

Normally VAV units are cooling only units. There are certain applications where electric or gas heat is used to provide morning warmup. When gas or electric heat is used for morning warmup the airflow will not be allowed to vary. The fan speed control will be disabled until a call for cooling is received, then the heating system will be locked out and VAV will be enabled.

III. POWER EXHAUST OPTIONS

When space over pressurization occurs, due to economizer operation, a power exhaust will be utilized to provide relief.

- A. When three position economizer is called for, an On/Off power exhaust will be used.

POWER EXHAUST w/ 3 POSITION ECON.

In the unit "OFF" or in the minimum economizer position, the power exhaust fan is off. When the unit goes to 100% outside air operation, the power exhaust fan motor starts and operates until the unit is shut off or the economizer goes back to minimum position.

The end switch located on the economizer outside air damper section, is field adjustable to allow for differences in building design. The switch engages and disengages the power exhaust motor(s) through a contactor. The end switch is included in the 24 VAC circuit.

- B. Full modulating economizer, a full modulating power exhaust will control the amount of actual exhausted air by means of a building sensing pressure control which opens or closes according to desired pressure in the space.

POWER EXHAUST w/ FULL MODULATING ECON. In the unit "OFF" or in the minimum economizer position, the power exhaust is off. As the economizer begins to modulate open, an end switch (adjustable) closes which starts the power exhaust fan motor.

The power exhaust operates until the economizer modulates below the end switch setting or the unit is shut off.

POWER EXHAUST w/ FULL MODULATING ECON. WITH BUILDING PRESSURE CONTROL

In the unit "OFF" or in the minimum economizer position the power exhaust is off. As the economizer begins to modulate open, an end switch (adjustable) closes which starts the power exhaust fan motor. The amount of exhaust air is controlled by a set of dampers in response to the unit mounted building static pressure controller. The power exhaust operates until the economizer modulates below the end switch setting or the unit is shut off.

(NOTE: Static pressure sensing tubing is field supplied and installed).

RM SERIES



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