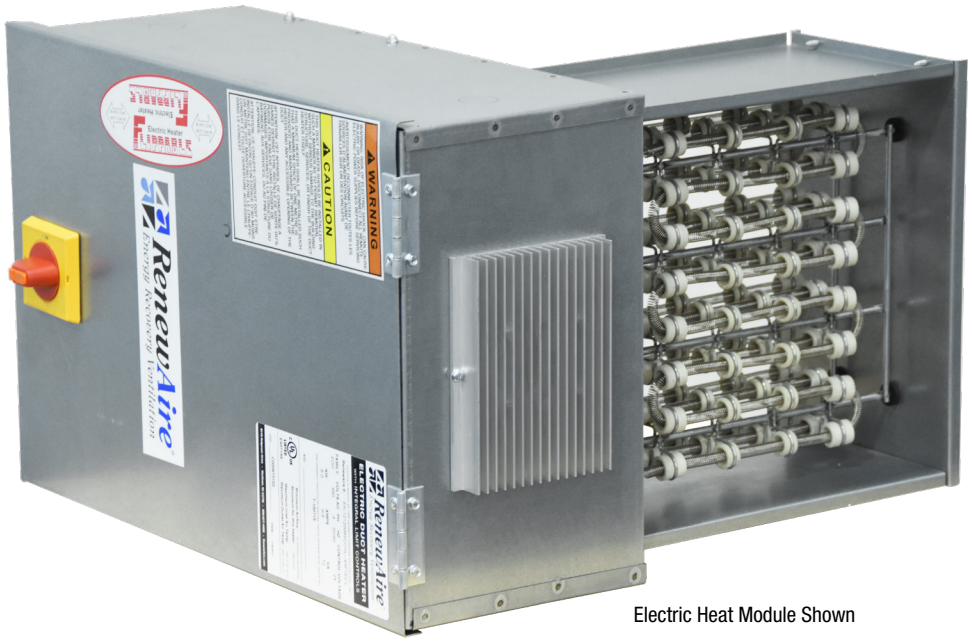
RenewAire
Energy Recovery Ventilation

Integral Electric Heat Module

Supplemental Manual for Options

DN-Series



Electric Heat Module Shown

Intertek

⚠ WARNING

ARC FLASH AND ELECTRIC SHOCK HAZARD

Arc flash and electric shock hazard. Disconnect all electric power supplies, verify with a voltmeter that electric power is off and wear protective equipment per NFPA 70E before working within electric control enclosure. Failure to comply can cause serious injury or death.

Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Before proceeding with installation, read all instructions, verifying that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The line side of the disconnect switch contains live high-voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch and verify that power is off with a voltmeter. Refer to unit electrical schematic.

Follow all local codes.

⚠ CAUTION

RISK OF ELECTRIC SHOCK OREQUIPMENT DAMAGE

Whenever electrical wiring is connected, disconnected, or changed, the power supply to the DOAS and its controls must be disconnected. Lock and tag the disconnect switch or circuit breaker to prevent accidental reconnection of electrical power.

IMPORTANT

This equipment is to be installed by following Industry Best Practices and all applicable codes. Any damage to components, assemblies, subassemblies, or the cabinet which is caused by improper installation practices will void the warranty.

⚠ CAUTION

RISK OF CONTACT WITH HOT SURFACES

This heater, including the heating elements, their support structure, and surrounding DOAS components are extremely hot during operation. Allow sufficient time for them to cool before working within the unit cabinet. Use extreme caution and wear protective gloves and arm protection when working on or near the heater.

⚠ CAUTION

RISK OF CONTACT WITH HIGH SPEED MOVING PARTS

Disconnect all local and remote power supplies, verify with a voltmeter that electric power is off and all fan blades have stopped rotating before working on the unit.

Do not operate this unit with any cabinet panels removed.

IMPORTANT

Air ducts connecting this heater to the Occupied Space must be installed in accordance with the Standards of the National Fire Protection Agency for the installation of Air-Conditioning and Ventilating Systems (Pamphlet No. 90A) and Warm-Air Heating and Air-Conditioning Systems (Pamphlet No. 90B).

IMPORTANT

This unit is intended for general ventilating and heating only. Do not use to exhaust hazardous or explosive materials and vapors. Do not connect this equipment to range hoods, fume hoods, or collection systems for toxics.

SAVE THIS MANUAL

NOTICE

This manual contains essential information for the DOAS it is installed in. Space for maintaining written records of heater maintenance and/or repairs is in the DOAS IOM. At the time the DOAS is commissioned, a maintenance schedule should be developed by the user to incorporate monthly and seasonal maintenance and include start-up maintenance tasks as described in this manual.

UNIT INFORMATION

Record information as shown below. In the unlikely event that factory assistance is ever required, this information will be needed.

Locate the RenewAire unit label found on the outside of the unit.

NOTE: This information is for purposes of identifying the unit-specific option data as needed, from the option code. *See DN-Series IOM Manual* for further details.

Unit Option Code: DN-□□-□□□□□□□□□□□E□□□□□□□

Serial Number: □□□□□□□□

SO#: □□□□□□

NOTE: This page is to be completed by the installing contractor. The completed document is to be turned over to the owner after start-up.

NOTE: Digit 17 of the unit configuration code (Option Code) indicates that the unit has an integral electric heat module. For further information on the DOAS configuration code, *see the DN-Series Installation, Operation, and Maintenance Manual.*

UNIT INFORMATION

RenewAire Energy Recovery Ventilation
201 Raemisch Rd Waunakee, WI 53597 (800) 627.4499

Energy Recovery Ventilator

ETL LISTED CONFORMS TO UL STD 1812 CERTIFIED TO CAN/CSA C22.2 No. 113
Intertek 4000510

Option Code DN-2-JINAB134--CE4VN2---L
Model/Modele DN-2-JIN **Sales Order** 485962
Serial Number F25125322D **Job Order** 745634-0000
SCCR 5 KAIC

Power Supply To Unit / Alimentation d'energie a l'unite		
Voltage	Minimum Circuit Amps	Max Overcurrent Protection Device
460V	40.4	45
60 HZ 3-Phase	Amp. Minimales de Circuit	Dispositif de protection maximum contre les surintensites

Coil	Type	Rows	FPI	Max. Pressure (psi/MPa)
Dehumidify	Fluid	4	11	460/3.2
Re-heat	-	-	-	-
Heat	-	-	-	-
Coil	Type	Rangee	FPI	Max. Pression (psi/MPa)

Motors Thermally Protected / Moteurs protégé thermiquement		
Voltage	Qty & kW/HP	FLA
460	2@3.0 HP	4.2
	Qty & kW/CV	APC

Motors Protected by Variable Frequency Drives / Les moteurs protégés par la frequence variable conduit		
Voltage	Qty & kW/HP	FLA
460	2@3.0 HP	5.4
	Qty & kW/CV	APC

Electric Heater / Chauffage Électrique		
Voltage/Phase	Amps	Input kW
480V/3-Ph	23.9	19.9
Natural Gas		

⚠WARNING ⚠AVERTISSEMENT

Danger of electric shock. Always disconnect power source before servicing. Do not install in a cooking area or make line-voltage electrical power connections directly between this unit and any appliance.
Danger de choc électrique. Tojours deconnector la source d'alimentation avant les rèparations. N'installez pas de zone cuisine ou de ligne de tension les connexions d'alimentation électrique directement entre cette unité et tout.

133995_002

UNIT LABEL (TYPICAL)

RenewAire Energy Recovery Ventilation

ELECTRIC DUCT HEATER
WITH INTEGRAL LIMIT CONTROLS

Conforms to ANSI/UL STD 1996 certified to CAN/CSA STD. C22.2 No. 155

RenewAire # EK-2416020SCCHL--43F1SS-N

FAMILY	VOLTS AC	PH	HZ	CONTROL VOLTAGE
EK	480	3	50/60	24

KW	AMPS	VA
19.9	23.9	12

See installation instructions for spacings, input air temperature, air velocity, etc.

T-111111

S/O: _____

c UL us LISTED 487155

Minimum Airflow: 70 CFM/KW (33 LPS/KW)
Minimum for this heater: 1050 CFM
Maximum Inlet Air Temp: 100° F (37.8° C)
Maximum Outlet Air Temp: 200° F (93° C)

C/O: C000673182 **Date:** __/__/__

201 Raemisch Rd . Waunakee, WI 53718 · 800.627.4499 · RenewAire.com

ELECTRIC HEATER PART NUMBER

TYPICAL ELECTRIC HEAT MODULE LABEL

TABLE OF ILLUSTRATIONS

TABLE OF WIRING SCHEMATICS

1.0 OVERVIEW

1.1 DESCRIPTION

The integral electric heater used in the RenewAire DN-Series is an open-coil type heater. It is factory-installed in the lower part of the DN-Series heat module and has its own control panel, incorporating a disconnect switch on the control panel cover and a modulating controller inside. Heat output is controlled by one or more Solid State Relays (SSRs). Heater operation is controlled by the unit Integrated Programmable Controller, which provides an analog 0–10 VDC signal. All heaters require a three phase power source which comes from the unit disconnect switch. Multiple voltages and heater sizes are offered. A number of different control options are selectable on the Integrated Programmable controller, to include:

- Adjustable set point, controlled by Return Air temperature
- Adjustable set point, controlled by Supply Air temperature
- OA Reset, controlled by Return Air temperature
- OA Reset, controlled by Supply Air temperature

All necessary temperature sensors are connected to the DN-Series Integrated Programmable Controller, which interprets the sensed temperatures and then provides an analog control signal to the heater's control panel.

NOTE: Module covers removed for clarity

FIGURE 1.1.0 ELECTRIC HEATER LOCATION IN DN-SERIES

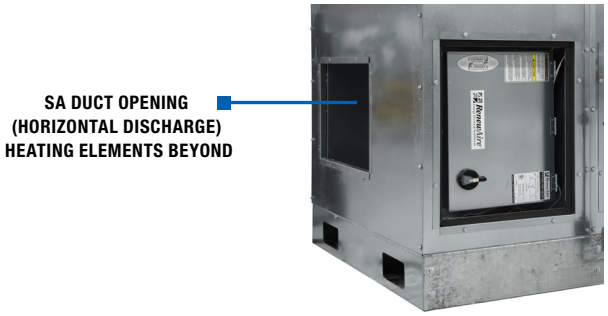


FIGURE 1.1.1 ELECTRIC HEATER OBLIQUE VIEW

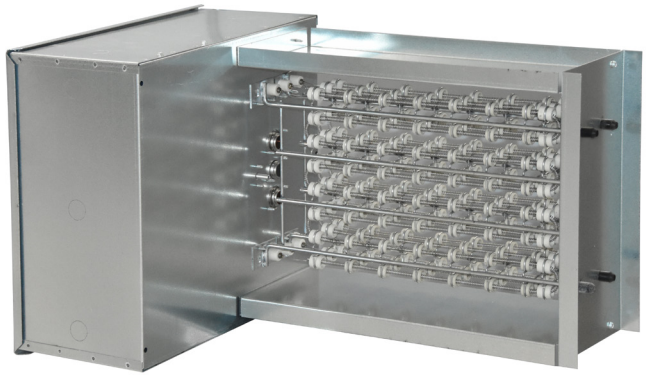


FIGURE 1.1.2 ELECTRIC HEATER (TYPICAL)

FIGURE 1.1.3 CONTROL PANEL COVER

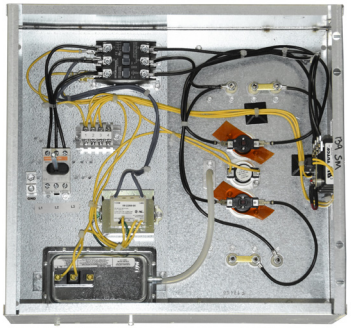


FIGURE 1.1.4 BASIC CONTROL PANEL

1.2 ELECTRICAL SUPPLY

The electric heat module is factory-wired and requires no additional field wiring. The electric heat module voltage is the same as the unit voltage with a single-point connection at the unit disconnect switch.

1.3 HEATER CAPACITY IN KILOWATTS

Electric heater capacity is based on kilowatts (kW). Electric heaters are nearly 100% efficient, so output capacity equals input capacity. Heaters are available in the following capacities:

- 5 kW
- 10 kW (9.9 actual)
- 15 kW
- 20 kW (19.9 actual)
- 25 kW
- 30 kW
- 40 kW (39.9 actual)
- 50 kW
- 60 kW (59.8 actual)

1.4 HEATER ELEMENTS

A choice of two different types of heater elements is offered: either 60–20–20 Ni–Cr–Fe with nickel plated terminal pins (standard) or 80-20 Ni-Cr with stainless steel terminal pins.

1.5 SAFETY FEATURES

Each heater is equipped with the following:

1.5.1 Airflow Switch

The airflow switch is a non-adjustable pressure switch that prevents the heater from being energized when no or very low air flow is present.

1.5.2 Automatic Reset Limit Switch

The auto reset limit switch is mounted on the heater next to the elements. If the limit switch detects temperatures greater than 130˚ F [54.4˚ C], it shuts down the heater until the temperature drops and then the limit switch automatically resets itself.

1.5.3 Manual Reset Limit Switches

There are two manual reset limit switches on the heater, located next to the heater elements. If the limit switch detects temperatures in excess of 200˚ F [93.3˚ C], the limit switch trips and shuts off the heater. The limit switch must be manually reset.

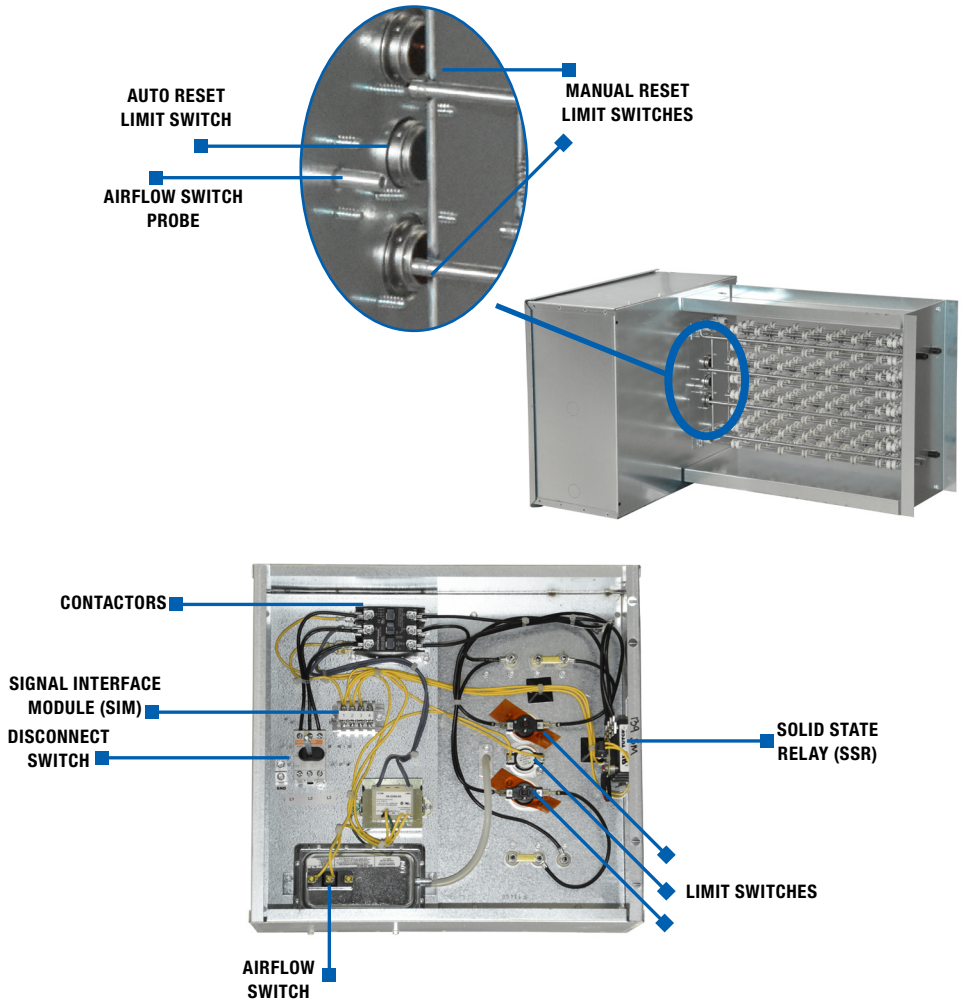


FIGURE 1.5.0 HEATER CONTROLS IDENTIFICATION

1.6 AIR FLOW

The air flow across the heater elements is always horizontal. If vertical discharge of the Supply Air is chosen as part of the DN unit configuration, the air flow is directed downward through the floor of the unit, after it passes through the electric heater. A minimum airflow through the heater is required at all times in order for the heater to operate. See Section 1.5.1 Airflow Switch.

1.7 MODULE HEAT RISE

All modules are installed on the positive pressure side of the fan.

- Maximum allowable discharge temperature is 120˚ F [48.9˚ C] for any installation.
- Maximum allowable temperature rise is 90˚ F [50˚ C].
- Maximum design duct static pressure is 3.0 InWC .

Note that the example below is based upon a specific Entering Air temperature. As Entering Air temperatures vary, the resulting temperature rise will also vary.

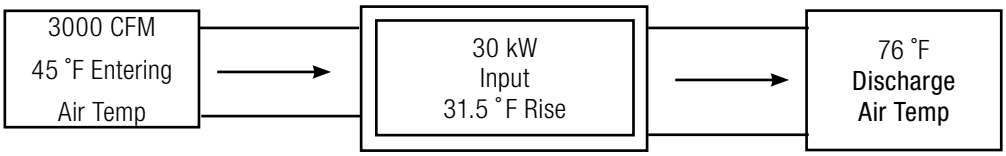


FIGURE 1.7.0 HEAT RISE CALCULATION

1.8 USER INTERFACE

The User Interface (U/I) is the device used to control operation of the module. This module is an integral part of a DN unit and is therefore controlled by the on-board Integrated Programmable Control.

1.9 ELECTRIC HEATER OPERATION

The electric heat module modulates its heat output by applying controlled, high-voltage pulses of current to the heating elements. High-voltage power comes from the heater disconnect switch and goes through one or two sets of contactors before being applied to a Solid State Relay (SSR). In normal operation, high voltage power is always present at the SSR, as long as the contactors are energized by the presence of 24 VAC. The SSR is controlled by a device called a Burst Firing Control Module (BFCM) that is mounted on the SSR.

The BFCM is a device that interprets a 0 – 10 VDC call for heat signal from the unit controller. Depending on the voltage of the call for heat signal, the BFCM will switch the SSR ON and OFF in high-speed pulses, causing the heat output to satisfy the call for heat.

In some larger electric heat modules (greater than 48A), the BFCM is replaced by a Vernier Step Controller, mounted on its own circuit board. The step controller is used to prevent extremely high-amperage surges by bringing on stages as needed.

The heater receives a 0-10 VDC activating signal from the Integrated Programmable Controller. The activating control signal comes into the heater control box and is terminated on the Signal Interface Module (SIM) or terminal strip. From there, the signal is applied to the BFCM, which is mounted on the SSR. The signal applied to the BFCM causes the SSR to generate a series of high-voltage pulses, applied to the heater elements. The higher the control signal voltage, the more high-voltage pulses that are applied to the heater elements.

Heater operation and output is controlled by the unit Integrated Programmable Controller, based on desired temperature. The heater shuts off when the controller senses that the desired temperature condition is met.

The heater will switch off if insufficient airflow is detected. The heater will also switch off if an over-temperature condition occurs. This condition is identified by intermittent or no heating. If this occurs, the cause of the over-temperature condition should be identified and corrected.

Also *see* Section 1.10 Low Voltage Control Operation.

NOTE: The electric heat module uses a Solid State Relay (SSR) to modulate heat output. Modulation provides a more efficient method of heating the Occupied Space than running at full output for brief periods.

NOTE: The term “Solid State Relay” (SSR), is a generic control type. The term “Silicon Controlled Rectifier” (SCR) is a specific type of SSR. The two terms are often interchanged and both are correct. For consistency, ther term “SSR” is used in this manual.

1.10 LOW VOLTAGE CONTROL OPERATION

The low voltage control circuitry consists of:

- 24 VAC transformer
- Signal Interface Module (SIM), or terminal block.
- Contactors with low-voltage coils. NOTE: There are often back-up contactors whose coils operate on line voltage.
- SSR Burst Firing Control Module (BFCM) (mounted directly on each SSR and not shown as a separate component on wiring schematic).
- Auto-reset high temperature switches. NOTE: There is also a manual-reset high temperature switch that operates on line voltage, not 24 VAC.
- Air flow switch

From the secondary side of the transformer, 24 VAC is supplied to the devices in the low voltage control circuit.

The signal interface module (SIM) or terminal strip receives the 0–10 VDC control signal from the DOAS controller. The control signal then goes to either the BFCM or to a Vernier Step Controller.

Contactors with low-voltage coils require 24 VAC to operate. Contactors are used primarily as safety devices that can interrupt current flow to the SSR in case of over-temperature or lack of air flow. In addition to a low-voltage contactor, there may be a backup contactor that is switched ON/OFF by line voltage.

NOTE: A contactor is an electronically-controlled switch used for switching an electrical power circuit ON and OFF. Contactors are controlled by a second circuit that is usually 24 VAC (low voltage). In some cases, the secondary circuit may be the same as the line voltage (high voltage). All contactors used in electric heat modules are Normally Open (NO) and require activating voltage in order to close.

The BFCM interprets the controller 0–10 VDC input signal and then supplies timed pulses of power to the Solid State Relay (SSR), which applies high-voltage power to the heater elements. On small electric heat modules, the BFCM is attached directly to the SSRs. On heat modules larger than 48A, a Vernier Step Controller is mounted on a separate board.

Auto-reset high temperature switches and the air flow sensor module are connected in series between 24 VAC and ground. If a high temperature reset switch is tripped open or if the air flow switch does not sense adequate air movement in the heater, the circuit is opened and the low-voltage contactors will not operate. Line voltage will not be supplied to the SSR.

Also, see Section 1.9 Electric Heater Operation and Section 2.4 Wiring Schematics in this manual.

NOTE: SSRs operate on line voltage but their output is controlled by the low-voltage BFCM.

2.0 SYSTEM REQUIREMENTS

2.1 ELECTRICAL SYSTEM REQUIREMENTS

The electric heater is factory-wired and requires no additional field wiring. The unit nameplate label displays the unit and electric heater voltage.

NOTE: Minimum air flow or greater must be maintained uniformly over the entire face of the heater.

2.2 GENERAL OPERATING REQUIREMENTS

Minimum Air Velocity: 70 CFM per KW (75-80 Recommended)
Maximum Inlet Air Temp: 100˚ F [37.8˚ C]
Maximum Heater KW: 30 kW per square foot of heater cross section.

The velocity of air should NEVER be lower than the specified minimum. In cases where this is not true, the kW must be reduced or the velocity of air increased.

NOTE: Observe at least one Heating cycle to ensure that cycling of safety limit controls does not occur under normal operating conditions before leaving the installation.

2.3 CONTROL WIRING

IMPORTANT

DO NOT adjust any dip switches on the controls within the heater! The dip switches are factory-set and are not to be changed.

The electric heat module receives its control signals from the DN-Series Integrated Programmable Controller. In the event that a Building Management System (BMS) is controlling the DOAS, BMS wiring is to be connected to the Integrated Programmable Controller, in accordance with DOAS instructions.

NOTE: The air temperature entering the heater should not exceed that marked on the heater nameplate label.

2.4 LOW VOLTAGE CONTROL SYSTEM

IMPORTANT

Do not use the electric heat module transformer to power external controls. Use the DOAS low-voltage 24 VAC transformer or an external, field-supplied 24 VAC transformer.

If external controls are powered by the DOAS low-voltage 24 VAC transformer or a field-supplied external 24 VAC transformer, follow the requirements for those transformers regarding wire length, wire gauge, and power draw.

This heater is provided with a Class II 24 VAC power supply system that operates the heater's contactor(s). In the event of a short-circuit or overload, the transformer itself is designed to fail safely.

2.5 SIZING AN ELECTRIC HEATER

An electric heater can be sized from the following information:

- Heater Width (W") and Heater Height (H")
  DN-2 = 16" H X 24" W
  DN-3 = 16" H X 30" W
  DN-5 = 16" H X 30" W
- Heater voltage and phase
- Heater Capacity rating (kW)
- Or Design Air Flow (CFM) and
- Desired Temperature Rise (Δ°F)

2.6 AMPERAGE DRAW

The formula for calculating line current is:

(Three phase): Amps = Watts / (line voltage of heater X 1.73)

To convert kW to Watts, multiply kW by 1,000.

2.7 KW AND TEMPERATURE RISE

The following formula may be used to determine the approximate total kW required when the CFM (air volume) and desired temperature rise are known:

$$kW = \frac{CFM \times \Delta T}{3150}$$

2.8 ELECTRIC HEATER TEMPERATURE RISE

Temperature rise is expressed as ΔT. The following formula may be used to determine the approximate temperature rise of an electric heater when the kW and CFM are known:

$$\Delta T = \frac{kW \times 3150}{CFM}$$

2.9 DETERMINING MAXIMUM HEATER KW

Maximum watts per square inch of heater area:

Heater width (inches) x heater height (inches) = Heater Area total square inches.

$$\text{Max watts} = 208.33 \left(\frac{W}{in^2}\right) \times \text{Heater area } in^2$$

Maximum kW for square foot of heater area:

Heater width (feet) X heater height (feet) = heater area total ft^2.

$$\text{Max kW} = 30 \left(\frac{kW}{ft^2}\right) \times \text{Heater area } ft^2$$

2.10 MINIMUM AIR VELOCITIES

The minimum uniform airflow in the integral electric heater is directly related to the inlet air temperature. Consideration must be given to both airflow across the heater and inlet air temperature, see the Minimum Air Velocities chart below.

1. Calculate the kilowatts per square foot of heater area by dividing the total kW required by the heater area.

Example: Total kW = 20
Heater area = (24" x 16") / 144 in^2 = 2.67 ft^2

$$kW / ft^2 = \frac{20}{2.67} = 7.49\ kW / ft^2$$

2. If the air flow is expressed in FPM then a direct cross reference can be made by comparing the temperature of the air (as it enters the electric heater) to the kW rating on the chart of rated velocity.

- Draw a line horizontally from the kW/Sq. Ft. required to the air inlet temperature being used
- From the point of intersection on the Inlet Air Curve, draw a line down vertically to establish the air velocity.
- The velocity should never be lower than the velocity as determined from the chart. In cases where this is not true, the velocity must be increased or the kW required must be reduced.

3. In cases where the air flow is expressed in CFM, then convert to FPM by dividing the CFM by the heater area.

Example: FPM = $\frac{CFM}{\text{Heater Area}}$

NOTE: Minimum airflow must be maintained at all points over the face of the heater.

MINIMUM AIR VELOCITIES

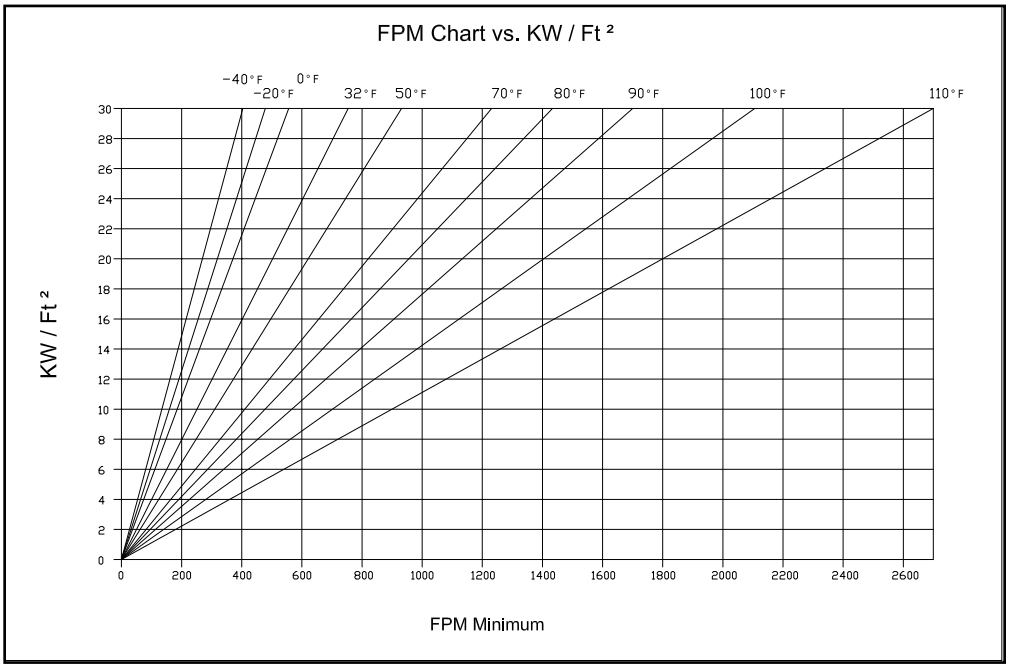


FIGURE 2.10.0 FPM VS. KW / FT.2 CHART

OPTION Integral Electric Heat Module

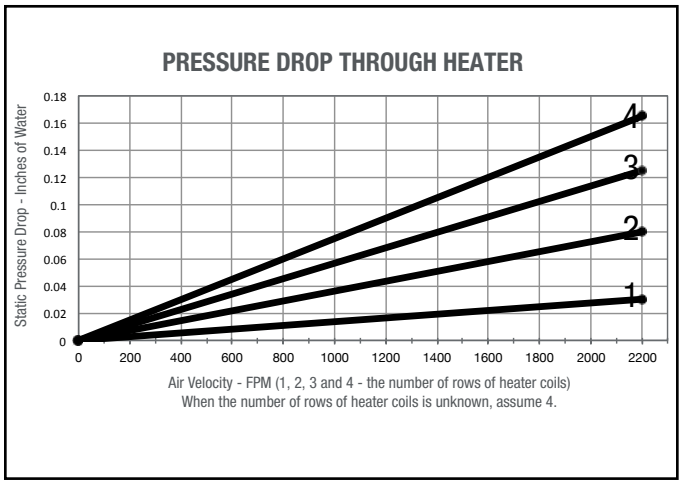


FIGURE 2.10.1 PRESSURE DROP CHART

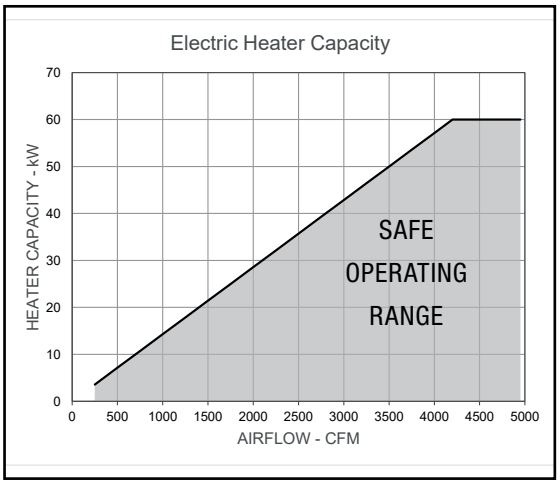


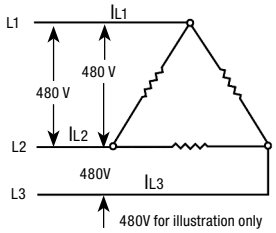
FIGURE 2.10.2 AIRFLOW CHART

2.11 ELECTRICAL REQUIREMENTS

Refer to general wiring diagram in Section 4.0 of this manual. Each heater also has its own specific wiring schematic label on the inside cover of the heater control box.

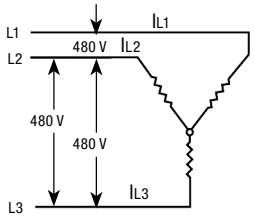
2.12 HEATING ELEMENT WIRING CONFIGURATION

THREE PHASE



THREE WIRE DELTA CONNECTION

1. Element Voltage = Line Voltage
2. Phase Currents In = $I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase line voltage.



THREE WIRE WYE CONNECTION

1. Element Voltage = $\frac{\text{Line Voltage}}{1.73}$
2. Phase Currents In = $I_{L1} = I_{L2} = I_{L3}$
3. Voltage measured between any two power legs (L1 to L2 etc.) should be equal to the three phase line voltage.

FIGURE 2.12.0 HEATING ELEMENT WIRING CONFIGURATION

RenewAire Energy Recovery Ventilation

2.13 DEFINITIONS FOR ELECTRIC HEAT MODULE

Heater Type:

EK—Electric heater module

Width:

W—Width of electric heating element in inches.
Range 24", 30"

Height:

H—Height of electric heating element in inches.
Range 16"

Capacity:

KW—Kilowatt rating of heater. Determined by airflow (CFM) and temperature rise (ΔT).
Range 5, 10, 15, 20, 25, 30, 40, 50, 60

Mount:

Slip-in (Standard)—heater is installed through opening in unit vestibule

Element Style:

Open Coil (Standard)—open coil resistance wire.

Element Material:

60-20-20 NI-CR-FE with nickel plate terminal pins (Standard)-standard “C” grade element wire. 60% nickel, 20% chromium, 20% iron.
80-20 NI-CR with stainless steel terminal pins (Option)-premium “A” grade element wire. 80% nickel, 20% chromium.

Airflow Orientation:

Horizontal (Standard)—heater installed where airflow is horizontal through the heater.

Control Box Offset:

Left Hand (Standard)—the control panel is offset to the left side of the heating elements as determined when looking into the control box.
Vertical—the control panel is aligned vertically with the heating elements as determined when looking into the control box. Only available on DN-2.

Voltage and Phase:

3-Phase-208 V, 240 V, 480 V, 600 V

Power Fusing:

Standard on all electric heater modules.

Stage:

Single Stage (Standard)—All heating elements are energized simultaneously. Selected when heater amperage is less than 96 A.
4-Stage—Heating capacity is divided into four sections. Selected when heater amperage is greater than or equal to 96 A.

Control Voltage:

24 VAC (Standard)—secondary voltage

Control Type:

Silicon Controlled Rectifier (SCR)—100% step-less modulating control. Accepts 0–10 Vdc from DOAS unit controller. Utilizes solid state relays (SSR) to switch current to the heating elements, on a time-proportioned basis.
An SSR is an electronic switching device similar to an electromechanical relay (contactor) but has no moving parts which allows very fast switching of high current loads without arcing or wearing out. A heater with an SSR controller must be installed in such a way as to provide good ventilation to the heat sink so that the life of the SSR is prolonged. Over-heating of an SSR causes it to fail.

Airflow Switch: (Standard)

Non-adjustable pressure switch that prevents the heater from being energized when no or very low air flow is present through the heater. Minimum air flow pressure is 0.05 InWG +/- .02.

Auto Reset: (Standard)

Automatic reset limit switch for primary over-temperature protection. Required by UL.

Manual Reset: (Standard)

Manual reset limit switch for secondary over-temperature protection. Required by UL.

Disconnect Switch: (Standard)

Non-fused interlocking switch mounted in the door of the heater control box. Must be turned off to open door on control box. Interrupts power to the heater when turned off.

Ground Lug: (Standard)

Connection point for grounding line voltage.

- All heaters are designed for zero clearance.
- Control box is constructed of galvanized steel.
- Control box has hinged access door with interlocking disconnect switch.
- All heaters are UL and cUL recognized components.

3.0 HEATER PLACEMENT

3.1 GENERAL

All electric heat modules are installed on the positive side of the circulating blower. Modules must be installed in a level, horizontal position. Observe unit clearances as shown in Section 5.4.

This information and these instructions apply to electric heater models for zero clearance installation.

- The electric heaters are approved for use with heat pumps, air conditioners or other forced air systems.
- The electric heaters are pre-wired and have voltage ratings to 600 volts, three phase.
- The electric heaters are furnished with integral controls.

3.2 DUCTWORK

Ductwork shall be sized to fit the openings of the heat module. Uniform airflow distribution over the electric heater elements is essential for proper operation and optimum efficiency. Use of baffles and/or turning vanes may be required to provide uniform airflow. Ductwork is fastened directly to the unit cabinet and then sealed, using Industry Best Practices/SMACNA guidelines.

4.0 ELECTRICAL

4.1 WIRING SCHEMATICS

4.1.1 Control Panel Wiring Schematic <48A

NOTE: Some components shown on this typical schematic may not be present on the unit as shipped from the factory. See the electric heater wiring schematic on the inside of the electric heat panel door in the unit heat module for specific wiring.

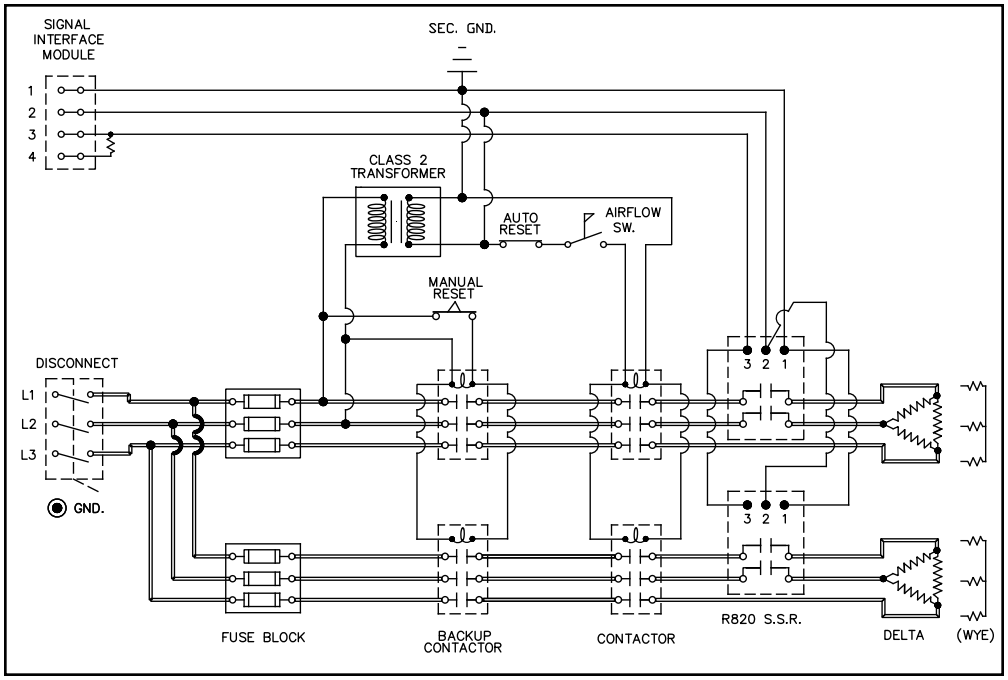


FIGURE 4.1.0 CONTROL PANEL WIRING SCHEMATIC <48A (TYPICAL)

4.1.2 Control Panel Wiring Schematic >48A

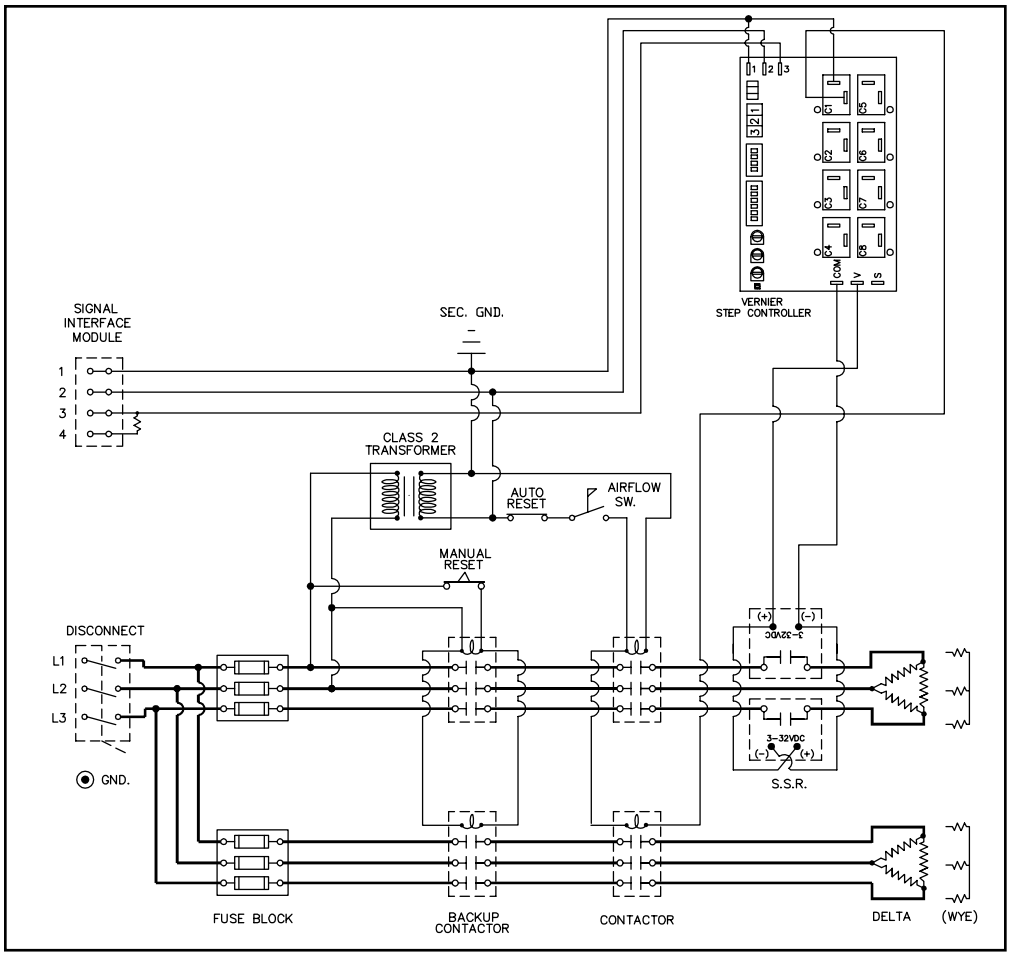


FIGURE 4.1.1 CONTROL PANEL WIRING SCHEMATIC >48A (TYPICAL)

NOTE: Some components shown on this typical schematic may not be present on the unit as shipped from the factory. See the electric heater wiring schematic on the inside of the electric heat panel door in the unit heat module for specific wiring.

5.0 INSTALLATION

Electric heaters are completely installed in the factory and meet code and application requirements.

5.1 MODULE INSPECTION ON ARRIVAL

As part of the DOAS inspection on arrival, the following areas of concern should be inspected:

- All screw-down electrical connections should be inspected for tightness.
- Visually inspect the heater elements to make sure that none are broken loose.

5.2 PREPARING FOR INSTALLATION

The electrical ratings for the module and unit are shown on the unit data plate found on the outside of the unit. Before installation, verify that the electrical supply matches the data plate information. Read this manual in its entirety before beginning installation. Check with local agencies having jurisdiction for any local requirements.

5.3 PLACEMENT OF MODULE

Because the DOAS may be incorporated into an owner's existing HVAC system, the following application principles should be observed:

1. Never operate an electric heater without airflow. The heater must always be interlocked with the fan. This is accomplished with an airflow switch and fan interlock through unit controller.
2. Never operate heater without achieving at least the minimum airflow required. Always refer to the installation instructions and the nameplate label to determine your minimum air velocities based on your inlet air temperature. If the minimum airflow requirements are not present the heater will not function properly and safely (see Airflow Illustration below).
3. Never operate the heater with uneven airflow. The minimum airflow requirements must be present at all points over the heater face.
4. Always locate the heater (unit SA opening) at least 24" from an elbow or turn.
5. Always locate the heater (unit SA opening) at least 48" from a heat pump or central air conditioner.
6. Always locate the heater (unit SA opening) at least 48" from any canvas duct connector or transition section for change in duct size. Use round-to-rectangular pyramidal transitions to connect round duct to rectangular duct. Always locate the heater at least 48" from any transition section for change in duct size. Follow installation guidelines given in manual and in accordance with SMACNA guidelines.
7. Always locate the heater (unit SA opening) at least 48" upstream from an humidifier.
8. Never insulate the exterior of the control box. The control box must be completely accessible and located where ventilation can be provided at all times.
9. Never use a different voltage and/or phase than what is listed on the heater nameplate label. The electric heater is to be used only at the voltage and phase that is listed on the nameplate label.

NOTE: An airflow switch only proves that airflow exists (a differential in static pressure), not that the minimum air velocities and proper air distribution for the heater exist.

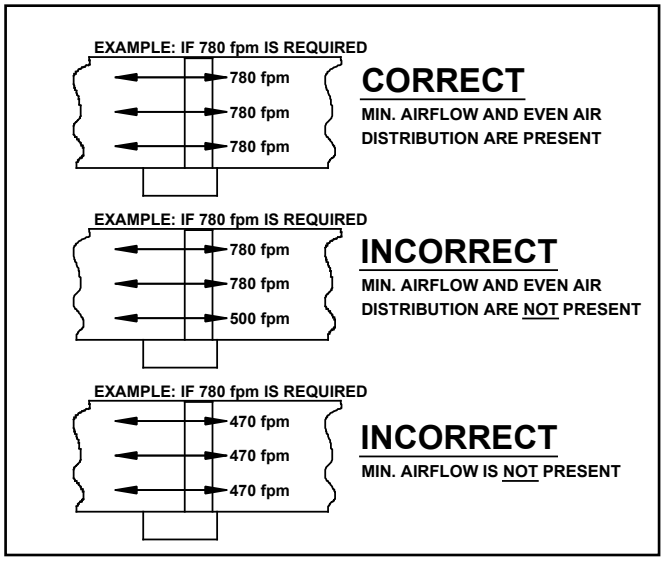


FIGURE 5.3.0 AIRFLOW ILLUSTRATION

5.4 CLEARANCES

Clearances are as detailed on the Dimensioned Drawing of each unit type, as applicable. Dimensioned drawings are found in the *DN-Series IOM.*

IMPORTANT

Provide adequate service access for maintenance. The module requires regular inspections. Install the module where access panels can be removed for cleaning and inspection and wiring can be accessed for installation and service. Observe all safety precautions when working on roofs, including locating the unit away from roof edges, provision of safety railings, and use of fall-protection equipment

Sufficient space must be left in front of the DOAS to allow for servicing of the unit and its electric heater module. See the dimensioned drawing for each model, as applicable.

5.5 MODULE INSTALLATION REQUIREMENTS

The heat module is installed on the positive pressure side of the unit fan. The air throughput must be within the CFM range marked on the module rating plate.

Ductwork should be mechanically fastened to the unit. Joints should be sealed with high temperature silicone caulking or high temperature tape to prevent leakage of circulating air. All outdoor module connections must be weather-tight to prevent rain and snow from entering the ductwork. Support all ductwork securely. DO NOT rely solely on module duct connections for support.

5.6 INSTALL SUPPLY AIR TEMPERATURE SENSOR

The Supply Air temperature sensor is factory-wired to the Integrated Programmable Controller but the sensor must be installed in the SA ductwork downstream of the electric heat module. The temperature sensor should be installed between 4 and 6 feet from the unit in the SA ductwork to control the temperature output of the electric heat module. The Supply Air temperature sensor is shipped in the low-voltage side of the unit electrical box (E-box).

FIGURE 5.6.0 DUCT TEMPERATURE SENSOR

⚠ CAUTION

RISK OF OVERHEATING

Do not install, place, or store materials within the DN unit in front of the electric heater.

6.0 OPERATION

6.1 ELECTRIC HEATER QUICK-START GUIDE

NOTE: Start-up and testing of the integral electric heater is normally done after the DN-Series Integrated Programmable Controller has been configured. The steps show in Section 6 of this manual are to confirm that the controller is programmed to operate in a test mode.

Operation of the electric heater module is dependent on receiving high voltage power from the DOAS disconnect switch and a 0-10 VDC control signal from the DN Integrated Programmable Controller. *Refer to the DN Integrated Controls User Manual* for detailed instructions.

Turn ON the electric heater disconnect switch.

6.2 VERIFY PROGRAMMING OF DOAS CONTROLLER

NOTE: Minimum aiflow through the electric heat module must be maintained at all times during operation.

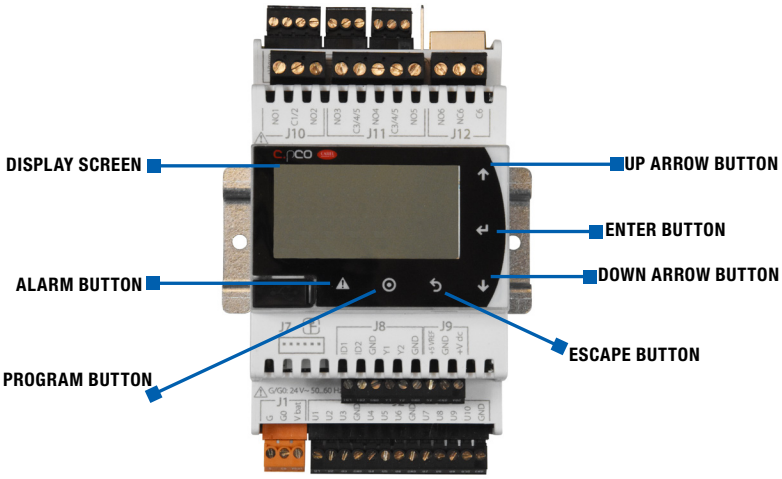


FIGURE 6.2.0 DOAS CONTROLLER

NOTE: Observe at least one complete heating cycle to verify proper operation of the electric heat module. This may require further adjustment of the heating setpoint.

NOTE: For further information on how to navigate the controller, see the *DN Integrated Controls User Manual*.

6.2.1 Disable the Integrated Controller

Turn ON the unit disconnect switch. As soon as the disconnect switch is turned ON, the controller will begin to boot-up, which takes about 10 seconds. When the Home Screen is displayed, press the ESCAPE button to go to the Main Menu. Scroll down to Unit Enable and press ENTER. Verify that the screen shows “OFF”. This will prevent the electric heat module from trying to run prematurely. Press the ESCAPE button to exit without changing the status.

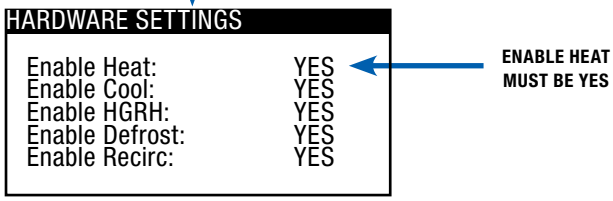
6.2.2 Disable BMS Control

For purposes of testing operation of the electric heater module, BMS control of the heater should be left turned OFF. On the controller, go to Home Screen > Main Menu > Settings and then press ENTER on the controller. For operation of the DOAS without BMS control, the screen should say ENABLE BMS: NO. Exit this menu item by pressing the ESCAPE button.

6.2.3 Verify the Controller is Configured for Heat

Go to Home Screen > Service Menu > Unit Type. Press the ENTER button. The next screen is the hardware configuration screen. Verify that ENABLE HEAT is YES. Exit this menu item by pressing the ESCAPE button.

PATH: HOME SCREEN > SERVICE MENU > UNIT TYPE

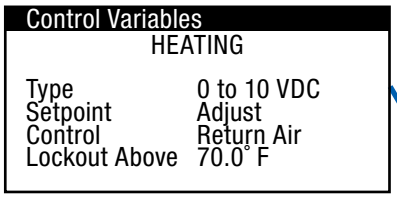


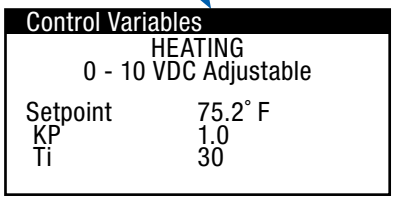
NOTE: The Service Menu is accessed by pressing the PROGRAM button and then entering a pass-code. For further information on how to navigate the controller, see the *DN Integrated Crontrols User Manual.*

6.2.4 Verify Heat Control Settings

Go to Home Screen > Control Variables. Press ENTER and scroll down to the Heating menu. There are two Heating screens. The first Heating Screen that appears should say Heating Type: 0-10 VDC. This is the default screen for DOAS heating control and is correct for electric heat. It may be necessary to raise the Setpoint and the Lockout Above temperatures higher in order to force the heater into operation, which can be done on Heating Screen 2. Exit this menu by pressing the ESCAPE button.

HEATING SCREEN 1

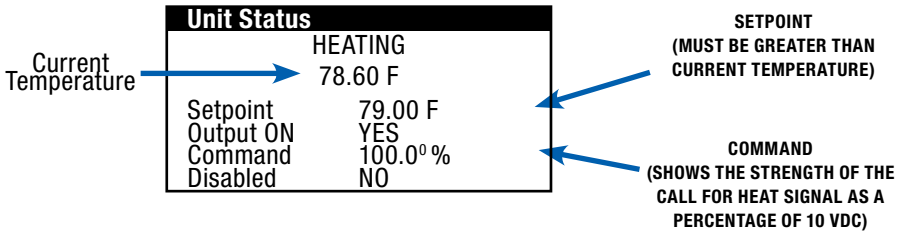




HEATING SCREEN 2

6.2.5 Verify That Heater Settings Will Call For Heat

Go to the Unit Status > Heating screen.



- The "Current Temperature" should be lower than the "Setpoint." If the Setpoint is lower than the Current Temperature, the controller will not call for heat. Change the setpoint, if necessary.
- The "Output ON" should be "YES." This means conditions are favorable for heating and the controller should provide a call for heat.
- The "Command" is between 0% and 100%. If the value is 0%, there is no call for heat.
- The "Disabled" should be "NO." If "Disabled" is "YES," the Outside Air temperature is above the Heat Lockout temperature. Change the Heat Lockout temperature setting in the Control Variables menu, if necessary.

NOTE: The factory-installed settings for fans are "Fixed Speed" and "25%". This means that if the fans have not yet been configured, the most airflow that will occur is 25% of maximum. This could result in too low airflow and temporary overheating. This will trip the auto-reset thermal switch and shut off the heater until it cools down.

6.3 ENABLE THE UNIT CONTROLLER

Go to Home Screen > Main Menu > Unit Enable. Switch Unit Enable to ON. Exit this menu item by pressing the ESCAPE button.

When the Unit Status is changed to ON, the dampers will open, the fans will begin running and a call for heat will go from the controller to the electric heat module.

6.4 VERIFY THE UNIT IS HEATING

Go to Home Screen > Main Menu > Unit Enable. Switch Unit Enable to ON. Exit this menu item by pressing the ESCAPE button.

When the Unit Status is changed to UNIT ON, the dampers will move into their correct positions, the fans will begin running and a call for heat will go from the controller to the electric heat module.

6.5 SHUTDOWN AFTER UNIT START-UP

- Restore any controller settings that were changed for testing purposes.
- Disable any call for heat signal from the Integrated Programmable Controller by going in the Service Menu > Unit Type. Change Enable Heat: to NO. This will prevent the controller from providing a call for heat signal when the unit is next started-up.
- Disable the unit controller by going in the Main Menu > Unit Enable and changing the setting to Unit OFF. This will prevent the unit from activating other systems prematurely when the unit is next started-up.
- Turn OFF the electrical disconnect switch for the DN-Series unit.
- Check for tools or debris that may have been left in the unit and then replace the module cover and close the cover on the electrical panel. This will provide additional protection from accidental exposure to high voltage wiring.

6.6 UNIT START-UP ADJUSTMENTS

6.6.1 Configuring the Controller for Normal Operation

The electric heat module is normally left ENABLED (Service Menu > Unit Type). Whenever the unit disconnect switch is on, the electric heat module also has power and will try to operate whenever there is a call for heat from the controller. In order for the controller to provide a Call For Heat, several controller menu items must be configured.

Path: Service Menu > Unit Type > Hardware Settings

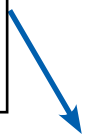
HARDWARE SETTINGS	
Enable Heat:	YES
Enable Cool:	YES
Enable HGRH:	YES
Enable Defrost:	YES
Enable Recirc:	YES

Hardware Settings: Enable Heat: YES. This setting tells the controller that there is a heating device installed and that the controller should manage the operation of the heating device. If this setting is left NO, the controller will not provide any control signals, Unit Status screens or Control Variable screens for heating. When Enable is changed to YES, the controller will manage the heat function according to the settings in the Control Variables screens.

Path: Main Menu > Control Variables

HEATING SCREEN 1

Control Variables HEATING	
Type	0-10 VDC
Setpoint	Adjust
Control	Return Air
Lockout Above	70.00 F



HEATING SCREEN 2

Control Variables HEATING 0-10 VDC Adjustable	
Setpoint	75.2˚ F
KP	1.0
Ti	30

NOTE: Sample screens shown at left show the default settings, as shipped from the factory.

- Type: always 0–10 VDC. This is the default setting. This is the signal that the electric heat module controller responds to. If the signal is 0 VDC, it means there is no call for heat. If the signal is 10 VDC, the heater controller will respond with maximum output.
- Setpoint: usually adjustable, which is the default. Choices for this item are either Adjustable or OA Reset.

See Heating Screen 1, above.

OA Reset is typically used in buildings that are controlled by a BMS. The desired effect is to automatically change the heating setpoint in response to changing Outdoor Air temperature.

Depending on the characteristics of the Occupied Space, it may be desirable to have the heating setpoint change upward when the OA gets very cold. When the OA temperature goes below the Minimum selected temperature, the setpoint automatically sets itself to a user-selected setpoint. As the OA temperature rises, the need no longer exists for that setpoint. When the OA temperature rises to the Maximum selected temperature, the setpoint changes to a second user-selected temperature. At any OA temperature between the Minimum and Maximum user-selected temperature values, the setpoint will vary proportionally.

The default settings for OA Reset are:

	OA Temp	Setpoint	
Min	0˚ F	60˚ F	(when the temperature falls below 0˚ F, the setpoint is 60˚ F)
Max	50˚ F	70˚ F	(when the OA temperature rises above 50˚ F, the setpoint is 70˚ F)

At any OA temperature between 0˚ F and 50˚ F, the setpoint moves proportionally between 60˚ F and 70˚ F.

- Control: Return Air is the default setting. Choices for this item are either Return Air or Supply Air. This setting determines where the controller will sample air temperatures.

  Return Air. With this option the controller monitors the temperature of the Return Air, the air that is being returned to the DOAS from the Occupied Space. This is the default setting. The controller uses the temperature and humidity sensor located at the RA duct opening.

  Supply Air. With this option, the controller monitors the temperature of the Supply Air, the air that is being sent into the Occupied Space. The controller uses the air temperature sensor that was field-installed on the Supply Air duct, normally 4-6 feet downstream from the electric heat module.

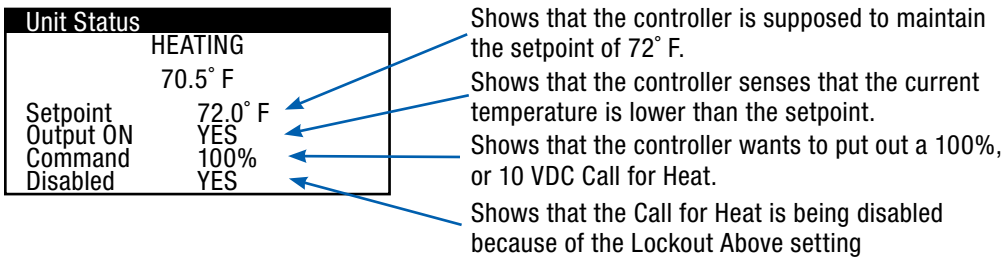
Setpoint: enter the desired temperature the controller should maintain.

IMPORTANT

In normal heating operation, the controller will prevent the heater from running when the Outdoor Air temperature is above the Lockout Above setpoint. The Lockout Above setpoint is assigned by the user, based on both ambient temperatures and experience with the building being heated. RenewAire suggests an initial Lockout Above setting of 50˚ F. If the OA air is at 50˚ F and the Return Air coming from the Occupied Space is at 72˚ F, the Supply Air recovers enough heat energy from the Return Air that it will reach about 67.6˚ F without any supplementary heat from the heat module when the energy exchange core is at maximum efficiency. In every building, there is additional heat being generated by human activity, equipment and thermal gain from sunlight, etc. If there is very little additional heat being generated in the Occupied Space, the Lockout Above setting may have to be raised. If there is a great deal of heat being generated, the Lockout Above setting can actually be lowered further.

The Lockout Above function has a hysteresis band built into it to prevent short-cycling when the OA temperature is near the Lockout Above setpoint. In other words, if the Lockout Above setpoint is at 50˚ F, the heat module will be disabled whenever the OA air temperature is higher than 50˚ F. When the OA air temperature drops to 50˚ F, the controller will continue to lockout the heat module until the OA temperature drops an additional 1.8˚ F, the hysteresis band.

If the controller shuts off the heat command signal because of the Lockout Above setting, the Unit Status > Heating screen will show Disabled, regardless of the strength of the Call For Heat signal.



- Lockout Above. Select an outdoor air temperature that can be used to disable the electric heat module. The Lockout Above temperature should be based on the Outdoor Air temperature that will no longer require heating of the Occupied Space.

IMPORTANT

Controllers that put out a variable Call for Heat require a means of anticipating the needed control signal. Heat modules in DN-Series units are all variable output and require a 0 - 10 VDC control signal.

The variable control signal uses a PI loop to make the variable signal respond properly to a Call for Heat. There are two factors that produce variations in the control signal that the heat module responds to. The Proportional Constant (KP) determines how aggressively the signal will respond to a need for heat. As soon as the controller senses a difference between the current temperature and the setpoint, the controller immediately puts out a Call for Heat. If the KP setting is too high, the command signal and temperature will over-shoot the setpoint. If the KP setting is too low, it takes too long for the heat module to satisfy a need for heat.

In order to reduce the over-shoot, the variable command signal needs a means of damping the signal that results from the KP setting. The controller also uses what is known as a Time Integral (Ti), which is a periodic sampling of the remaining error. The sampling then modifies the command signal, smoothing the KP signal response. If the Ti sampling occurs too often, it slows the rate of command signal increase. If it doesn't occur often enough, the command signal will still over-shoot the setpoint.

The process of setting the KP and Ti values is "controller tuning". Tuning the controller is normally the last step in the process of commissioning a DN-Series unit. Information on setting KP and Ti is found in the *DN Integrated Controller User Manual*.

- KP. This stands for Proportional Gain. The factory setting is 1. This represents how aggressively the electric heater will respond to a need for more (or less) heat. In normal operation, the most cost-effective and most comfortable response to a need for heat is for the electric heater to ramp up smoothly until the heat setpoint is met. Example: the controller senses that there is a need for a 2 degree temperature rise in the Occupied Space. With a KP setting of 1, the controller will slowly ramp up the Call for Heat command to the electric heater. If the user finds this response to be too slow, the KP setting can be increased. If the KP setting is raised too high, the heater will heat up rapidly and over-shoot the desired temperature. See the *DN Integrated Controller User Manual* for further information on selecting a KP value.
- Ti. This stands for Time Integral. The factory setting is 30. This refers to the frequency that the KP signal is monitored in order to modify the KP signal. See the DN Integrated Controller User Manual for further information on selecting a Ti value.

NOTE: The process of setting the KP and Ti setpoints is part of controller tuning. Controller tuning is a necessary part of commissioning the unit but is not needed to verify correct operation of the unit.

See Heating Screen 2, Section 6.1 of this manual.

6.6.2 Normal Operation

- Turn ON the unit disconnect switch. This will provide power to the electric heat module and also boot-up the unit controller.
- Enable the heating function by going to the controller Service Menu > Unit Type and set Enable Heat to YES.
- Enable the controller outputs by going to the Main Menu > Unit Enable. Set Unit Enable to ON.
- Set thermostat or controller to desired temperature.
- Verify if the heat module should run by viewing Unit Status > Heating screens. This will show the currently sensed temperature, the heating setpoint and the Lockout Above setpoint.

7.0 MAINTENANCE

⚠ WARNING

ARC FLASH AND ELECTRIC SHOCK HAZARD

Arc flash and electric shock hazard. Disconnect all electric power supplies, verify with a voltmeter that electric power is off and wear protective equipment per NFPA 70E before working within electric control enclosure. Failure to comply can cause serious injury or death.

Customer must provide earth ground to unit, per NEC, CEC and local codes, as applicable.

Before proceeding with installation, read all instructions, verifying that all the parts are included and check the nameplate to be sure the voltage matches available utility power.

The line side of the disconnect switch contains live high-voltage.

The only way to ensure that there is NO voltage inside the unit is to install and open a remote disconnect switch and verify that power is off with a voltmeter. Refer to unit electrical schematic.

Follow all local codes.

IMPORTANT

Maintenance and troubleshooting are to be performed by experienced and qualified personnel!

Maintenance of the electric heat module is normally performed annually, prior to the start of the heating season. Maintenance consists of:

- Make a visual inspection of all screwed-on electrical connections. Check for signs of corrosion, pitting or scorching that would be associated with loose connections. Repair or replace any connectors that show physical damage.
- Check or tighten all electrical connections.
- Press the reset button on the manual reset limit switch to make sure it is properly set for operation.
- Run through a complete heat cycle to verify that the heater is not reaching excessive temperatures and causing the auto-reset or manual-reset switches to trip. It may be necessary to adjust the temperature set point to enable a complete heating cycle. See Section 5.0 Installation for information.

7.1 SERVICE PARTS

All RenewAire electric heaters are designed to be maintenance free and operate for a long time without problems.

The following are recommended steps:

- Perform annual maintenance and inspections as shown in Section 7.0 Maintenance in this manual.
- If defective parts are discovered, replace them with only factory-original parts.
- If repair parts are needed, see Section 9.0 Factory Assistance, below.

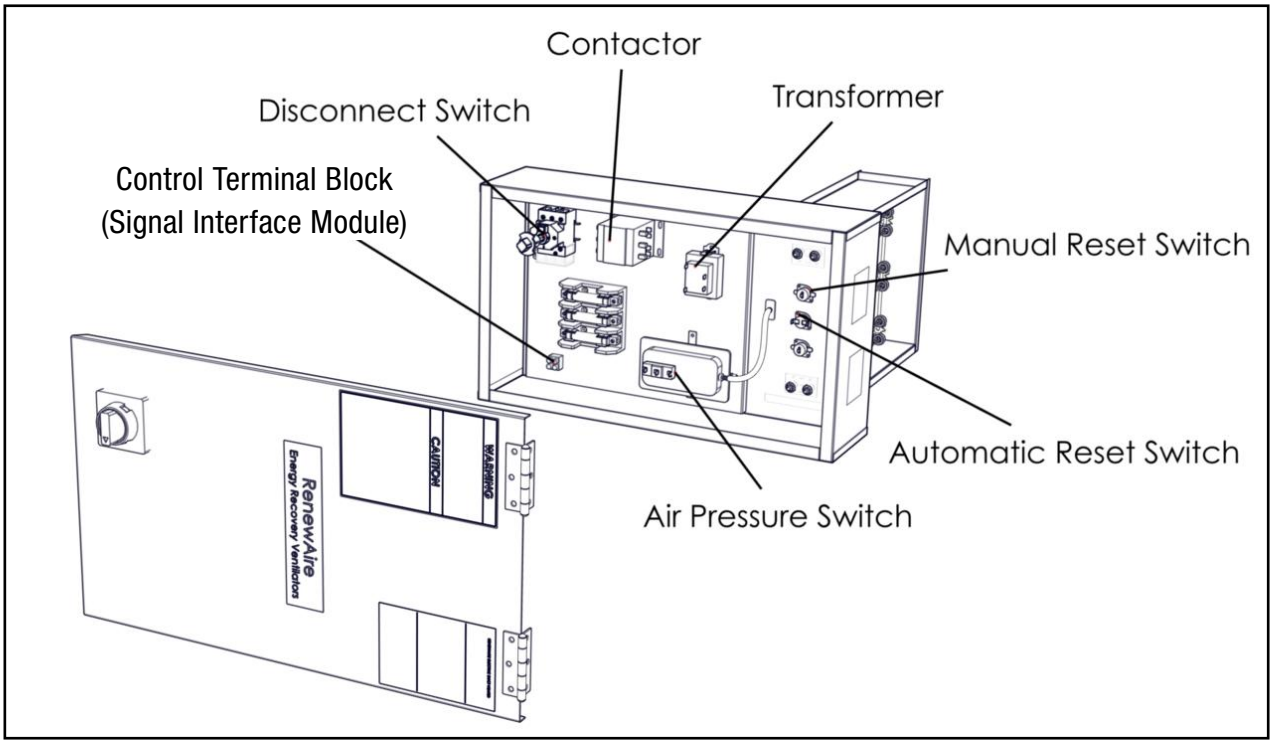


FIGURE 7.1.0 ELECTRIC HEATER SERVICE PARTS

8.0 TROUBLESHOOTING

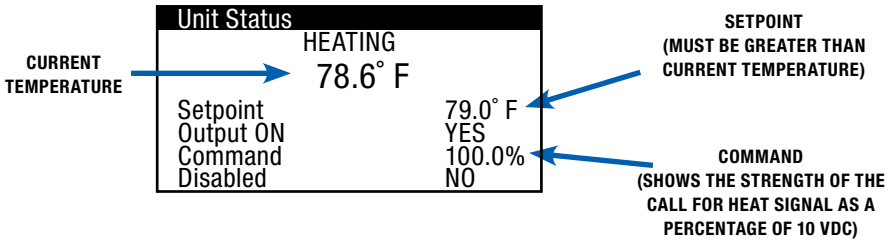
The DN unit and electric module were tested at the factory prior to shipment. After installation, the Integrated Programmable Controller should be configured at the site for the specific application.

If the electric heat module is not operating correctly, before calling the factory, perform the following troubleshooting depending on the symptom.

8.1 NO HEAT

If the electric heat module is not providing ANY heat it may be due to an inoperable component or controller setting. Verify the following:

- Heat module Disconnect Switch is turned on.
- Heat module fuses are not blown. If a fuse is blown, remove cause of short circuit and replace fuse.
- Manual Reset Limit Switches are set. If manual reset limit switch is popped out, determine cause of overheat condition and correct it. Reset switch by pushing in button.
- Sufficient airflow for heat module Airflow Pressure Switch. The Airflow Pressure Switch prevents the heater from being energized when airflow differential air pressure across the heating elements is below 0.05 InWG. Increase airflow through the unit to the minimum airflow marked on the rating label on the door of the electric heater control panel.
- Integrated Programmable Controller is programmed for heat application. View the Heating screen on the controller by pressing the ESCAPE hard button to open the Main Menu screen. Unit Status will be highlighted, press ENTER and then scroll down until the Unit Status HEATING screen is displayed.



- The “Current Temperature” should be lower than the “Setpoint.” If the Setpoint is lower than the Current Temperature, the controller will not call for heat. Change the setpoint, if necessary.
- The “Output ON” should be “YES.” This means conditions are favorable for heating and the controller should provide a call for heat.
- The “Command” is between 0% and 100%. If the value is 0%, there is no call for heat.
- The “Disabled” should be “NO”. If “Disabled” is “YES,” the Outside Air temperature is above the Heat Lockout temperature. Change the Heat Lockout temperature setting in the Control Variables menu, if necessary. See images below.
- Call for Heat from Integrated Programmable Controller. If a BMS is controlling the unit, it may be the BMS or connection is not functioning properly.

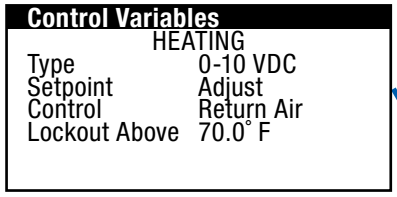
8.2 INTERMITTENT HEAT

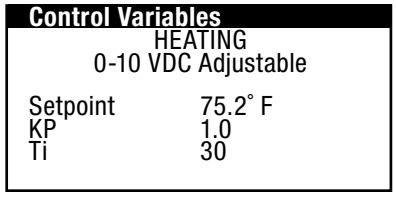
If the electric heat module provides heat that is INTERMITTENT or is CYCLING ON and OFF, it may be due to an over-temperature condition or a controller setting. An over-temperature condition causes the auto-reset limit switch to switch OFF until the temperature condition corrects itself and then switches back on, causing a cycling effect. Locate the cause of any over-temperature condition and correct it. Verify the following:

- Sufficient airflow across the Heating Elements. Insufficient airflow across the heating elements can cause an over-temperature condition. It can also cause the airflow pressure switch to not turn ON, or, if it is right at the differential pressure setpoint it may cause the switch to cycle ON and OFF. The airflow pressure switch prevents the heater from being energized when airflow pressure differential across the heating elements is below 0.05 InWG. Increase airflow through the unit to the minimum airflow marked on the rating label on the door of the electric heater control panel.
- Supply Air Temperature Sensor placed correctly. The SA temperature sensor provides a feedback signal to the unit controller for the air temperature downstream of the heater. The sensor should be located 4–6 feet downstream of the heater, in the duct. If the sensor is too far away or not reading the correct air temperature the controller will continue to call for greater heat. This may lead to an over-temperature condition.
- KP and Ti settings in the integrated controller. The KP and Ti settings can cause the heater to ramp up too fast causing overshoot and an over-temperature condition. Change the KP and Ti settings in the Control Variables menu, if necessary.

Path: Main Menu > Control Variables

HEATING SCREEN 1





HEATING SCREEN 2

8.3 INSUFFICIENT HEAT

If the electric heat module provides heat that is INSUFFICIENT, it may be due to controller settings. Verify the following:

- Correct airflow for heater. Too much airflow across the heating elements causes the air temperature to not rise as much as expected. The heater capacity is sized for a design airflow.
  Temperature rise is calculated from $\Delta T = kW \times 3150 / CFM$.
- Supply Air Temperature Sensor placed correctly. The SA temperature sensor provides a feedback signal to the unit controller for the air temperature downstream of the heater. If the sensor is too close or not reading the correct air temperature, the controller will shut off the heater or reduce heat output.
- KP and Ti settings in the Integrated Controller. The KP and Ti settings can cause the heater to ramp up too slowly. Change the KP and Ti settings in the Control Variables menu, if necessary.

OPTION Integral Electric Heat Module

Remember that RenewAire Customer Service can only assist with the products sold by RenewAire and their options. It cannot resolve engineering issues that result from air handling system design by others.

About RenewAire

For over 40 years, **RenewAire has been a pioneer in enhancing indoor air quality (IAQ)** in commercial and residential buildings of every size. This is achieved while maximizing sustainability through our fifth-generation, static-plate, enthalpic-core **Energy Recovery Ventilators (ERVs) that optimize energy efficiency**, lower capital costs via load reduction and decrease operational expenses by minimizing equipment needs, resulting in significant energy savings. Our ERVs are competitively priced, simple to install, easy to use and maintain and have a quick payback. They also enjoy the industry's best warranty with the lowest claims due to long-term reliability derived from innovative design practices, expert workmanship and **Quick Response Manufacturing (QRM)**.

As the pioneer of static-plate core technology in North America, RenewAire is the largest ERV producer in the USA. We're **committed to sustainable manufacturing** and lessening our environmental footprint, and to that end our Waunakee, WI plant is 100% powered by wind turbines. The facility is also one of the few buildings worldwide to be LEED® Gold and Green Globes certified, as well as having achieved ENERGY STAR Building status. In 2010, RenewAire joined the Soler & Palau (S&P) Ventilation Group in order to provide direct access to the latest in energy-efficient air-moving technologies. For more information, visit: renewaire.com

201 Raemisch Road | Waunakee, WI | 53597 | 800.627.4499 | RenewAire.com

Soler&Palau Ventilation Group
Member of the S&P Group
Family of Brands

RenewAire® Energy Recovery Ventilation

About RenewAire

For over 40 years, **RenewAire has been a pioneer in enhancing indoor air quality (IAQ)** in commercial and residential buildings of every size. This is achieved while maximizing sustainability through our fifth-generation, static-plate, enthalpic-core **Energy Recovery Ventilators (ERVs) that optimize energy efficiency**, lower capital costs via load reduction and decrease operational expenses by minimizing equipment needs, resulting in significant energy savings. Our ERVs are competitively priced, simple to install, easy to use and maintain and have a quick payback. They also enjoy the industry's best warranty with the lowest claims due to long-term reliability derived from innovative design practices, expert workmanship and **Quick Response Manufacturing (QRM)**.

As the pioneer of static-plate core technology in North America, RenewAire is the largest ERV producer in the USA. We're **committed to sustainable manufacturing** and lessening our environmental footprint, and to that end our Waunakee, WI plant is 100% powered by wind turbines. The facility is also one of the few buildings worldwide to be LEED® Gold and Green Globes certified, as well as having achieved ENERGY STAR Building status. In 2010, RenewAire joined the Soler & Palau (S&P) Ventilation Group in order to provide direct access to the latest in energy-efficient air-moving technologies. For more information, visit: renewaire.com

201 Raemisch Road | Waunakee, WI | 53597 | 800.627.4499 | RenewAire.com

Soler&Palau Ventilation Group
Member of the S&P Group
Family of Brands

RenewAire® Energy Recovery Ventilation