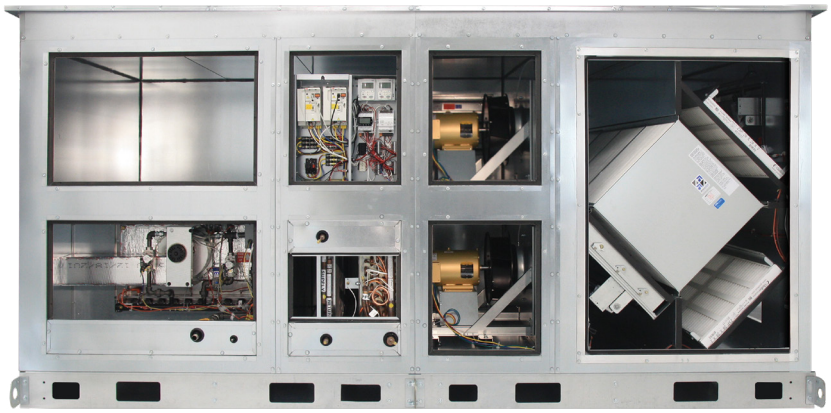
RenewAire
Energy Recovery Ventilation

DN SERIES DOAS

Installation, Operation and Maintenance Manual

DN2IN
DN3IN
DN5IN



Model DN3IN Shown

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ETL LISTED
c US
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 volt meter. Refer to unit electrical schematic.

Follow all local codes.

⚠ CAUTION

RISK OF ELECTRIC SHOCK OR EQUIPMENT 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 electric power.

⚠ CAUTION

RISK OF DAMAGE TO ENTHALPIC CORES

Whenever working within the DOAS cabinet, protect the enthalpic cores from accidental damage. The core media is subject to damage from dropped tools or other foreign objects.

Low air flow can cause fouling of the enthalpic cores. The DOAS must never be operated without clean filters in place and minimum airflow must be greater than 250 CFM per full-sized core.

IMPORTANT

This unit is intended for general ventilating 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.

IMPORTANT

This unit is for ventilating finished structures only. It is not to be used until after all construction has been completed and construction debris and dust are cleaned from the Occupied Space.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

This unit may include a gas heater.

Read and comply with all safety information and warnings in the *RenewAire Indirect Gas-Fired User Manual* that is included with the unit.

⚠ CAUTION

RISK OF ELECTRIC SHOCK

Optional VFDs use capacitors that will retain a high voltage charge even after power is disconnected. After fans come to a complete stop, wait for five minutes for the capacitors to discharge themselves.

⚠ 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.

⚠ CAUTION

RISK OF CONTACT WITH HOT SURFACES

The blower motor and other electrical 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 hot blower motors and electrical components.

IMPORTANT

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

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.

READ AND SAVE THIS MANUAL/LIRE ET CONSERVER CE MANUEL

NOTICE

This manual contains space for maintaining written records of unit maintenance and/or repairs. See Section 7.2 Maintenance Records. 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, information located on the unit label 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 from the Option Code.

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.

Option Code:

D	N	-		-	J	I	N						-								-	-		

Serial Number:

SO #:

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-3-JINBH133--RS-EN2---L
Model/Modele DN-3-JIN **Sales Order** 485962
Serial Number F25125320D **Job Order** 745632-0000
SCCR 5 KAIC

Power Supply To Unit / Alimentation d'energie a l'unite

Voltage	Minimum Circuit Amps	Max Overcurrent Protection Device
208V	19.4	25
60 HZ 3-Phase	Amp. Minimales de Circuit	Dispositif de protection maximum contre les surintensites

Coil	Type	Rows	FPI	Max. Pressure (psi/MPa)
Dehumidify	R410A	3	14	460/3.2
Re-heat	R410A	1	11	700/4.8
Heat	Steam	1	6	150/1.0
Coil	Type	Rangee	FPI	Max. Pression (psi/MPa)

Motors Thermally Protected / Moteurs protégé thermiquement

Voltage	Qty & kW/HP	FLA
200-240	2@2.7 kW	8.6-7.2
	Qty & kW/CV	APC

Motors Protected by Variable Frequency Drives / Les moteurs protégés par la frequence variable conduit

Voltage	Qty & kW/HP	FLA
-	-	-
	Qty & kW/CV	APC

Gas Heater / Chauffage A Gaz

Voltage/Phase	Amps	Input MBH
-	-	-

⚠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 réparations. 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)

TABLE OF ILLUSTRATIONS

CONFIGURATION CODE FOR DN-IN DOAS

Note: Not all options are available on every model.

MODEL NUMBER	D	N	-		-	J								-	-							-	-		
DIGIT NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Digits 1–5:	Model
"DN-2-" = 1,650 CFM	
"DN-3-" = 3,300 CFM	
"DN-5-" = 4,950 CFM	

Digit 6:	Exchanger Type
"J" = G5 Core	

Digits 7–8:	Location (See Restriction 1)
"IN" = Indoor	
"RT" = Rooftop	

Digit 9:	SA Fan Location (See Restrictions 18 & 19)
"B" = Before Coil (Standard)	
"A" = After Coil	

Digit 10:	Orientation
"A", "B", "C", "D", "E", "G", "J", "K", "L", "M", "N", "P", (Indoor Units ONLY)	
"V", "H", "R", "F"	

Digit 11:	Insulation
"1" = 1 inch	
"2" = 2 inch with Thermal Break	

Digit 12:	Phase (See Restriction 15)
"1" = Single Phase	
"3" = Three Phase	

Digit 13:	Voltage (See Restrictions 2 & 7)
"3" = 208V	
"4" = 460V	
"5" = 230V	
"8" = 575V	

Digit 16:	Cooling
"-" = None	
"C" = Chilled Water	
"D" = Direct Expansion	
"H" = Heat Pump	
"P" = Heat Pump + Hot Gas Reheat (HGRH)	
"R" = Direct Expansion + Hot Gas Reheat (HGRH)	

Digit 17:	Heating (See Restrictions 3, 16, & 20)
"-" = None	
"E" = Electric Heater	
"G" = Gas Heat Module	
"P" = Heat Pump	
"S" = Steam	
"H" = Hot Water	

Digit 18:	Heater Size (See Restrictions 4, 8, 9, 10, 11, 12, 13, & 14)
"-" = None	
"1" = Gas 50 MBH or Electric 5kW	
"2" = Gas 75 MBH or Electric 10kW	
"3" = Gas 100 MBH or Electric 15kW	
"4" = Gas 125 MBH or Electric 20kW	
"5" = Gas 150 MBH or Electric 25kW	
"6" = Gas 200 MBH or Electric 30kW	
"7" = Gas 250 MBH or Electric 40kW	
"8" = Gas 300 MBH or Electric 50kW	
"9" = Gas 350 MBH or Electric 60kW	

Digit 19:	Fan Control (See Restrictions 5 & 6)
"E" = ECM	
"V" = VFD	

Digit 20:	Unit Fusing
"N" = Non-Fused (Standard)	
"F" = Fused	

Digit 21:	Unit Control Enhancements
"2" = Premium Controls without BacNet	
"4" = Premium Controls with BacNet	

Digit 24:	Customization
"-" = None	
"P" = Standard Paint, No Customizations	
"X" = Custom Unit, No Paint	
"Z" = Custom Unit and Paint	

Digit 25:	Safety Listing (See Restriction 17)
"L" = Listed	
"N" = Non-Listed	

***NOTES:**
Digits 3, 5, 14, 15, 22, and 23 are not used in these models.

Restrictions:
1: Location Code "RT" only available with Orientation Codes "H", "V", "R" & "F".
2: Voltage Code "4" & "8" only available with Phase Code "3".
3: Heating Code "P" only available with Cooling Codes "H" or "P".
4: Heater Size Option only available with Heating Codes "E" & "G".
5: Fan Control Code "E" only available with Voltage Codes "3", "4", & "5".
6: Fan Control Code "V" only available with Phase Code "3".
7: Voltage Code "8" only available with Fan Control "V".
8: Heater Size Codes "8" & "9" are not available when Model Code is "DN-2-" and Heating Code is "E".
9: Heater Size Codes "8" & "9" are not available when Model Code is "DN-3-" or "DN-5-" and Unit Voltage Code is "3" or "5" and Fan Control Code is "V" and Heating Code is "E".
10: Heater Size Code "8" is not available when Model Code is "DN-5-" and Unit Voltage Code is "3" and Fan Control Code is "E" and Heating Code is "E".
11: Heater Size Code "9" is not available when Model Code is "DN-3-" or "DN-5-" and Unit Voltage Code is "3" or "5" and Fan Control Code is "E" and Heating Code is "E".
12: Heater Size Code "7" is not available when Model Code is "DN-5-" and Unit Voltage Code is "3" or "5" and Fan Control Code is "V" and Heating Code is "E".

For Technical Support E-mail: RenewaireSupport@renewaire.com

MODEL NUMBER	D	N	-		-	J								-	-							-	-		
DIGIT NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Restrictions:
13: Heater Size Codes "5", "6", & "7" are not available when Model Code is "DN-2-" and Heating Code is "G".
14: Heater Size Codes "8" & "9" are not available when Model Code is "DN-2-" or "DN-3-" and Heating Code is "G".
15: Phase Code "1" is only available with Model Code "DN-2-".
16: Heating Code "E" is not available with Phase Code "1".
17: Some units with Customization Code "X" are not Safety Listed.
18: SA Fan Location Code "A" is not available when no coils are selected.
19: SA Fan Location Code "B" is not available when only coils are selected for Heating and Cooling and Orientation Codes are "B", "D", "F", "J", "K", "N", "P", or "V".
20. Heating Codes "H" & "S" are not available with Cooling Codes "H" or "P".

Fan Horspower for VFD (See Restrictions 2, 4, & 5)
3 HP
5 HP

Vibration Isolation for VFD (See Restriction 3)
Spring
Neoprene (Standard)

GFCI Convenience Outlet
Yes
No

Drain Overflow Switch
Yes
No

Paint
None (Standard)
2500 Hour Salt Spray

Paint Color
White
Grey
Custom

Outside Air Hood Moisture Eliminator (See Restriction 18)
Yes
No

Recirculation Damper
Yes
No

Coil Tube Geometry (answered for each coil)
3/8" 1.000" x 0.866"
3/8" 1.250" x 1.0825"
1/2" 1.250" x 1.0825"
5/8" 1.500" x 1.299"
5/8" 1.500" x 1.500"
1.0" 3.000" x 2.000"

Coil Rows (answered for each coil)
1, 2, 3, 4, 5, 6

Coil Fins Per Inch (answer for each coil)
6, 7, 8, 9, 10, 11, 12, 13, 14

Coil Coating (answer for each coil)
None
Electrofin UV

Coil Mode (Water Coil Only) (See Restriction 16)
Cooling
Heating
Cooling & Heating (Seasonal Changeover)

Coil Style (Evaporator Coil Only) (See Restriction 10)
Standard
Interlaced 2 Circuits

Element Material (Electric Heater)
60-20-20 Ni-Cr-Fe with Nickel-Plate Terminal Pins (Standard)
80-20 Ni-Cr with Stainless Steel Terminal Pins (Corrosion Resistant)

Fuel Type (Gas Heat Module)
Natural Gas (Standard)
Propane

Tube Material (Gas Heat Module)
409 Stainless Steel (Standard)
304 Stainless Steel

Elevation Range (Gas Heat Module)
0–2000'
2001'–2999'
3000'–3999'
4000'–4999'
5000'–5999'
6000'–6999'
7000' and above

Control Type (Gas Heat Module)
Modulating 5:1 (Natural Gas)/3:1 (Propane) (Standard)
Modulating 10:1 (Natural Gas)/6:1 (Propane)

Gas Derated (Gas Heat Module) (See Restriction 9)
Yes
No

Combustion Inlet Type (Gas Heat Module) (See Restriction 17)
Separated Combustion (Separate combustion air intake and flue exhaust)
Exhaust flue venting only (Combustion air intake via intake louver on unit)

Restrictions:

1: Fan kW is only available with Fan Control Code "E".
2: Fan Horsepower is only available with Fan Control Code "V".
3: Vibration Isolation is only available with Fan Control Code "V".
4: Fan Horsepower "3" is only available in Model Code "DN-2-".
5: Fan Horsepower "5" is only available in Model Codes "DN-3-" & "DN-5-".
6: 1.35kW is only available in Model Code "DN-2-" & with Phase Code "1".
7: 2.70kW is only available in Phase Code "3" and Voltage Code "3" or "5".
8: 3.70kW is only available in Phase Code "3" and Voltage Code "4".
9: Gas derating question only applies for elevations above 2000'.
10: Interlaced 2 Circuits Coil Style is only available with Direct Expansion Coil or Heat Pump Coil.
11: If only one coil is selected, it must be placed in position 1.
12: Coil Position 2 only available when 2 or 3 supply air coils have been specified.
13: Coil Position 3 only available when 3 supply air coils have been specified.
14: For Cooling Codes "P" & "R", the Hot Gas Reheat Coil must be in the position directly following the cooling coil.
15: For Cooling Codes “D” & “R”, the Direct Expansion coil must be placed in position 1.
16: One coil may be specified to act as both a hot water and chilled water coil. Only available when Cooling Code is C and Heating Code is H.
17: Combustion Inlet Type Separated Combustion only applies for Location Code "IN".
18: Outside Air Hood Moisture Eliminator only available in Location Code "RT".

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NOTE: This unit is a Dedicated Outdoor Air System, or DOAS. It is commonly referred to throughout this manual as a DOAS. This manual is specifically for the indoor version, as indicated by digits 7 & 8 of the configuration code, "**IN**". There is also an outdoor version of this DOAS as indicated by digits 7 & 8 of the configuration code, "**RT**". The outdoor version has a separate manual.

1.0 OVERVIEW

1.1 DESCRIPTION

The DN-Series unit is a Dedicated Outdoor Air System (DOAS) that provides ventilation air to a conditioned space. The DN unit cools, heats, and/or dehumidifies the ventilation air depending on the options selected for the unit. The unit takes Outside Air (OA) and passes it through static plate enthalpic cores to recover energy from exhaust air. The air is then conditioned as required and provided to the occupied space. Cooling coils, heating coils, re-heat coils, electric heaters and gas heaters are all available options for conditioning the ventilation air. Standard equipment for every unit includes dedicated variable-speed plenum fans and a sophisticated on-board electronic control package offering many different control options.

The DN-Series unit is available in three different sizes and is ordered as an indoor or rooftop (outdoor) version. Each unit is constructed in the form of modules with each module performing a dedicated function. Each module has configurable options that are selected by the user. See illustrations on the next page.

1.1.1 Energy Recovery

Energy recovery between the Outside Air and Return Air is accomplished by means of integral static plate enthalpic cores. Stale return air from the occupied space and fresh outside air pass through the enthalpic cores. The airstreams are physically separated and never mix. Sensible and latent energy are transferred between the two airstreams.

1.1.2 Ventilation Air

Ventilation air is needed by the occupied space to replace stale air that is lost or exhausted from the building. Ventilation air is generally conditioned by heating or cooling the air before it is delivered to the occupied space.

IMPORTANT

The DOAS can contain optional chilled water coils, steam coils, hot water coils and DX coils, all of which are to be connected to owner-provided equipment. The DOAS does not include DX compressors. The DOAS will provide low-voltage digital and analog signals to call for operation and modulation of the owner-provided equipment. No refrigerant control valve (TXV) is provided and must be specified by the engineer of the overall system for separate sourcing.

1.1.3 Heating

Heating options include:

- Integral indirect gas-fired heat module, either natural gas or propane
- Integral electric heater
- Integral hot water coil, for connection to an external hot water source (by others)
- Integral coil for connection to an external heat pump (by others)
- Integral coil for steam heat (steam by others)

1.1.4 Cooling

Cooling options include:

- Integral DX coil, for connection to an external compressor (by others)
- Integral chilled water coil, for connection to an external chilled water source (by others)
- Integral water coil for connection to an external heat pump (by others)

1.1.5 Reheat

Reheat is accomplished by means of an optional Hot Gas Reheat (HGRH) coil. The HGRH coil is installed within the unit and is to be connected to an external compressorized refrigerant system, furnished by others. The HGRH coil and DX cooling coil need to be selected together to achieve the desired performance. Contact RenewAire for help in specifying an HGRH coil.

1.2 MODEL SIZES

The indoor DOAS is available in three different sizes:

Model DN-2: 1,650 CFM (small cabinet size)

Model DN-3: 3,300 CFM (medium cabinet size)

Model DN-5: 4,950 CFM (large cabinet size)

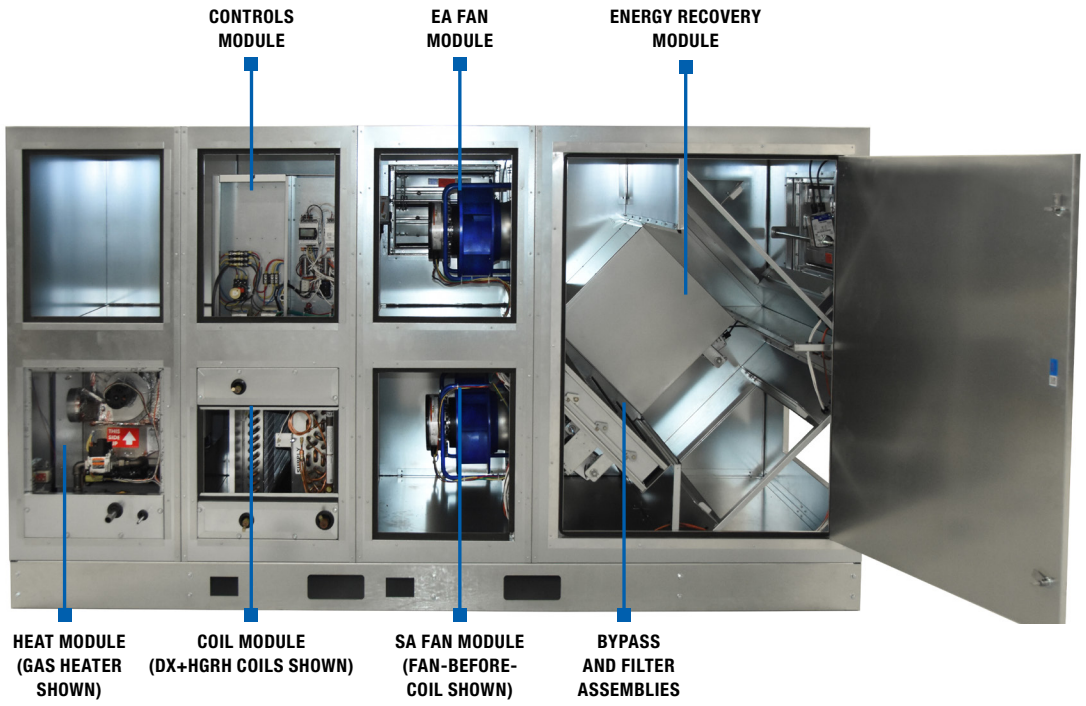


FIGURE 1.2.0 DN DOAS MODULES

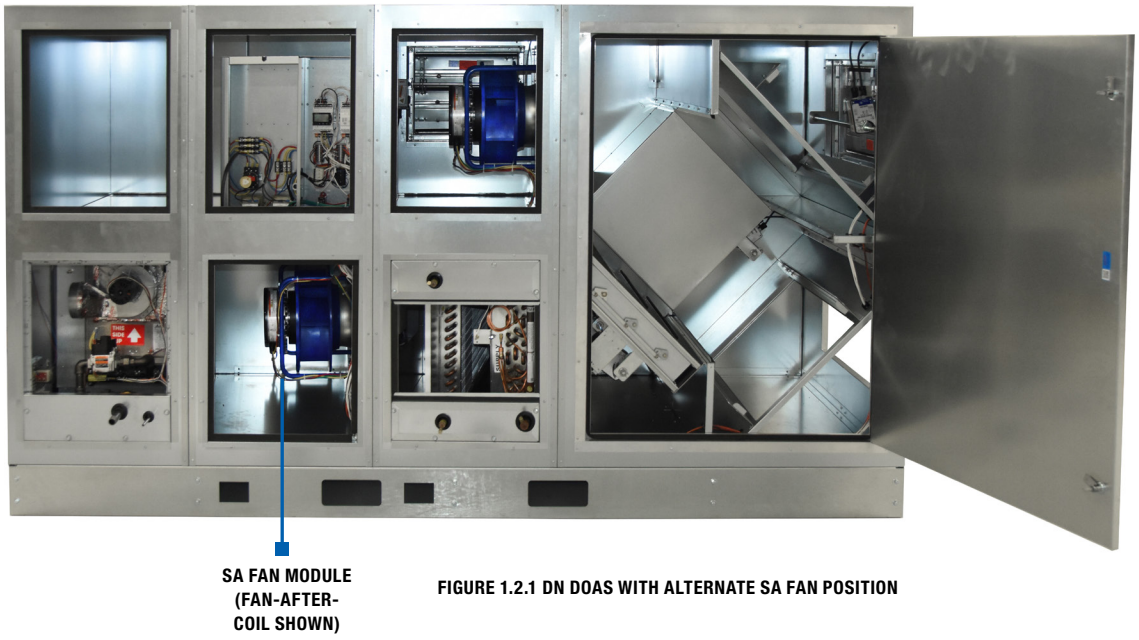


FIGURE 1.2.1 DN DOAS WITH ALTERNATE SA FAN POSITION

1.3 AIRFLOWS

IMPORTANT

It is important to understand and use the equipment airstream terminology as it is used in this manual. The airstreams are defined as:

- OUTSIDE AIR (OA): Air taken from the external atmosphere and, therefore, not previously circulated through the system. Each DN unit has an OA air inlet, optionally located on either the roof or the end wall.
- FRESH AIR (FA): Air that is downstream of the enthalpic cores and is ready for conditioning.
- SUPPLY AIR (SA): Conditioned air that is supplied to an occupied space. Each DN unit has an SA outlet that may deliver either conditioned return air or fresh air. The Supply Air outlet is optionally located on either the end wall or the floor.
- RETURN AIR (RA): Air that is returned to a heating or cooling appliance from a conditioned space. When the DN unit operates in recirculation mode, RA is conditioned and returned to the occupied space in the form of SA. Each DN unit has an RA inlet, optionally located on either the floor or the end wall of the unit.
- EXHAUST AIR (EA): Air that is removed from a heating or cooling appliance and discharged. Each DN unit has an EA outlet with a damper. The Exhaust Air outlet is optionally installed on either the side wall or the roof of the unit.

1.3.1 Airflow Inlet and Outlet Configurations

The DN unit has many configurations available for airflow inlet and outlet. Inlets and outlets are selected for the unit either horizontally through the end walls or vertically through the floor or roof. Each individual airflow location is selected from the unit pictures below. The number “1” represents horizontal airflow and the number “2” represents vertical airflow. Select a “1” or a “2” for each unit inlet and outlet and then apply all four locations to the matrix at right, selecting the one example that fits all criteria. The identifying letter beneath each Figure is shown on the configuration code. See configuration code Digit 10.

KEY TO AIRFLOW CODES	
OA	Outside Air Into Unit
RA	Room Air Into Unit
SA	Supply Air Into Occupied Space
EA	Exhaust Air Leaving Unit
1	Horizontal
2	Vertical

KEY TO CONFIGURATION CODES				
OA	RA	SA	EA	CODE
1	1	1	1	H
2	1	1	1	A
1	1	2	1	F
2	1	2	1	B
1	2	1	1	R
2	2	1	1	C
1	2	2	1	V
2	2	2	1	D
1	1	1	2	E
2	1	1	2	G
1	1	2	2	J
2	1	2	2	K
1	2	1	2	L
2	2	1	2	M
1	2	2	2	N
2	2	2	2	P

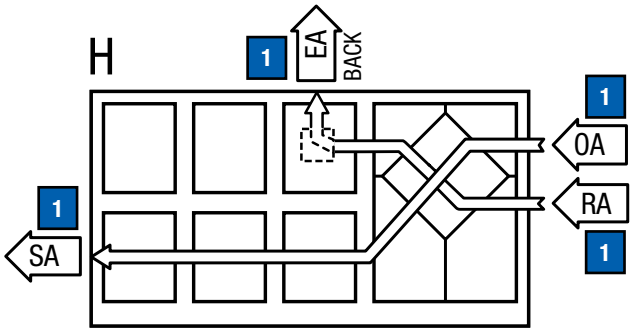


FIGURE 1.3.0 AIRFLOW CONFIGURATION FOR ORIENTATION H

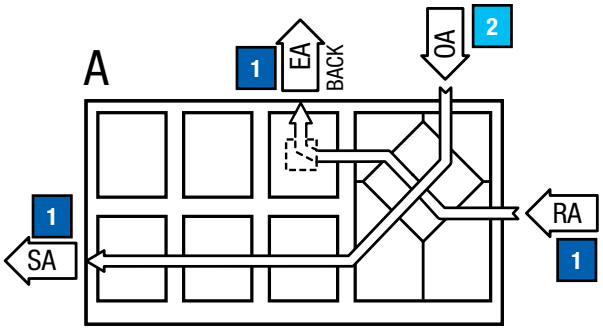


FIGURE 1.3.1 AIRFLOW CONFIGURATION FOR ORIENTATION A

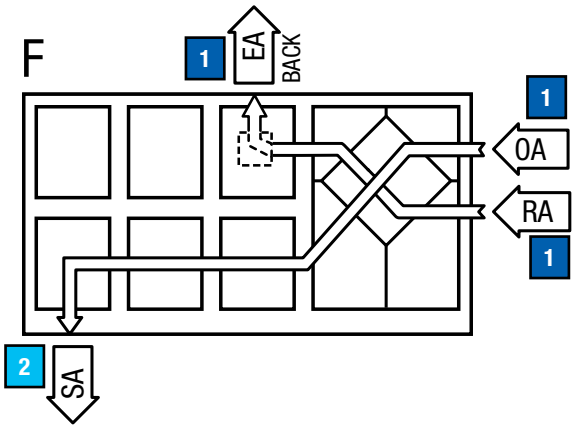


FIGURE 1.3.2 AIRFLOW CONFIGURATION FOR ORIENTATION F

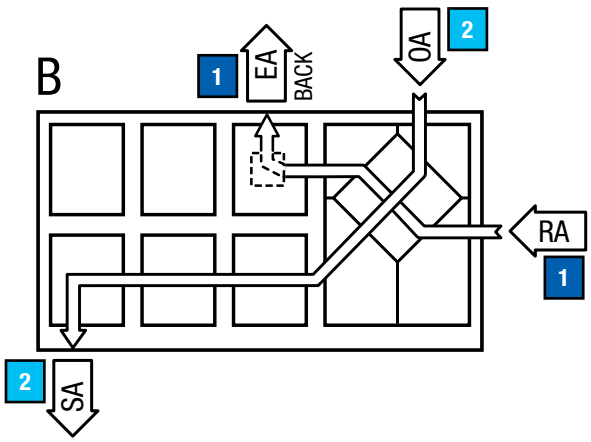


FIGURE 1.3.3 AIRFLOW CONFIGURATION FOR ORIENTATION B

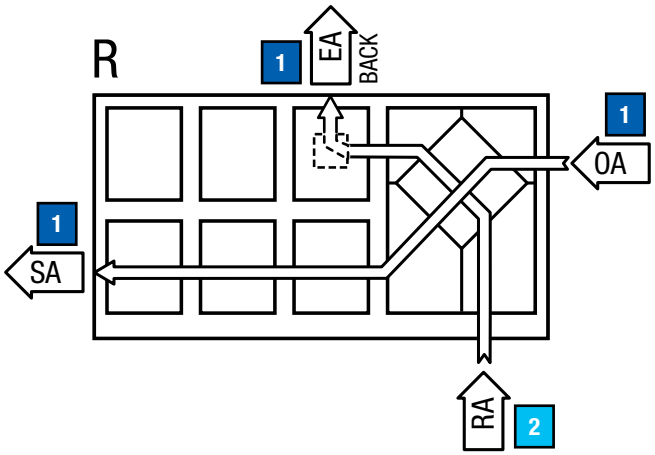


FIGURE 1.3.4 AIRFLOW CONFIGURATION FOR ORIENTATION R

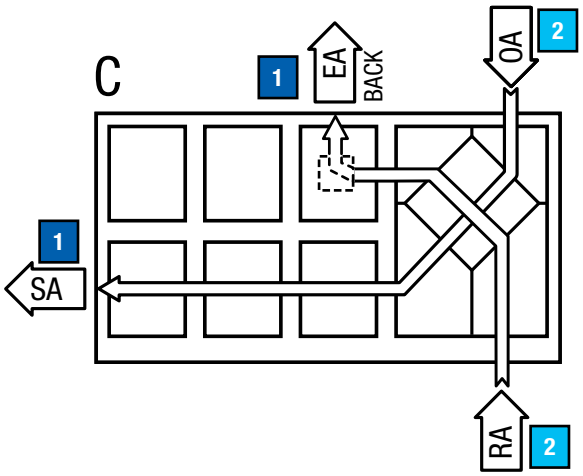


FIGURE 1.3.5 AIRFLOW CONFIGURATION FOR ORIENTATION C

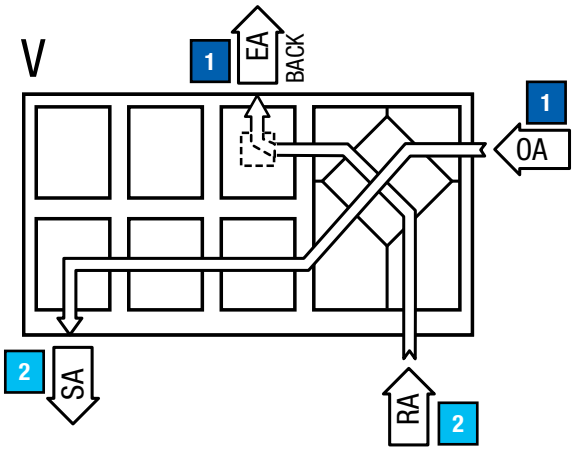


FIGURE 1.3.6 AIRFLOW CONFIGURATION FOR ORIENTATION V

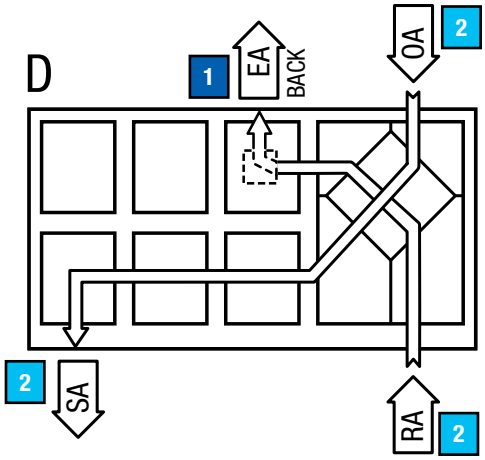


FIGURE 1.3.7 AIRFLOW CONFIGURATION FOR ORIENTATION D

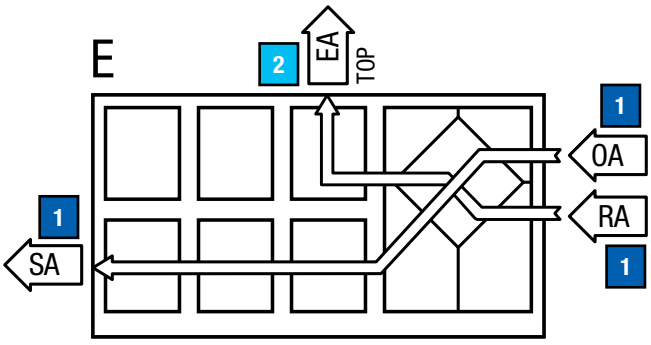


FIGURE 1.3.8 AIRFLOW CONFIGURATION FOR ORIENTATION E

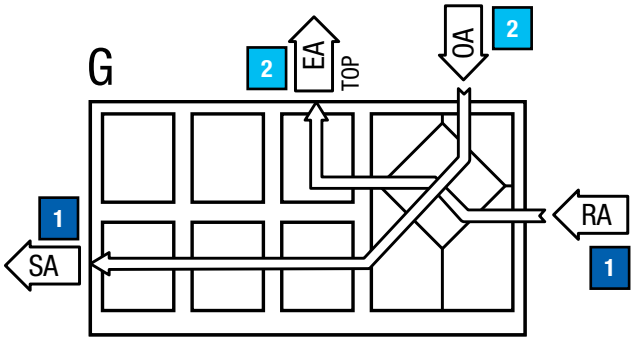


FIGURE 1.3.9 AIRFLOW CONFIGURATION FOR ORIENTATION G

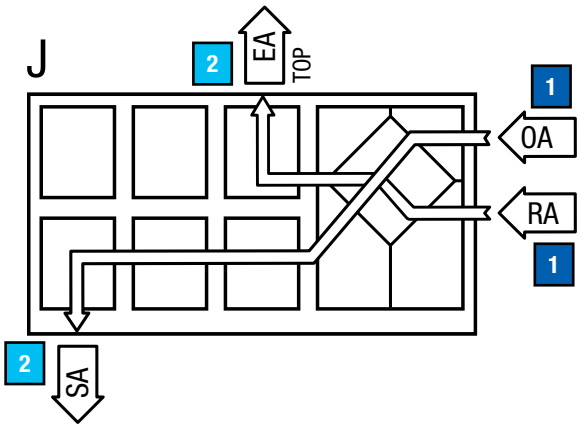


FIGURE 1.3.10 AIRFLOW CONFIGURATION FOR ORIENTATION J

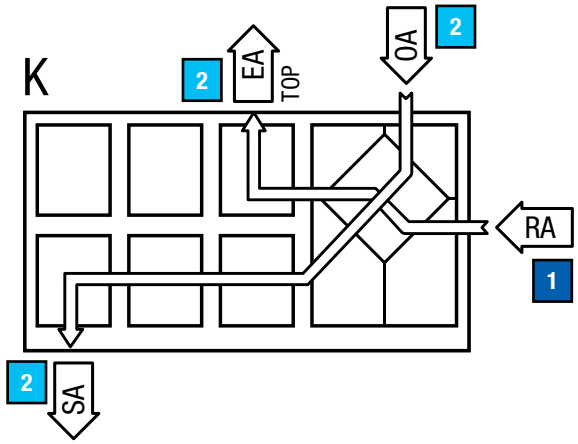


FIGURE 1.3.11 AIRFLOW CONFIGURATION FOR ORIENTATION K

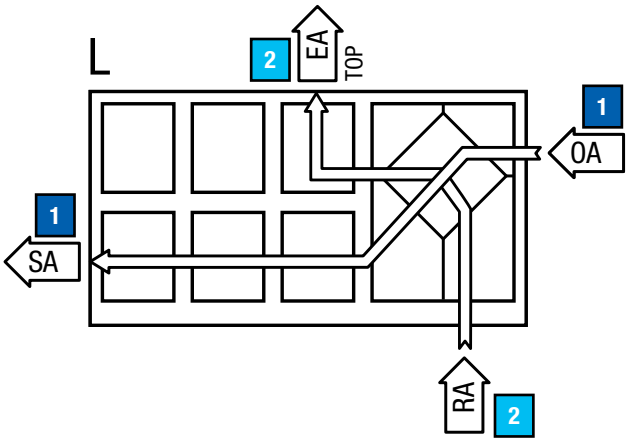


FIGURE 1.3.12 AIRFLOW CONFIGURATION FOR ORIENTATION L

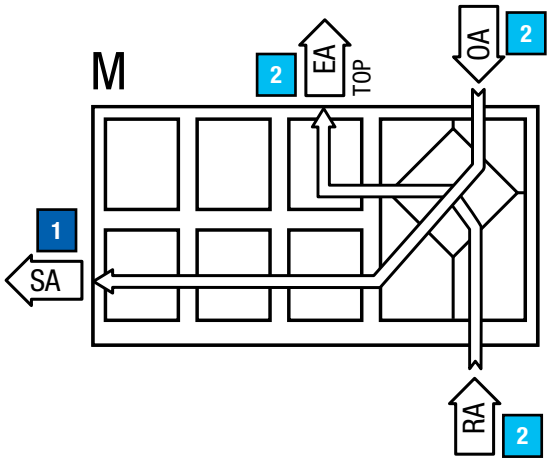


FIGURE 1.3.13 AIRFLOW CONFIGURATION FOR ORIENTATION M

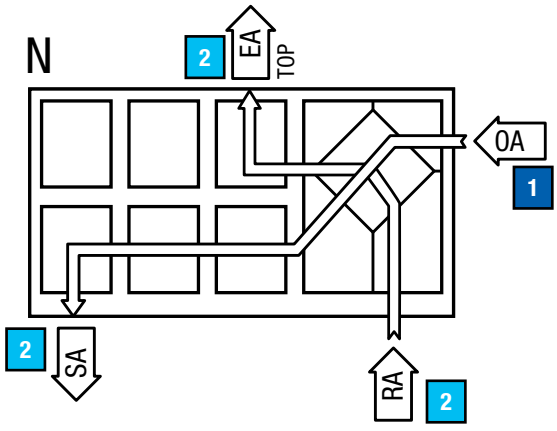


FIGURE 1.3.14 AIRFLOW CONFIGURATION FOR ORIENTATION N

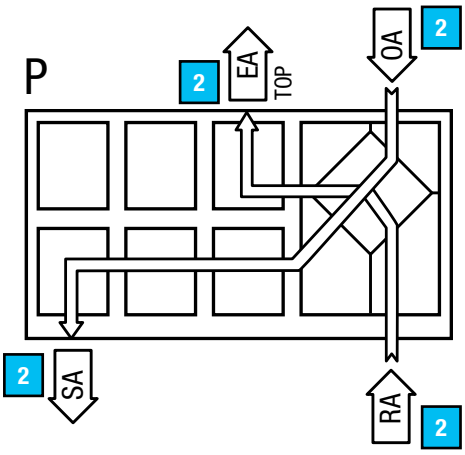


FIGURE 1.3.15 AIRFLOW CONFIGURATION FOR ORIENTATION P

1.3.2 Internal Airflow

Inside the DN DOAS unit, OA and RA airstreams are directed based on operating modes. There are three modes of operation: energy recovery, economizer/bypass and recirculation.

In Energy Recovery Mode, OA and RA airflow is through the enthalpic cores. The isolation dampers are open and both fans are operating. The economizer face damper is open, and the bypass damper is closed, allowing OA air to flow through the enthalpic cores only. Energy is recovered between the OA and RA airstreams.

Economizer/Bypass Mode, a standard feature, is activated when the Outside Air enthalpy is less than the Return Air enthalpy and free cooling is desired. OA airflow passes through the bypass compartment. The isolation dampers are open and both fans are operating. The economizer face damper and bypass damper modulate to meter Outside Air flow through the enthalpic cores and bypass compartment for no or limited energy recovery. Modulation of the face and bypass dampers allows the Fresh Air to maintain a desired air temperature without use of additional cooling. In full bypass mode, all Outside Air flows through the bypass compartment with the economizer damper fully closed and the bypass damper fully open. Return Air continues to pass through the cores.

Recirculation Mode, an optional feature, is typically used during the Unoccupied Mode. OA air does not enter the unit and RA airflow bypasses the enthalpic cores. The isolation dampers are closed and only the Supply Air fan is operating. The recirculation damper diverts Return Air through the bypass compartment and to the Supply Air fan. Additional heating or cooling can be added to the airstream before delivery back to the Occupied Space.

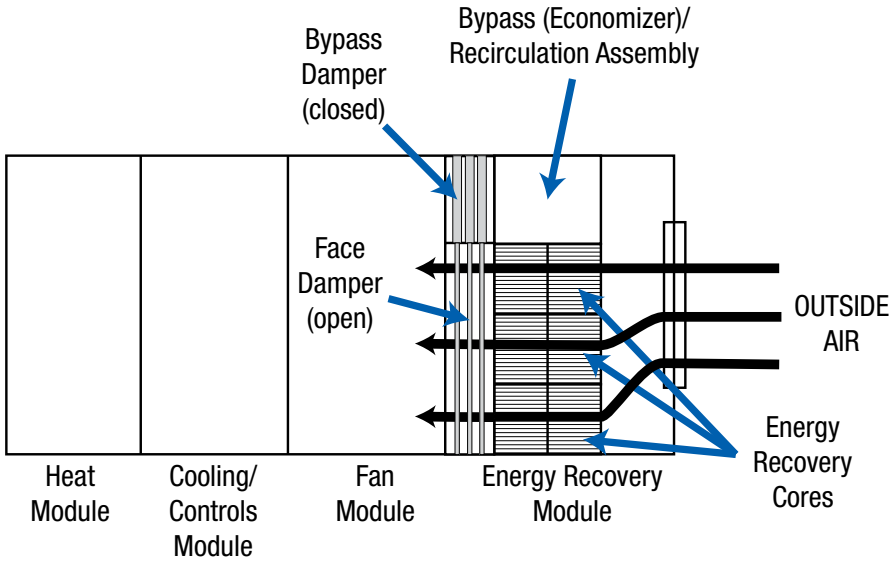
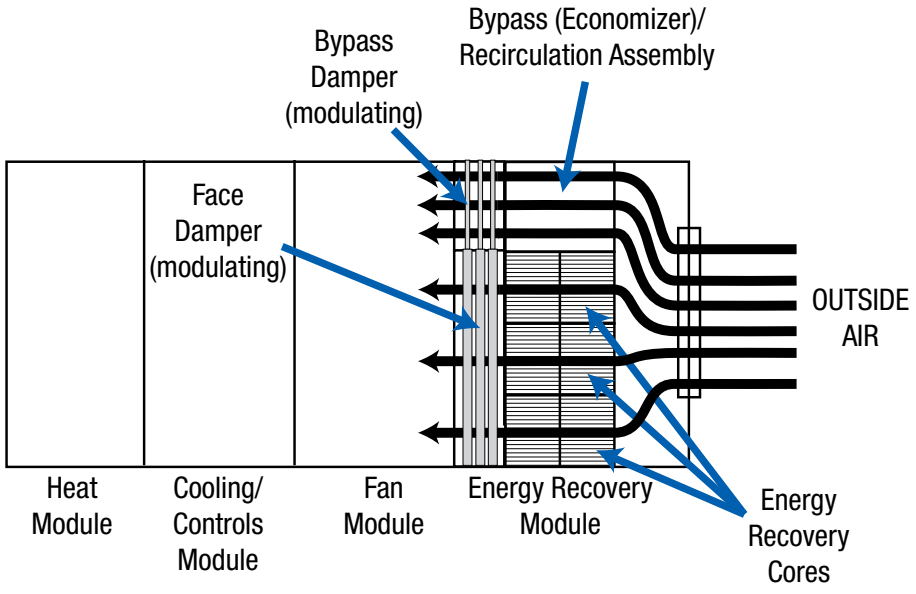
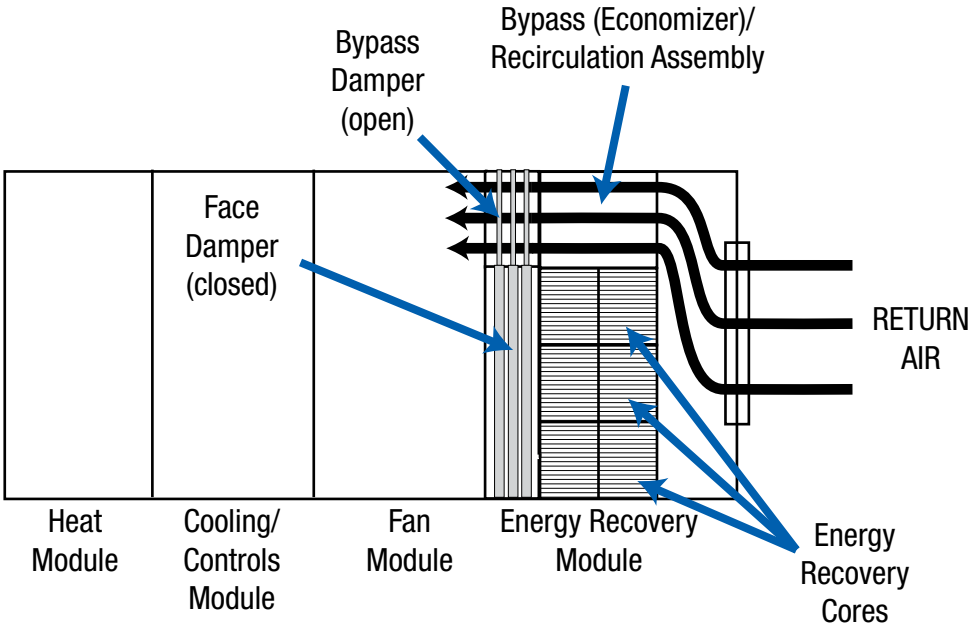


FIGURE 1.3.16 PLAN VIEW OF AIRFLOW DURING ENERGY RECOVERY MODE



OUTSIDE AIR IS METERED THROUGH THE BYPASS ASSEMBLY AND THE ENTHALPIC CORES. ALL RETURN AIR PASSES THROUGH THE ENTHALPIC CORES.

FIGURE 1.3.17 PLAN VIEW OF AIRFLOW DURING BYPASS MODE



NO OUTSIDE AIR.

ALL RETURN AIR PASSES THROUGH THE RECIRCULATION ASSEMBLY.

FIGURE 1.3.18 PLAN VIEW OF AIRFLOW DURING RECIRCULATION MODE

1.4 HEATING

1.4.1 Gas Heat Module

DN units can have an optional heat module with an Indirect Gas-Fired Heater. The gas heater is factory-installed complete and ready for field-connection to gas supply and exhaust piping. The gas heat module is available in 5:1 or 10:1 modulation and controlled by an analog signal from the controller. Each module has a condensate discharge tube that must be trapped in the field and may require winterization. *See the RenewAire Integral Indirect Gas-Fired Heat Module User Manual for more information.*

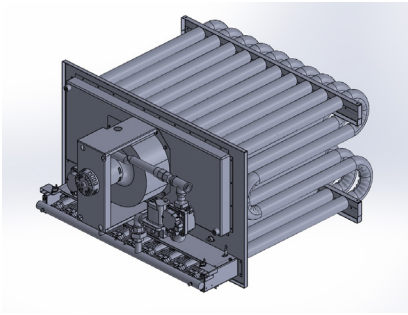


FIGURE 1.4.0 GAS HEAT MODULE (TYPICAL)

1.4.2 Electric Heat Module

DN units can have an optional heat module with an electric heater. The open coil-type electric heater is factory-installed complete with single-point power connection at the unit disconnect switch. Electric heaters are available in a number of different sizes and each heater has a control module that modulates the output of the heater. The heater control module is controlled by an analog signal from the controller. See illustration below. *See the RenewAire Integral Electric Heat Module User Manual for further information.*

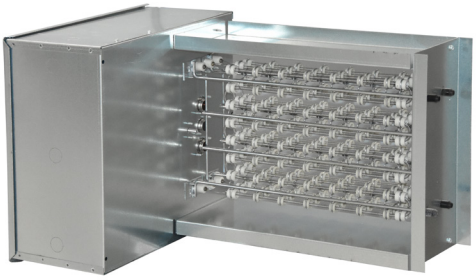


FIGURE 1.4.1 ELECTRIC HEAT MODULE (TYPICAL)

1.4.3 Water Coil/Steam Coil

DN units can have an optional heat module with a hot water coil or steam coil installed in the heating module.

The unit controller provides a digital Enable signal to the user-provided hardware and then an analog signal to modulate the steam or water source.

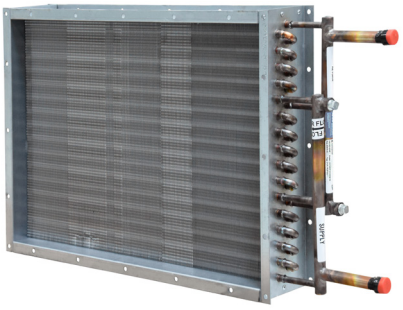


FIGURE 1.4.2 WATER COIL (TYPICAL)

1.5 COOLING

1.5.1 Split DX Coil

A DX refrigeration coil is offered as an option in the DN, for use as part of a split DX cooling system. The DX coil is engineered for R-410A refrigerant, but other refrigerants may be used. Consult your RenewAire sales representative for further information.

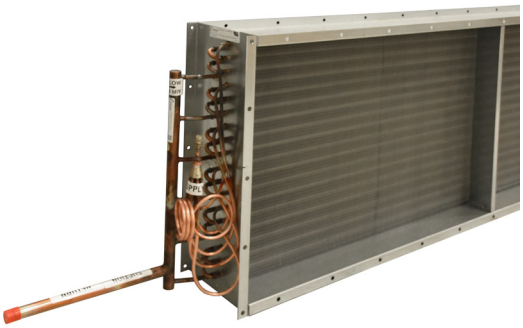


FIGURE 1.5.0 DX COIL (TYPICAL)

The refrigerant coil is installed at the factory. The DX coil is positioned above a condensate drain pan that must be trapped by the user/installer. The condensate trap may require winterization.

1.5.2 Chilled Water Coil

A chilled water coil is offered as an option in the DN. It may be used in conjunction with a user-supplied chilled water source.

It is the user's responsibility to assess supply water conditions and verify suitability for use. In addition, it is the user's responsibility to winterize the water lines as needed.

RenewAire does not make any recommendations regarding minimum quality of cooling water nor for any treatments that may be needed.

If a chilled water coil is installed, it is the installer's responsibility to provide and install a trap on the condensate drain pan. The trap is to be freeze-protected, as needed.

1.6 HOT GAS REHEAT

A Hot Gas Reheat (HGRH) coil is offered as an option. The HGRH coil is only available when a DX coil is also selected for the DN unit. The HGRH and DX coils must be selected together to achieve the desired performance of the system. The HGRH coil is connected in the field to a user-supplied refrigerant system.

There are primarily three different methods for accomplishing hot gas reheat. All three include a condenser reheat coil but require different equipment and are connected and piped differently, based on the method. Consult your RenewAire sales representative or the factory for further information and for help in specifying an HGRH coil.

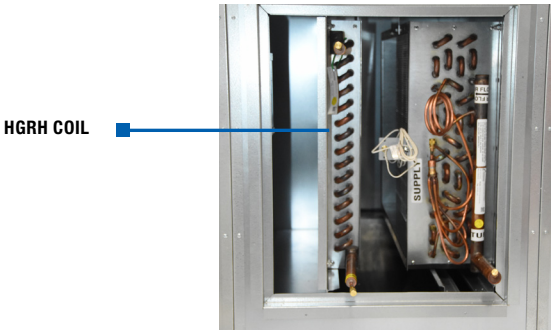


FIGURE 1.5.1 HOT GAS REHEAT COIL

2.0 COMPONENT DESCRIPTION

2.1 CABINET CONSTRUCTION

- The DN is available in either single-thickness (1") wall or double-thickness (2" thick, with thermal break) wall construction. See Digit 11 of the Configuration Code.
- The sheet metal exterior of the unit is 20 gauge galvanized steel.
- Doors and removable panels are secured with quarter-turn latches.
- All units are equipped with lifting lugs for hoisting by a crane and all units have integral openings located in the unit base for use of a fork lift.

See the *DN-Series DOAS Shipping, Rigging, Hoisting and Assembly Manual* for rigging and handling instructions.

2.1.1 Cabinet Paint

Four options are offered for exterior finishes of the unit.

- None (galvanized)
- White paint
- Gray paint
- Custom paint

2.2 FAN MOTORS

Each DN unit is equipped with direct-drive plenum-type blower/motor packages. Premium efficiency Electronically Commutated (EC) motors are standard. EC motor assemblies are mounted on an air inlet cone which is then bolted to the cabinet. Fan speed control is accomplished by a variable analog signal from the Integrated Programmable Controller to the fan motor.

Optionally, Premium efficiency asynchronous motors can be ordered. Asynchronous motors are bolted to a sled to maintain position at the inlet cone. Fan speed control is accomplished by on-board Variable Frequency Drives (VFDs).

See Digit 19 of the Configuration Code.

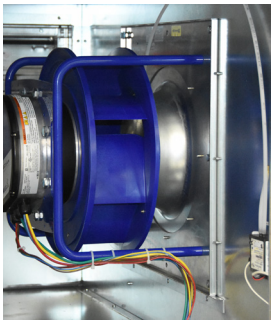


FIGURE 2.2.0 EC FAN ASSEMBLY (STANDARD)

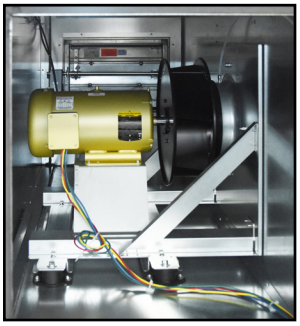


FIGURE 2.2 1 ASYNCHRONOUS MOTOR FAN ASSEMBLY (OPTIONAL)

2.2.1 Fan Speed Control

When the unit is equipped with EC motors, fan speed control is accomplished by a variable analog control signal from the microprocessor controller to the EC fan motor.

If asynchronous motors are ordered, fan speed control is accomplished by on-board VFDs. See Digit 19 of the Configuration Code.

2.3 DAMPERS

AMCA Class 1A leakage-rated airfoil dampers are standard on all units. Standard motorized isolation dampers are located at the unit walls for Outside Air (OA) and Exhaust Air (EA). Standard face and bypass dampers are located internal to the unit in the energy recovery module. The optional recirculation damper is in the energy recovery module also.

All dampers are operated by 24 VAC electric actuators. The actuators are mounted on the inside of the unit and are controlled by the Integrated Controls system. The OA and EA dampers are powered open, spring return close. The face and bypass damper actuator is powered modulation, spring return to the energy recovery position, i.e., face damper open, bypass damper closed. The optional recirculation damper is powered open, spring return close.

NOTE: Also, see damper illustrations on the following page.

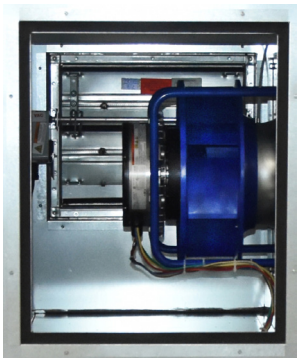


FIGURE 2.3.0 EA FAN WITH DAMPER (BEHIND)

FIGURE 2.3.1 OA DAMPER AND ACTUATOR

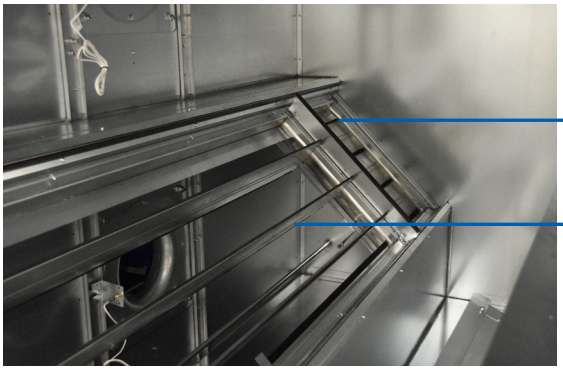


FIGURE 2.3.2 FACE AND BYPASS DAMPERS

FIGURE 2.3.3 BYPASS ASSY VIEWED FROM FRONT

NOTE: The cores used in all DNs are 5th generation, static plate enthalpic cores. They are commonly referred to in this manual as “cores”.

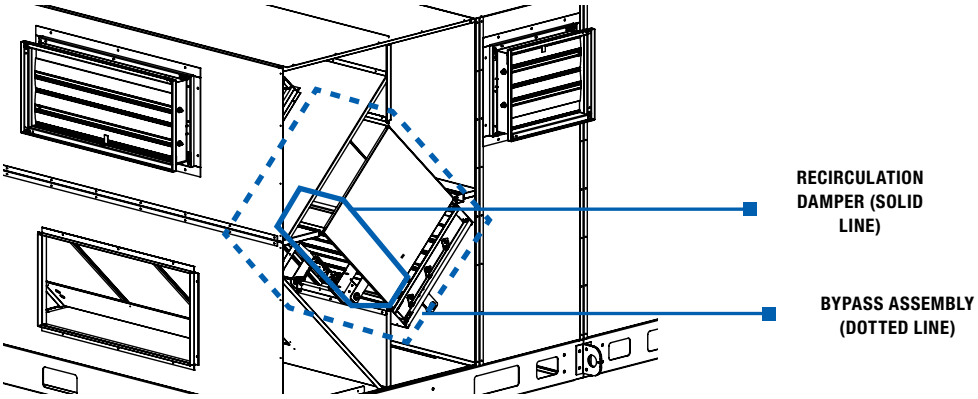


FIGURE 2.3.4 RECIRCULATION DAMPER INSIDE BYPASS ASSEMBLY

2.4 ENTHALPIC CORES

Every DN is equipped with enthalpic cores and the number of cores varies by DN model. All cores are similar in construction. See Digit 6 of the Configuration Code.

2.5 FILTERS

Filters are an essential part of the DN and the unit should never be operated without properly installed filters. Filters are typically shipped installed in the unit. The standard filter is a 2 inch thick MERV 8. Optionally available are 2 inch thick or 4 inch thick MERV 13 filters, and 2 inch or 4 inch thick MERV 14.

2.5.1 Filter Monitors

All DN units are equipped with filter monitors. When the monitor system detects filter pressure above a setpoint, the controller provides an indication that the air filters are clogged and require changing.

2.6 CONTROLS

RenewAire provides an integrated control package with or without a BACnet license. See Digit 21 of the Configuration Code.
The points list is found in the *DN-Series Integrated Programmable Controls Manual*.

2.6.1 Integrated Programmable Controls

The controller is a multi-function device that monitors operation of the DN unit and air conditions. It evaluates conditions such as temperatures, air pressures, air flows and air quality and then modulates the operation of the air handler to meet owner-specified set points. The controller can function as a stand-alone device or it can also be connected to a BMS. For detailed information on the integrated controller, see the *RenewAire DN-Series Integrated Programmable Controls User Manual.*

2.6.2 Variable Frequency Drive (OPTIONAL)

Variable Frequency Drive (VFD) control of the asynchronous motors provides continuous modulation of fan speed. The VFD is used in conjunction with the Integrated Programmable Controller. On DN-2 and DN-3 models, the VFDs and their keypads are in the unit electrical box. For DN-5 models, the VFDs are in the EA fan compartment and the keypads are in the unit electrical box.

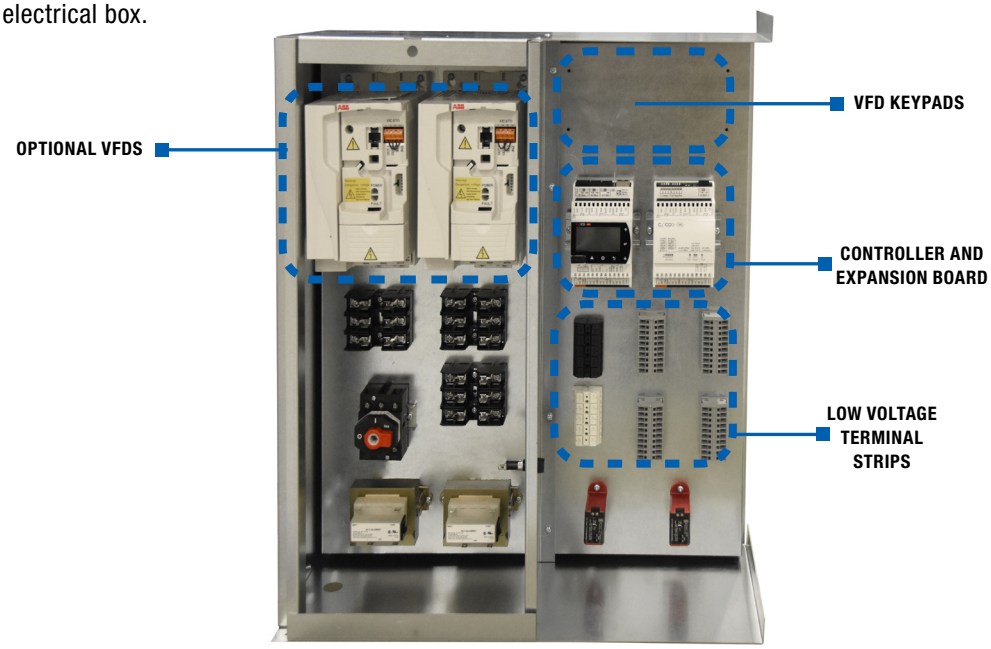


FIGURE 2.6.0 INTEGRATED CONTROLS INSTALLED

2.7 GAS HEAT MODULE (OPTIONAL)

A single indirect gas-fired heat module is provided, when ordered. The gas heat module may be conFigured for indoor installations as either separated combustion or exhaust flue vent only. A variety of sizes are available. The optional heater module has an on-board control panel to modulate the heat output. An analog 0–10 VDC signal is produced by the integrated controller. The gas heat module is always installed in the lower part of the DN heat module and is always downstream of the fans. See Digit 18 of the DN Configuration Code. Also see the *RenewAire Integral Indirect Gas-Fired Heat Module User Manual.*

2.8 ELECTRIC HEAT MODULE (OPTIONAL)

The optional electric heat module has an on-board control panel with a Solid State Relay (SSR) module to modulate the heat output. An analog 0–10 volt signal is produced by the integrated controller. Electric heater modules are always installed in the lower part of the DN heat module and is always downstream of the fans. See Digit 18 of the DN configuration code. Also see the *RenewAire Electric Heat Module User Manual.*

2.9 SPLIT DX COOLING (OPTIONAL)

All units ordered with optional split DX cooling have a factory-installed DX coil. The DX coil has a liquid (supply) line connection on the leaving air side of the coil. A suction line connection is on the entering air side of the coil. Both connections are copper. The suction header is equipped with an external equalizer line connection. **No refrigerant control valve (TX valve) is provided and must be specified by the designer of the overall system for separate sourcing.** DX cooling coils are mounted above a condensate pan that must be trapped and winterized.

The coil must be connected to separate, external equipment provided by others. The DN unit Integral Controller provides a digital "enable" signal and an analog modulating signal to the external, field-provided condensing equipment.

See Digit 16 of the DN Configuration Code.

2.10 HOT GAS REHEAT (OPTIONAL)

For humidity control, the DN may be ordered with an integral Hot Gas Reheat (HGRH) coil. The HGRH coil has a supply line connection on the leaving air side of the coil and a return line connection on the entering air side of the coil. Both connections are copper. **No external equipment, piping or refrigerant control valves are provided and must be specified by the designer of the overall system for separate sourcing.**

See Digit 16 of the DN Configuration Code.

2.11 CHILLED WATER COOLING (OPTIONAL)

An optional chilled water coil may be ordered for the DN. The chilled water coil has a supply line connection on the leaving air side of the coil and a return line connection on the entering air side of the coil. Both connections are copper. The coils will vent and drain through the factory-installed vent and drain fittings when mounted level for horizontal flow. **No fluid control valve is provided and must be specified by the designer of the overall system for separate sourcing.** Chilled water cooling coils are mounted above a condensate pan that must be trapped and winterized.

The coil must be connected to separate, external equipment provided by others. It may be connected to either an external chilled water source or to a heat pump. If it is used with a heat pump, the coil serves for both heating and cooling. The DN unit integral controller provides a digital "enable" signal and an analog modulating signal to the external, field-provided equipment.

See Digit 16 of the DN Configuration Code.

2.11.1 Optional Overflow Switch

The optional overflow switch is factory-installed on the condensate pan and wired directly to the low voltage terminal strip in the DN. If the water level in the pan should rise to an unacceptable level, the magnetic reed switch will cause the unit to shut down the fans and return the dampers to their normally-closed positions. The overflow switch is factory-wired to the controller "enable" function so the DN will simply shut down whenever the water level rises too high and will then resume operation when the water level drops. If the overflow switch causes an override of the "enable" function, the controller will show ENABLE OFF and it will not register as an ALARM condition. The overflow switch can also be used with DX cooling.

FIGURE 2.11.0 OPTIONAL OVERFLOW SWITCH

2.11.2 Waterless Drain Traps

Waterless drain traps are offered as an accessory for field-installation in the condensate drain lines. They are offered in two different versions, one for negative pressure and one for positive pressure. For further information and images, see Section 5.7.4 Waterless Drain Traps Accessory in this manual. The waterless drain traps can also be used with DX cooling.

2.12 HOT WATER/STEAM HEATING (OPTIONAL)

The DN unit may be ordered with either a hot water coil or a steam coil. The hot water coil has a supply line connection on the leaving air side of the coil and a return line connection on the entering air side of the coil. The steam coil has a supply line connection at the middle of its header and a return line connection at the bottom of its header. All connections are copper. The coils will vent and drain through the factory-installed vent and drain fittings when mounted level for horizontal flow. **No fluid control valve is provided and must be specified by the designer of the overall system for separate sourcing.** Heating coils are mounted above a drain pan that must be trapped and winterized.

The coil must be connected to separate, external equipment provided by others. The DN unit integral controller provides a digital “enable” signal and an analog modulating signal to the external, field-provided equipment.

See Digit 17 of the DN Configuration Code.

3.0 SHIPPING/RECEIVING/HANDLING

All DN units are palletized and then shipped by common carrier. It is the installer’s / customer’s responsibility to coordinate delivery and properly handle the shipment during unloading and storage. RenewAire also provides a model-specific manual for shipping, rigging, lifting and assembly that is available online at RenewAire.com.

3.1 UNIT WEIGHTS/DIMENSIONS

The unit weights and dimensions vary based on configuration of the unit and options selected. Sections 3.1.1 and 3.1.2 list weights and dimensions for maximum size units. Secions 3.1.3, 3.1.4 and 3.1.5 provide weights and dimensions of additional unit configurations.

3.1.1 Unit Dimensions and Weight

Unit dimensions and weight:

DOAS Model DN-2 with 1" thick walls: 126" L x 60 3/4" W x 71 7/8" H
DOAS Model DN-2 with 2" thick walls: 128" L x 62 3/4" W x 73 7/8" H
Typical unit weight with 1" thick walls: 1250–2425 pounds
Typical unit weight with 2" thick walls: 1350–2550 pounds

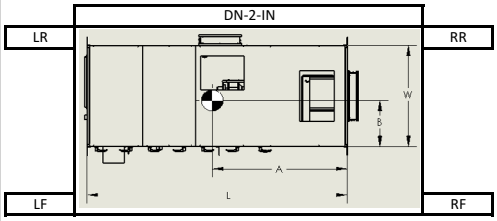
DOAS Model DN-3 with 1" thick walls: 147.875" L x 90 1/8" W x 71 7/8" H
DOAS Model DN-3 with 2" thick walls: 149.875" L x 92 1/8" W x 73 7/8" H
Typical unit weight with 1" thick walls: 1600–3475 pounds
Typical unit weight with 2" thick walls: 1725–3675 pounds

DOAS Model DN-5 with 1" thick walls: 174" L x 103 3/4" W x 88 7/8" H
DOAS Model DN-5 with 2" thick walls: 176" L x 105 5/8" W x 90 7/8" H
Typical unit weight with 1" thick walls: 2600–4850 pounds
Typical unit weight with 2" thick walls: 2725–5050 pounds

3.1.2 Shipping Dimensions and Weight

DOAS Model DN-2 with 1" thick walls:	140" L x 90" W x 77" H
DOAS Model DN-2 with 2" thick walls:	140" L x 90" W x 79" H
Typical shipping weight with 1" thick walls:	1450–2625 pounds
Typical shipping weight with 2" thick walls:	1550–2750 pounds
DOAS Model DN-3 with 1" thick walls:	160" L x 90" W x 77" H
DOAS Model DN-3 with 2" thick walls:	160" L x 90" W x 79" H
Typical shipping weight with 1" thick walls:	1825-3700 pounds
Typical shipping weight with 2" thick walls:	1950-3900 pounds
DOAS Model DN-5 with 1" thick walls:	180" L x 101 1/2" W x 94" H
DOAS Model DN-5 with 2" thick walls:	180" L x 101 1/2" W x 96" H
Typical shipping weight with 1" thick walls:	2850–5100 pounds
Typical shipping weight with 2" thick walls:	2975–5300 pounds

3.1.3 DN-2-IN Unit Corner Weights



DN-2-IN 1" CABINET UNIT WEIGHTS (LBS)

MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	70.86	48	36.85	23.69	1250	329	321	296	304
ERV + Coil	95.36	48	51.51	22.9	1750	494	451	384	421
ERV + EH	95.36	48	47.21	23.18	1600	410	383	390	418
ERV + GH	95.36	48	51.11	21.57	1750	516	421	365	447
ERV + Coil + EH	119.89	48	60.41	22.79	2100	556	502	495	547
ERV + Coil + GH	119.89	48	64.46	21.55	2250	667	543	467	573
ERV + Coil + ST	119.89	48	63.53	22.06	2250	644	548	486	572

Center of Gravity "A" and "B" Dimensions +/- 2"

DN-2-IN 2" CABINET UNIT WEIGHTS (LBS)

MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	72.86	50	37.85	24.69	1330	350	341	316	324
ERV + Coil	97.36	50	52.51	23.9	1850	521	477	407	445
ERV + EH	97.36	50	48.21	24.18	1700	435	407	415	443
ERV + GH	97.36	50	52.11	22.57	1850	543	447	388	472
ERV + Coil + EH	121.89	50	61.41	23.79	2220	586	532	524	577
ERV + Coil + GH	121.89	50	65.46	22.55	2370	699	574	495	602
ERV + Coil + ST	121.89	50	64.53	23.06	2370	676	579	514	601

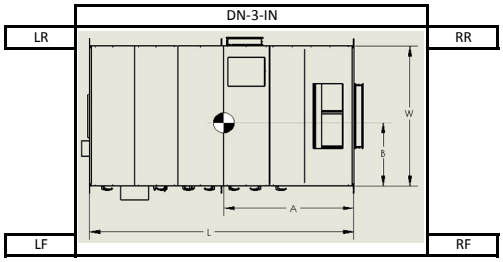
Center of Gravity "A" and "B" Dimensions +/- 2"

ADDITIONAL WEIGHTS FOR OPTIONS (LBS)	
OPTIONS	UNIT
RECIRC	25
VFD	150

Add the additional weights for options to the Unit Weights to determine Unit and Corner weights for a specific unit.

FIGURE 3.1.0 DN-2-IN APPROXIMATE CORNER WEIGHTS

3.1.4 DN-3-IN Unit Corner Weights



DN-3-IN 1" CABINET UNIT WEIGHTS (LBS)									
MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	70.86	77.42	36.24	38.21	1600	414	404	386	396
ERV + Coil	95.40	77.42	50.40	36.99	2300	635	581	518	567
ERV + EH	117.21	77.42	55.07	37.70	2350	566	538	607	639
ERV + GH	117.21	77.42	58.82	34.90	2650	730	599	595	725
ERV + Coil + EH	141.74	77.42	67.48	36.81	2900	724	656	722	797
ERV + Coil + GH	141.74	77.42	71.28	34.67	3275	909	738	729	899
ERV + Coil + ST	141.74	77.42	69.21	37.16	3100	787	727	761	825

Center of Gravity "A" and "B" Dimensions +/- 2"

DN-3-IN 2" CABINET UNIT WEIGHTS (LBS)									
MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	72.86	79.42	37.24	39.21	1725	446	435	416	427
ERV + Coil	97.40	79.42	51.4	37.99	2450	674	618	553	604
ERV + EH	119.21	79.42	56.07	38.7	2500	603	573	645	679
ERV + GH	119.21	79.42	59.82	35.9	2800	770	635	631	764
ERV + Coil + EH	143.74	79.42	68.48	37.81	3100	774	703	773	850
ERV + Coil + GH	143.74	79.42	72.28	35.67	3475	963	785	776	952
ERV + Coil + ST	143.74	79.42	70.21	38.16	3300	837	774	811	877

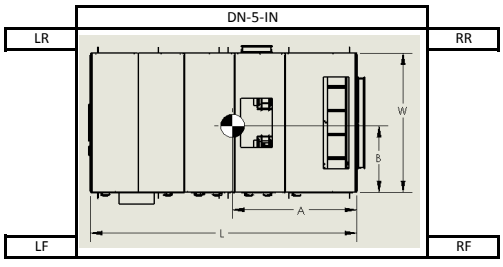
Center of Gravity "A" and "B" Dimensions +/- 2"

ADDITIONAL WEIGHTS FOR OPTIONS (LBS)	
OPTIONS	UNIT
RECIRC	25
VFD	175

Add the additional weights for options to the Unit Weights to determine Unit and Corner weights for a specific unit.

FIGURE 3.1.1 DN-3-IN APPROXIMATE CORNER WEIGHTS

3.1.5 DN-5-IN Unit Corner Weights



DN-5-IN 1" CABINET UNIT WEIGHTS (LBS)									
MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	78.04	91	39.23	44.51	2600	668	639	632	661
ERV + Coil	109.78	91	53.08	44.58	3300	814	782	835	869
ERV + EH	136.26	91	61.09	44.29	3550	817	775	953	1005
ERV + GH	136.26	91	63.72	43.38	3800	930	847	964	1059
ERV + Coil + EH	168.00	91	74.54	44.25	4250	969	917	1150	1215
ERV + Coil + GH	168.00	91	78.46	43.4	4450	1087	991	1131	1241
ERV + Coil + ST	168.00	91	74.33	44.43	4300	974	929	1171	1227

Center of Gravity "A" and "B" Dimensions +/- 2"

DN-5-IN 2" CABINET UNIT WEIGHTS (LBS)									
MODELS	L	W	A	B	UNIT	LF	LR	RR	RF
ERV	80.04	93	40.23	45.51	2725	699	670	663	692
ERV + Coil	111.78	93	54.08	45.58	3450	851	818	873	908
ERV + EH	138.26	93	62.09	45.29	3700	852	809	993	1046
ERV + GH	138.26	93	64.72	44.38	3950	967	882	1003	1098
ERV + Coil + EH	170.00	93	75.54	45.25	4450	1015	962	1203	1270
ERV + Coil + GH	170.00	93	79.46	44.4	4650	1136	1038	1182	1294
ERV + Coil + ST	170.00	93	75.33	45.43	4500	1020	974	1224	1282

Center of Gravity "A" and "B" Dimensions +/- 2"

ADDITIONAL WEIGHTS FOR OPTIONS (LBS)	
OPTIONS	UNIT
RECIRC	50
VFD	340

Add the additional weights for options to the Unit Weights to determine Unit and Corner weights for a specific unit.

FIGURE 3.1.2 DN-5-IN APPROXIMATE CORNER WEIGHTS

3.2 RECEIVING

Upon delivery of the DN, inspect it carefully for shipping damage and completeness. Verify the presence of any accessories that are to be field-installed or filters that are shipped loose. If shipping damage is discovered, take digital pictures and note the visible damage on the shipping manifest. Notify your RenewAire dealer immediately.

3.3 RIGGING

For rigging instructions, see the *DN-Series DOAS Shipping, Rigging, Hoisting and Assembly Manual* that is available online at RenewAire.com.

3.4 HANDLING AND STORAGE

Upon delivery to a job site, the DN should ideally be placed and installed immediately. If the unit cannot be installed immediately, it should be protected from the weather, either by moving it indoors or by covering with tarps. When placing the DN on the ground, the placement area should be flat and level. Take care to avoid twisting or wracking of the unit.

4.0 UNIT PLACEMENT

4.1 SOUND ATTENUATION OUTSIDE THE BUILDING

The exhaust hood is the primary source of noise outside the building. When practical, orient the exhaust air hood to point away from houses or public areas.

4.2 PLACEMENT CAUTIONS

Air handlers are typically placed in a location specified by others. There are a number of situations that may demand relocation:

- The outside air intake must be at least 10' away from exhausts such as dryer vents, chimneys, furnace and water heater exhausts or other sources of contamination or carbon monoxide.
- Do not locate outside air intake where vehicles may be serviced or left idling.
- Never locate the outside air inlet inside a structure.
- Do not install the unit inside a garage or parking structure.

NOTICE

This DN unit must be installed in compliance with SMACNA guidelines and all applicable local building codes.

4.3 SERVICE CLEARANCES

See Dimensional Drawings at the front of this manual for required service clearances.

5.0 INSTALLATION

5.1 UNIT PLACEMENT

Unit location is normally specified by others but installers must also verify that the installation is in accordance with all local codes and building regulations.

Place the DN unit in its final location and level it by installing shims under the unit base. Shims should be placed at all four corners of the unit and not more than four feet apart on the sides and ends. Shims should be made of galvanized sheet metal.

The DN unit must be within 1/8" of level in any four-foot distance or slightly pitched from back to front of the unit to allow for proper drainage of the condensate drain pan at the front of the DN unit.

5.2 DUCT CONNECTIONS

All ductwork is field-supplied and installed. In general, duct construction should follow SMACNA guidelines for duct construction and airtightness. Follow duct design specified in construction documents to achieve design system airflows.

If any ducts connected to the DN unit pass through unconditioned spaces, they must be insulated with vapor barrier on both inside and outside of the insulation. If ducts are to be attached to factory-installed dampers, the dampers have an integral flange for anchoring the duct(s). See images below.

Ducts may be fastened to the duct flange on the damper(s) or they may be oversized for direct attachment to the DOAS cabinet.

All RA and SA openings have duct flanges for connection to ductwork.

NOTE: Ducts inside a building that are connected to the outside must be insulated with a sealed vapor barrier on both the inside and the outside of the insulation.

FIGURE 5.2.0 CLASS I DAMPER (TYPICAL)

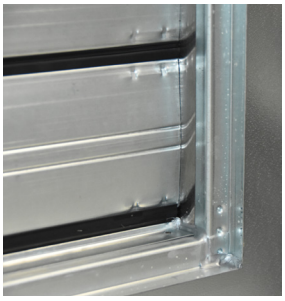


FIGURE 5.2.1 DUCT FLANGE ON DAMPER (TYPICAL)

5.2.1 Indoor Sound Attenuation

Duct stiffness:

Make sure the ductwork at the unit openings is stiff enough to resist the flexing and resulting booming noise associated with system start up and shutdown, as well as the turbulent flow conditions at the unit outlets.

In general, provide smooth transitions from the unit openings to the duct. The ducts connecting to the openings should be straight for a sufficient distance, with gradual transitions to the final duct size. These guidelines are consistent with SMACNA recommended duct layout practices for efficient and quiet air movement.

Radiated noise:

Ducts can be significant sources of radiated sound. The SA duct should be insulated for sound control. This insulation should start at the unit. At a minimum, the first ten feet of duct should be insulated. All parts of the SA and RA ducts located in a mechanical space with noise-generating equipment should also be insulated for sound control, both to minimize sound radiation out of the SA and RA ducts and also to control sound radiation into both ducts.

5.3 ELECTRICAL REQUIREMENTS

⚠ 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 volt meter. Refer to unit electrical schematic.

Follow all local codes.

Unit electrical requirements are found on the unit label located on the left end panel of the unit. Determine the voltage, phase, and ampacity of the power supply for the unit. Before bringing power to the unit, check unit rating label to confirm it matches the voltage and phase of the power being supplied. Minimum wire size for supply power should be determined using the Minimum Circuit Ampacity (MCA) rating on the unit rating label. Wire insulation must have minimum 75^{0}C rating. Wire insulation must have minimum 600V rating. Use conduit, strain reliefs, etc. as required to secure field wiring. Field connections must be accessible for inspection. It is the installer's responsibility to provide all supply wiring in accordance with local codes and installation in accordance with Industry Best Practices.

All internal electrical components have been wired at the factory. It is only necessary to bring supply voltage, control wires, and wires to external equipment supplied by others to the unit.

5.3.1 Factory-Recommended Electric Service Entry

It is recommended that the high and low voltage wiring enter at the left end as shown. Wiring must be secured within the unit as needed, and according to all local codes.

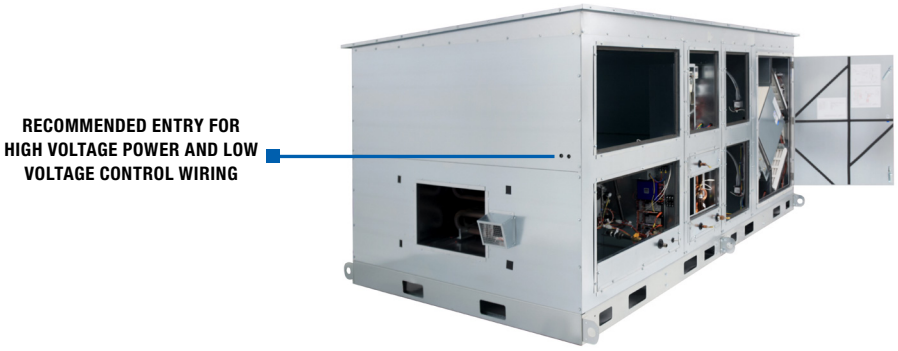


FIGURE 5.3.0 FACTORY-RECOMMENDED ELECTRIC SERVICE ENTRY

5.3.2 High-Voltage Electrical Connections

This DN uses a single-point high voltage electrical supply connection. All wires are to be terminated at the same point on the top of the disconnect switch. See photo below. Depending on the ampacity of the unit, different disconnect switches may be used, but high voltage supply wiring is always terminated at the top of the disconnect switch.

NOTE: Every DN has an electrical box, commonly referred to as an "E-Box". Each E-Box is divided into a high voltage side and a low voltage side.

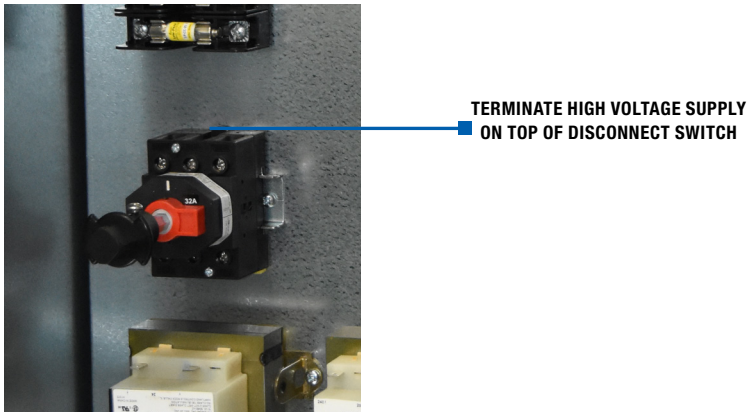


FIGURE 5.3.1 DISCONNECT SWITCH (TYPICAL)

High voltage wiring is to go through the side of the electrical box and be terminated on the terminals located on the top of the disconnect switch.

All electrical wiring installed by others in the field is to be secured as needed and according to all local codes and in accordance with Industry Best Practices.

5.3.3 Low Voltage Electrical Connections

The right side of the electrical box is used for low-voltage electrical connections. Any low-voltage control wires installed by others in the field should terminate in the right side of the electrical box.

There are six low voltage terminal blocks located in the electrical box; 4 gray, 1 white and 1 black. Only the gray terminal blocks are used to terminate optional control sensors. See Figures below and on following page.

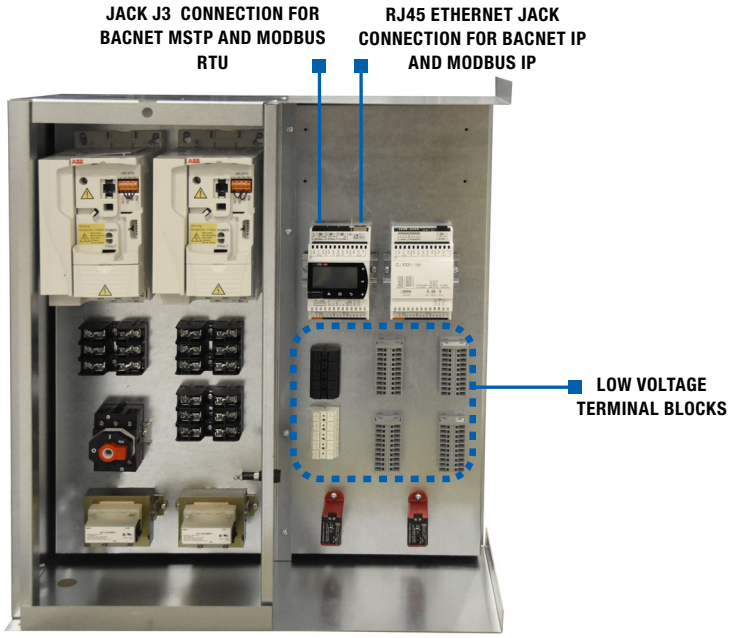


FIGURE 5.3.2 LOW VOLTAGE TERMINAL BLOCKS INSTALLED

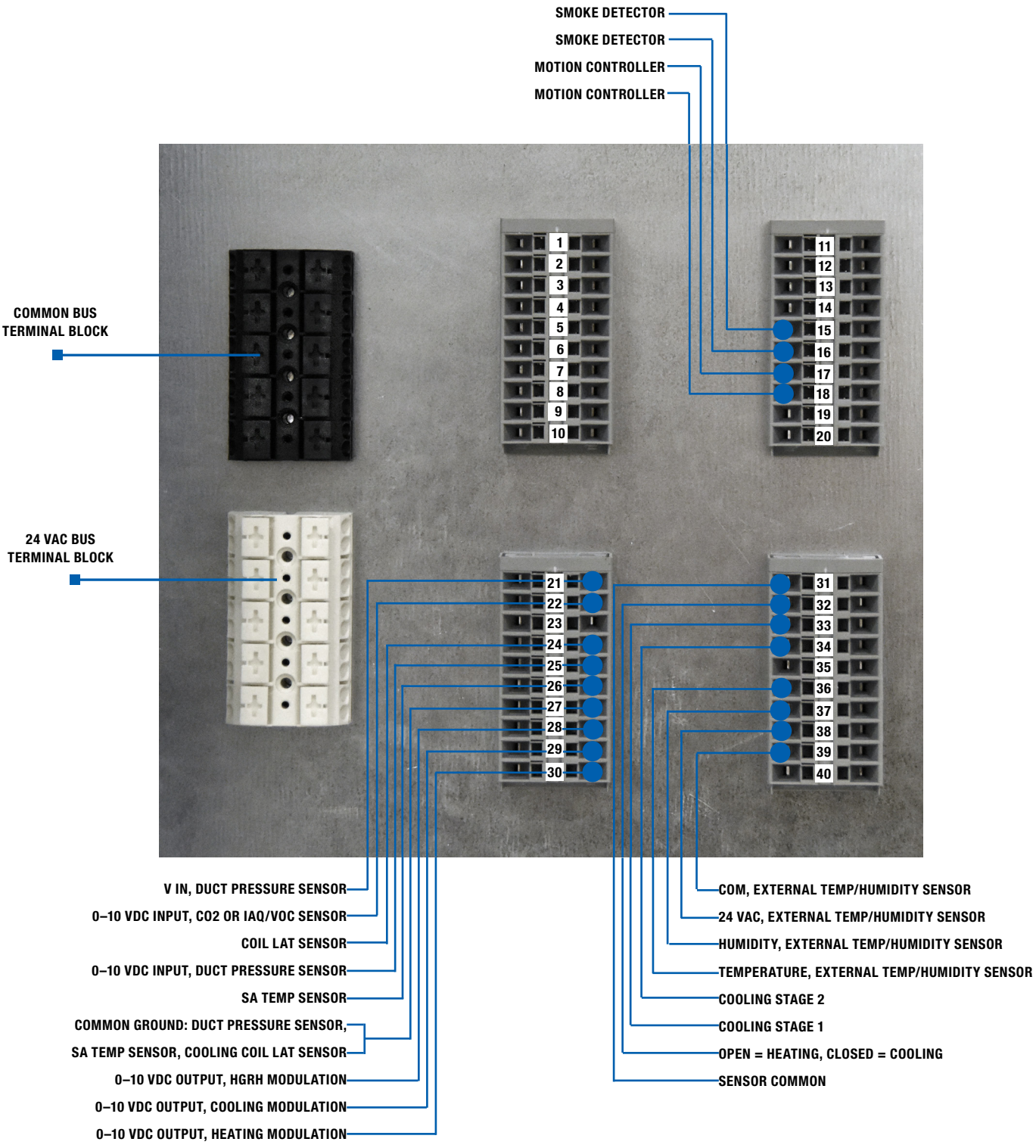


FIGURE 5.3.3 FIELD WIRING

5.3.4 24 VAC Class II Power Supply

This unit is equipped with 2 Class II 24 VAC power supply transformers (see image below). One transformer provides power for the integrated controller and the second transformer provides power for optional sensors.

A built-in circuit breaker on the 24 VAC transformer prevents damage to the transformer and other low voltage components in the event of a short-circuit or overload. The transformer itself is designed to fail safely in extreme cases.

⚠ CAUTION

RISK OF DAMAGE TO POWER SUPPLY AND CONNECTED COMPONENTS

UNITS WITH 230 VAC POWER SOURCE:

The DOAS is shipped from the factory with the transformers set for 208 VAC primary power. If the actual power source is 230 VAC, move the black primary-side lead from the transformer's "208 V" terminal to the transformer's "230 V" terminal.

Connect only to components intended for use with a 24 VAC power supply.

Do not interconnect the unit's Class II power supply with an external Class II power supply.

Do not use undersized low voltage wiring to connect this device. Observe the wire gauge / wire length chart below.

Do not overload the power supply.

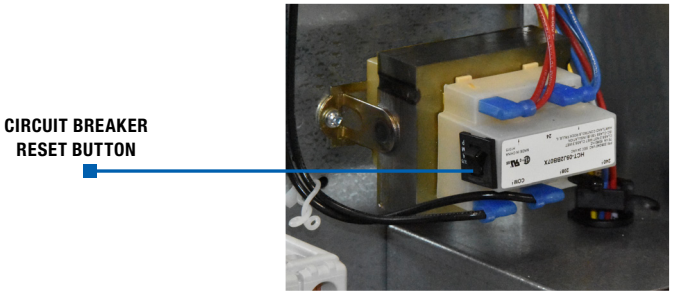


FIGURE 5.3.4 24 VAC POWER SUPPLY TRANSFORMER

Transformer Specifications:

Nominal output voltage under load: 24 VAC

Typical output voltage at no load: 29–31 V

Minimum contact rating for connected control device: 50 mA (1.2 VA)

Circuit breaker trip point: 3.75 A

Limits of Class II Power Output:

Control devices drawing a total of 8 VA may be connected. More than one device may be connected. Observe the following wire guidelines:

Wire Gauge	#22	#20	#18	#16	#14	#12
Circuit Length	100'	150'	250'	400'	700'	1000'

Resetting the Circuit Breaker:

If the transformer is subjected to excessive load or a short circuit, the integral circuit breaker will trip.

Shut off the primary-side power to the unit and remove the excessive load or the short circuit. The circuit breaker can be reset about 15 seconds after it trips.

NOTE: This wiring schematic is TYPICAL of single phase, 230 VAC input for model DN-2. This drawing is for a unit that includes gas heat and EC motors. A unit-specific electrical schematic is found inside the access door to the core module.

Also see additional wiring schematics on following pages for TYPICAL control wiring and TYPICAL field wiring.

5.4 WIRING SCHEMATICS

5.4.1 Typical Input Power

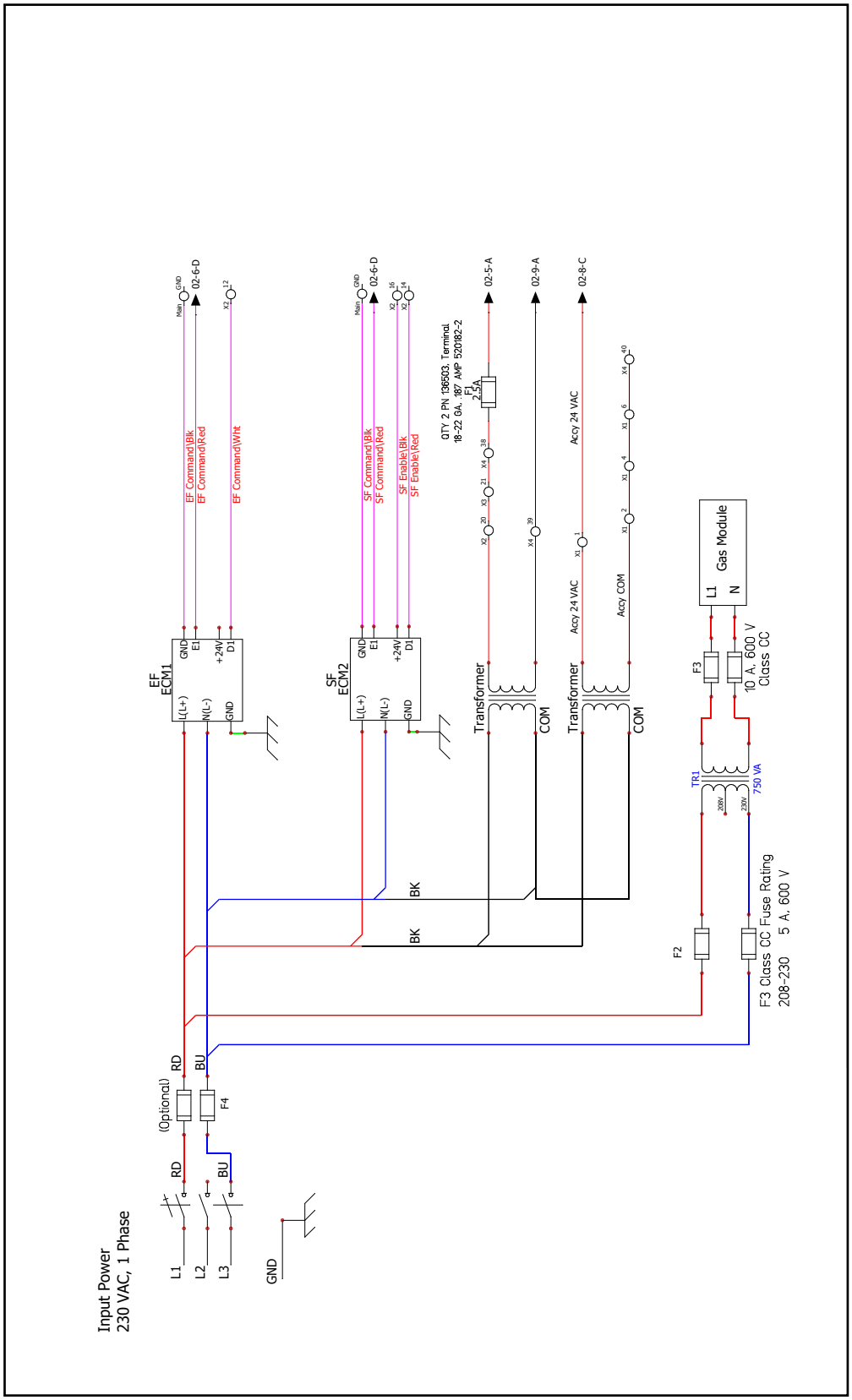


FIGURE 5.4.0 DN-2 SINGLE PHASE POWER WIRING SCHEMATIC

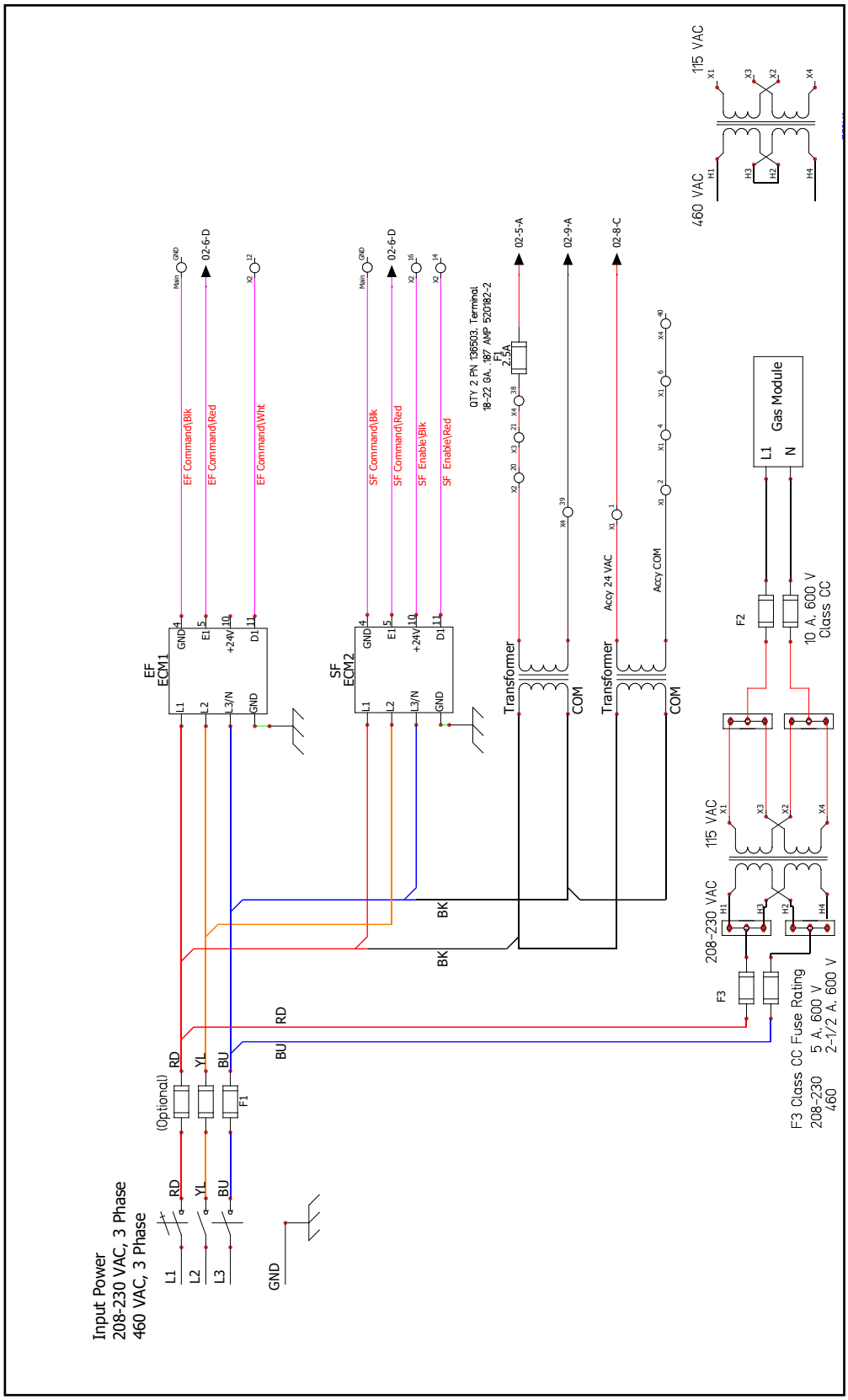


FIGURE 5.4.1 DN-2, DN-3 THREE PHASE POWER WIRING SCHEMATIC

NOTE: This wiring schematic is TYPICAL of three phase, 208–230 and 460 VAC input for model DN-2 and DN-3. This drawing is for a unit that includes gas heat and EC motors. A unit-specific electrical schematic is found inside the access door to the core module.

Also see additional wiring schematics on following pages for TYPICAL control wiring and TYPICAL field wiring.

NOTE: This wiring schematic is TYPICAL of three phase, 208–230 and 460 VAC input for model DN-5. This drawing is for a unit that includes gas heat and EC motors. A unit-specific electrical schematic is found inside the access door to the core module.

Also see additional wiring schematics on following pages for TYPICAL control wiring and TYPICAL field wiring.

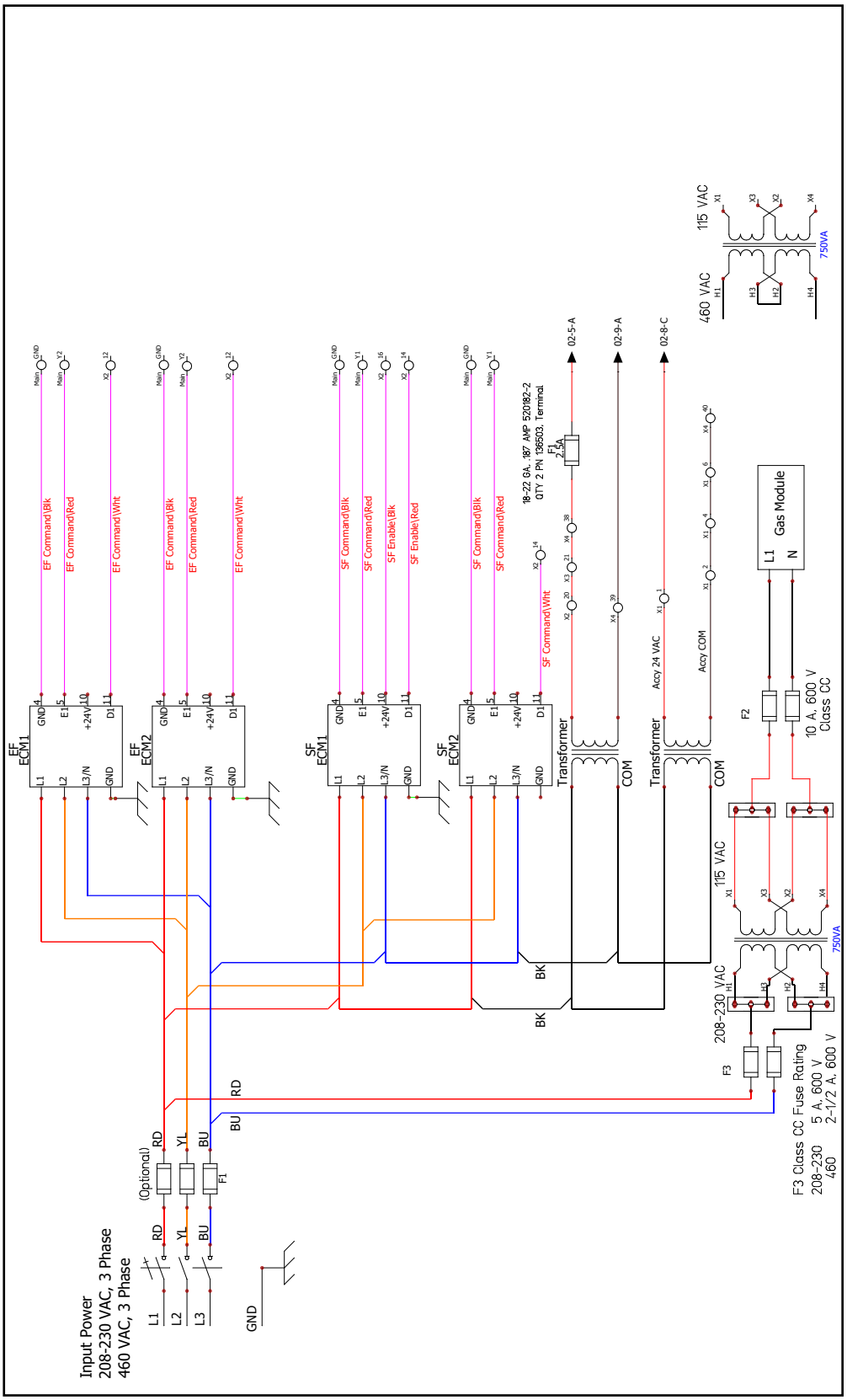


FIGURE 5.4.2 DN-5 THREE PHASE POWER WIRING SCHEMATIC

5.4.2 Typical Control Wiring

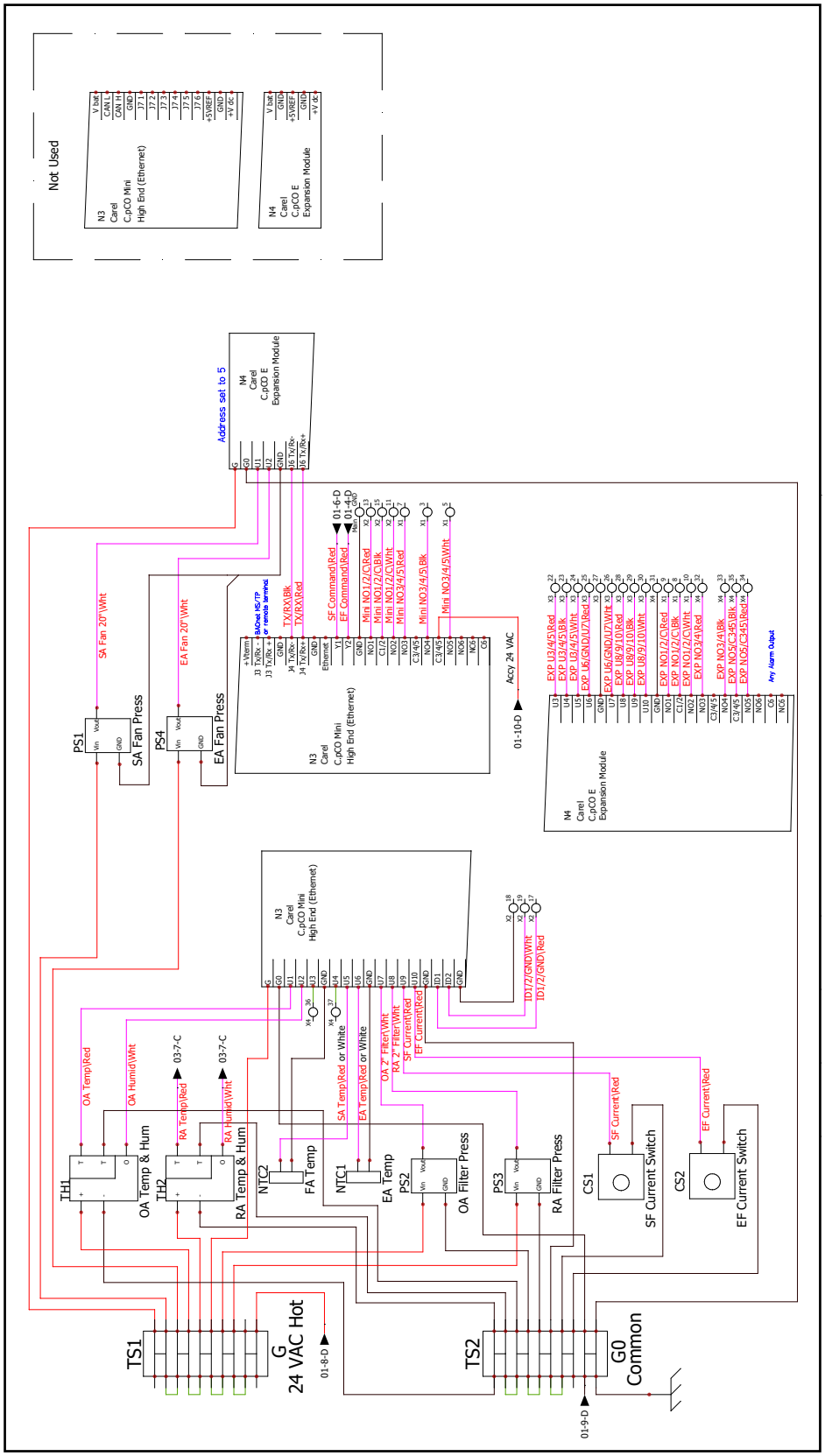


FIGURE 5.4.3 DN-2, DN-3, DN-5 TYPICAL CONTROL WIRING

NOTE: This wiring schematic is TYPICAL control wiring for a three phase, 208–230 and 460 VAC input for models DN-2, DN-3, and DN-5. This drawing is for a unit that includes gas heat and EC motors. A unit-specific electrical schematic is to be found inside the access door to the unit core module.

Also see additional wiring schematic on following page for TYPICAL field wiring.

5.4.3 Typical Field Wiring

NOTE: This wiring schematic is TYPICAL of three phase, 208–230 and 460 VAC input for models DN-2, DN-3, and DN-5. This drawing is for a unit that includes gas heat and EC motors. A unit-specific electrical schematic is to be found inside the access door to the unit core module.

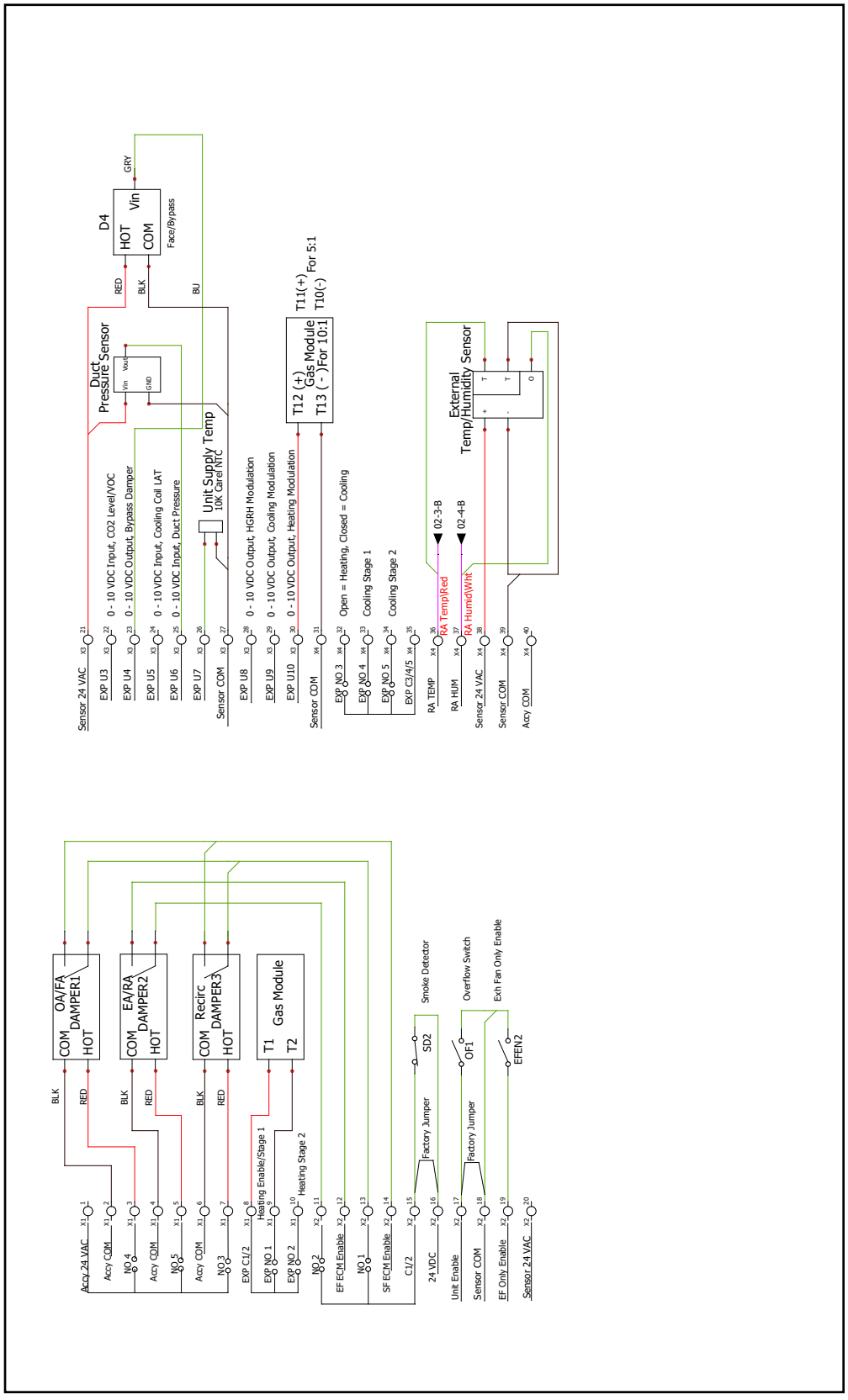


FIGURE 5.4.4 DN-2, DN-3, DN-5 TYPICAL FIELD WIRING

5.5 PIPING CONNECTIONS

5.5.1 Coil Connections

Piping connections to DN coils may be water coil (either heating or cooling), steam coil or refrigerant for a DX cooling coil or a HGRH coil. The coils must be connected to separate, external equipment provided by others. All connecting lines must be supported independently of the unit. Do not rely on the connection to the coil to support the pipes.

Fluid coils are located in the coil module which may be either upstream or downstream of the SA fan module. Coils are always positioned vertically and the inlets and outlets are stubbed through the fixed portion of the access panel. Coil header connections should be insulated inside the unit. Fluid coils must typically be flushed at time of connection to an external water source. Fluid coils are dry when shipped, with connections capped.

Optional DX coils are installed in the coil module which may be either upstream or downstream of the SA fan. The coil connections for the suction line of the DX coils is stubbed through the fixed portion of the access panel at the front of the unit. Coil header connections should be insulated inside the unit. DX coils are dry when shipped, with connections capped.

IMPORTANT

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

FIGURE 5.5.0 SUCTION LINE FOR DX COIL

5.5.2 Drain Traps

Condensate drains are found as part of a condensate drain pan assembly in a cooling section of the DN and on integral gas heat modules. **All condensate drains must be trapped.** Depending on the configuration of the unit as ordered, there may be condensate drains for DX coils, chilled water coils and gas heat modules. DX coils and chilled water coils are installed above condensate drain pans and the drains from those pans must be trapped and, if necessary, winterized. If a gas heat module is installed, the condensate discharge tube from the module must also be trapped and winterized, as needed.

Cooling module drain pans have a sloped bottom and an integral drain fitting at the low end. The drain fitting is 1" diameter stainless steel with female NPT. The drain fitting for all DN indoor units is located at the front of each unit.

For instructions on designing both positive and negative pressure drain traps, see Section 5.5.3 Drain Trap Construction in this manual. A poorly designed and installed drain trap can restrict condensate flow and may cause the condensate to overflow.

For specific information on trapping a gas heat module condensate drain, see the *RenewAire Integral Indirect Gas-Fired Heat Module User Manual*.

FIGURE 5.5.1 CONDENSATE DRAIN LOCATIONS (TYPICAL)

When the SA fan module is located upstream of the cooling module, the resulting pressure sensed at the condensate pan will be POSITIVE. See below.

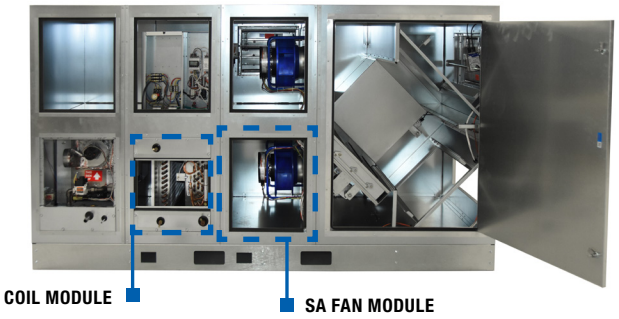


FIGURE 5.5.2 SA FAN MODULE LOCATED BEFORE THE COIL MODULE

When the SA fan module is located downstream of the cooling module, the resulting pressure sensed at the condensate pan will be NEGATIVE. See below.

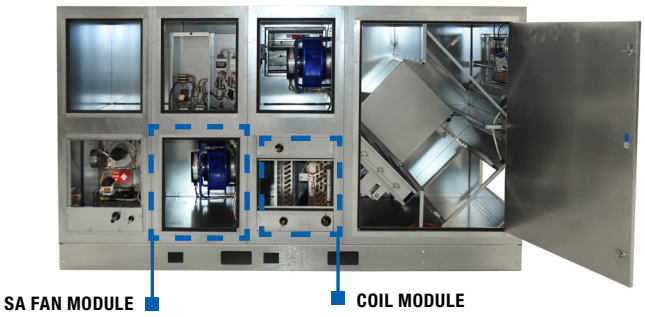


FIGURE 5.5.3 SA FAN MODULE LOCATED AFTER THE COIL MODULE

Condensate drain trap clearances

The unit base has an access port for the condensate drain pipe, centered vertically. The access port is 3" tall and the condensate drain pipe must exit the unit through it.

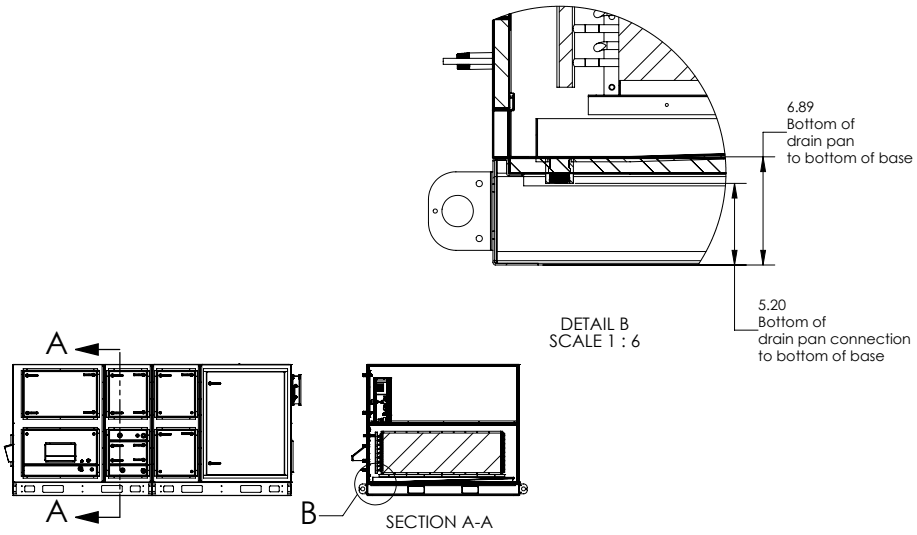


FIGURE 5.5.4 CONDENSATE DRAIN TRAP CLEARANCES

5.5.3 Drain Trap Construction

Drain traps should be constructed in accordance with local building codes, using Industry Best Practices. Drain traps are essential to allow water to flow out of the drain pan(s). More important, though, when there is negative internal static within the unit, the trap prevents outside air from being pulled into the unit and consequently splashing water inside the unit. Drain trap design is dependent on the static pressure at the drain location and also whether the pressure is negative or positive. For all drain traps, RenewAire recommends the installation of threaded plugs at several locations to permit periodic cleaning and filling of the trap. Also recommended is the use of a vacuum breaker if water is being discharged from the trap into a drain pipe. The vacuum breaker can be omitted if the condensate is being drained directly onto the ground. See illustration below.

NOTE LOCATIONS OF RECOMMENDED CLEAN-OUT PORTS

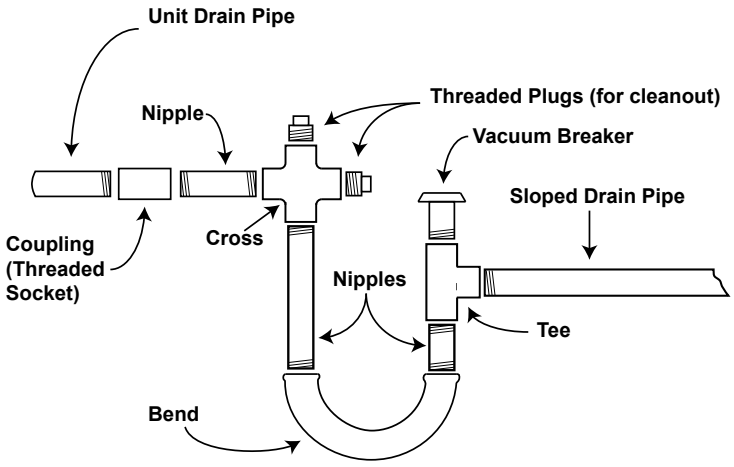
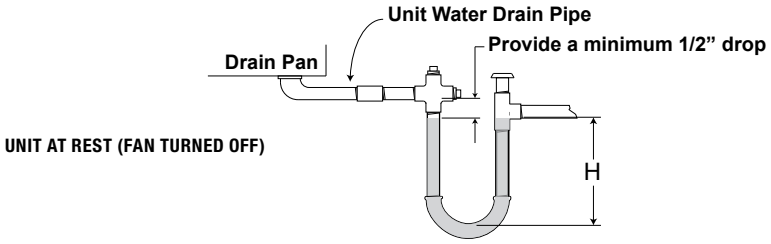


FIGURE 5.5.5 TYPICAL DRAIN TRAP CONSTRUCTION

In order to properly design drain traps, certain information must be obtained. First, carefully check the drawings to find the number and locations of all drain traps. Also from the drawings, determine if the drain traps will be positive or negative pressure.

If a positive pressure trap is needed, fabricate the trap as shown in the drawing below.



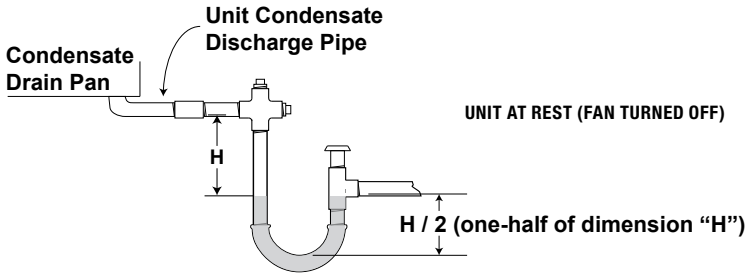
Dimension "H" equals the positive pressure in inches of water column PLUS a minimum of 1/2 inch

FIGURE 5.5.6 POSITIVE PRESSURE DRAIN TRAP CONSTRUCTION

When fabricating a positive pressure drain trap, dimension "H" equals the Static Pressure in inches of water column plus a minimum of 1/2 inch.

Be sure that the offset distance between the height of the condensate inlet and the condensate outlet is at least 1/2 inch.

If a negative pressure trap is needed, fabricate the trap as shown in the following drawing.



Dimension "H" equals the negative pressure in inches of water column PLUS a minimum of one inch

FIGURE 5.5.7 NEGATIVE PRESSURE DRAIN TRAP CONSTRUCTION

When fabricating a negative pressure drain trap, dimension "H" equals the Static Pressure in inches of water column plus a minimum of one inch. The outlet side of the drain trap should have a water column equal to one-half of dimension "H".

Specific materials and fittings are to be used as local conditions dictate. Since the trap is to be kept filled with either water or glycol solution at all times, it may be necessary to fabricate the trap from metal so that an electric heat tape can be installed to prevent freezing.

Condensate may be drained directly onto the ground only if local codes permit it. If allowed to drain directly, a pad must be provided for the condensate to drip onto.

5.5.4 Waterless Drain Traps

As an alternative to a field-fabricated and installed condensate P-trap, RenewAire offers an HVAC waterless trap. The advantages to a waterless trap are that they may require less vertical clearance for (negative pressure) installations, they generally do not require winterization and they do not require priming at the beginning of the cooling season.

Two different models are offered, both the N-type for negative pressure applications and the P-type for positive pressure applications. Both models are rated for a maximum of 12 In. W.C.. All waterless traps have a cleanout port for annual maintenance. RenewAire recommends that waterless traps be installed with a screen union kit to permit removal of the trap for maintenance, which consists of back-flushing with water or compressed air. RenewAire also recommends installation of a condensate pan overflow switch to shut down the DOAS if the condensate level should rise to unacceptable levels.

Type “P” waterless traps are typically installed vertically and require a 1" sweep on both the top and bottom. If screen-unions are used (recommended), that will increase the overall height clearance of the device slightly.

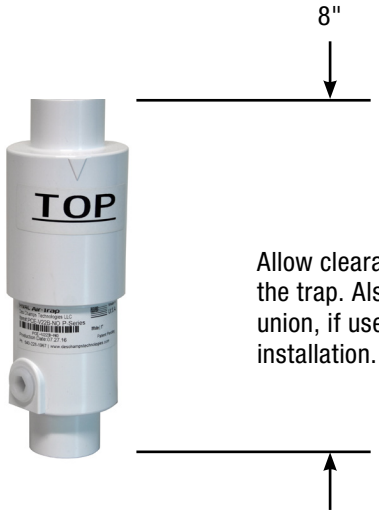


FIGURE 5.5.8 TYPE “P” POSITIVE PRESSURE WATERLESS TRAP

Type “N” traps are installed horizontally with the cleanout port UP. Follow manufacturer’s instructions for installation.

FIGURE 5.5.9 TYPE “N” NEGATIVE PRESSURE WATERLESS TRAP

	Maximum-positive-pressure	Maximum negative-pressure	Clearance required for positive pressure P-trap	Clearance required for negative pressure P-trap	Clearance required for positive pressure waterless trap	Clearance required for negative pressure waterless trap
DN-2	3–5 In. W.C.	3–5 In. W.C.	4.75"	7.75"	8.25"	4.25"
DN-3	3–5 In. W.C.	3–5 In. W.C.	4.75"	7.75"	8.25"	4.25"
DN-5	3–5 In. W.C.	3–5 In. W.C.	4.75"	7.75"	8.25"	4.25"

Maximum pressure is the In. W.C. detected at the condensate drain outlet. This pressure may vary, depending on factors such as airflow, fan position, and external static.

Clearance is the distance to be allowed BELOW the bottom of the DN unit base. This clearance represents typical P-trap construction based on provided guidelines or waterless trap construction, based on manufacturer's instructions.

5.6 GAS REQUIREMENTS

All DN units equipped with an indirect-fired gas heat module are to have gas supply connected in accordance with the instructions in the *RenewAire Indirect Gas-Fired Heat Module User Manual* supplied with this unit.

6.0 OPERATION

6.1 PRINCIPLE OF OPERATION

DN-Series units operate automatically based on the programming of the integrated controller. The unit receives a call for ventilation. Its isolation dampers open and turn on the fans. The unit determines the operating mode by continuously monitoring the air streams for temperature and enthalpy.

6.2 PRE START UP

Prior to operating the unit for the first time, perform the following steps:

6.2.1 Verify Voltage

Using a voltmeter, test the input voltages as supplied to the disconnect switch. Refer to Digit 13 of the unit Configuration Code to find the rated voltage. The supplied voltage must be within +/- 10% of the rated voltage.

6.2.2 Verify Transformer Wiring

Units with 230 VAC power source are shipped with the transformer wired for 208 VAC. If the unit is receiving 230 VAC, make sure the black primary-side wire on the transformer's 208 V terminal has been moved to the 230 V terminal.

6.2.3 Inspect Filters

Filters must be installed prior to fan start up. Filters must be clean and butted tightly against each other, allowing no air bypass around them.

6.2.4 Inspect Fans

Prior to start up, the fans should be rotated by hand to make sure that the impeller is not rubbing anywhere and that it turns freely.

6.2.5 Inspect and Clean the Interior

During the construction and installation phases of a project, dust, dirt and debris will often accumulate inside a unit. Thoroughly clean the inside of the unit by vacuuming and/or wiping with a damp rag.

6.2.6 Inspect Ductwork Connections

Ducts attached to the DOAS must be firmly attached, sealed and supported in accordance with installation instructions and SMACNA guidelines.

6.3 BASIC OPERATIONAL CHECK

Prior to connection and activation of any external controls, the DN is to be tested for correct operation. Verify that all Pre Start up steps as described above have been performed.

6.3.1 Quick-Start

See the *DN-Series Quick-Start Guide* for a complete set of instructions to verify damper operation and correct fan rotation. The basic steps are:

- Turn ON the unit disconnect switch located on the face of the E-box. The controller will boot-up and the display illuminates.
- From the controller Main Menu, switch the Unit Enable status to ON. The isolation dampers open and then the fans start turning.
- Once the fans begin moving, change the Unit Enable status to OFF. Verify the fans are turning the correct direction.

6.3.2 Fan Rotation

The first time the unit is started, verify the fans are turning the correct direction. If a fan is turning the wrong direction, it is likely due to a three-phase power source has been improperly connected.

6.3.3 Current Switch Setting

Current switches are calibrated at the factory for the default fan mode of fixed speed, 25% of maximum. Whenever new fan speed parameters are entered, the current switches must be recalibrated. See the instructions in Section 7.1.14 of this manual.

NOTE: All dampers should be tested at start up to verify that the dampers will open fully. *See the DN Quick-Start Guide.*

6.4 FINAL UNIT SET-UP

After completing the Quick-Start, the unit is ready for final set up. Set up the unit and the integrated controller based on the equipment and options installed and the application. Refer to the *DN-Series Integral Programmable Controls User Manual* for controller programming and operation. Make final connections for any external controls.

NOTE: For information on programming and operating the Integrated Programmable Controller, see the *DN-Series Integral Programmable Controls User Manual*.

7.0 MAINTENANCE

RenewAire units are built to operate with minimal maintenance. Experience on the part of the service person is the most important issue in establishing a maintenance schedule. Maintenance is performed on a quarterly and annual basis.

24 hours after unit installation and initial start up, perform the following:

- If the unit has DX or cooling coils, inspect the condensate pan to make sure condensate is draining properly.
- Check air filters since they collect dust, dirt and debris at time of start up.

7.1 SCHEDULE

Maintenance of this unit is broken down into quarterly and annual tasks. The schedule should be adjusted for heating and cooling. If there is a cooling system in the unit, the annual maintenance should be scheduled for the start of the cooling season. If there is a heating system in the unit, the annual maintenance for the heating system should be scheduled for the start of the heating season. For some installations, it may be necessary to perform these tasks more often.

7.1.1 General Cleaning and Inspection (Quarterly)

Perform general cleaning and inspection when changing filters.

- Remove foreign objects from unit.
- Remove paper, leaves, etc. from inlet and outlet screens.
- Inspect for insect nests in unit, inlets and outlets.
- Check drain pans for overflowing and pooling.
- Check all motor and blower wheel mounting bolts are tight.

7.1.2 Filters (Quarterly)

Filter cleanliness and replacement is the most important and frequent maintenance issue. Dirty filters will cause an immediate reduction in operating efficiency of the DOAS. Normally, filter condition should be checked frequently by checking pressure drop data on the integrated microprocessor controller. The controller constantly monitors air pressure within the unit and will provide an alarm when pressure drop across the filters exceeds a user-assigned setpoint. Paper filters are not to be cleaned, they are to be replaced. In general, if a filter looks dirty, replace it.

Filter sizes and quantities:

DN-2: 16" x 20" x 2" nominal. Quantity: 4

DN-3: 20" x 20" x 2" nominal. Quantity: 6

DN-5: 16" x 20" x 2" nominal. Quantity: 14
DN-5 filter quantities include (10) for enthalpic cores and (4) for bypass.

7.1.3 Filters Pressure Drop Tables

2" MERV 8 Clean Filter Pressure Drop (In. W. G.)															
Airflow (CFM)	375	500	750	1000	1125	1500	1650	2000	2500	3000	3300	3500	4000	4500	4950
DN-2	0.04	0.05	0.09	0.12	0.13	0.19	0.21								
DN-3			0.04	0.06	0.07	0.09	0.10	0.13	0.16	0.20	0.22				
DN-5					0.05	0.07	0.07	0.09	0.12	0.14	0.16	0.17	0.20	0.23	0.26

2" MERV 13 Clean Filter Pressure Drop (In. W.G.)															
Airflow (CFM)	375	500	750	1000	1125	1500	1650	2000	2500	3000	3300	3500	4000	4500	4950
DN-2	0.05	0.06	0.10	0.15	0.17	0.25	0.29								
DN-3			0.05	0.07	0.08	0.11	0.12	0.16	0.21	0.27	0.31				
DN-5					0.06	0.08	0.09	0.11	0.15	0.19	0.21	0.23	0.27	0.32	0.37

4" MERV 13 Clean Filter Pressure Drop (In. W.G.)															
Airflow (CFM)	375	500	750	1000	1125	1500	1650	2000	2500	3000	3300	3500	4000	4500	4950
DN-2	0.04	0.05	0.08	0.12	0.14	0.22	0.25								
DN-3			0.04	0.05	0.06	0.09	0.10	0.13	0.18	0.23	0.27				
DN-5					0.04	0.06	0.07	0.09	0.12	0.16	0.18	0.20	0.24	0.28	0.33

2" MERV 14 Clean Filter Pressure Drop (In. W.G.)															
Airflow (CFM)	375	500	750	1000	1125	1500	1650	2000	2500	3000	3300	3500	4000	4500	4950
DN-2	0.11	0.16	0.26	0.37	0.44	0.65	0.75								
DN-3			0.12	0.17	0.19	0.28	0.31	0.40	0.55	0.71	0.81				
DN-5					0.14	0.19	0.22	0.28	0.37	0.48	0.54	0.59	0.72	0.85	0.98

4" MERV 14 Clean Filter Pressure Drop (In. W.G.)															
Airflow (CFM)	375	500	750	1000	1125	1500	1650	2000	2500	3000	3300	3500	4000	4500	4950
DN-2	0.08	0.11	0.18	0.27	0.31	0.47	0.54								
DN-3			0.08	0.12	0.13	0.20	0.22	0.29	0.39	0.51	0.59				
DN-5					0.10	0.14	0.15	0.20	0.27	0.34	0.39	0.43	0.52	0.62	0.72

7.1.4 Cabinet Maintenance (Annual)

Once each year the entire cabinet should be thoroughly inspected for dirt build-up, corrosion or scratches to the finish (whether galvanized or painted). If dirt build-up is found, it should be cleaned and the source corrected. If scratches or corrosion are found, the surface should be cleaned and a protective coating should be applied.

Annual inspection:

- Inspect all door seals to make sure they are still pliable and function properly. Replace any seals that are hardened, cracked or ineffective.
- Inspect doors for proper alignment and door handle tension. See Section 7.1.15 in this manual.
- Inspect all caulked joints to verify that caulking is in good repair. Any joint caulk that is cracked or ineffective should be removed and replaced with fresh caulking.
- Look for rust, corrosion or dirt build-up. If found, clean the area and apply a proper sealant. Correct the source of any dirt.

7.1.5 Electric Motor Maintenance (Annual)

The most important issue in motor maintenance is motor cleanliness. Removing dust and grease buildup on the motor housing assists proper cooling. Never wash-down the motor.

7.1.6 VFDs (OPTIONAL)

Power electronics have limited life and may exhibit changed characteristics or performance deterioration after years of use under normal conditions. Periodic inspection and maintenance of the drive unit is required.

Drives contain a variety of power electronics such as power transistors, semiconductors, capacitors, resistors, fans, and relays. The electronics in the drive serve a critical role in maintaining proper motor control.

The VFD manual that was shipped with the unit has a maintenance and inspection schedule.

The drive will require more frequent inspection if it is placed in harsh environments, such as:

- High ambient temperatures
- Frequent starting and stopping
- Fluctuations in the AC supply or load
- Excessive vibrations or shock loading
- Poor storage conditions

Perform the first equipment inspection 3 months after installation.

The cooling fan on a VFD has an expected life of 2–3 years while the main circuit capacitors have an expected life of 10 years.

Inspect all VFDs annually to verify that cooling fans are not blocked and are operating properly without causing overheating of either the VFD or the driven motor.

VFDs have a Performance Life Monitor built in so that the owner can use the keypad on the VFD to check for expected remaining life.

7.1.7 Enthalpic Core Maintenance (Annual)

⚠ CAUTION

RISK OF DAMAGE TO ENTHALPIC CORES

Whenever working within the DOAS cabinet, protect the enthalpic cores from accidental damage. The core media is subject to damage from dropped tools or other foreign objects.

The enthalpic core media is a fibrous material that must be kept clean at all times. As a minimum, cores should be cleaned once per year.

- DO NOT WASH OR ALLOW THE ENTHALPIC CORES TO GET WET.
- DO NOT EXPOSE THE ENTHALPIC CORES TO HIGH HEAT OR FLAMES.

NOTE: When cores are removed from the unit, they should be immediately protected from accidental damage, water, high heat, or flames.

- DO NOT DIRECT COMPRESSED AIR AT THE CORE MEDIA.
- DO NOT REMOVE THE ENTHALPIC CORES FROM THE UNIT UNLESS NECESSARY.
- USE CAUTION WHEN WORKING AROUND THE ENTHALPIC CORES. DO NOT DROP TOOLS OR OTHER OBJECTS ON THE CORES, DO NOT BUMP OR TWIST THE CORES.

To access enthalpic cores for cleaning, remove the air filters.

To clean enthalpic cores, all exposed surfaces must be vacuumed with an attachment having long, soft bristles. The greatest buildup of dirt and dust will normally be on the leading 1–2 inches of the inlet side (closest to the air filters).

Removal of Enthalpic Cores

Before removing enthalpic cores, switch the main disconnect to OFF. Open the door to the Energy Recovery Module and simply pull each core straight out of its guides.

FIGURE 7.1.0 END VIEW OF CORE SUPPORT ASSEMBLY

Reinstallation of Enthalpic Cores

Many DN units use a combination of what are referred to as “full size” and “half size” cores. When a half size core is used, it is positioned next to the access door. Full size cores are located behind any half size core. Cores have foam gasketing on one end of each core. The core should be reinstalled so that the foam gasketing is toward the back of the DN unit and the core label is facing toward the front. See illustration above.

7.1.8 Coil Maintenance (Annual)

⚠ CAUTION

RISK OF INCIDENTAL DAMAGE TO DOAS COMPONENTS

Many cleaning agents that are commonly used on coils may be damaging to other components such as enthalpic core media. Use protective sheeting to prevent accidental spread of chemicals. Thoroughly wash down the area when finished.

The primary maintenance issue with coils is “housekeeping”. Periodic inspection of all coils is needed to search for bent fins which will impede air flow and inspect for cleanliness which reduces the efficiency of the coil.

Coils must be cleaned to maintain maximum performance. Check coils once per year under normal operating conditions and if dirty, brush or vacuum clean.

Soiled fins reduce the capacity of the coil, demand more energy from the fan and create an environment for odor and bacteria to grow and spread through the conditioned zone. Low pressure water spray may be used for cleaning the fins. In all cases, TEST THE SPRAY PRESSURE over a small corner of the coil to determine if the fins will withstand the spray pressure. Bent fins should be straightened as needed.

The RTFP coil uses round copper tubing with many thin aluminum plates that go from tube to tube. The aluminum plates can easily be bent and when that happens, the plates need to be straightened. Use a common "fin comb" to straighten the plates. If there is dirt build-up on the fins, the ability of the coil to transfer heat is greatly reduced. Dirt can be cleaned off by using a commercial cleaning agent and then hosing it down with fresh water.

For coils with fragile fins or high fin density, foaming chemical sprays and washes are available. Many coil cleaners use harsh chemicals, so they must be used with caution by qualified personnel only. Care must be taken not to damage the coils, including the fins, while cleaning.
Caution: fin edges are sharp!

NOTE: Whenever using cleaning agents inside an unit, thoroughly wash down the area with fresh water when finished. Make sure that all residue, including cleaning chemicals, has been removed from the unit.

CAUTION: Use of glycol or polypropolyene in ratios other than originally specified will affect thermal exchange properties.

7.1.9 Condensate Drain Maintenance (Annual)

Every DN unit having either a chilled water coil or a DX coil will have a drain pan. A drain pan is a tray or pan inside the unit that is designed to collect condensation resulting from normal operation of cooling coils.

Drain traps are located outside the air handler and are connected to a drain pan. A drain trap gives a path for discharge of condensation but its primary function is to provide a water column that prevents outside air from being drawn into the unit.

Drain pans and drain traps are places that are subject to bacteria growth. Each month, drain pans and drain traps should be inspected and drain traps should be filled. Inspect both the traps and the pans for evidence of bacteria or algae. If there is any evidence, clean thoroughly and treat with an appropriate growth inhibitor. If evidence of algae or bacterial growth is found, inspect and treat weekly until the problem is solved.

At the start of each heating season, drain traps should be filled with a glycol solution and if there is an electric heater (heat tape) on the trap or drain trap discharge pipe, it should be tested to make sure it functions properly.

7.1.10 Damper Maintenance (Annual)

IMPORTANT

Damper linkages are to be lubricated with a graphite lubricant that does not contain petroleum or silicone. Petroleum lubricants are known to cause build-up of dirt and grime, while silicone lubricants can cause contamination spread in facilities where finishing of products with lacquers and paints is performed.

Dampers are to be inspected annually for correct operation. Make sure they open and close fully. Inspect the side linkages for excessive looseness and lubricate the linkages with graphite lubricant.

7.1.11 Fan Maintenance (Annual)

All DN units use 2 direct-drive plenum fans. Blow or wipe any accumulated dust off the blower wheel. Inspect the wheel for cracks or other damage. Observe the fans during operation, checking for vibration or noise. Rotate the impellers by hand, checking for any rubbing of the impeller against the inlet cone.

7.1.12 Gas Heat Module Maintenance (Annual)

See the gas heat module maintenance requirements as shown in the *Indirect Gas-Fired Heat Module User Manual.*

7.1.13 Electric Heat Module Maintenance (Annual)

See the electric heat module maintenance requirements as shown in the *Integrated Electric Heater Module User Manual.*

7.1.14 Current Switch Adjustment

Current switches are installed in the low voltage side of the E-Box. They work by sensing current passing through one or more high voltage power lines that pass through the center of the switch module.

Each switch has two indicator LEDs, showing “trip off” or “trip on”. The switch functions as an alarm condition indicator for the unit controller. If the switch goes into alarm, the controller alarm will reset itself when the alarm condition is satisfied. The controller will not reset itself and will continue to show an alarm in the circuit or system being monitored. **Current switches are to be field-adjusted when the unit is running at its minimum speed.**

FIGURE 7.1.1 CURRENT SWITCH (TYPICAL)

On the top of the sensor, there are an adjusting screw and two LED lights, one red and one blue. The adjusting screw will turn 15 turns. To set the sensor:

- Verify the BLUE LED is on.
- Slowly adjust the screw clockwise until the RED LED just turns on. This sets the trip point at the normal operating load current.
- If the RED LED is on after initial power-up, slowly adjust the screw counter-clockwise until the BLUE LED turns on and then slowly adjust the screw clockwise until the RED LED just turns on.

7.1.15 Door Latch Adjustment

With age and use, the door gaskets may become compressed and no longer provide a complete seal against air leakage. The door latches can be easily adjusted by changing the position of the swing arm on the inside of the door. See photo below.

FIGURE 7.1.2 DOOR LATCH ADJUSTMENT

7.1.16 Fan/Motor Removal

Each EC motor and fan are part of an assembly that is mounted on an air inlet cone. If a fan or EC fan motor should require servicing or replacement, the entire assembly should be removed from the DN. The assembly is bolted to the plenum wall with 8 bolts and the assembly rests on a bracket. See the Service Parts illustration in this section. Also see photographs on following page.

Each asynchronous motor and fan are part of an assembly that is mounted on a sled. If a fan or fan motor should require servicing or replacement, the fan and motor should be unbolted from the sled in order to remove it from the DN. See the Service Parts illustration in this section. Also see photographs on following page. When reinstalling the motor and fan, verify correct clearances from the fan to the inlet cone.

FIGURE 7.1.3 SINGLE PHASE EC MOTOR WIRING CONNECTIONS

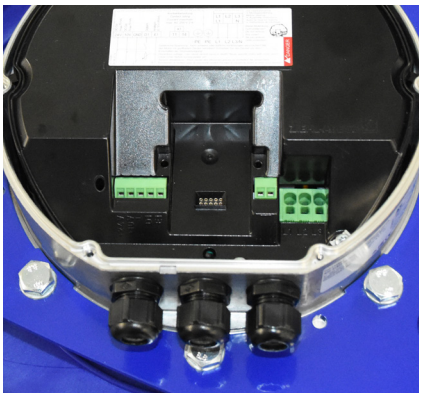


FIGURE 7.1.4 THREE PHASE EC MOTOR WIRING CONNECTIONS

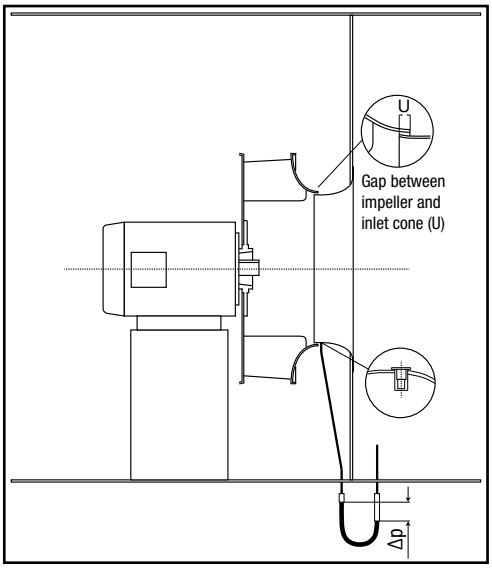


FIGURE 7.1.5 ASYNCHRONOUS MOTOR AND FAN ASSEMBLY, CORRECT OVERLAP IS .14"

7.1.17 Coil Removal

If it becomes necessary to remove any water or DX coil from a DOAS, it will have to be pulled straight forward through the front access panel opening. Any DX coil that is in the coil compartment will have to be evacuated. All coil tubes that extend through the access door must be cut off to allow removal of the door. Coils rest on either a bracket or rails and each coil has a positioning bracket at the rear of each coil, holding it in place. There are also two retaining bolts at the front of each coil, positioned toward the front of the DOAS.

7.1.18 Water Treatment

RenewAire does not make any recommendations regarding minimum water quality for user-supplied water in the DOAS coils. If the user is employing a water treatment system, observe the instructions provided with the specific treatment system.

7.1.19 Winterization

Winterization normally applies to “wet” areas of an air handler that will be exposed to freezing temperatures. This includes any water-filled coils and/or water supply piping and water drains, such as from condensate pans and P-traps. Prior to the first hard frost of the year, all air handler components should be examined and a plan put in place to either remove all water from the device or else to protect water-laden components. It is the user’s responsibility to determine possible freezing risks and implement a plan to protect the unit from freeze damage.

7.2 MAINTENANCE RECORDS

Also see the User Manuals for any included options such as gas heat and electric heat.

MAINTENANCE LOG			
ENTER DATES OF SERVICE			
OA FILTER CHANGE	RA FILTER CHANGE	INSPECTION/ CLEANING	INITIALS

7.3 SERVICE PARTS

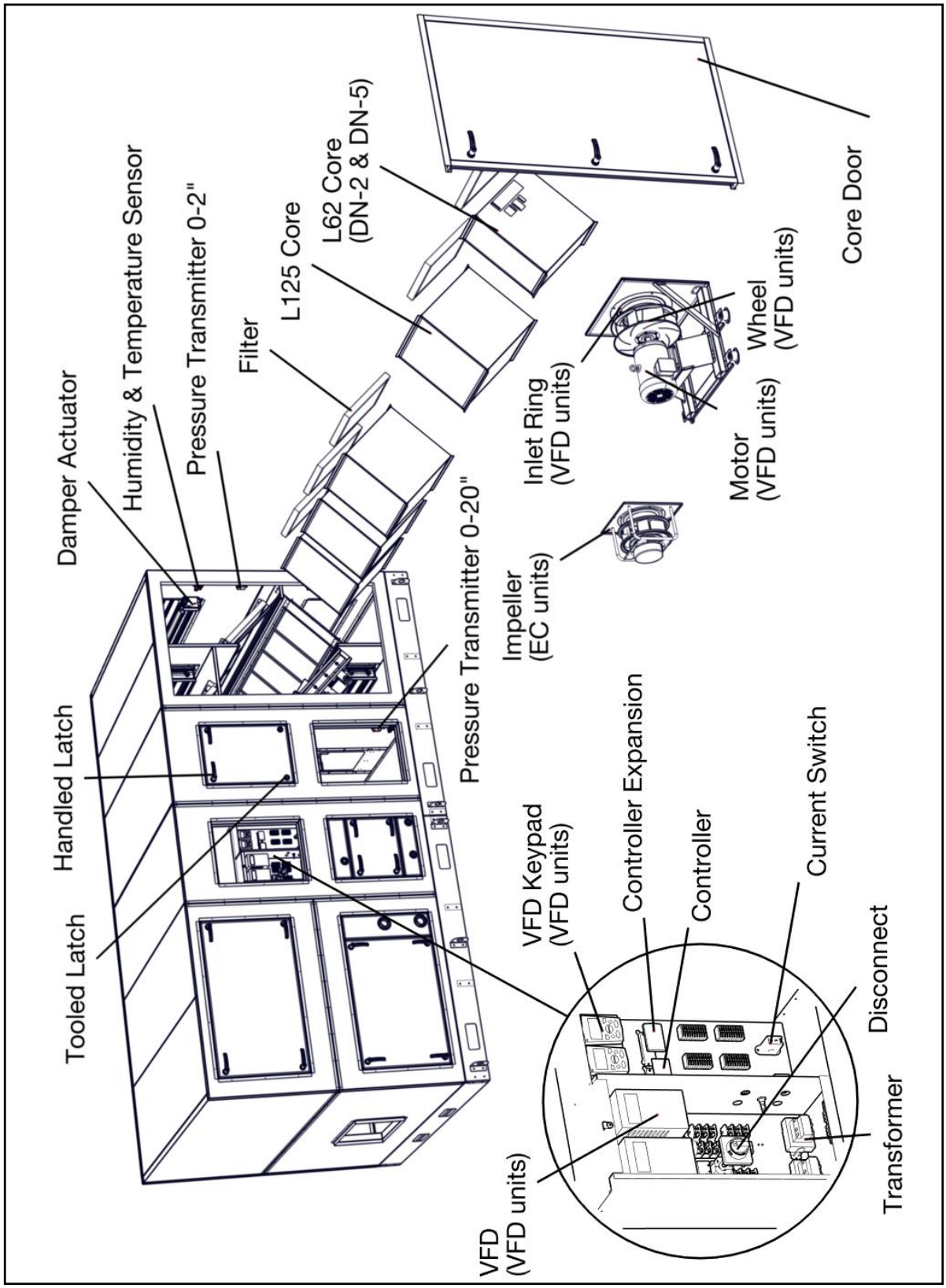


FIGURE 7.3.0 DN SERVICE PARTS

8.0 TROUBLESHOOTING

The DN unit was tested at the factory prior to shipment. After installation, the Integrated Controller should be set up at the site for the specific application. Over time, components can wear out or become inoperable.

Before calling the factory, perform the following checks:

- Check there is voltage at the disconnect switch. A remote disconnect switch or circuit breaker may be turned off,
- Check there is voltage across the fuses, if any. If a fuse is blown, remove the cause of the short circuit and replace the fuse.
- Check that the integrated controller display is lit. If it is not, check the controller fuse. Check the 24 VAC transformer circuit breakers. If fuse is blown or if circuit breakers tripped, remove excessive load causing short circuit. Replace fuse or reset transformer circuit breakers.
- Verify there is a call for the unit to operate. The OA and EA dampers should be open. If the dampers are not open, troubleshoot the dampers. If dampers are open but fans are not operating, then the current switches may need adjustment. See Section 7.1.14 Current Switch Adjustment.

Any faults in the operation of the DN unit are normally recorded by the Integrated Controller. The first step in troubleshooting is to view the Alarm screens. Press the Alarm button on the face of the controller to see all current alarms and what function or component is causing the alarm. In some cases, the Alarm pre-set may need to be adjusted or an offset may need to be changed.

BEFORE MAKING ANY CHANGES TO THE CONTROLLER PROGRAMMING, BE CERTAIN TO HAVE AN UPDATED BACKUP FILE SO THAT CURRENT SETTINGS CAN BE EASILY RESTORED, IF NEEDED.

Problems are sometimes strictly mechanical, in which a fan or damper or some other component simply stops working. Mechanical problems are easily traced to specific components by using the prompts provided by the Alarm function button on the face of the controller.

In other cases, problems may be caused by the unit trying to overcome a pre-set or operating parameter that has been set by the user. In these cases, a simple adjustment of the pre-set or an offset may correct the Alarm condition.

9.0 FACTORY ASSISTANCE

In the unlikely event that you need assistance from the factory for a specific issue, make sure that you have the information called for in the Unit Records page in the Owner Information section of this manual. The person you speak with at the factory will need that information to properly identify the unit and the installed options.

To contact RenewAire Customer Service:

Call: 800-627-4499

Email: RenewAireSupport@RenewAire.com

Remember that RenewAire Customer Service can only assist with the products sold by RenewAire, it cannot resolve engineering issues that result from air handling system design by others, nor can it provide instructions for connecting to an owner-supplied BMS. There is a complete points list found in the *RenewAire DN-Series Integrated Programmable Controls User Manual,* provided with the unit and also available on the RenewAire.com website.

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

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