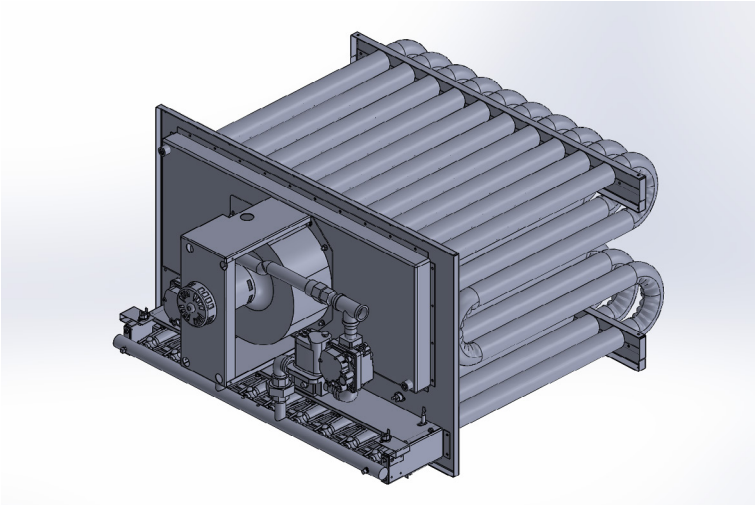
RenewAire
Energy Recovery Ventilation

Integral Indirect Gas-Fired Heat Module

Supplemental Manual for Options

DN-Series



Indirect Gas Heat Module Shown

Intertek

⚠ WARNING

FIRE OR EXPLOSION HAZARD

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

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

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

⚠ WARNING

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

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

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠ 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.

⚠ AVERTISSEMENT

RISQUE D'INCENDIE OU D'EXPLOSION

Le non repsect des mises en garde pourrait entraîner des blessures graves, la mort ou des pertes matérielles.

Prendre soin de lire et de comprendre les instructions d'installation, de fonctionnement at d'entrention contenues dans ce guide.

Une installation, un réglage, une modification, une réparation ou un entretien inapproprié peut entraîner des blessures graves, la mort ou des pertes matérielles.

⚠ AVERTISSEMENT

Ne pas entreposer ni utiliser d'essence ou autre vapeurs ou liquides inflammable à proximité de cet appareil ou de tout autre appareil.

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ

- Ne tentez pas d'allumer un appareil.
- Ne touchez pas à un interrupteur; n'utilisez pas de téléphone dans l'édifice où vous vous trouvez.
- Sortez de l'édifice immédiatement.
- Appelez immédiatement le fournisseur de gaz à partir d'un téléphone à l'exterieur de l'édifice. Suivez les instructions du fournisseur de gaz.
- Si vous ne pouvez joindre le fournisseur de gaz, appelez les pompiers.

L'installation at les réparations doivent être confiées à un installateur qualifié ou au fournisseur de gaz.

⚠ AVERTISSEMENT

RISQUE FLASH D'ARC ET DE CHOC ÉLECTRIQUE

Risque d'arc êlectrique et de choc électrique. Débrancher toutes les alimentation électrique, vérifier avec un voltmètre que l'alimentation électrique est coupée et portez des vêtements de protection conformément à la norme NFPA 70E avant de travailler dans la console de commande électrique. Le non-respect peut entraîner des blessures graves ou la mort.

Le client doit fournir la terre à l'unité, selon les codes NEC, CEC et locaux, selon le cas.

Avant de procéder à l'installation, lisez toutes les instructions, vérifiez que toutes les pièces sont incluses at vérifier la plaque signalétique pour vous assurer que la tension correspond à la puissance disponible du réseau.

Le côté entrée du sectionneur contient une haute tension active.

La seule façon de s'assurer qu'il n'y a pas de tension à l'intérieur de l'unité est d'installer et d'ouvrir un interrupteur de déconnexion à distance et de vérifier que l'alimentation est coupée à l'aide d'un voltmètre. Référe-vous au schéma électrique de l'appareil.

Suivez tous les codes locaux.

⚠ CAUTION

RISK OF ELECTRIC SHOCK OR EQUIPMENT DAMAGE.

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

⚠ ATTENTION

RISQUE DE CHOC ELECTRIQUE OU DE DOMMAGE D'APPAREIL

Chaque fois que le câblage électrique est connecté, déconnecté ou changé, l'alimentation électrique du module et des commandes du module doit être déconnectée. Verrouillez et étiquetez le sectionneur ou le disjoncteur pour éviter une reconnexion accidentelle de l'alimentation électrique.

⚠ CAUTION

Do not install units in locations where flue products can be drawn into adjacent building openings such as windows, fresh air intakes, etc.

Distance from vent terminal to adjacent public walkways, adjacent buildings, operable windows and building openings shall conform with the local codes. In the absence of local codes, installation shall conform with the National Fuel Gas Code, ANSI Z223.1 or the Canadian CAN/CGA B-149 Installation Codes.

⚠ ATTENTION

N'installez pas les appareils dans des endroits où les produits de combustion peuvent être aspirés dans les ouvertures de bâtiment adjacentes, comme les fenêtres, les prises d'air frais, etc.

La distance entre le terminal de ventilation et les allées publiques adjacentes, les bâtiments adjacents, les fenêtres ouvrantes et les ouvertures de bâtiment doivent être conformes aux codes locaux. En l'absence de codes locaux, l'installation doit être conforme au Code national du gaz combustible, à la norme ANSI Z223.1 ou aux codes d'installation Canadiens CAN/CGA B-149.

⚠ CAUTION

Installation of wiring must conform with local building codes. In the absence of local building codes, installation must conform to the National Electric Code ANSI/NFPA 70-Latest Edition. Unit must be electrically grounded in conformance with this code. In Canada, wiring must comply with CSA C22.1, Canadian Electrical Code.

⚠ ATTENTION

L'installation du câblage doit être conforme aux codes du bâtiment locaux. En l'absence de codes de construction locaux, l'installation doit être conforme au Code national de l'électricité ANSI/NFPA 70-dernière édition. L'unité doit être mise à la terre électriquement conformément à ce code. Au Canada, le câblage doit être conforme à la norme CSA C22.1 du Code Canadien de l'électricité.

NOTICE

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.

IMPORTANT

Cet équipement doit être installé en suivant les meilleures pratiques de l'industrie et tous les codes applicables. Tout dommage aux composants, aux assemblages, aux sous-ensembles ou à l'armoire qui est causé par des pratiques d'installation incorrectes annulera la garantie.

NOTE: SEE ADDITIONAL CAUTIONS AND WARNINGS IN SECTION 4.8, GAS PIPING INSTALLATION.

REMARQUE: VOIR LES MISES EN GARDE ET LES AVERTISSEMENTS SUPPLÉMENTAIRES DE LA SECTION 4.8, INSTALLATION DE TUYAUTERIE DE GAZ.

SAVE THIS MANUAL

NOTICE

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

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.

UNIT INFORMATION

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

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

NOTE: This information is for purposes of identifying the unit-specific option data from the option code. *See DN-SERIES IOM manual* for further details.

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

Unit Option Code: D N - □ - □□□□□□□□□□□□G□□□□□□□

Serial Number: □□□□□□□

SO#: □□□□□

UNIT INFORMATION

RenewAire Energy Recovery Ventilation
201 Raemisch Rd Waunakee, WI 53597 (800) 627.4499
renewairesupport@renewaire.com

Energy Recovery Ventilator

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

Option Code DN-3-JRTBV138---G3VN2---L
Model/Modele DN-3-JRT **Sales Order** 485962
Serial Number F25125321D **Job Order** 745633-0000
SCCR 5 KAIC

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

Voltage	Minimum Circuit Amps	Max Overcurrent Protection Device
575V	14.3	15
60 HZ 3-Phase	Amp. Minimales de Circuit	Dispositif de protection maximum contre les surintensites

Coil	Type	Rows	FPI	Max. Pressure (psi/MPa)
Dehumidify	-	-	-	-
Re-heat	-	-	-	-
Heat	-	-	-	-
Coil	Type	Rangee	FPI	Max. Pression (psi/MPa)

Motors Thermally Protected / Moteurs protégé thermiquement

Voltage	Qty & kW/HP	FLA
575	2@5.0 HP	5.3
	Qty & kW/CV	APC

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

Voltage	Qty & kW/HP	FLA
575	2@5.0 HP	6.1
	Qty & kW/CV	APC

Gas Heater / Chauffage A Gaz

Voltage/Phase	Amps	Input MBH
115V/1-Ph	2.4	100
Natural Gas		

WARNING AVERTISSEMENT

Danger of electric shock. Always disconnect power source before servicing. Do not install in a cooking area or make line-voltage electrical power connections directly between this unit and any appliance.
Danger de choc électrique. Toujours 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.

133997_002

UNIT LABEL (TYPICAL)

RenewAire Energy Recovery Ventilation
201 Raemisch Rd Waunakee, WI 53597 (800) 627.4499
renewairesupport@renewaire.com

PACKAGED HEATER
For Industrial / Commercial Use
ANSI Z83.8 / CSA 2.6

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

For Outdoor Use Only / Pour Usage Exterieur Seulement

Max. Input / Consommation max.	100000	Btuh	29307	W	Category III
Min. Input / Consommation min.	20000	Btuh	5861	W	
Max. Output / Puissance maximale	81000	Btuh	23739	W	
Max. Airflow / Debit d'air maximal	3750	CFM	Min. Airflow / Debit d'air min.	1250	CFM

Gas heater tested at / Chauffage au gaz teste a 2.5 in. wc.

Equipped For / Equipe pour	Natural	Gas With / Gaz avec	2.30mm	Drill Orifice / trou d'orifice
Manifold Press. / Pression d'alimentation	3.5	In. wc	0.88	kPa
Minimum Gas Supply Pressure for input: / Pression minimale d'alimentation du gaz pour l'entree:	5	In. wc	1.25	kPa
Electrical / Alimentation d'electrique	115	VAC, 60 Hz, 1-ph	2.4	Amps

For installation in Non-Combustible cabinet on the positive pressure side of circulating air blower. Suitable for installation downstream of refrigeration systems. / Pour l'installation dans une armoire non combustible sur le côté positif de la ventilateur d'air de circulation. Convient pour l'installation en aval des systèmes de réfrigération.

Minimum clearance to combustible construction / Dégagement minimum de la construction combustible:
Sides 6 In. Top 6 In. Base 2 In. Front 36 In.

WARNING

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

AVERTISSEMENT

Une installation, un reglage, une modification, une reparation, ou un entretien non conforme aux nomes peut entrainer des dommages materiels, des blessures ou la mort. Lisez attentivement les instructions d'installation, de fonctionnement et d'entretien avant de faire l'installation ou l'entretien cet equipement.

133969_002

TYPICAL GAS HEATER RATING LABEL

TABLE OF ILLUSTRATIONS

TABLE OF WIRING SCHEMATICS

1.0 OVERVIEW

1.1 DESCRIPTION

The gas heater found in the RenewAIre DN unit is an indirect gas fired heat module, classified as either Category I or Category III. Flue gas venting is either horizontal (through the wall) or vertical (through the roof). Modules can be ordered in several different BTU inputs. All modules produce a low pressure drop and are enclosed within a galvanized steel cabinet. The temperature rise across the module is 30–70˚F [-1.11–21.1˚C].

THESE HEAT MODULES COMPLY WITH ANSI Z83.8 AND CSA 2.6M GAS-FIRED HEAT MODULE

NOTE: This unit is an integral indirect gas-fired heat module that will be referred to in this manual as a module.

NOTE: Within this manual, U.S. units of measure are given first and then the SI version is provided in brackets [ ] immediately after.

1.2 GAS SUPPLY

RenewAire gas-fired heat modules can be ordered with either natural gas or LP gas as a fuel source, not to exceed pressure of 13.5 inches water Column (InWC) [3,359 Pa]. For all modules:

- **Natural gas supply** pressure must be a **minimum** of 5 InWC [1,244 Pa] and a **maximum** of 13.5 InWC [3,359 Pa].
- **Propane gas supply pressure** must be a **minimum** of 12 InWC [2,986 Pa] and a **maximum** of 13.5 InWC [3,359 Pa].
- If gas pressure exceeds 13.5 InWC [3,359 Pa], an additional regulating valve must be field-supplied and installed.

1.3 ELECTRICAL SUPPLY

The gas heat module is factory-wired and requires no additional field wiring. Line voltage readings between L1 and Neutral as well as L1 and Ground should be within +/- 3 volts of the voltage rating on the module data label, found on the front of the heat module.

1.4 INPUT CAPACITY IN MBH [W]

Gas module sizes are based upon the INPUT MBH (thousands of BTUs per hour) [Watts]. This is a measure of heat energy available and is not to be confused with heat output, which is affected by the efficiency of the module. Modules are available in the following input capacities:

- 50 MBH [14,653 W]
- 75 MBH [21,980 W]
- 100 MBH [29,307 W]
- 125 MBH [36,633 W]
- 150 MBH [43,960 W]
- 200 MBH [58,614 W]
- 250 MBH [73,267 W]
- 300 MBH [87,921 W]
- 350 MBH [102,574 W]

NOTE: All indirect gas-fired heat modules are 81% efficient.

IMPORTANT

The gas module sizes shown above are rated for installation at altitudes up to 2,000 feet [610 m]. Starting at altitudes above 2,000 feet [610 m], appliances should be de-rated 4 percent and another 4% for each 1,000 feet [305 m] of elevation above 2,000 feet. Example:

2000–2999 Ft = 4% de-rate

3000–3999 Ft = 8% de-rate

4000–4999 Ft = 12% de-rate

5000–5999 Ft = 16% de-rate

6000–6999 Ft = 20% de-rate

7000 Ft and above, consult factory

1.5 GAS MODULE MODULATION (TURNDOWN)

Turndown is a gas module operating mode in which the input gas volume is reduced to provide more consistent heating of the Occupied Space. Example: a 200 MBH input module is being used to provide heat when ambient conditions call for only a small amount of added heat. Rather than the module running at full output for a brief period, the gas supply is reduced in order to provide a smaller heat output, which allows the module to run for a longer period, improving hysteresis. Each modulation scheme requires that the gas train be designed for that specific turndown scheme. Modulation of the gas supply typically involves a different gas valve or valves, some programming differences to the onboard controller and a different gas manifold. All heat modules are modulated. RenewAire gas heat modules are available with the following turndown options:

- 5:1 Modulation (available for gas heat modules 50–350 MBH)
- 10:1 Modulation (available for gas heat modules 200–350 MBH)

Module turndown is expressed as a ratio of the maximum to minimum heat output. Example: a module that can deliver as little as one tenth of its maximum rating is said to have a turndown ratio of 10:1.

1.6 GAS VALVES

Gas valves used in RenewAire gas heat modules are 1-stage, 2-stage and modulated. See Section 4.7 Gas Valve Illustrations in this manual. Every gas valve is normally closed (NC) and requires an activating signal from an ignition controller to activate the valve solenoid. If the valve is 2-stage, an additional signal from the signal conditioner is required to change the gas output to the second level, or stage. If the valve is modulating, a variable (analog) signal is required from the signal conditioner to vary the gas output from the valve. Staged valves (either 1-stage or 2-stage) have fixed output levels for each stage. A modulating valve provides a variable output, dependent on a 0–10 volt signal sent to the valve from the Maxitrol Signal Conditioner. Modulating valves are used in conjunction with staged valves to arrive at the desired turndown.

1.7 IGNITION CONTROLLERS

Each gas manifold or each section of a split manifold has its own ignition system, controlled by a Capable Controls Series 5 ignition controller. The ignition controller controls the ignition spark, the flame sensor, air proving switch and activates the solenoid on the gas valve. Heat modules with 5:1 turndown generally have only one ignition controller and a single gas manifold. Heat modules with 10:1 turndown generally have a split gas manifold with two ignition controllers and two ignition systems.

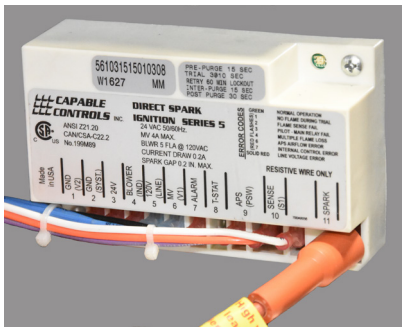


FIGURE 1.7.0 IGNITION CONTROLLER (TYPICAL)

MODEL SC-30 USED TO ACHIEVE 10:1 TURNDOWN IN 3-VALVE SCHEMES

MODEL SC-40 USED TO ACHIEVE 5:1 TURNDOWN IN 2-VALVE SCHEMES

FIGURE 1.7.1 MAXITROL SC-30 SIGNAL CONDITIONER

1.8 SIGNAL CONDITIONERS

Signal conditioners are used in all heat modules to control the outputs of the gas valves. In general, they modulate a modulating gas valve by providing either a 0–10 VDC or a 2–10 VDC signal to the valve. See photo on previous page.

1.9 MODULE HEAT RISE

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

- Maximum allowable discharge temperature is 160˚F [71˚C] for any installation.
- Maximum allowable temperature rise is 70˚F [21.1˚C]
- Maximum design duct static pressure is 3.0 InWC [746.5 Pa].

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

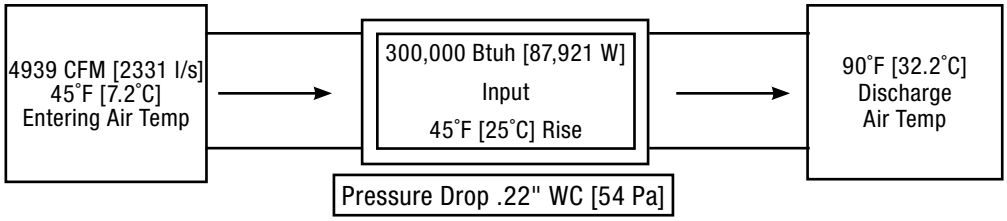


FIGURE 1.9.0 MODULE HEAT RISE CALCULATION

1.10 USER INTERFACE

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

1.11 GAS HEATER OPERATION

The heater receives high-voltage power from the DOAS disconnect switch. High-voltage power from the unit disconnect switch runs to a step-down transformer in the gas heat compartment. Primary input voltage to the transformer is the unit voltage. Secondary output voltage to the gas heat draft inducer blower is 115 VAC. Both sides of the step-down transformer are fused.

The heater receives a 0–10 VDC activating signal from the Integrated Programmable Controller. The activating control signal wires terminate on the signal conditioner. The signal conditioner controls the output of the gas valves in proportion to the 0–10 VDC signal.

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

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

2.0 SYSTEM REQUIREMENTS

2.1 VENTING

2.1.1 Equivalent Length

Vent pipe lengths are given as “equivalent lengths.” When vent pipes are installed, they often require that an elbow(s) be installed as part of the vent pipe. Elbows restrict free flow of gases through the vent pipe. A 90˚ elbow added to a straight run of vent pipe is the equivalent of adding 5' [1.5 m] of length to the vent and adding a 45˚ elbow is the equivalent of adding 2.5' [0.75 m] in length.

Example: A horizontal vent is 6.5' [2 m] long, but it has a 45˚ elbow in the middle. Its equivalent length is therefore 9' [2.75 m] (6.5' + 2.5') [2 m + 0.75 m]. If this horizontal run of venting were being used in conjunction with a vertical run of venting, the minimum length of the vertical run must be 12' [3.66 m] (horizontal equivalent length < 75% of vertical length).

2.1.2 Indoor Module Venting

All heat modules must be connected to a venting system to convey flue gases outside of the building.

Vent systems must be sized and installed in accordance with ANSI Z223.1 (NFPA 54) or in Canada CAN/CGA—B149. There are three acceptable methods for venting indoor module installations:

- Vertical Indoor venting—uses building air for combustion, vent pipe run outdoors through single roof penetration.
- Horizontal Indoor venting—uses building air for combustion, vent pipe run outdoors through single wall penetration
- Separate Combustion 2-Pipe venting—uses outside air for combustion, vents outdoors—two roof or wall penetrations.

2.1.2.1 Vertically Vented Heat Modules

Proper venting of the heat module is the responsibility of the installer. Vent piping is supplied by others. When operated with the venting system in place, proper heat module operation must be verified, including flue gas analysis of each connected module.

1. Use single wall or double wall (Type B) vent pipe of diameters shown below:

INPUT RATING (BTUh)	INPUT RATING [W]	VENT PIPE DIA.
50,000–199,999	14,653–58,614	5 in. [12.7 cm]
200,000–350,000	58,616–102,574	6 in. [15.25 cm]

2. Maximize the height of the vertical run of vent pipe. A minimum of 5 feet [1.5m] of vertical pipe is required. The top of the vent pipe must extend at least 2 feet [0.61m] above the highest point on the roof. (Use Listed Type B vent for external runs).
3. An approved weatherproof vent cap must be installed to the vent termination.
4. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of 10 feet [3m]. Horizontal runs should be pitched downward ¼ inch per foot (21 mm/m) and should be supported at 3 foot [1m] maximum intervals.
5. Design vent pipe runs to minimize the use of elbows. Each 90˚ elbow is equivalent to 5 feet [1.5m] of straight vent pipe run.
6. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, insulate vent pipe to prevent condensation inside vent pipe. Insulation should be a minimum of ½ inch (12.7 mm) thick, foil faced material suitable for temperatures up to 500˚F [260˚C].
7. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.
8. Vent connectors serving Category 1 heaters must not be connected into any portion of a mechanical draft system operating under positive pressure.

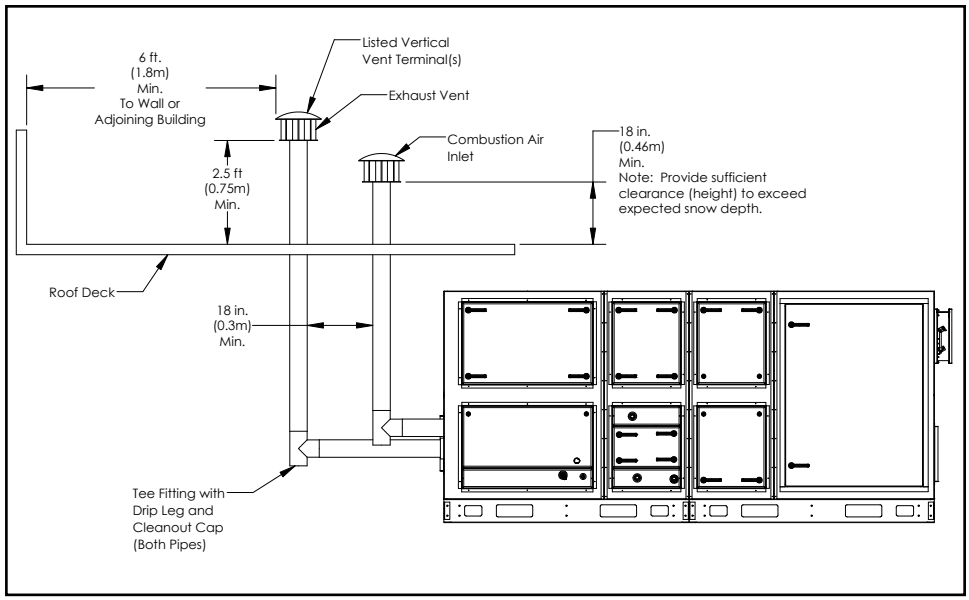


FIGURE 2.1.0 INDOOR VERTICAL VENTING FOR FLUE EXHAUST

NOTE: For assistance with vent sizing and design, contact a reputable company such as Precision Vent or Tjernlund.

NOTE: All installations must comply with SMACNA guidelines.

NOTE: All ductwork and venting as shown in illustrations is supplied by others and field-installed.

2.1.2.2 Horizontally Vented Heat Modules

Pressures in Category III venting systems are positive and therefore care must be taken to avoid flue products from entering the heated space. Use only vent materials and components that are UL listed and approved for Category III venting systems.

All vent pipe joints must be sealed to prevent leakage into the heated space. Follow instruction provided with approved venting materials used. The proper vent pipe diameter must be used, to insure proper venting of combustion products.

The total equivalent length of vent pipe must not exceed 50 feet [15.25 m]. Equivalent length is the total length of straight sections, plus 5 feet [1.52 m] for each 90˚ elbow and 2.5 feet [0.76 m] for each 45˚ elbow.

NOTE: A field-supplied and installed power vent may be required for vent runs longer than 50 equivalent feet [15.25 m].

The vent system must also be installed to prevent collection of condensate. Pitch horizontal pipe runs downward ¼ inch per foot [21mm/meter] toward the outlet to permit condensate drainage. Insulate vent pipe exposed to cold air or routed through unheated areas. Insulate vent pipe runs longer than 10 feet (3m). Insulation should be a minimum of ½ inch [12mm] thick foil faced material suitable for temperatures up to 500˚F [260˚C]. Maintain 6 inch [152 mm] clearance between vent pipe and combustible materials.

A vent cap listed for horizontal venting must be provided. Vent cap inlet diameter must be same as the required vent pipe diameter. The vent terminal must be at least 12 inches [305 mm] from the exterior wall that it passes through to prevent degradation of building material by flue gases. The vent terminal must be located at least 1 foot [305 mm] above grade, or in snow areas, at least 3 feet [1 m] above snow line to prevent blockage. Additionally, the vent terminal must be installed with a minimum horizontal clearance of 4 feet [1.2 m] from electric meters, gas meters, regulators or relief equipment.

OPTION Integral Indirect Gas-Fired Heat Module

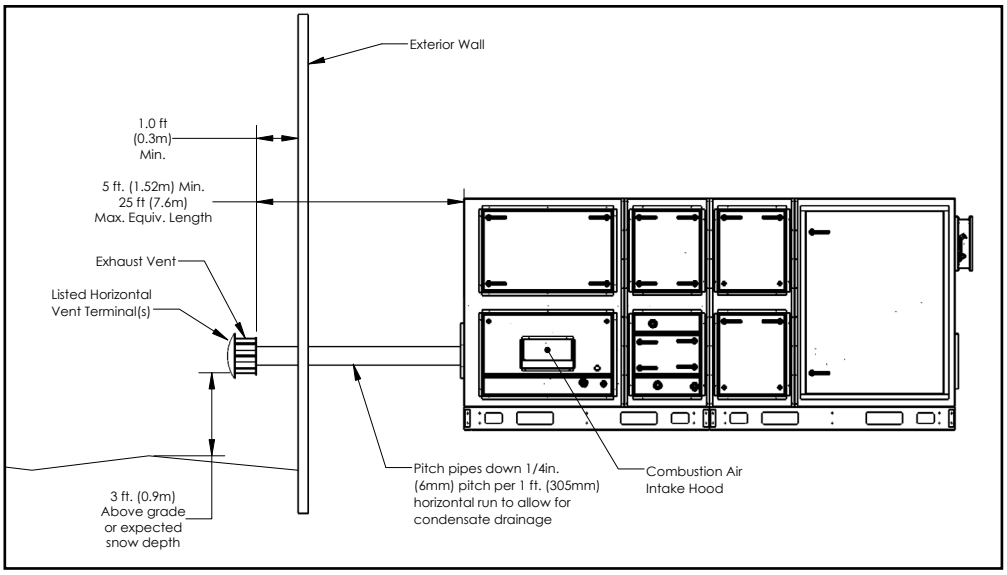


FIGURE 2.1.1 INDOOR HORIZONTAL VENTING FOR FLUE EXHAUST

NOTE: For assistance with vent sizing and design, contact a reputable company such as Precision Vent or Tjernlund.

NOTE: All installations must comply with SMACNA guidelines.

NOTE: All ductwork and venting as shown in illustrations is supplied by others and field-installed.

EACH HEAT MODULE MUST HAVE ITS OWN INDIVIDUAL VENT PIPE AND TERMINAL. Do not connect vent system from horizontally vented units to other vent systems or a chimney.

Through-the-wall vents shall not terminate over public walkways, or over an area where condensate or vapor could create a nuisance or hazard.

2.1.2.3 Two-Pipe Separate Combustion Systems

The module is mounted with the burner section in a reasonably airtight vestibule compartment, as these systems provide combustion air from outside the heated space and vent the products of combustion outdoors. Additionally the heating unit must include the following:

1. A tooled door latch to ensure that door or panel is closed or in place during operation.
2. Approved vent terminals on both the supply air inlet and flue gas exhaust. NOTE: The inlet and outlet terminals must be located in the same pressure zone to provide for safe appliance operation.
3. For combustion air piping, use 24 gauge galvanized steel single wall pipe. Tape joints with aluminum foil tape and secure with corrosion resistant screws.
4. Inlet air pipe must be same size as exhaust vent pipe based on input ratings.
5. For exhaust venting, use 24 gauge galvanized single wall or Type B vent for vertically vented modules.
6. For exhaust venting, use only vent materials and components that are UL listed and approved for Category III vent systems when venting horizontally.
7. Exhaust and vent piping must not exceed a combined 50 equivalent feet [15.25 m].

Proper installation of air inlet and flue gas exhaust piping are essential to proper operation of the heat module.

Separate combustion systems may not be common vented. Each module must have its own individual air supply and flue gas exhaust vent.

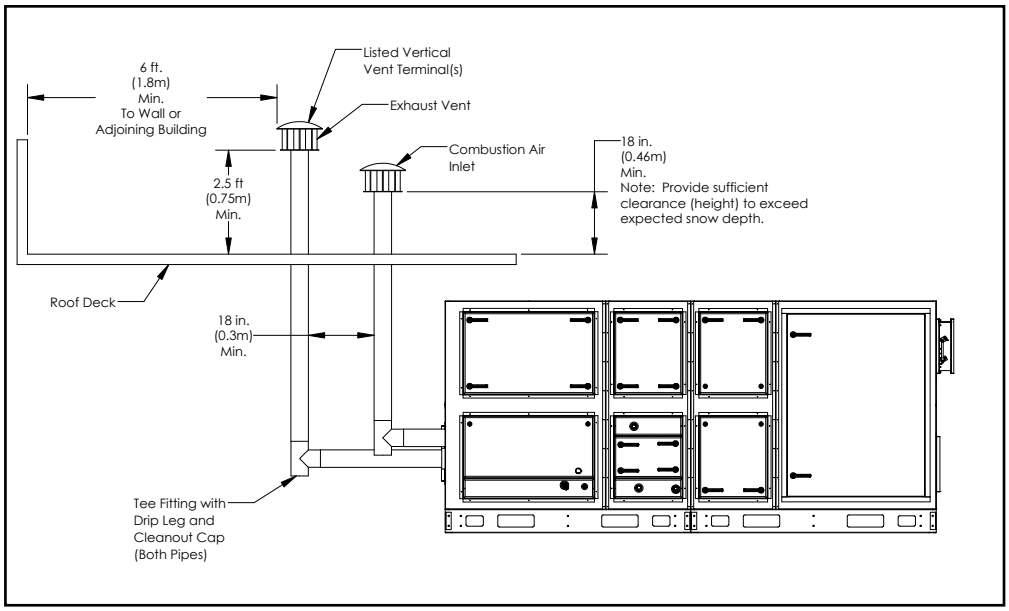


FIGURE 2.1.2 VERTICAL VENTING—SEPARATE COMBUSTION

NOTE: For assistance with vent sizing and design, contact a reputable company such as Precision Vent or Tjernlund.

NOTE: All installations must comply with SMACNA guidelines.

NOTE: All ductwork and venting as shown in illustrations is supplied by others and field-installed.

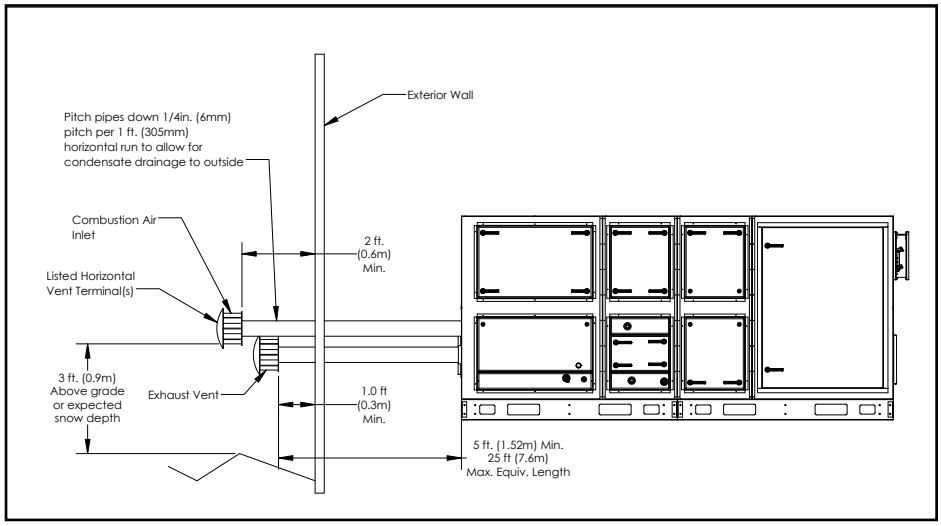


FIGURE 2.1.3 HORIZONTAL VENTING—SEPARATE COMBUSTION

NOTE: Be sure the vent cap used for horizontal venting applications is approved for horizontal application. Certain manufacturers' vent terminals are approved for vertical installation only

2.1.3 Outdoor Module Venting

Outdoor modules must be individually vented.

The venting system is designed for direct discharge of flue gases to the outdoors. The vent discharge opening should be located to provide an unobstructed discharge to the outside and should be located as far from the combustion air as possible, but in the same pressure zone.

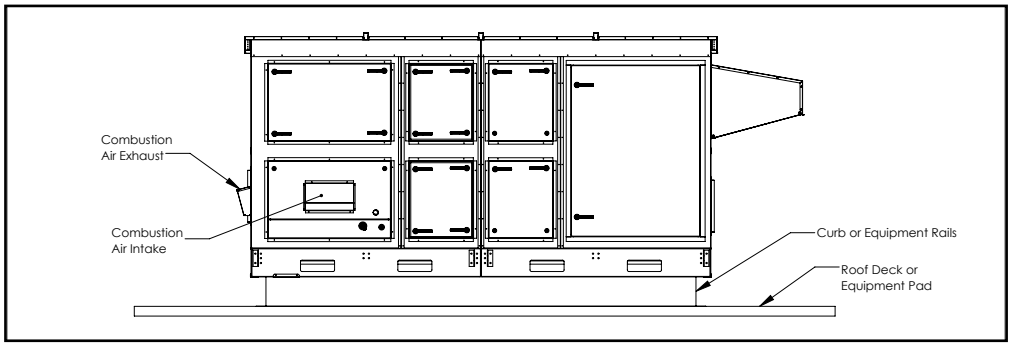


FIGURE 2.1.4 OUTDOOR HORIZONTAL VENTING

2.2 GAS SUPPLY

Installation of piping must conform with local building codes and ordinances, or, in the absence of local codes, with ANSI Z223.1, the National Fuel Gas Code. In Canada, installation must be in accordance with CAN/CGA-B149 for natural gas and B149.2 for propane units.

Gas piping must be sized for the total BTU input of all modules serviced by a single supply.

Be sure that gas regulators servicing more than one modules have the proper pipe and internal orifice size for the total input of all modules serviced by the regulator.

See table below for minimum inlet gas pressure required and maximum permissible supply pressure at each module.

	Natural Gas	Propane Gas
Minimum (50 to 350 MBH models): [14,653 to 102,574 W]	5.0 InWC [1244 Pa]	11.0 InWC [2737 Pa]
Maximum Inlet Pressure:	13.5 InWC [3359 Pa]	13.5 InWC [3359 Pa]

Connect a fitting suitable for connection to a pressure gauge capable of measuring gas pressure to 1/8" NPT tap provided on the inlet side of the gas valve or manual shut-off tapping. Measure inlet pressure to each module serviced by a single regulator with all modules in operation.

Gas supply piping to multiple modules should be configured to provide equal pressure to all modules. With all modules operating at full output, minimum supply gas pressure should be checked at all modules.

A drip leg (sediment trap) and a manual shut off valve must be provided immediately upstream of the gas control on the heating unit. To facilitate servicing of the unit, installation of a union is recommended.

All gas supply and furnace connections must be leak tested prior to placing equipment in service.

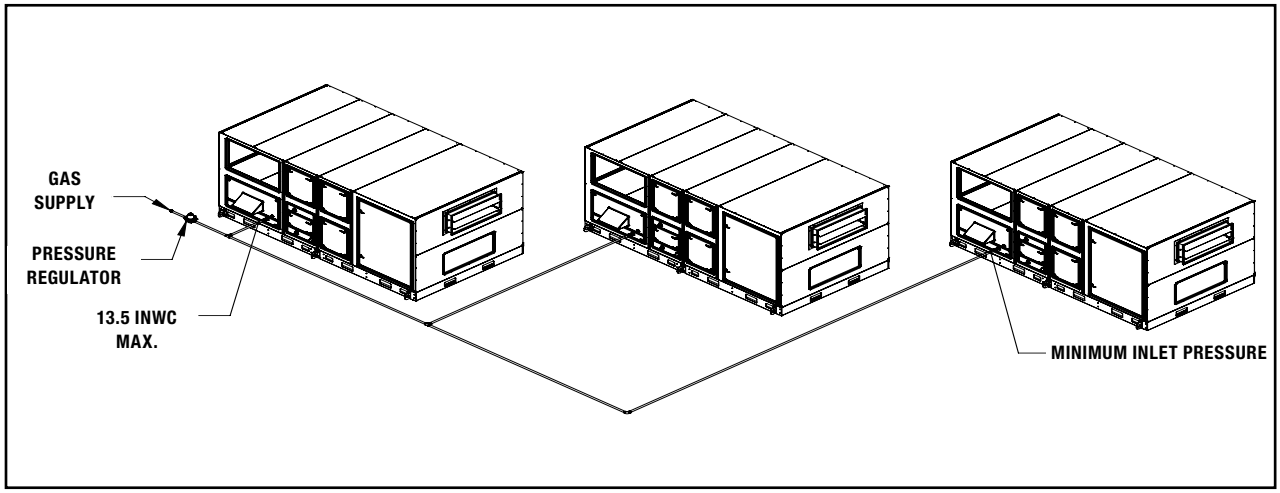


FIGURE 2.2.0 EXAMPLE OF MULTIPLE DOAS SUPPLY GAS PIPING

2.3 ELECTRICAL SUPPLY

2.3.1 Electrical Data

⚠ CAUTION

RISK OF FIRE, ELECTRIC SHOCK, OR INJURY

Before servicing or cleaning the module, switch power off at the disconnect switch or service panel and lock-out/tag-out to prevent power from being switched on accidentally. More than one disconnect switch may be required to de-energize the equipment for servicing.

Installation work and electrical wiring must be done by qualified professionals in accordance with all applicable codes, standards, and licensing requirements.

Any structural alterations necessary for installation must comply with all applicable building, health, and safety code requirements.

When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.

Use the module only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

⚠ ATTENTION

RISQUE D'INCENDIE, DE CHOC ÉLECTRIQUE OU DE BLESSURE

Avant d'effectuer l'entretien ou le nettoyage du module, coupez l'alimentation au niveau du sectionneur ou du panneau de service et verrouillez / étiquetez pour éviter que l'alimentation soit accidentellement activée. Plus d'un sectionneur peut être nécessaire pour mettre l'équipement hors tension pour l'entretien.

Les travaux d'installation et de câblage électrique doivent être effectués par des professionnels qualifiés conformément à tous les codes, normes et exigences de licence applicables.

Toute modification structurelle nécessaire à l'installation doit être conforme à toutes les exigences du code du bâtiment, de la santé et de la sécurité en vigueur.

Lorsque vous coupez ou percez dans le mur ou le plafond, n'endommagez pas le câblage électrique et les autres accessoires cachés.

Utilisez le module uniquement de la manière prévue par le fabricant. Si vous avez des questions, contactez le fabricant.

OPTION Integral Indirect Gas-Fired Heat Module

Electrical specifications are as shown in the charts below.

FOR MODELS WITH MBH 050, 075, 100, 125, 150	
INPUT VOLTAGE	MODULE FLA
	5:1 Modulating
115 VAC	2.4

FOR MODELS WITH MBH 200, 250, 300, 350		
INPUT VOLTAGE	MODULE FLA	
	5:1 Modulating	10:1 Modulating
115 VAC	4.0	4.0

FIGURE 2.3.0 MODULE FLA

All modules are equipped with a Class II 24VAC power supply system that operates the module internal controls.

IMPORTANT

Do not use the gas module transformer(s) to power external controls. Use the DOAS low voltage 24VAC transformer or an external supplied 24VAC transformer.

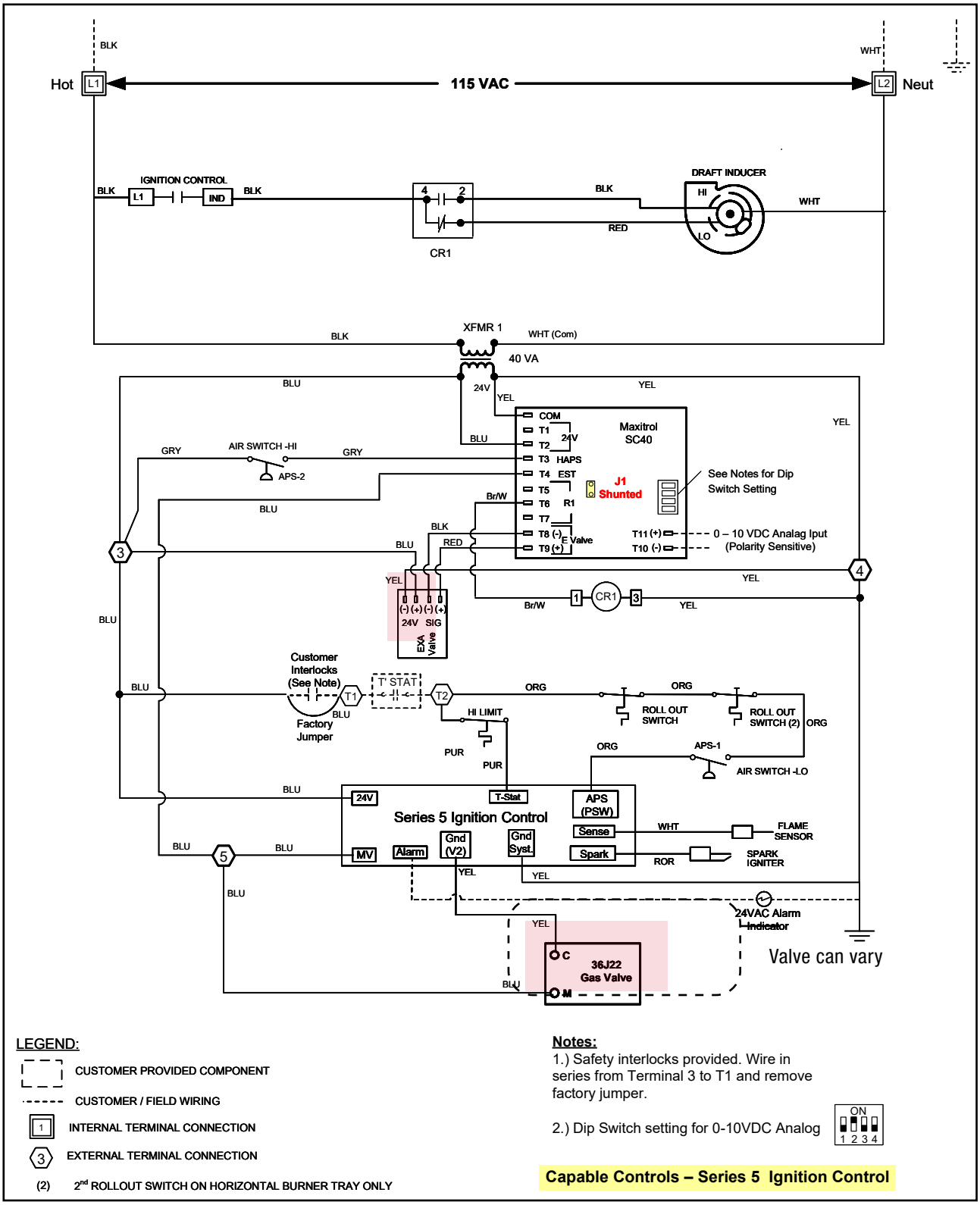
If external controls are to be powered by the DOAS low voltage 24 VAC transformer or external supplied 24 VAC transformer then follow the requirements for those transformers regarding wire length, wire gauge, and power draw.

This gas appliance must be electrically grounded in accordance with local codes, or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA, and/or the Canadian Electrical Code, CSA C22.1.

2.3.2 Electrical Schematics

NOTE: Module-specific wiring schematics are provided with each unit and can be found in the document package shipped with the unit.

NOTE: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105˚C.



LEGEND:

- CUSTOMER PROVIDED COMPONENT
- CUSTOMER / FIELD WIRING
- INTERNAL TERMINAL CONNECTION
- EXTERNAL TERMINAL CONNECTION
- (2) 2nd ROLLOUT SWITCH ON HORIZONTAL BURNER TRAY ONLY

Notes:

1.) Safety interlocks provided. Wire in series from Terminal 3 to T1 and remove factory jumper.

2.) Dip Switch setting for 0-10VDC Analog

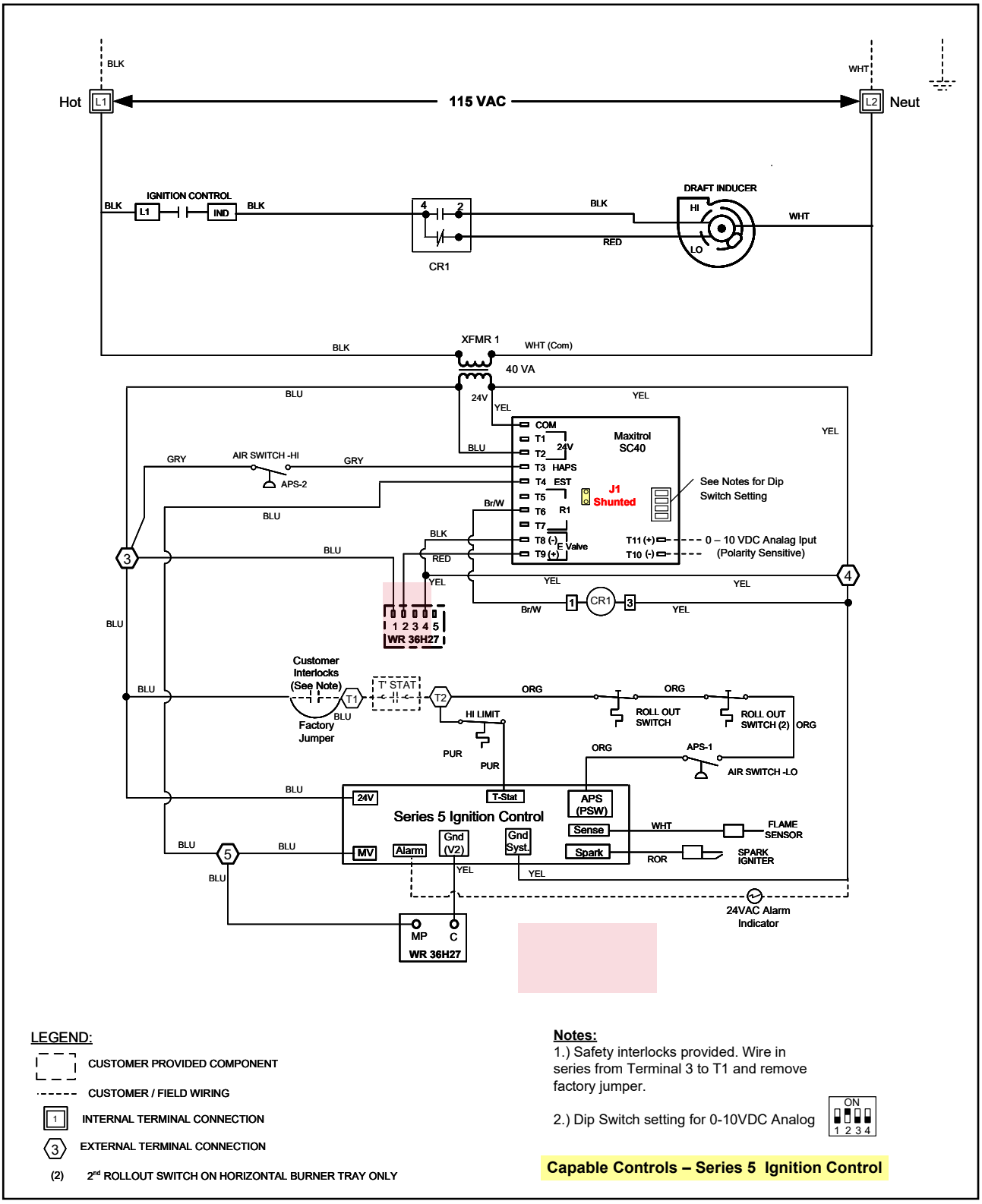
Capable Controls – Series 5 Ignition Control

FIGURE 2.3.1 CONTROL WIRING, 5:1 TURNDOWN MODULE, 50–100 MBH

OPTION Integral Indirect Gas-Fired Heat Module

NOTE: Module-specific wiring schematics are provided with each unit and can be found in the document package shipped with the unit.

NOTE: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105˚C.



LEGEND:

- CUSTOMER PROVIDED COMPONENT
- CUSTOMER / FIELD WIRING
- INTERNAL TERMINAL CONNECTION
- EXTERNAL TERMINAL CONNECTION
- (2) 2nd ROLLOUT SWITCH ON HORIZONTAL BURNER TRAY ONLY

Notes:

1.) Safety interlocks provided. Wire in series from Terminal 3 to T1 and remove factory jumper.

2.) Dip Switch setting for 0-10VDC Analog

Capable Controls – Series 5 Ignition Control

FIGURE 2.3.2 CONTROL WIRING, 5:1 TURNDOWN MODULE, 125–175 MBH

RenewAire Energy Recovery Ventilation

NOTE: Module-specific wiring schematics are provided with each unit and can be found in the document package shipped with the unit.

NOTE: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105˚C.

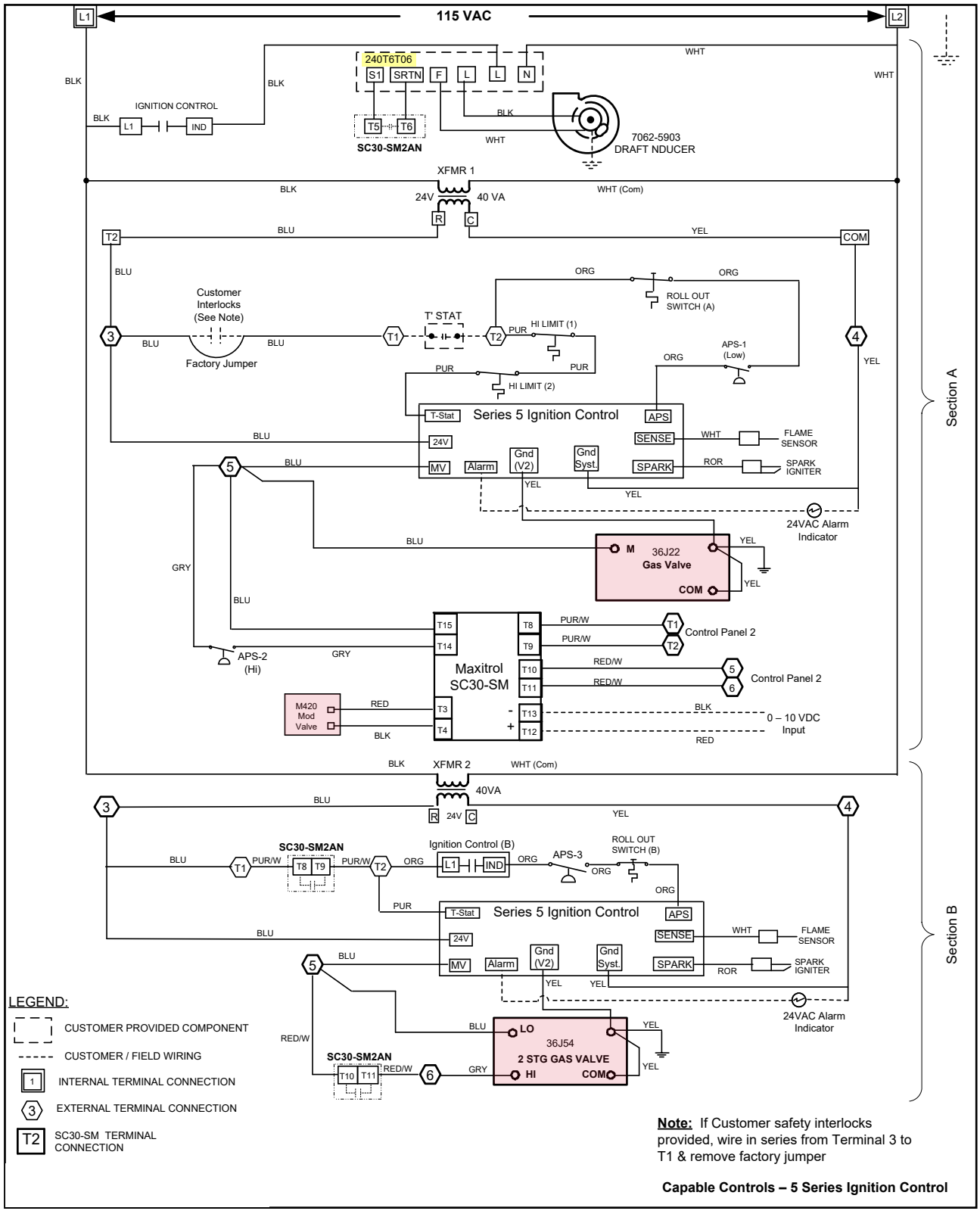


FIGURE 2.3.3 CONTROL WIRING, 10:1 TURNDOWN MODULE, 200–250 MBH

OPTION Integral Indirect Gas-Fired Heat Module

NOTE: Module-specific wiring schematics are provided with each unit and can be found in the document package shipped with the unit.

NOTE: If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105˚C.

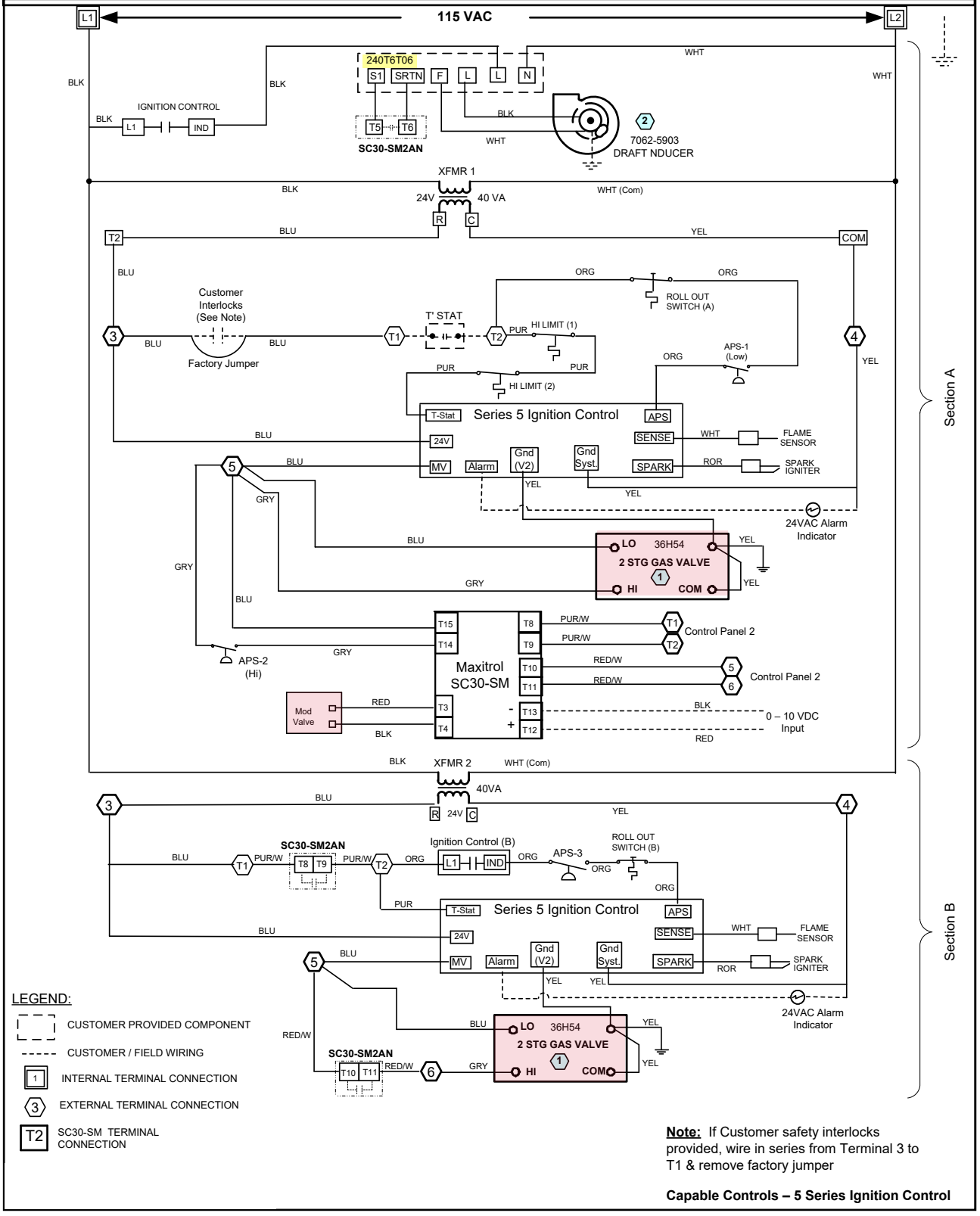


FIGURE 2.3.4 CONTROL WIRING, 10:1 TURNDOWN MODULE, 300–350 MBH

RenewAire Energy Recovery Ventilation

3.0 PLACEMENT RECOMMENDATIONS

⚠ WARNING

RISK OF FIRE OR EXPLOSION!

Do not install heat module where it may be exposed to potentially explosive or flammable vapors!

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any module. Do not install in potentially explosive atmosphere laden with dust, sawdust or similar products.

⚠ CAUTION

RISK OF DAMAGE TO HEAT EXCHANGER AND PRODUCTION OF DANGEROUS GASES

Do not locate module in areas where corrosive vapors are present in the atmosphere or can be mixed with combustion air entering the module. Airborne contaminants can cause corrosion and shorten the life of the heat exchanger and components. Chlorinated hydrocarbon compounds (chlorine, hydrogen, and carbon), when exposed to high temperatures can cause phosgene gases, which are hazardous.

⚠ AVERTISSEMENT

RISQUE D'INCENDIE OU D'EXPLOSION

N'installez pas le module de chauffage à un endroit où il pourrait être exposé à des vapeurs potentiellement explosives ou inflammables.

Ne stockez pas et n'utilisez pas d'essence ou d'autres vapeurs et liquides inflammables à proximité de ce module ou de tout autre module. Ne pas installer dans une atmosphère potentiellement explosive chargée de poussière, de sciure de bois ou de produits similaires.

⚠ ATTENTION

RISQUE DE DOMMAGES À L'ÉCHANGEUR DE CHALEUR ET À LA PRODUCTION DE GAZ DANGEREUX

Ne pas placer le module dans des zones où des vapeurs corrosives sont présentes dans l'atmosphère ou peuvent être mélangées avec de l'air de combustion entrant dans le module. Les contaminants en suspension dans l'air peuvent provoquer la corrosion et réduire la durée de vie de l'échangeur de chaleur et des composants. Les composés d'hydrocarbures chlorés (chlore, hydrogène et carbone), lorsqu'ils sont exposés à des températures élevées, peuvent provoquer des gaz de phosgène dangereux.

All heat modules are installed on the positive pressure side of the circulating blower.

Modules must be installed in a level, horizontal position. Verify that structural support is adequate for the unit weight.

The heating section requires an ample supply of air for proper and safe combustion of the fuel gas. Do not block or obstruct air openings to the area where the heating unit is installed. Locate the unit to ensure an adequate supply of fresh air to replace air used in the combustion and ventilation process.

Observe unit clearances as shown in Section 3.1.

3.1 CLEARANCES TO COMBUSTIBLES

Clearances to combustibles as appropriate for the product category, but in no case less than the following unless determined by test as part of the manufacturer's equipment listing:

Sides and back: 6 inches [152 mm] Bottom: 2 inches [51 mm]
Top: 6 inches [152 mm] Front: 36 inches [914 mm]
Vent pipe to any combustible surface: 6 inches [152 mm]

3.2 DUCTWORK

Ductwork should be sized to fit the openings on the heat module. Uniform airflow distribution over the heat exchanger is essential for proper operation and optimum unit efficiency. Use of baffles and/or turning vanes may be required to provide uniform air flow through the heating unit. See Ductwork Configuration drawings.

Ductwork is to be fastened directly to the unit cabinet and then sealed, using Industry Best Practices/SMACNA guidelines. Ductwork adjacent to the module should have a removable service panel installed to allow inspection of the heat exchanger tubes during annual maintenance.

NOTE: All duct installations must conform to SMACNA guidelines.

NOTE: All duct layouts depicted in this manual are suggested and may be modified to accommodate field conditions.

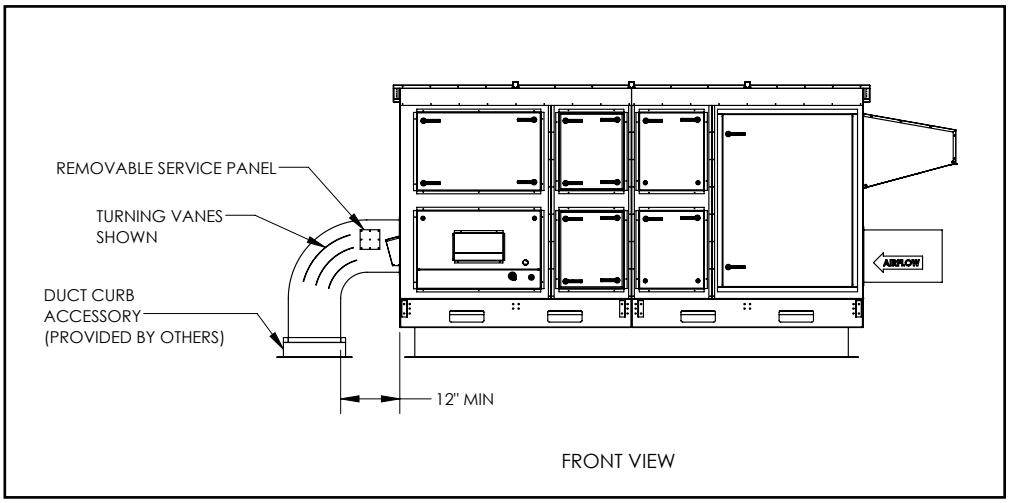


FIGURE 3.2.0 OUTDOOR HORIZONTAL DUCTWORK CONFIGURATION

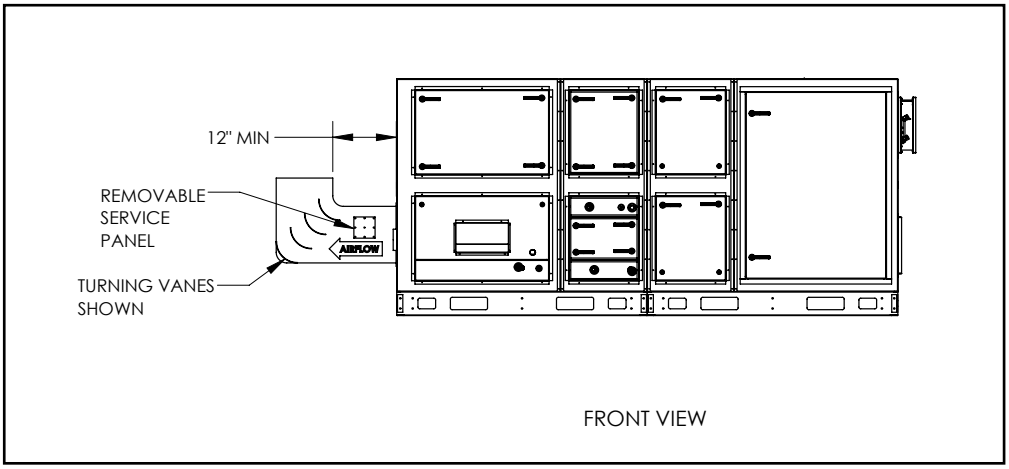


FIGURE 3.2.1 INDOOR HORIZONTAL DUCTWORK CONFIGURATION

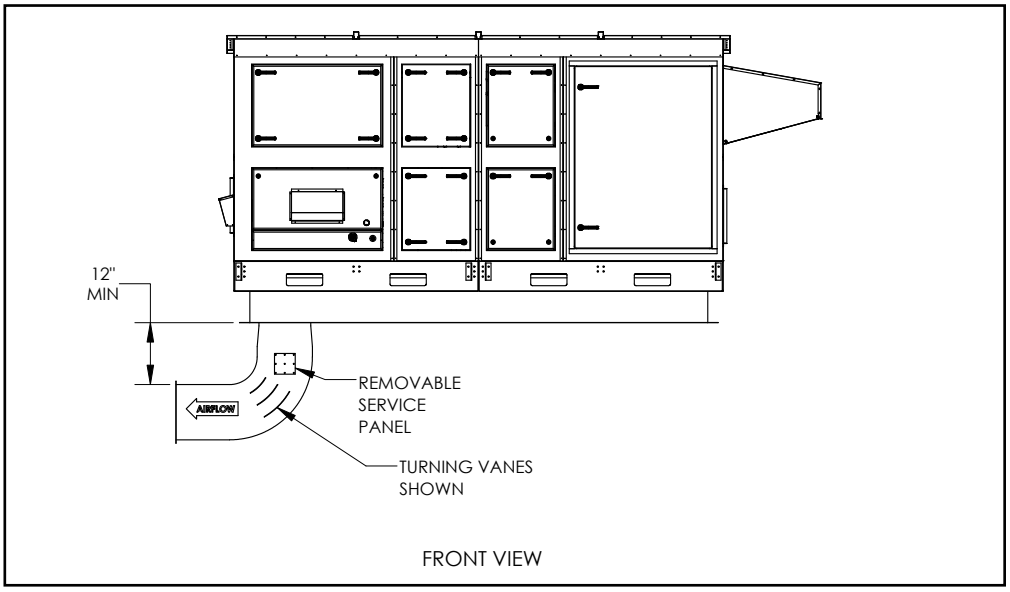


FIGURE 3.2.2 OUTDOOR VERTICAL DUCTWORK CONFIGURATION

4.0 COMPONENT TECHNICAL DATA

4.1 PERFORMANCE DATA

NOTE: To convert Airflow CFM to l/s, 1 CFM = 0.47 l/s.
To convert MBH to Watts, 1 MBH = 293 Watts
To convert ˚F Temperature Rise to Celsius, multiply the ˚F by 0.5556
To convert the Pressure Drop in InWC to Pascals, 1 Inch Water Column = 248.8 Pascals

NOTE: Pour convertir le débit d'air CFM en l/s, 1 CFM = 0.47 l/s.
Pour convertir MBH en Watts, 1 MBH = 293 Watts
Pour convertir ˚F Temperature Rise en Celsius, multiplier les ˚F par 0.5556

Pour convertir la perte de charge en InWC en Pascals, Colonne d'eau de 1 pouce = 248.8 Pascals

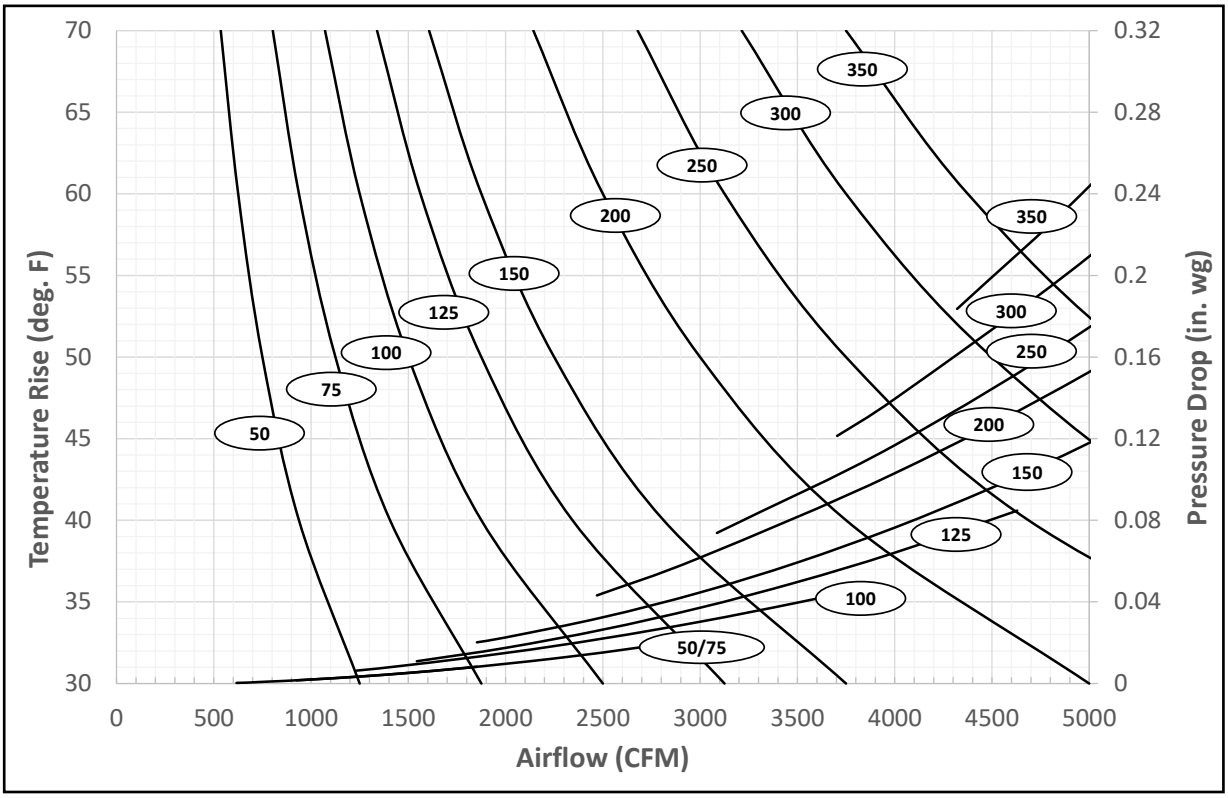


FIGURE 4.1.0 50–350 MBH TEMPERATURE AND PRESSURE CHART

NOTE: For instructions on conversion of units to SI, see the instructions at the top of the previous page.

4.2 MODULE SIZE SELECTION

Module sizes are specified according to Input MBH. To select the correct module size, it is necessary to determine the required heat output in BTU/Hr and then apply the efficiency rating of the module to that output to determine the correct module size, measured in Input MBH. The required heat output has to incorporate a correct airflow, correct temperature rise and acceptable pressure drop. The pressure drop can be determined by using the Temperature and Pressure chart on the previous page.

The steps in sizing a module are:

Step 1: Calculate the required output using:
Output (Btu/Hr) = 1.08 x Airflow (cfm) x Temperature Rise (˚F)

Step 2: Convert the required output from Btu/Hr to MBH by using the results from Step 1:
Divide the required output in Btu/Hr (found in Step 1) by 1,000

Step 3: Calculate the minimum Input MBH:
Divide the output MBH (found in Step 2) by the module efficiency (81%)

Step 4: From the results of Step 3, select a module rated for the next input size larger than the minimum required (found in Step 3).

Example:

An installation requires an airflow rate of 3000 cfm and a temperature rise ΔT (˚F) of 30.

Step 1: Calculate required output in Btu/Hr using
Required output (Btu/Hr) = 1.08 x 3000 x 30 = 97,200 Btu / Hr

Step 2: Convert the required output from Btu/Hr to MBH by using the results from Step 1:
Required output (MBH) = 97,200 / 1000 = 97.2 MBH

Step 3: Calculate the required Input MBH using
Input MBH = 97.2 / 0.81 = 120 MBH

Step 4: Select a module rated for the next larger input size, which would be 125 MBH.

Once a module has been selected, identify the correct module on the Temperature and Pressure chart shown on the previous page. Each module is represented by two curved lines. One curved line shows the temperature rise that the module produces at different airflow rates. The temperature rise is greater when the airflow is less. The second curved line shows the pressure drop at different airflow rates. The pressure drop increases as the airflow increases. Example: A 125 MBH module as shown in the upper chart on the previous page is intended to run at 3000 cfm. At 3000 cfm, the Temperature Rise line shows that there will be a temperature rise of about 31˚F. The Pressure Drop line shows that at 3000 cfm, there will be a pressure drop of 0.036 InWC.

4.3 MAXIMUM AND MINIMUM AIRFLOWS

For every heat module, there is a range of airflow that must be maintained in order to produce an acceptable ΔT temperature rise and acceptable pressure drop. If the airflow is too low, the resulting temperature rise will be too high. If the airflow is too high, the ΔT will be inadequate. The temperature rise that should occur must be at least 30˚F and less than 70˚F.

To determine the minimum airflow in a module:
Minimum airflow (cfm) = module size (MBH) x 1000 x module efficiency (81%) / 1.08 x 70 (˚F)

To determine the maximum airflow in a module:
Maximum airflow (cfm) = module size (MBH) x 1000 x module efficiency (81%) / 1.08 x 30 (˚F)

4.4 HEAT MODULE PRESSURE DROP

For every heat module, the airflow through the module encounters resistance and this produces a drop in pressure between the inlet side and the outlet side. The greater the airflow through the module, the greater the pressure drop from one side of the module to the other.

To determine the pressure drop across a module, use the Temperature and Pressure chart shown in section 4.1 of this manual. Find the airflow in cfm, shown at the bottom of the chart. Follow the grid line up until it intersects with the Pressure Drop line for the desired module. Use the example shown in Section 4.2 of this manual as an illustration.

4.5 MODULE DATA CHART

Temperature Rise										
Unit	No. of Tubes	Input Rate	Output	Temperature Rise		Air Flow @ Nom. Duct Opening		Vent Diameter	Gas Train NPT	Weight–Installed
Model No.	Qty	Btu/h	Btu/h	Min. ˚F	Max. ˚F	Min. CFM	Max. CFM	"D" inch	inch	lb
HM-050	3	50,000	40,500	30	70	536	1250	5	1/2	87
HM-075	3	75,000	60,750			804	1875		1/2	87
HM-100	4	100,000	81,000			1071	2500		1/2	97
HM-125	5	125,000	101,250			1339	3125		3/4	114
HM-150	6	150,000	121,500			1607	3750		3/4	125
HM-200	8	200,000	162,000			2143	5000	6	3/4	145
HM-250	10	250,000	202,500			2679	6250		3/4	180
HM-300	12	300,000	243,000			3214	7500		3/4	201
HM-350	14	350,000	283,500			3750	8750		3/4	231

4.6 GAS TRAIN SCHEMATIC

NOTE: The gas train is defined as the structure that all gases pass through, going from the gas inlet to the exhaust side of the collector box.

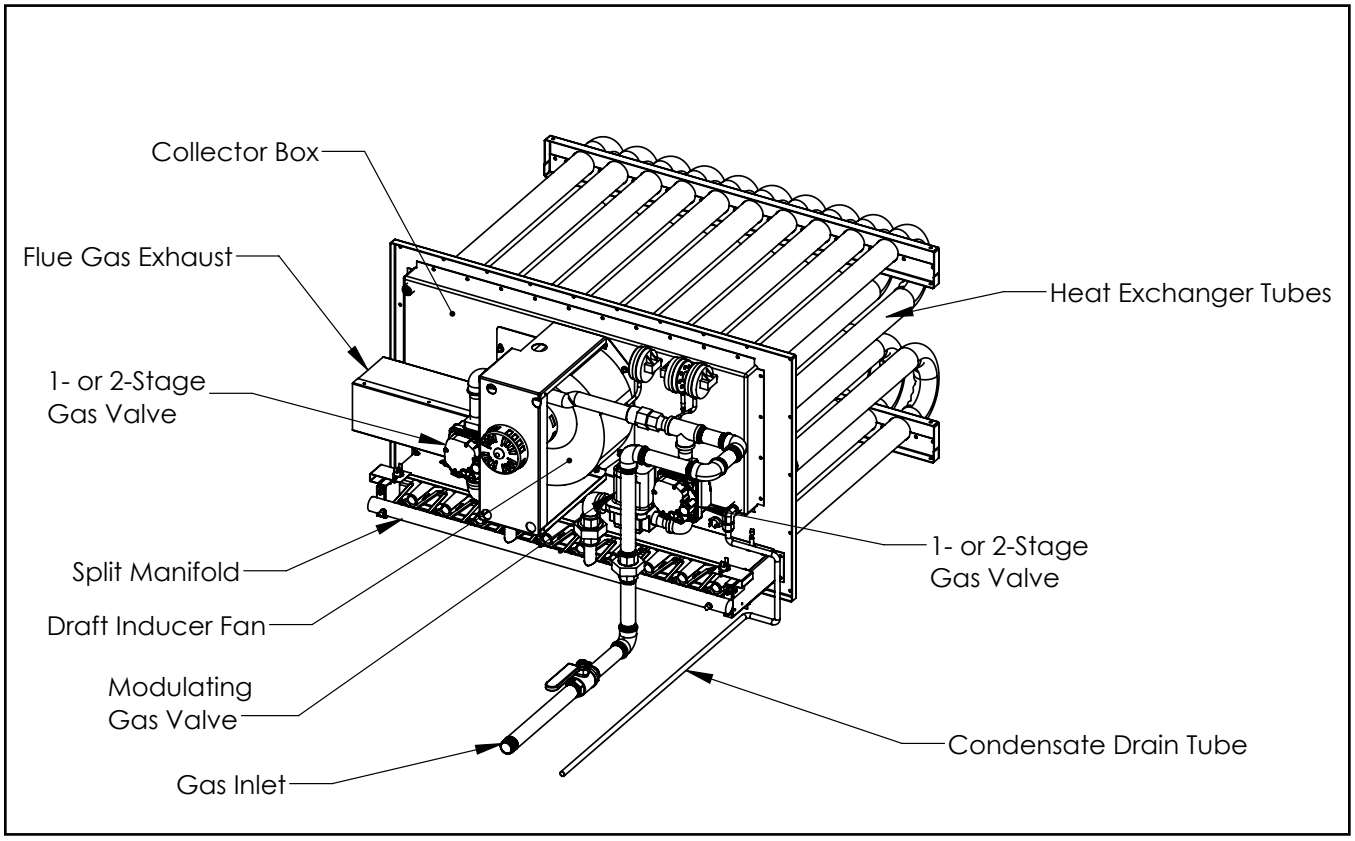


FIGURE 4.6.0 EXAMPLE OF MODULATED GAS TRAIN

4.7 GAS VALVE ILLUSTRATIONS

Photographs are typical of valves used. Actual valve models vary by installation.

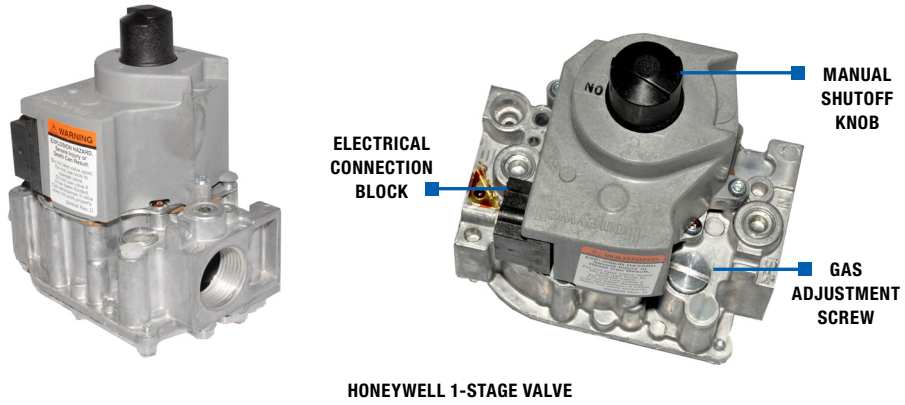


FIGURE 4.7.0 SINGLE STAGE GAS VALVES (TYPICAL)

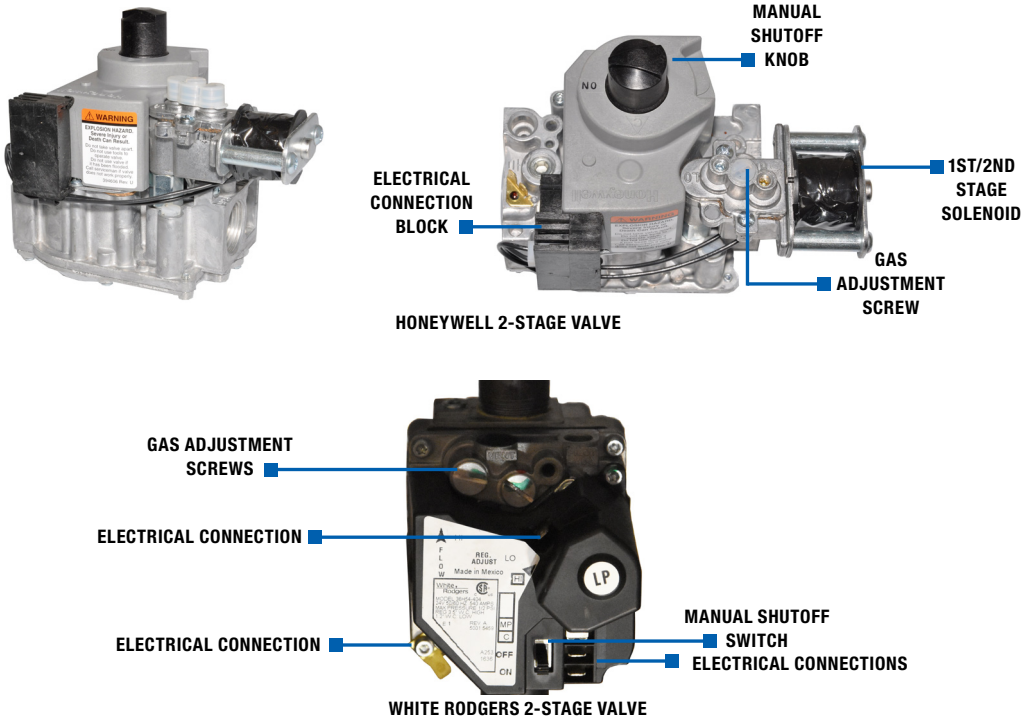
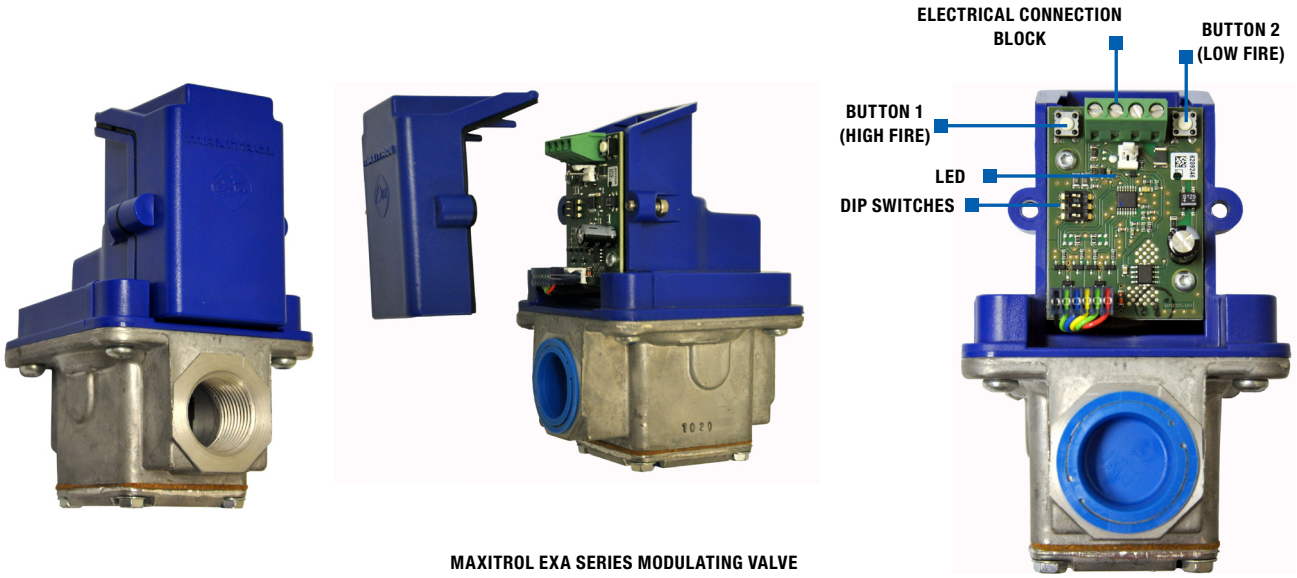


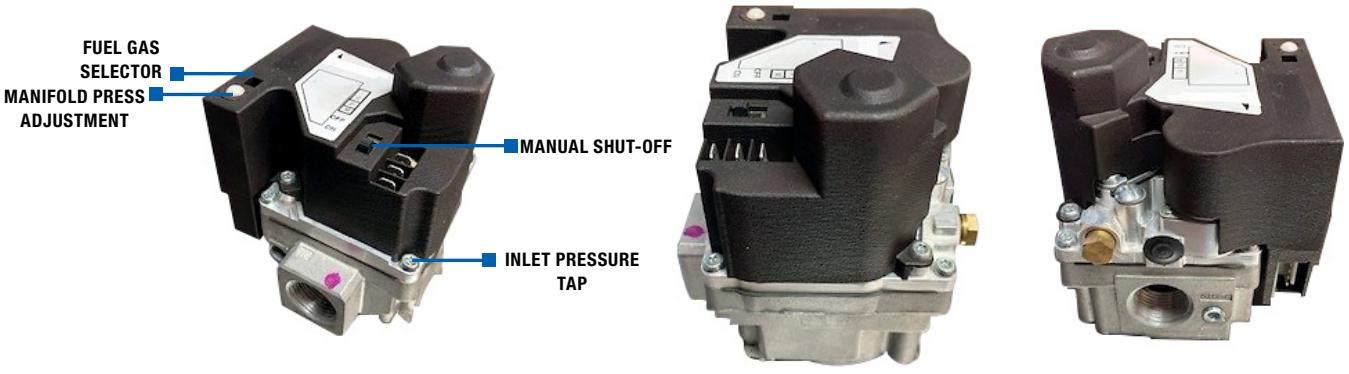
FIGURE 4.7.1 TWO-STAGE GAS VALVES (TYPICAL)

OPTION Integral Indirect Gas-Fired Heat Module

MAXITROL M SERIES MODULATING VALVE



MAXITROL EXA SERIES MODULATING VALVE



WHITE RODGERS MODCOMBO VALVE

FIGURE 4.7.2 MODULATING GAS VALVES (TYPICAL)

4.8 DEFINITIONS FOR GAS HEAT MODULE

Heater Type:

HM—indirect gas-fired duct furnace from 50 MBH up to 350 MBH

Input Capacity:

MBH—BTU per hour (÷1000) rating for furnace input capacity.

Input capacities are 50, 75, 100, 125, 150, 200, 250, 300, and 350.

Fuel Type:

Natural Gas (Standard)—natural gas used in most applications.

Propane (Option)—propane available.

Tube Material:

409 Stainless Steel (Standard)—provides excellent corrosion resistance at elevated temperatures and is more corrosion-resistant than aluminized steel.

304 Stainless Steel (Option)—higher chromium and nickel content than 409 stainless steel with superb corrosion resistance at elevated temperatures.

Airflow Orientation:

Horizontal—module installed where airflow in ductwork is horizontal through the heater.

Thermal Efficiency:

81% Efficiency—standard thermal efficiency for gas-fired heat module. Thermal efficiency is ratio of output capacity to input capacity.

Elevation:

0-2000 feet (Standard)—module burner orifices for operation up to 2000 ft. above sea level.

2001-6999 feet (Option)—module burner orifices for operation 2001–6999 ft. above sea level.

Above 7000 feet (Option)—module burner orifices for operation over 7000 ft. above sea level.

System/Inducer Voltage:

Single Phase—115V

Voltage Phase:

Single Phase only.

Control Voltage:

24VAC (Standard)—secondary voltage

Control Type:

Modulating 5:1 Turndown (3:1 turndown for propane)—module operates from 20–100% of output capacity based on 0-10Vdc input.

Modulating 10:1 Turndown—(6:1 turndown for propane) module operates from 10%–100% of output capacity based on 0-10 VDC input.

Automatic Reset Fixed Temperature High Limit Switch: (Standard)

Automatic reset limit switch included for primary over-temperature protection. Required by safety certifying agencies.

Combustion Air Pressure Switch: (Standard)

Combustion air pressure switch included to prove sufficient air flow is present. Required by safety certifying agencies.

Manual Reset Flame Rollout Switch: (Standard)

Manual reset flame rollout switch included to monitor presence of burner flame. Required by safety certifying agencies.

Direct Spark Ignition Control (Standard):

Direct spark ignition control monitors Call For Heat and ensures draft inducer fan is operating before spark commences and gas valve is energized for the ignition period. Once burner ignites and cross light and flame is detected, spark is shut off. During heating operation, the pressure switch and main burner flame is constantly monitored for proper operation.

5.0 INSTALLATION

5.1 MODULE INSPECTION ON ARRIVAL

This module was test operated and inspected at the factory prior to shipment and was in satisfactory working order. A copy of the test and inspection sheet is included in the documentation package provided. Inspect the packaging on delivery for any signs of damage. Report any damage immediately to the transporting agency.

5.2 PREPARING FOR INSTALLATION

The type of gas for which the module is equipped, the input rating and electrical ratings are all shown on the unit data plate, found on the outside of the unit. Before installation, be sure that the available gas and electrical supply match the unit data plate information.

Read this manual in its entirety before beginning installation. Check with local gas utility or agencies having jurisdiction to determine if there are local requirements covering installation of heat modules.

5.3 INSTALLATION CODES

The heat module covered in this manual is design certified by Intertek Testing Services/ETL for commercial or industrial use in the United States and Canada.

These units must be installed in accordance with local building codes, the National Fuel Gas Code (NFPA54/ANSI Z223.1 or in Canada, with the Canadian Natural Gas and Propane Installation Code (CSA B149.1)

5.4 PLACEMENT OF MODULE

The module is factory-installed in a DOAS manufactured by RenewAire. It is the installing contractor's responsibility to verify that installation of the DOAS with its gas heat module is installed safely, in accordance with all applicable codes.

5.5 CLEARANCES

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

IMPORTANT

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

Sufficient space must be left in front of the DOAS to allow for servicing of the unit and its gas heater module. This space will normally be equal to the width of the access door to the energy recovery module. This also allows for adequate clearance for intake air for units that do not utilize two-pipe separated combustion systems. See the dimensioned drawing for each model, as applicable.

All gas heat modules must be connected to a venting system to convey flue gases outside of the heated space.

Vent locations for vertically vented units:

Exhaust vent cap must be a minimum of 2 feet above the highest point on the roof. Provide sufficient clearance to exceed anticipated snow depth.

Vent locations for horizontally vented units:

Exhaust vent cap must be a minimum of 1 foot from the exterior wall and 3 feet above the anticipated snow depth. The terminal must be installed with a minimum horizontal clearance of 4 feet from electric meters, gas meters, regulators or relief equipment.

Two-pipe separated combustion systems:

Vertical venting:

The combustion air inlet must be a minimum of 18 inches above the roof deck and must exceed the expected snow depth.

The exhaust gas outlet must be a minimum of 2.5 feet above the roof deck and 6 feet from the nearest wall or adjoining building.

Horizontal venting:

The combustion air inlet must be positioned a minimum of 2 feet from the exterior wall and 3 feet above grade or expected snow depth.

The exhaust gas outlet must be located a minimum of 18 inches from the combustion air inlet and a minimum of 1 foot from the exterior wall. It must be above the anticipated snow depth.

5.6 MODULE INSTALLATION REQUIREMENTS

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

Ductwork should be mechanically fastened to the unit. Joints should be sealed with high temperature silicone caulking or high temperature tape to prevent leakage of circulating air. All outdoor module duct connections must be weathertight to prevent rain and snow from entering the ductwork. Support all ductwork securely. DO NOT rely solely on module duct connections for support. Provide removable access panels in ductwork immediately downstream of the heat module to allow for inspection of the heat exchanger. These openings should be large enough to observe smoke or reflected light inside the casing to inspect the heat exchanger for leaks and to check for hot spots on the heat exchanger due to poor air distribution or insufficient air volume. Attach covers so as to prevent air leakage. See figure below.

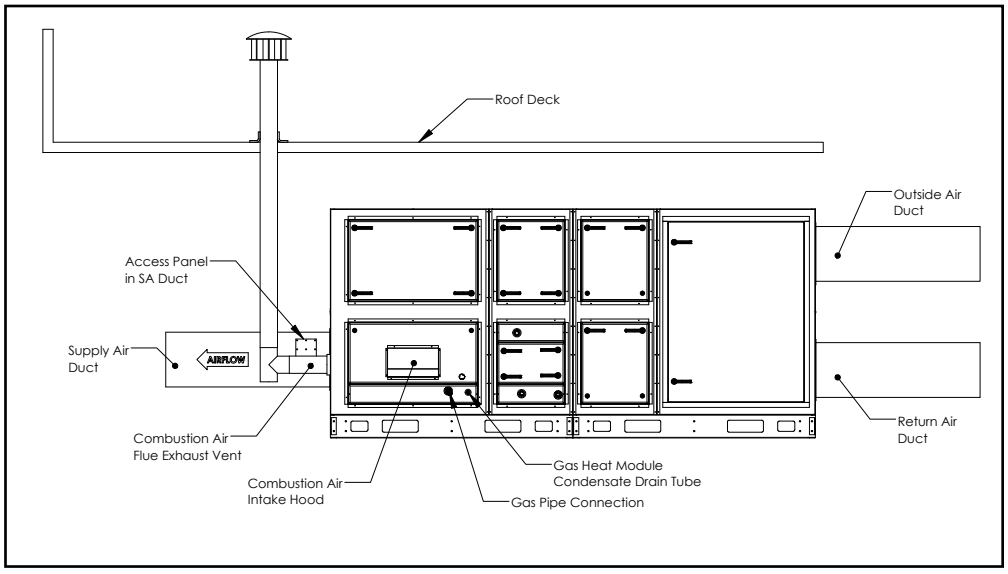


FIGURE 5.6.0 INSTALLATION EXAMPLE

5.7 INSTALL SUPPLY AIR TEMPERATURE SENSOR

The Supply Air temperature sensor is factory-wired to the Integrated Programmable Controller but the sensor must be installed in the SA ductwork downstream of the gas heat module. The temperature sensor should be installed between 4 and 6 feet from the unit in the SA ductwork to control the temperature output of the gas heat module.

The Supply Air temperature sensor is shipped in the low-voltage side of the unit electrical box.

5.8 INSTALL GAS SUPPLY PIPING

5.8.1 Installation of Gas Piping

⚠ WARNING

All components of this or any other gas-fired heating unit must be leak-tested prior to placing the unit into operation. A soap and water solution or other non-corrosive leak detection fluid should be used to perform this test. NEVER test for gas leaks with an open flame.

⚠ WARNING

When leak testing at pressures equal to or less than 14 inches WC [3.5 kPa], first close the field-installed shutoff valve to isolate the unit from the gas supply.

IMPORTANT

All gas piping must be installed in accordance with the latest edition of the National Fuel Gas Code, ANSI Z223.1 and any local codes that may apply. In Canada, the equipment shall be installed in accordance with the Installation Code for Gas Burning Appliances and Equipment, (CGAB 149) and Provincial Regulations for the class. Authorities having jurisdiction should be consulted before installations are made.

IMPORTANT

All piping should be clean and free of any foreign material. Foreign material entering the gas train can cause damage.

IMPORTANT

DO NOT connect the module to gas types other than what is specified and DO NOT connect the unit to gas pressures that are outside the pressure range shown on the unit label.

IMPORTANT

Before applying gas to the valves, test the gas pressure to make sure it is less than 13.5 InWC. Pressures greater than 13.5 inches WC will damage the gas valves.

NOTE: When connecting the gas supply, the length of the run must be considered in determining the pipe size to avoid excessive pressure drop. Refer to a Gas Engineer's handbook for gas pipe capacities.

NOTE: Gas heat modules 50 MBH–100 MBH have a single 1/2" NPT gas connection. Gas heat modules 125–350 MBH have a single 3/4" NPT gas connection.

5.8.2 Determine Gas Supply Requirements

The data sticker located on the outside of the unit lists the requirements for the gas being supplied to the unit.

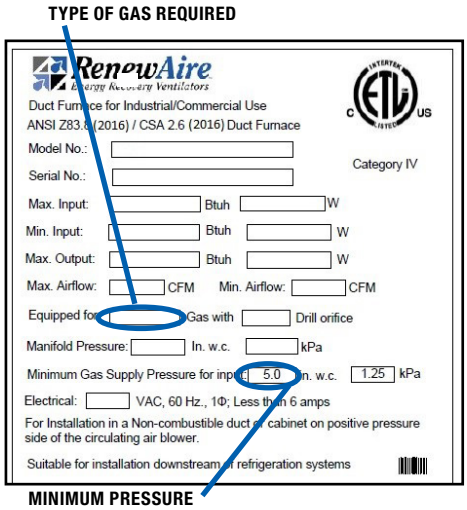


FIGURE 5.8.0 TYPICAL DATA LABEL

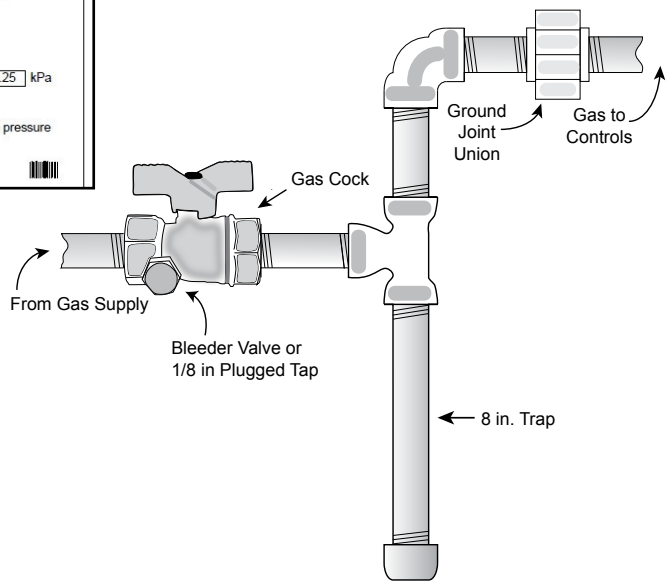


FIGURE 5.8.1 TYPICAL GAS SUPPLY PIPING CONNECTION

A manual shut-off valve (gas cock), a 1/8 inch plugged test port or bleeder valve and a drip leg must be field-installed between the gas supply pipe and the start of the gas train. The valve and test port must be accessible for the connection of a test gauge. Supply gas connections must be made by a qualified installer and are to be provided by others.

Connect gas supply piping to the gas fitting on the front of the module. Follow all local codes, or, in the absence of any local codes, comply with ANSI Z223.1.

5.9 CONNECT CONDENSATE DRAIN

Each ducted gas module is equipped with a 3/8 inch diameter stainless steel condensate drain tube that extends from the front of the module. The condensate drain tube is under negative pressure and must be trapped. The trap is to be provided by others and field-installed. The trap should be fabricated in accordance with local building codes. It should allow for easy cleaning and easy addition of a glycol solution, if needed for winterization. In addition, attention should be given to the possible need for heat tapes. If heat tapes are to be used, it may be necessary to fabricate the trap and other drain piping from metal.

The drain trap should be filled with water or glycol solution prior to module start-up.

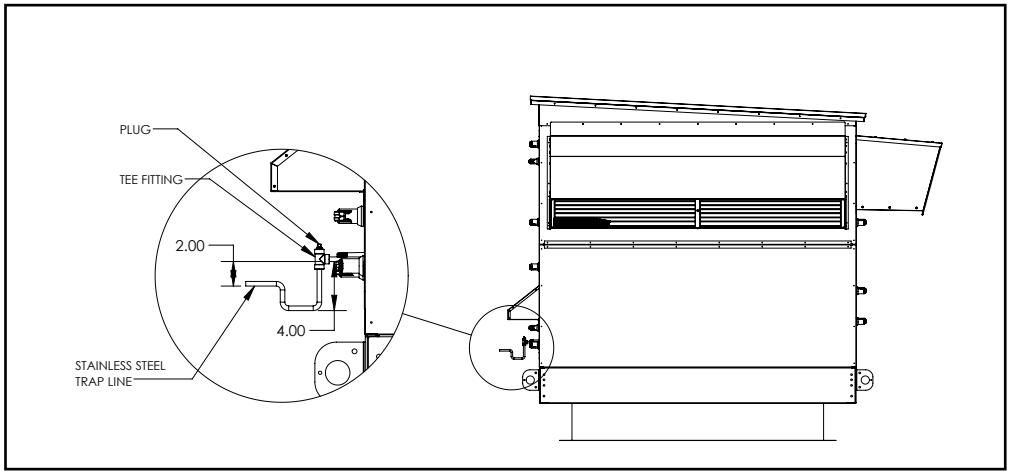


FIGURE 5.9.0 RECOMMENDED DRAIN TRAP CONSTRUCTION

6.0 OPERATION

6.1 GAS HEATER QUICK-START GUIDE

NOTE: Start-Up is defined as the process of activating each system within a newly-installed module after it has been properly installed in the system in which it is expected to operate. A full and proper start-up cannot be performed unless the Occupied Space with all its associated ductwork, controls and design options are completed and intact and ready for full-load testing.

A wiring diagram and a Sequence of Operation are provided in the unit information package for each specific control system provided on the heat module. Refer to the documents before attempting to place the unit in service.

- This heat module does not have a pilot light. It is equipped with a direct spark ignition device that automatically lights the gas burner. DO NOT try to light burners by hand.
- BEFORE OPERATING, leak test all gas piping up to the heater valve. Smell around the unit area for gas. DO NOT attempt to place the unit in operation until source of gas leak is identified and corrected.
- Use only hand force to push and turn the gas control knob to the “ON” position. NEVER use tools. If knob does not operate by hand, replace gas valve prior to starting the unit. Forcing or attempting to repair the gas valve may result in fire or explosion.
- Do not attempt to operate the module if there is indication that any part or control has been under water. Any control or component that has been under water must be replaced prior to trying to start the module.

The gas heat module requires both high-voltage power and a low-voltage control signal. High-voltage power is present whenever the DN-Series disconnect switch is turned on. The control signal is provided by the DN-Series Integrated Programmable Controller.

⚠ 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.

Before proceeding with Quick-Start, read all instructions.

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

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

⚠ WARNING

RISK OF FIRE OR EXPLOSION

Testing of gas pressures involves removal of pressure tap plugs, which will permit some loss of combustible gas to the atmosphere. Any buildup of combustible gases can cause a fire or explosion.

When gas lines or gas pressure taps are opened, turn off all power to the DN-Series unit at the main disconnect switch. If gas can be smelled, wait five minutes for the gas to dissipate before turning power back on.

NOTE: Quick-Start is used to test the gas supply and general operational readiness of the gas heat module. It verifies that correct gas pressure is being applied to the system and that the system will fire and produce heat in a test mode. Quick-Start is not a substitute for full configuration of the controller.

NOTE: Whenever the unit disconnect switch is turned OFF, turn OFF the gas supply.

Prior to starting a gas heat module for the first time, test the gas pressure at the main gas supply line and at the manifold. Many gas heat modules will have a split manifold having two pressure test taps and it may be necessary to run the pressure test twice if only one manometer is available. In some cases, modulating gas valves are used and correct results will only be obtained if the call for heat is at 100%.

6.2 VERIFY PROGRAMMING OF THE DOAS CONTROLLER

Shut off gas at supply line.

6.2.1 Disable the Integrated Controller

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

NOTE: For further information on how to navigate the controller, see the Integrated Programmable Controller user manual.

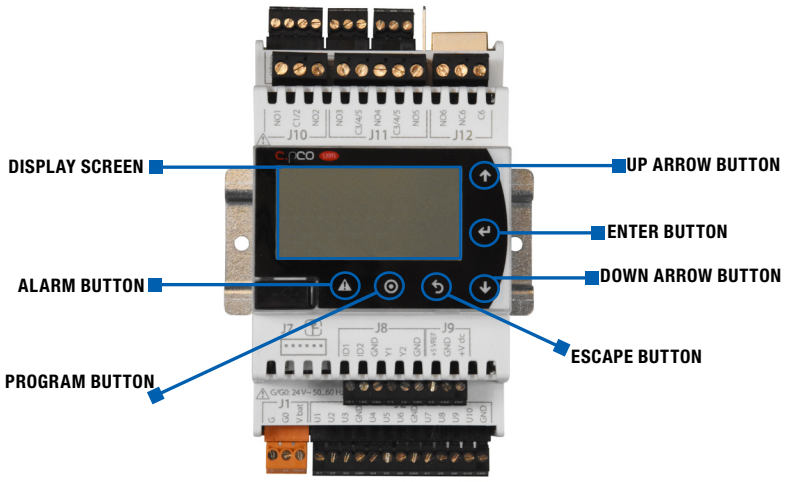


FIGURE 6.2.0 DOAS CONTROLLER

6.2.2 Disable BMS Control

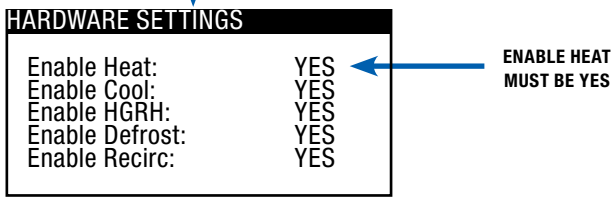
For purposes of testing operation of the gas heater module, BMS control of the heater should be left turned OFF. On the controller, go to Home Screen > Main Menu > Settings and then press ENTER on the controller. For operation of the DOAS without BMS control, the screen should say ENABLE BMS: NO. Exit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

6.2.3 Verify the Controller is Configured for Heat

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

NOTE: The Service Menu is accessed by pressing the PROGRAM button and then entering a passcode.For further information on how to navigate the controller, see the Integrated Programmable Controller user manual.

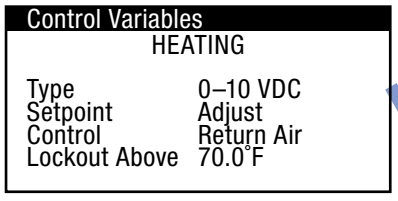
PATH: HOME SCREEN > SERVICE MENU > UNIT TYPE

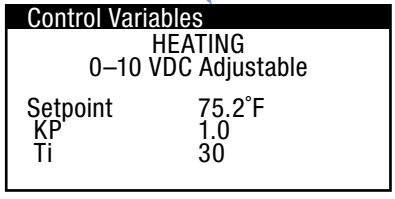


6.2.4 Verify Heat Control Settings

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

HEATING SCREEN 1

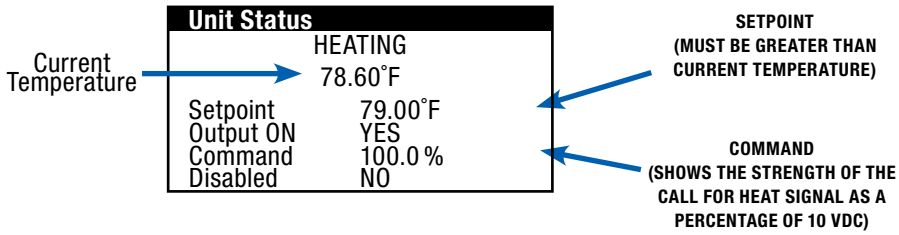




HEATING SCREEN 2

6.2.5 Verify That Heater Settings Will Call For Heat

Go to the Unit Status > Heating screen.



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

6.3 TEST GAS PRESSURES AND FLAME QUALITY

Turn the unit disconnect switch OFF while testing gas supply pressure.

With the unit disconnect switch OFF and the gas supply valve OFF, install a manometer at the pressure tap located on the gas supply line.

Turn the gas supply valve ON and verify that the supply gas pressure is at least 5.0 InWC and not higher than 13.5 InWC for natural gas or 11.0 InWC to 13.5 InWC for LP gas.

Record the gas pressure in the chart on next page.

Shut off the gas at the gas supply line, remove the manometer and replace the pressure tap plug.

With the unit disconnect switch OFF, use the bleeder/pressure tap on the main inlet valve and bleed the air from the supply pipe. When gas can be smelled, close the pressure tap and then wait five minutes for the escaped gas to dissipate.

With the unit disconnect switch OFF, install the manometer on the pressure tap on the gas manifold. If there are two pressure taps, either use two manometers or repeat the test as necessary.

Turn the gas supply valve ON.

Turn ON the unit disconnect switch. When the unit disconnect switch is turned ON, it provides high-voltage power to the gas heat module and will also produce 24 VAC needed for operation of the gas valves and for switching between 1st stage and 2nd stage on two-stage valves. The controller will not provide a call for heat until the controller is ENABLED. Gas valves are Normally Closed (NC) until they receive an activating signal from the module controller.

NOTE: There are two gas shut-off valves on the gas heat module. One is found in the module, behind the module cover. The second valve is field-supplied and installed and should have a bleeder/pressure tap. See the illustration in Section 5.8.2 of this manual.

6.3.1 Enable the Unit Controller

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

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

As soon as the controller is enabled, the gas heat module will immediately begin a 15 second pre-ignition purge, followed by ignition. When gas furnaces are lit for the first time, there is often air in the gas line that will prevent gas from reaching the burners. When this happens, the heat module will not ignite and the module controller will try three times to light. After three tries, the heat module controller will go into lockout.

After the purge cycle, the heat module will switch on the gas valves and the igniter, producing gas pressure at the manifold.

Verify that the gas pressure at each pressure tap on the gas manifold is between 3.4 InWC and 3.5 InWC for natural gas or 10.0 InWC for LP gas at maximum input.

Record the gas pressures in the chart below.

When the heat module is lit, view the flames at each burner in accordance with the instructions in Section 6.6.1 of this manual. Adjust high fire and low fire, if necessary.

OBSERVED INLET GAS PRESSURE (must be between 5.0 InWC and 13.5 InWC for Natural Gas and between 11.0 InWC and 13.5 InWC for LP Gas)	OBSERVED MANIFOLD GAS PRESSURE AT HIGH FIRE (must be between 3.4 InWC and 3.5 InWC for Natural Gas and 10.0 InWC for LP Gas)	
	Single Manifold Pressure (if applicable)	
(SPECIFY TYPE OF GAS AND PRESSURE OBSERVED))	Split Manifold Pressure Left Side	
	Split Manifold Pressure Right Side	

6.4 FAILURE TO IGNITE

On the initial start-up, or after the unit has been off for long periods of time, the first ignition trial may be unsuccessful due to need to purge air from the manifold at start-up.

If ignition does not occur on the first trial, the gas and spark are shut off by the ignition control and the control then enters an inter-purge period of 15 to 90 seconds, during which time the draft inducer continues to run. At the end of the inter-purge period, another trial for ignition will be initiated.

Control will initiate up to three ignition trials on a call for heat before lockout of control occurs. Control can be brought out of lockout by turning the controller setpoint to its lowest position and waiting 5 seconds and then turning it back up to call for heat. Some controls provided will automatically reset after one hour and initiate a call for heat.

6.5 TEMPERATURE RISE

Testing for heat rise is done as part of unit commissioning. It should not be attempted at this time because the gas heat module must run at full output and the fans must be running at maximum output.

Restore controller settings and shut off gas at the supply valve. Remove manometer and reinstall plugs in the pressure taps.

6.6 UNIT START-UP ADJUSTMENTS

6.6.1 Burner Flames

Prior to completing the start-up, check the appearance of the main burner flame. See images below for characteristics of properly adjusted Natural Gas systems.

The burner flame should be predominantly blue in color and well defined and centered at the tube entry. Distorted flame or yellow tipping of natural gas flame, or a long yellow flame on propane, may be caused by lint and dirt accumulations inside burner or at burner ports, at air inlet between burner and manifold pipe, or debris in the main burner orifice. Soft brush or vacuum clean affected areas.

Poorly defined, substantially yellow flames, or flames that appear lazy, indicate poor air supply to burners or excessive burner input. Verify gas supply type and manifold pressure with rating plate information.

Poor air supply can be caused by obstructions or blockage in heat exchanger tubes or vent discharge pipe. Inspect and clean as necessary to eliminate blockage. Vacuum any loose dirt or loose debris. Clean heat exchanger tubes with a stiff brush. Poor flame characteristics can also be caused by undersized combustion air openings or flue gas recirculation into combustion air supply. Increase air opening size or re-direct flue products to prevent recirculation.

Reduced air delivery can also be the result of fan blade slippage, dirt accumulation on the fan blade or low voltage to draft inducer motor. Inspect draft fan assembly and be sure the fan blade is secure to motor shaft. Check the line voltage to the module.

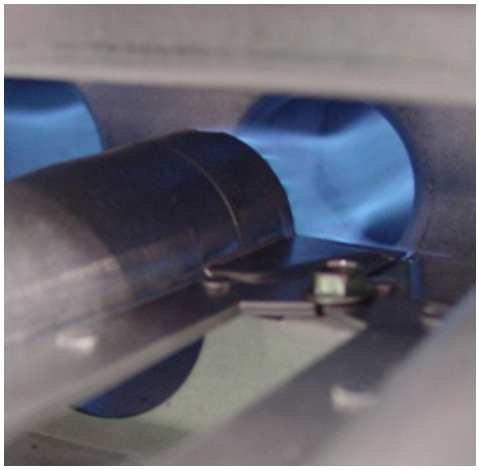


FIGURE 6.6.0 BURNER FLAME AT 1.2 INWC [298 PA] MANIFOLD PRESSURE (DRAFT INDUCER AT HIGH SPEED)

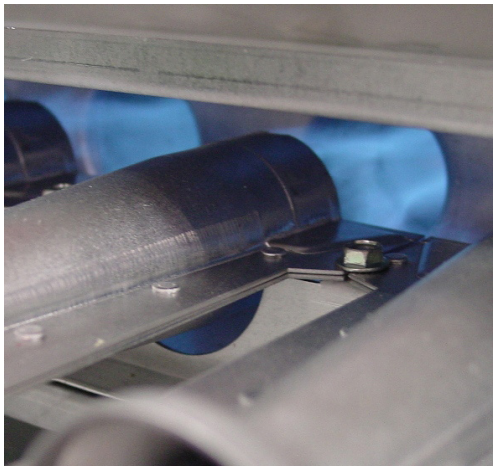


FIGURE 6.6.1 BURNER FLAME AT HIGH FIRE 3.5 INWC [871 PA] MANIFOLD PRESSURE (DRAFT INDUCER AT HIGH SPEED)

IMPORTANT
The high-fire settings on the gas valve(s) have been factory-set using the maximum manifold gas pressure as shown on the data label.

NOTE: Information outlining the normal sequence of operation and a wiring diagram for the control system supplied with each module are provided in this manual and with the information package shipped with the unit.

6.6.2 Shutdown After Unit Start-Up

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

6.6.3 Configuring the Controller for Normal Operation

The gas heat module is normally left Enabled (Service Menu > Unit Type) with the gas supply ON, unless the disconnect switch on the DOAS is turned OFF. Whenever the disconnect switch is ON, the gas heat module also has power and will try to light whenever there is a call for heat from the controller. As a safety measure, when power to the DOAS is turned off, the gas supply valve is also to be turned off.

In order for the controller to provide a call for heat, several controller menu items must be configured.

Path: Service Menu > Unit Type > Hardware Settings

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

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

Path: Main Menu > Control Variables

HEATING SCREEN 1

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

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

HEATING SCREEN 2

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

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

See Heating Screen 1.

OA Reset is typically used in buildings that are controlled by a BMS. The desired effect is to automatically change the heating setpoint in response to changing Outdoor Air temperature. Depending on the characteristics of the Occupied Space, it may be desirable to have the heating setpoint change upward when the OA gets very cold. When the OA temperature goes below the Minimum selected temperature, the setpoint automatically sets itself to a user-selected setpoint. As the OA temperature rises, the need no longer exists for that setpoint. When the OA temperature rises to the Maximum selected temperature, the setpoint changes to a second user-selected temperature. At any OA temperature between the Minimum and Maximum user-selected temperature values, the setpoint will vary proportionally.

The default settings for OA Reset are:

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

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

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

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

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

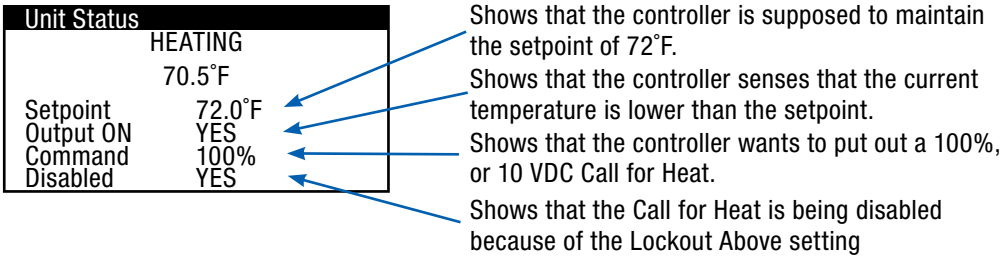
Setpoint: enter the desired temperature the controller should maintain.

IMPORTANT

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

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

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



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

IMPORTANT

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

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

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

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

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

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

See Heating Screen 2, Section 6.6.3 of this manual.

6.6.4 Normal Operation

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

6.6.5 Restarting a Heat Module

In the event that the gas supply is disconnected from the appliance or that the appliance must be restarted:

- Disable any call for heat by the controller by resetting the controller to disable the heating function. In the controller, go to the Service Menu > Unit Type > Enable Heat and change the status to OFF.
- Disconnect all power to the appliance by turning the DOAS disconnect switch to OFF.
- Turn the manual gas supply valve to the OFF position.

Restart the unit by:

- Turn the main disconnect switch on the DOAS back to ON.
- Turn the gas supply valve back to the ON position.
- Enable the heating function of the DOAS by going to the Service Menu and enabling the heating function.
- Provide a call for heat to the gas heater module. In the controller, go to the Main Menu > Control Variables > Heating and verify that the setpoint is greater than the ambient temperature.

Note that when the appliance has received a call for heat, a purge cycle will begin. If the appliance fails to light, the appliance will try three times to relight before going into a lockout condition.

NOTE: The process described here is known as a "hard restart". It resets both the unit controller and the heat module controller to their programmed conditions. It is generally used only after the heat module goes into a lockout condition.

7.0 MAINTENANCE

Annual maintenance: This heat module should be inspected and serviced annually by a qualified service agency to assure proper operation. Annual servicing of the module is normally performed at the beginning of the heating season.

7.1 MODULE INSPECTION

Turn off all electrical power to the unit before inspection and servicing.

- Visually inspect the condition of the heat exchanger tubes. Look for cracks, heat damage or other deterioration in the tubes. Any heat exchanger tubes showing failure must be replaced before the unit is placed back in service.
- The burner assembly should be disassembled for inspection and cleaning.
- Burners, igniters and flame sensors should be removed and cleaned. Check for obvious signs of corrosion, accumulation of dirt and debris and any heat or water related damage. Any damaged or deteriorated parts should be replaced before the unit is placed back in service.
- Clean the draft inducer, vent ducts and vent terminal screens.
- Check electrical wiring for loose connections or deteriorated insulation.
- Check the attachment point of the module to the cabinet or ducts to verify they are air tight.

NOTE: It may be necessary to use a “borescope” to properly inspect the heat exchanger tubes.

- Check for gas tightness of all pipe joints and connections.
- Check the automatic gas valve to ensure that the gas valve seat is not leaking.
- If there is a condensate drain tube, make sure the drain line is not obstructed. Verify that the drain tube is properly trapped and, if necessary, properly freeze-protected. Clean any debris or blockage from the drain line.

7.2 MODULE OPERATION CHECK

- Turn on power to the unit and set the controller heat setpoint high enough to call for heat, allowing module to operate.
- Check for proper start-up and ignition as outlined in Sequence of Operations (SOO) for the control provided. The SOO is printed on a separate page and is to be found with the module documentation package.
- Check the appearance of the burner flame. Reference information in the Installation section of this manual.
- Verify that the heat rise is correct. For modulated modules, check heat rise at high fire.
- Return controller to normal setting.

⚠ CAUTION

If any of the original wiring needs to be replaced, it must be replaced with wiring materials suitable for 105˚C.

Label all wires prior to disconnection when servicing the unit. Wiring errors can cause improper or dangerous operation. Verify proper operation after servicing.

7.3 SERVICE PARTS

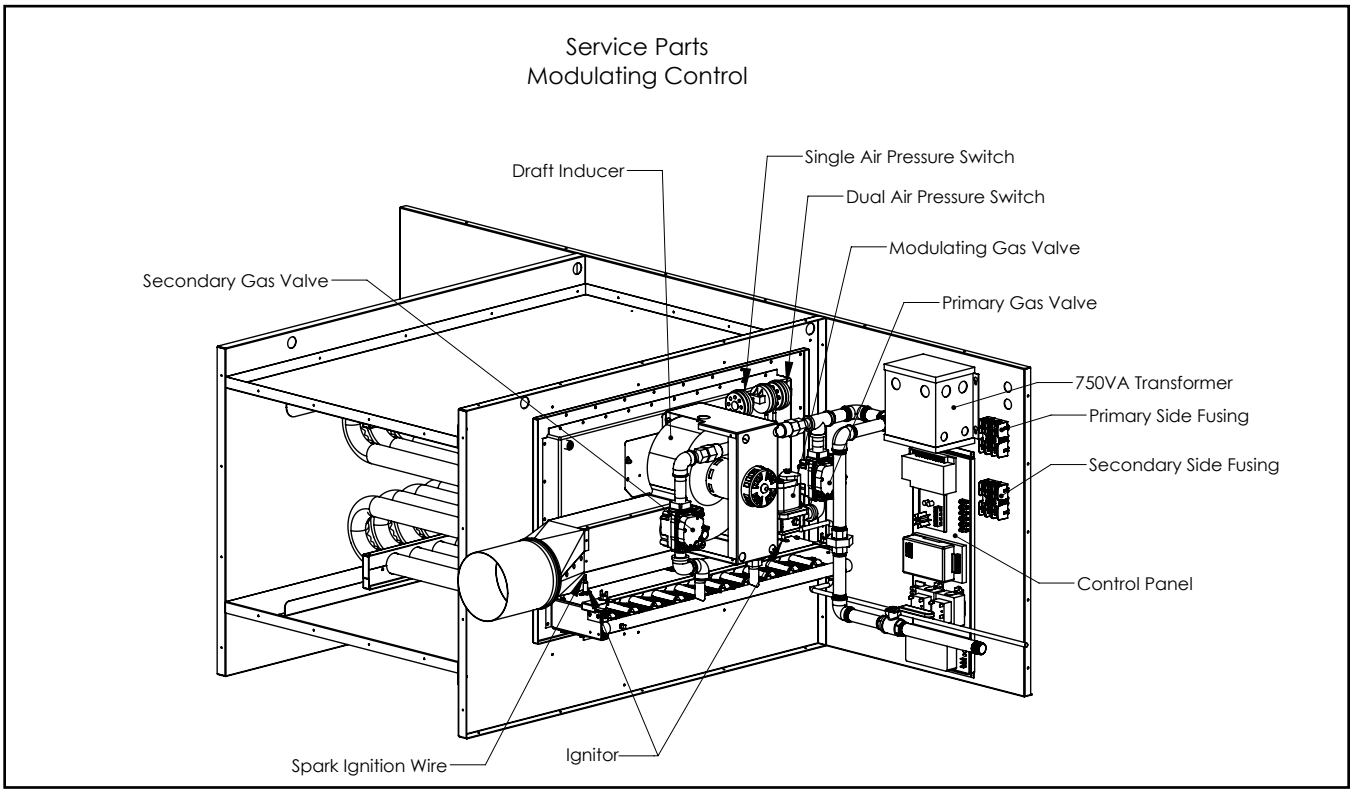


FIGURE 7.3.0 SERVICE PARTS—MODULATED CONTROL

8.0 TROUBLESHOOTING

In the event the gas heater fails to heat, check the following:

- Check the disconnect switch on the front of the unit and make sure it is turned ON.
- Check the fuses for the step-down transformer for the gas heat module.
- Check the Disable value on the Heating screen to make sure the unit is not being disabled by the Lockout Above setting (Main Menu > Unit Status > Heating).
- Check the signal conditioner terminals and make sure that a 0–10 VDC signal is being received.

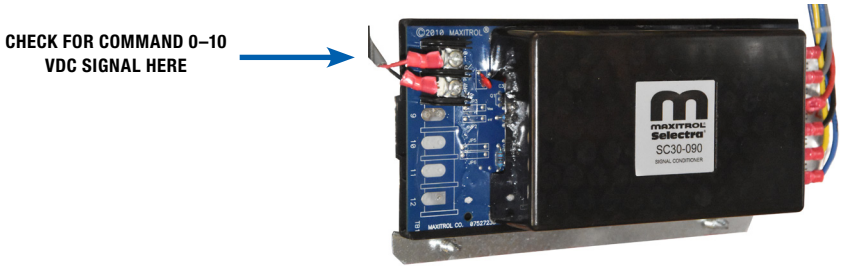


FIGURE 8.0.0 MAXITROL SC-30 SIGNAL CONDITIONER

If there is no control signal, verify that the Integrated Programmable Controller has enabled Heat, (Service Menu > Unit Type) the control signal is 0–10 VDC (Main Menu > Control Variables > Heating) and the controller itself is ENABLED (Main Menu > Unit Enable).

Any failure of the heat module to operate properly can be isolated by:

- Verify that conditions shown in the start-up portion of this manual are correct
- Follow the Sequence of Operation (SOO) to determine the point of failure.

The most important resource for trouble shooting is the Sequence of Operation. The sequence varies for each unit, depending on the module size, the turndown ratio and the controls. In some cases, heat modules are controlled by a building management system (BMS) and the issue may be with the BMS, not with the module.

8.1 SEQUENCE OF OPERATIONS (SOO)

Each heat module has a specific Sequence of Operation. The SOO is printed separately and shipped with the module documentation package. As an aid to understanding the operation of the heat module, following is a GENERIC sequence of operation.

1. Thermostat (or heat enable) closes and provides a call for heat, powering T2 or T1 and T2.
2. 24 VAC is applied to IC terminal T'STAT, provided that the high limit switch is in the closed position.
3. The module control will check that pressure switch contacts are open.
4. The induced draft fan is energized at high speed.
5. When the air switch (APS-1) closes, a 15 second pre-purge period begins.
6. At the end of pre-purge, the spark commences.
7. Burners ignite and cross-light.
8. When flame is detected by the flame sensor, the spark is shut off immediately while the gas valve(s) and combustion blower remain energized.
9. During heating operation, the thermostat, pressure switch and main burner flame are constantly monitored to assure proper system operation.
10. When the thermostat (controller) is satisfied and the demand for heat ends, the gas valve(s) is de-energized immediately. The control senses loss of flame and a 30 second post-purge occurs before the fan is de-energized.

NOTE: The module-specific SOO will also provide information regarding ignition and operational failures, recovery from lockout and a complete set of LED Normal Operation codes and a set of Error Codes. The SOO provides details that are specific to the controls and turn-down of the specific module.

8.2 IGNITION CONTROLLER

Problems with ignition can often be diagnosed by viewing the LED indicator on the Series 5 Ignition Controller that is used on all models. The controller monitors operation of the module and will shut down the module for a number of reasons and provide a flashing error code. It also indicates the stages of ignition and correct operation.

ERROR CODE:

Solid Green = Normal operation

1 Red Flash = No Flame During Trial

2 Red Flashes = Flame Sense Fail

3 Red Flashes = Pilot Main Relay Fail

4 Red Flashes = Multiple Flame Loss

5 Red Flashes = Rollout Error

6 Red Flashes = APS Airflow Error

7 Red Flashes = Internal Control Error

Solid Red = Line Voltage Error

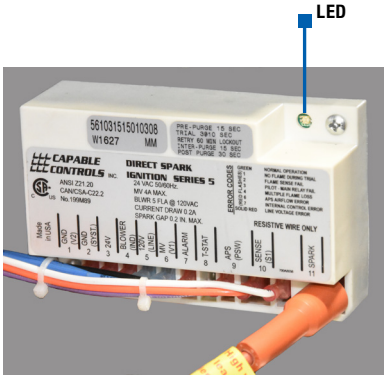


FIGURE 8.2.0 SERIES 5 IGNITION CONTROLLER

9.0 FACTORY ASSISTANCE

In the unlikely event that you need assistance from the factory for a specific issue with the Indirect Gas-Fired Module, make sure that you have the information called for in the Unit Information page in the beginning 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 and their options. They cannot resolve engineering issues that result from air handling system design by others.

10.0 WARRANTY

The RenewAire Indirect Gas-Fired Heat Module is covered under the standard RenewAire ERV warranty. A copy of the warranty is included with the unit manuals. If the warranty should be lost or misplaced, a PDF version can be downloaded from:

http://www.renewaire.com/support/for-the-professional/documentation/warranty-information

In addition to the standard RenewAire warranty, certain components in the heat module that are constructed of stainless steel (such as the heat exchanger tubes) have an extended prorated warranty. RenewAire's maximum liability on this limited warranty shall decrease as set forth below. The Customer shall be required to pay a percentage of the current replacement price in accordance with the following schedule at the time such failure in materials or workmanship occurs:

WARRANTY YEAR	CUSTOMER PAY PERCENTAGE
Year 1	0% of List Price
Year 2	10% of List Price
Year 3	20% of List Price
Year 4	30% of List Price
Year 5	40% of List Price
Year 6	50% of List Price
Year 7	60% of List Price
Year 8	70% of List Price
Year 9	80% of List Price
Year 10	90% of List Price

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

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