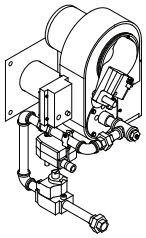
Installation and Service Instructions



Economite RE4400DS HTD
Gas Burner

In the United States, installation must conform with local codes or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1-latest edition available from American National Standard Institute. Further reference should be made to the recommendation of your fuel supplier.

In Canada, installation must conform with local codes or in the absence of local codes, with Installation Codes for Gas Burning Appliances and Equipment, CGA Standard CAN/CGA 1-B-149.1 or 2. Further reference should be made to the recommendation of your fuel supplier.

⚠ WARNING: Additions, changes, conversions and service must be performed by an authorized Midco representative, service agency or the fuel supplier. Use only Midco specified and approved parts.

INSTALLER: Inform and demonstrate to the user the correct operation and maintenance of the gas utilization equipment. Inform the user of the hazards of storing flammable liquids and vapors in the vicinity of this gas utilization equipment and remove such hazards. Affix this manual and associated literature to the burner. CODE COMPLIANCE IS THE SOLE RESPONSIBILITY OF THE INSTALLER.

USER: Retain this manual for future reference. If other than routine service or maintenance as described in this manual and associated literature is required, contact a qualified service agency. DO NOT ATTEMPT REPAIRS. An inadvertent service error could result in a dangerous condition.

⚠ WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result, causing property damage, personal injury or death.

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.
- Immediately phone your gas supplier from another 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.

⚠ AVERTISSEMENT. Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion pouvant entraîner des dommages matériels, des blessures ou la mort.

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

QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- Ne pas tenter d'allumer d'appareil.
- Ne touchez à aucun interrupteur. Ne pas vous servir des téléphones se trouvant dans le bâtimentoù vous êtes.
- Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur. Si vous ne pouvez rejoindre le fournisseur de gaz, appelez le service des incendies.

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.

FOR SERVICE CONTACT

Name: _____

Address: _____

_____

Phone: _____

Date of Installation: _____

BURNER MODEL: _____

BILL OF MATERIAL NUMBER: _____

SERIAL NUMBER #: _____

WIRING DIAGRAM: _____

AVOID ERROR IN PARTS SELECTION. When ordering use complete MIDCO Part Number and Description. Furnish Burner Model Number, Bill of Material Number and Serial Number (if available) from the specification plate found on the product. **IMPORTANT:** Availability of parts as well as specifications are subject to change without notice. Please consult factory for item availability.

SAFETY INFORMATION TERMS: The following terms are used to identify hazards, safety precaution of special notations and have standard meanings throughout this manual. They are printed in all capital letters using a bold type face as shown below, and preceded by the exclamation mark symbol. When you see the safety alert symbol and one of the safety information terms as shown below, be aware of the hazard potential.

⚠ **DANGER:** Identifies the most serious hazards which will result in severe personal injury or death.
WARNING: Signifies a hazard that could result in personal injury or death.
CAUTION: Identifies unsafe practices which would result in minor personal injury or product and property damage.

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Part 1 - Installation

Specifications [1]

The **ECONOMITE Model RE 4400DS HTD (High Turn Down)** burners with direct spark ignition are perfectly suited and adaptable to most gas utilization equipment, including rooftop and industrial applications.

AIR DELIVERY (Approximate Air Delivery at Zero Draft)		
RE4400DS HTD	125 SCFM [2]	
FIRING RATE (NATURAL) [3]		
MAXIMUM MBH [4].....	400	
MINIMUM MBH [4].....	20	
GAS SUPPLY PRESSURE REQUIRED		
	Min	Max
250 MBH	7.0″ to	14.0″ W.C
350 MBH	7.0″ to	14.0″ W.C
400 MBH	7.0″ to	14.0″ W.C
TUBE DIAMETER	4″	
RECOMMENDED COMBUSTION CHAMBER SIZE (AT MAX. BTU/HR)		
WIDTH.....	10″	
LENGTH.....	16.5″	
ELECTRICAL SUPPLY	208 / 240 VAC..... 60 Hertz	
ELECTRONIC CONTROL VOLTAGE	24 VAC	
FLAME SAFETY.....	Direct Spark Ignition of Main Flame, Electronic Safety	

Table 1: Burner Specifications

1. Standard burners are shipped as NATURAL gas models.
2. SCFM = Standard Cubic Feet / Minute.
3. All Ratings Based on 1000 BTU/Cu. Ft. NATURAL Derate burner for altitude over 2,000 feet by 4% for each 1,000 feet above sea level.
4. 1 MBH = 1,000 BTU/hr.

I Combustion Chamber

□ The burner tube, or the stainless steel sleeve that is included with the burner, must be sealed air tight into the combustion chamber opening. The sleeve is preferred as it is designed to properly locate the end of the tube relative to the inside wall of the combustion chamber.

⚠ **CAUTION: In no case should the burner tube be allowed to extend into the chamber proper; it must be set at least 1″ short of the inside surface because high combustion chamber temperatures will cause premature pilot, electrode, burner tube and sleeve deterioration.**

II Electrical

⚠ **CAUTION: Refer to wiring diagram in Figure 1A or Figure 1B or located on the inside of the burner housing cover.**

Installation wiring and grounding to the burner must conform to local codes, or, in their absence in the United States to National Electric Code, ANSI/NFPA No. 70 latest edition; in Canada, to Canadian Electrical Code Part 1, CSA Standard C22.1

□ Use copper wire not less than 14 gage for line voltage wiring. Hook up to a dedicated line with an on-off disconnect switch and a minimum 10 Amp breaker.
□ The frame of the burner should be well grounded. Normally the piping and/or electric conduit will provide sufficient grounding. However, a ground lug is located in control box for positive grounding where insulated pipe couplings are used or where any doubt exists regarding grounding sufficiency.
□ Confirm that the polarity is correct—hot wire to strip terminal L1, neutral L2—and that the neutral line is not subject to induced low voltage (check L2 to earth ground) from other equipment, as that can cause the Electronic Control to malfunction.
□ Each installation must include suitable limit control(s).

⚠ **CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

II Electrical - Continued

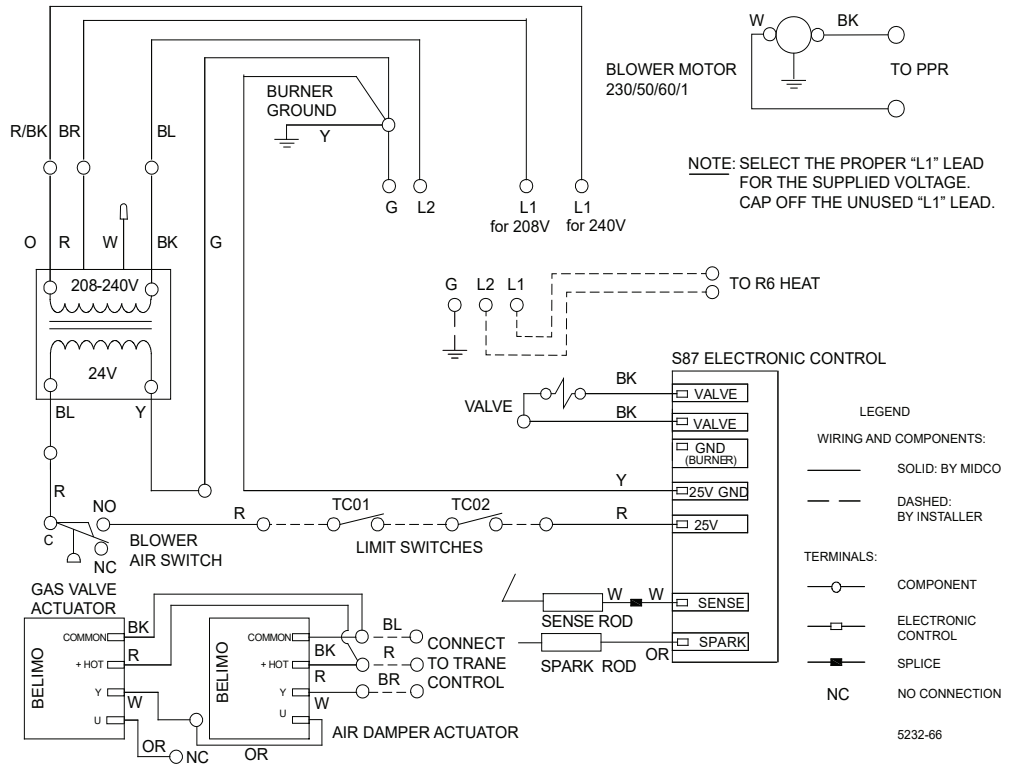

Figure 1A: Honeywell Wiring Diagram

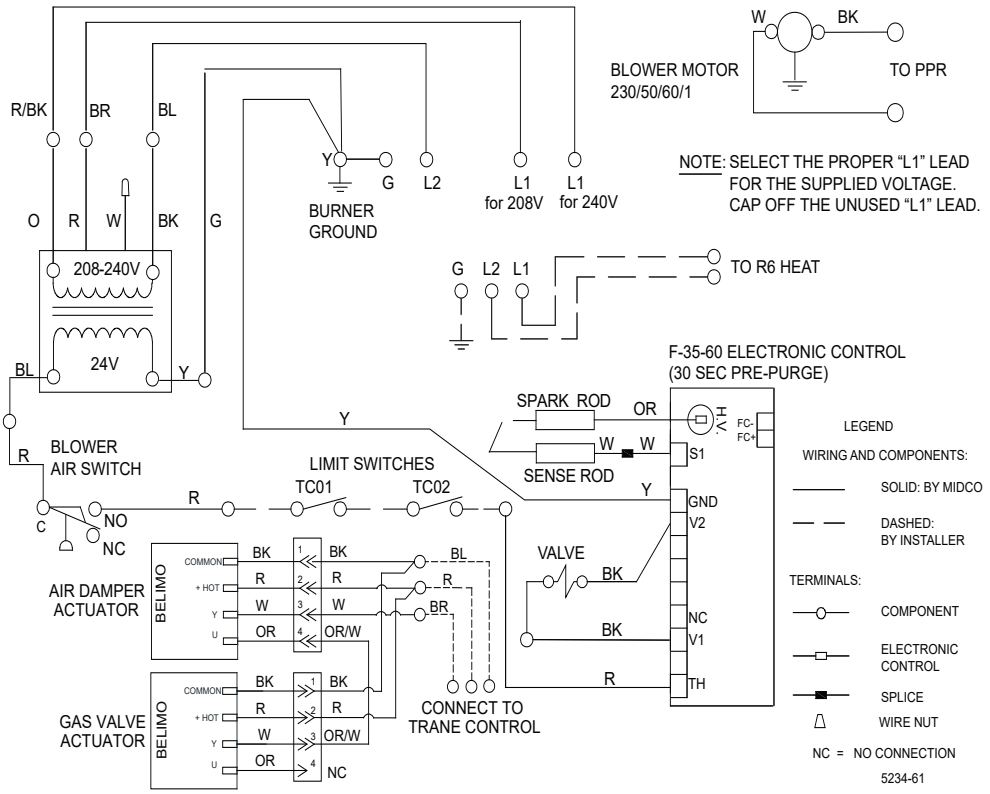

Figure 1B: Fenwal Wiring Diagram

Part 1 - Installation

III Piping

⚠ CAUTION: The available gas pressure should be within the limits shown in Table 1. Excessive pressure may damage electric valves, regulators and manual valves. If the supply pressure exceeds the 14.0″ W.C. maximum, a suitable high pressure regulator must be installed between the Main Manual Shut-Off Valve and burner combination valve.

□ The burner gas supply piping should branch off from the main line as close to the gas meter as possible. Do not connect to the bottom of a horizontal section. Use new black pipe and malleable fittings free of cutting and threading burrs or defects.
□ Piping must also comply with your local codes.
□ To obtain the maximum firing rate of the burner, the gas supply piping must be sized to provide a minimum pressure of 7.0″W.C. (Natural) to the inlet of the combination redundant valve when the burner and all other gas utilization equipment are on. The main regulator, if equipped, should be mounted upright and in a horizontal run of pipe.

⚠ CAUTION: Because it is difficult to accurately control pressure during supply pipe leak testing, it is recommended that all low pressure 1/2 PSIG (14.0″ W.C. max.) components be disconnected during testing. Exposing low pressure regulators and valves, including manual valves, to pressures over 1/2 PSIG (14.0″ W.C.) will cause damage and void all warranties.

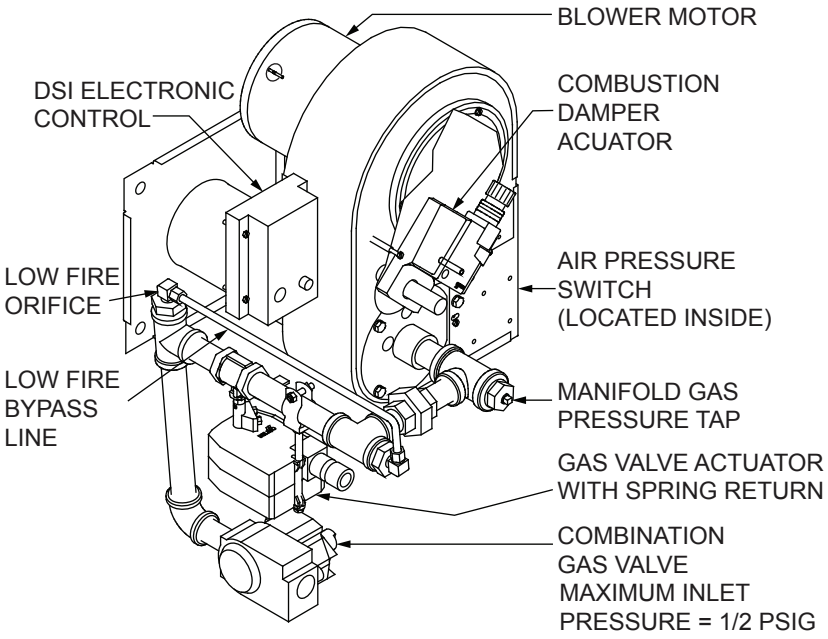

Figure 2: Typical Piping Diagram

⚠ DANGER: Explosion hazard.
Do not use oxygen for pressure testing.
An explosion could occur during initial start up.

□ If the burner piping must be rearranged because of space limitation, be sure to carry out the general arrangement shown in Figure 2. Install the combination valve in any position except up-side down.
□ When the burner is installed in the vestibule of jacketed equipment, it is recommended that the Automatic Safety Shut-Off Valves be left adjacent to the burner within the vestibule and the Main Manual Shut-Off Valve be installed outside.
□ When high supply gas pressure is encountered, as in the case in many industrial plants, the gas line size can be reduced to allow for a greater pressure drop; however, the size must be sufficient to deliver burner rating pressure.

⚠ CAUTION: High gas pressure supply lines require the proper pressure reducing regulators. Install a high pressure regulator of the Tight Shut-Off type, sized for main gas input, upstream of the low pressure regulators.

III Piping - Continued

□ The high pressure regulators must be adjustable to 14″ W.C. outlet pressure.
□ When the gas supply line is about to be put into service it must be tested to ensure that it is gas tight. Use air or inert gas under pressure and test with soap and water to locate leaks.
□ Before gas is turned on to the system, a check must be made to see that there are no open fittings and to make sure the burner main valve is closed.
□After checking for leaks, purge the gas line up to the burner inlet. Purging the air from the gas supply line at this step will expedite the first light-off.

IV Main Gas Input Selection

Burners are approved for use with NATURAL gas and should be used only with the gas specified on the rating plate.

V Initial Start-up

□ Sequence of Initial Start-up

1. On a call for heat, the roof top unit's inlet damper will open. Once the inlet damper opens, the end switch on the inlet damper's Belimo Actuator will close and the main blower will be energized.
2. With all limits and safeties closed the RE4400DS HTD burner circuit will be energized.
3. On a call for heat, the burner motor is energized. The combustion damper motor drives to 100% open for a 45 second prepurge prior to ignition.
4. After 30 seconds, the combustion damper motor drives to minimum position.
5. The ignition sequence begins and the combination gas valve and internal spark generator are energized. If a flame signal is proven (2-5 DC microamps), then the burner will begin to modulate after a 10 second delay.
6. If the flame is lost during the run mode, then the DSI Electronic Control will re-energize the combination gas valve and internal spark generator after the prepurge cycle. If the flame signal is not above 2-5 DC microamps, then the the burner will lock out and will need to be reset.

□Start-up Instruction for RE4400DS HTD

1. Set the operating control to off or thermostat below room temperature.
2. Turn manual gas cock on.
3. Turn burner power on.
4. Set operating control to ON or thermostat to call for heat. Wait 75 seconds. If the burner has failed to light or if burner lights then goes out, then the system will go into safety lockout. De-energize the system by setting operating control to off or thermostat below room temperature for at least 30 seconds to reset the system. Repeat step 4 for restart.
5. The Belimo Actuator controls the firing rate of the burner by providing a signal to terminal 3 on the actuator. The actuator has stops (set screws), which have been pre-set to 20 MBH (0.02″ W.C. manifold pressure, 2 Volts DC signal input) at low fire and 400 MBH (4.7″ W.C. manifold pressure, 8 Volts DC signal input) at maximum fire. The regulator on the combination valve has been set to high fire and should not need to be adjusted. The "Modulating Gas Valve" (butterfly valve which is attached to the spring return actuator) will vary the amount of gas flow into the burner.
6. The low fire bypass and the Modulating Gas Valve are pre-set by the factory for a minimum firing rate of 20 MBH. The flame signal at this firing rate should be above 2 DC microamps.
7. Check the modulation tracking for 400 MBH units only (for 250 MBH and 350 MBH units, just check the manifold pressure of respective firing rate) by modulating the burner to 4 Volts DC signal (heating signal of 33%). The manifold pressure should be approximately 0.8″ to 0.9″ W.C. If not, loosen the 7/16″ nut on the Modulating Gas Valve Actuator and make necessary adjustments with the green handle of the butterfly valve (see Figure 3). Retighten the nuts and modulate the burner to low fire (2 Volts DC) then back up to 4 Volts DC again to check the adjustments. If the manifold pressure is not as specified, repeat step 7.
8. The damper should be flush with the low fire stop. The O_2 concentration of the flue exhaust at the low fire rate should be approximately 10% +/-2. To adjust the O_2 level at low fire (allow more air or reduce the air), vary the alignment between the damper and the inlet ring. Minimum air shutter adjustment can be done by adjusting the three #8-18 screws on the inlet ring (see Figure 4). To increase or decrease the O_2 percentage substantially, loosen the air damper from the shaft and make necessary adjustments. Check combustion readings to verify burner performance.

V Initial Start-up - Continued

⚠ CAUTION: Make sure that the capacity range of the burner, manifold pressure, and the preliminary combustion air shutter setting are suitable for capacity rating of the gas utilization equipment.

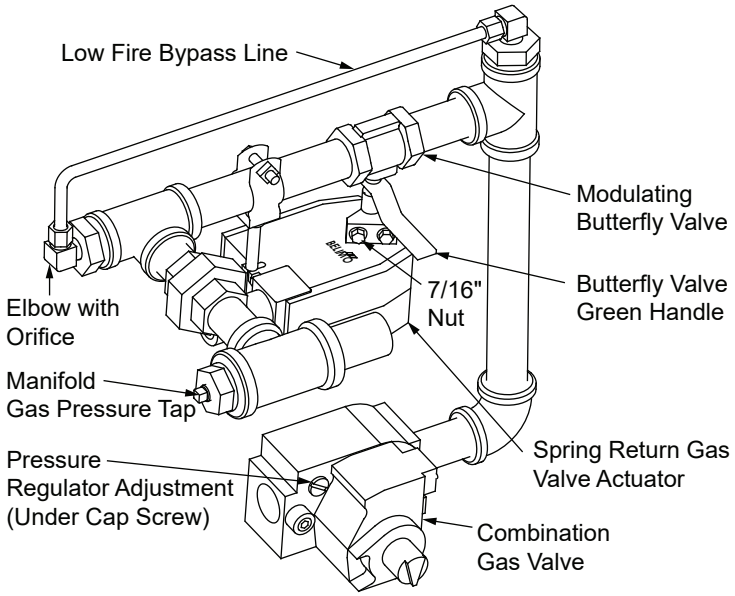

Figure 3: RE4400DS HTD Valve Train Assembly

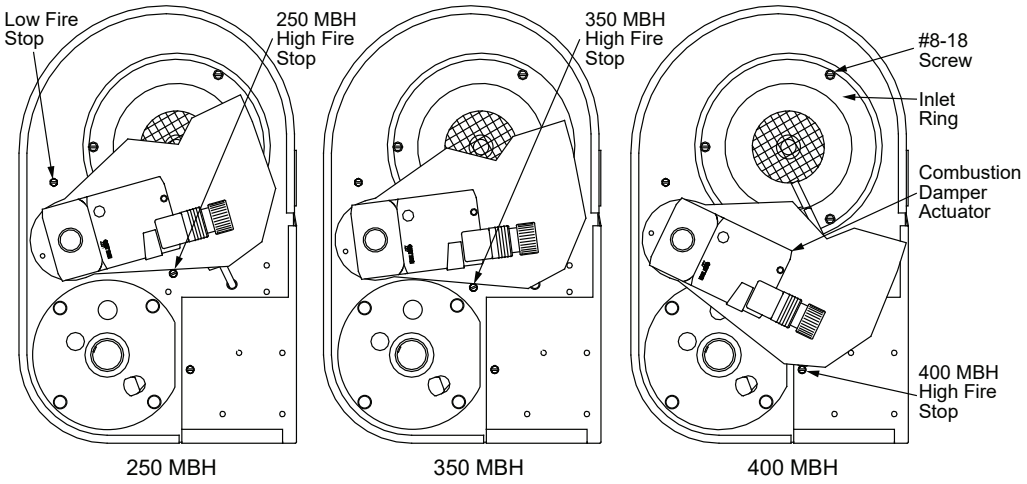

Figure 4: RE4400DS HTD High Fire Damper Locations

250MBH		350MBH/ 400MBH	
Input MBH	Manifold [1] Pressure ("W.C.)	Input MBH	Manifold [1] Pressure ("W.C.)
		400	4.7
		350	3.9
250	2.7	250	2.5
150	1.1	150	0.8
25	0.02	25	0.02

Table 2: RE4400DS HTD Natural Gas High Fire Pressure Settings

[1] Adjust the combination gas valve to vary the manifold gas pressure and burner input within the range shown. Do not exceed pressure as listed in Table 2 under any circumstances. Use combustion readings (CO and O_2) and a flow meter to determine exact inputs.

DANGER: Do not tamper with the unit or controls. If trouble occurs contact the installing contractor, service agency, or fuel supplier. See front cover.

DANGER: Be sure that the main Shut-Off Valve is closed and the burner power supply is turned off before removing any parts for service.

CAUTION: Cover plates, guards, and enclosures must be maintained in place at all times except during maintenance and service.

VI Electrodes

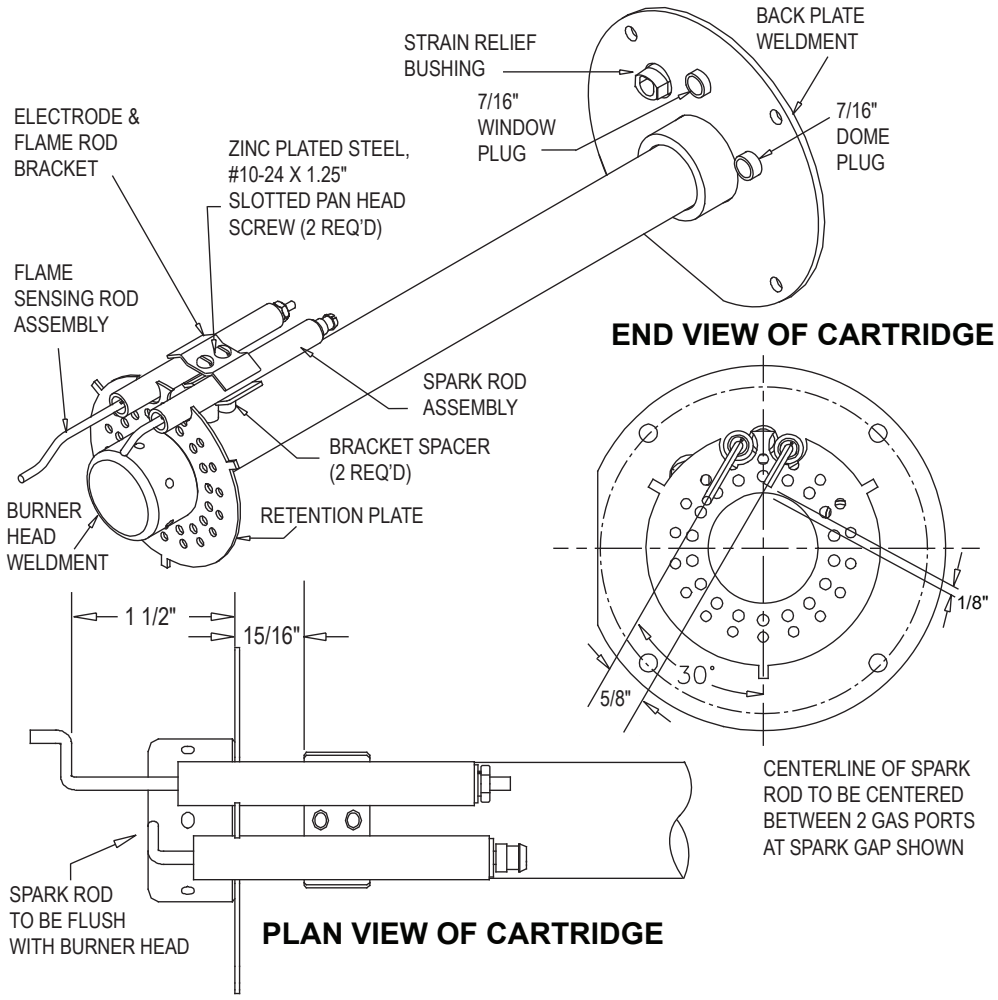

Figure 5: RE4400DS HTD Cartridge Assembly

□ The flame sensing rod must be positioned as shown in Figure 5 so that the Electronic Control will detect a proper flame.

□ Both the spark and flame rods are current carrying conductors and, along with their connecting wires, must be kept free of contact with conductive metal parts of the burner. Rod insulators and wire insulators should be clean, dry and free of cracks.

□ Both the spark and flame rods are made from heat resistant alloys and can be expected to have a long service life. They should be routinely inspected, however, for corrosion or loss of metal.

VII Valve Train

□ Should replacement or service be required, valve manufacturer's instructions must be followed as outlined in their information sheet.
□ Outlet pressure settings must be checked while the gas is flowing.
□ To adjust outlet pressure, remove the seal cap for access to the adjusting screw. Turning the screw clockwise will increase outlet pressure, counterclockwise will decrease outlet pressure.

VIII Sequence of Operation

□ Sequence of operation

1. When the external airflow over the heat exchanger is established, the roof top unit inlet damper will open. Once the inlet damper opens, the end switch on the Belimo Actuator will close and the main blower will be energized.
2. With all limits and safeties closed, the RE4400DS HTD burner circuit will be energized.
3. On a call for heat, the burner motor is energized. The combustion damper motor drives to 100% open for a 45 second prepurge prior to ignition.
4. After 45 seconds, the combustion damper motor drives to minimum position.
5. The ignition sequence begins and the combination gas valve and internal spark generator are energized.
6. If the flame is lost during the run mode, the DSI Electronic Control will re-energize the combination gas valve and internal spark generator after the prepurge cycle. If the flame signal is not above 2-5 DC microamps, then the burner will lock out and will need to be reset.

IX Electronic Control

□ The Electronic Control (such as the Honeywell S87 or the Fenwal F-35-60) is a low voltage, solid state, direct spark ignition control module for gas-fired equipment. UL Listed models are only available with a pre-purge timer. The Electronic Control controls the gas valve, monitors the main burner flame and generates a high voltage for spark ignition.
□ The Electronic Control uses separate electrodes for spark ignition and flame sensing. Use with any gas control designed for DSI application that is rated at 2.0 A or less. Includes a 30 second (minimum) delay for use with system pre-purge.
□ For operation characteristics, maintenance, and service procedures, refer to manufacturer's literature provided with burner or contact your Electronic Control dealer.

X Start Up

□ Refer to Trane Operation Manual for burner startup or refer to section V of this manual.

XI Special Equipment (OEM Versions)

Special equipment, either factory or contractor installed, may cause variation in the procedures and descriptions given in this manual.

Consult the OEM's manual to identify the differences in the information.

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