



HD-400(R) INDIRECT FIRED SPACE HEATER



**HD-400
STANDARD MODEL**



**HD-400R
RECIRCULATING MODEL**

USER INSTRUCTIONS MANUAL

PLEASE RETAIN THIS DOCUMENT FOR FUTURE REFERENCE

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GENERAL HAZARD WARNING

FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER CAN RESULT IN SERIOUS DEATH, SERIOUS BODILY INJURY, AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND / OR ELECTRICAL SHOCK. ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER. IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABEL, ETC., CONTACT THE MANUFACTURER.

WARNING

NOT FOR HOME OR RECREATIONAL VEHICLE USE

WARNING

KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER, OR CARDBOARD A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES, OR UNKNOWN CHEMICALS.

WARNING

THE INTENDED USE OF THIS HEATER IS FOR THE TEMPORARY HEATING OF A BUILDING OR STRUCTURE UNDER CONSTRUCTION, ALTERATION, REPAIR, OR EMERGENCIES ONLY.

TESTING AGENCY

This heater is designed and approved for use as a construction heater in accordance with the Standard for Portable Industrial Gas-Fired Heaters ANSI STD A83.7 / CSA 2.14.

CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE ANY QUESTIONS ABOUT APPLICATIONS.

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

WARNING

AIR QUALITY HAZARD

- Do not use this heater for heating human living quarters
- Use of direct-fired heaters in the construction environment can result in exposure to levels of CO, CO₂, NO₂ which are considered to be hazardous to health and potentially life threatening
- Do not use in unventilated areas
- Know the signs of CO and CO₂ poisoning: Headaches, stinging eyes, dizziness, disorientation, difficulty breathing, feeling of being suffocated
- Proper ventilation air exchange (OSHA 29 CFR 1926.57) to support combustion and maintain acceptable air quality shall be provided in accordance with OSHA 29 CFR 1926.154, ANSI A10.10 Requirements for Temporary and Portable Space Heating Devices and Equipment used in the Construction Industry or the Natural Gas and Propane Installation Codes CSA B149.1
- Periodically monitor levels of CO, CO₂, NO₂ existing at the construction site; minimum: at the start of the shift and every 4 hours thereafter
- Provide ventilation air exchange, either natural or mechanical, as required to maintain acceptable indoor air quality, ensuring that the ventilation cannot become obstructed, and adjusting for proper ventilation as the project progresses
- Pipe Fittings: When any pipe fittings are loosened, tightened, or replaced, an approved thread sealing compound should be applied to the threads to ensure that they are leak proof and pressure tight
- Flare Fittings: Thread sealing compound is not required on SAE flare fittings
- Post-Service Leak Checks: The entire valve train should be checked for leaks using a soapy water solution or an approved leak detector solution whenever the heater is serviced
- Installation & Maintenance: Heaters are to be installed and operated in accordance with CGA Standard B149.1 Installation Code and to any provincial or local codes. Service should only be carried out by a qualified propane gas fitter
- Placement: The heater should only be fired on a level surface. Minimum clearances (see Technical Specifications section) should always be respected
- Combustibles: Do not store or use flammable products (gases, liquids, or solids) within the vicinity of the heater. Minimum clearances (see Technical Specifications section) should always be respected

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INSTALLATION

The installation of this heater for use with Natural Gas (NG) or Propane (LP) and shall conform with local codes or, in the absence of codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54. Installation of the unit shall be in accordance with the regulations of the authorities having jurisdiction or the CSA Standard B139, and must be done by a qualified gas technician or gas fitter.

CLEARANCE FROM COMBUSTIBLES

TOP	FRONT	SIDES	REAR	FLUE PIPE
1 m (3 ft)	3 m (10 ft)	1 m (3 ft)	1 m (3 ft)	1 m (3 ft)

FUEL

This heater is designed to operate with:

- Natural Gas
- Propane

This heater must be located at least 3 m (10 ft) in Canada, or 1.83 m (6 ft) in the United States, from any fuel gas cylinders. This heater shall not be directed toward any fuel gas cylinders within 6 m (20 ft).

You do not need to change any of the burner components but you must make sure that the fuel selector valve is in the proper fuel position.

ELECTRICAL REQUIREMENTS

This appliance is equipped with a three-prong (grounded) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle.

115 Vac / 60 Hz supply must be available. Please note that the heater requires 15 amps for proper operation. Ensure appropriate gauge extension cord is used.

- 12/3 AWG up to 50 ft
- 10/3 AWG from 50 ft to 100 ft

CONNECTING THE CYLINDER(S)

If cylinders are used to supply the heater, no cylinders smaller than 45 kg (100 lbs) capacity shall be used. These cylinders must supply a vapour withdrawal only.

1. All cylinder connections must be tightened with a wrench
2. Cylinder valve shall be closed before connecting or disconnecting fittings
3. A soap and water solution must be applied to all connections in order to leak-check the system

The gas supply must be turned off at the cylinder(s) when the heater is not in use. When the heater is to be stored indoors, the connection between the supply cylinder(s) and the heater must be disconnected, and the cylinder(s) must be removed and stored in accordance with the Standard For The Storage And Handling Of Liquefied Petroleum Gases, ANSI/NFPA 58 and CSA B149.1, and the Natural Gas And Propane Installation Code.

PIPING

This heater must be installed by qualified gas technician or gas fitter, following local codes published by the authority having jurisdiction. The gas technician or gas fitter must use the appropriate gas sizing charts to determine proper pipe sizing and length.

INLET PRESSURES

Maximum pressures:

- Propane: 13.0" W.C.
- Natural Gas: 10.0" W.C.

Minimum pressures:

- Propane: 8.0" W.C.
- Natural Gas: 4.0" W.C.

This heater must be supplied by pressures indicated on the approval label. Over pressure may cause controls to fail. Do not supply this unit with more than 1/2 psig (14.0" W.C.).

Note: A second stage regulator must be installed if the supply pressure exceeds 1/2 psig (14.0" W.C.).

FLUE PIPE

For outdoor applications, the flue pipe connection must terminate with a vertical run at least 61 cm (2 ft) long with a vent cap.

For indoor applications, the venting must consist of a minimum 61 cm (2 ft) vertical run to a maximum of 6 m (20 ft) total vent length. See diagram below for horizontal vent installation.

The vent outlet on the heater is 15 cm (6 in) diameter. Certified venting must be used at all times. Where back drafts may occur, a vent cap should be used on the exit from the flue pipe. All venting must correspond with the CSA B149 standard or in its absence, local codes.

DUCTING

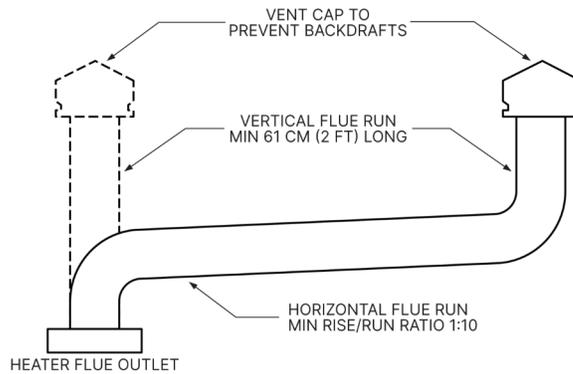
Industrial heater ducting with a minimum temperature handling of 149° C (300° F) including wire reinforcement to prevent collapsing. Heater is designed for use with two 30 cm (12 in) diameter, or one 40 cm (16 in) diameter ducting equipped with pin lock coupling or cuff & buckle. Ducting should be inspected periodically for tearing and wear marks. Ducting should be stored in a dry area when not in use.

HOSES

Ensure all hoses used to connect this heater to a fuel supply are Type 1 approved propane / natural gas hose assemblies.

VENTING REQUIREMENTS

CAUTION: WHEN THE HEATER IS CONNECTED TO A FLUE PIPE, THE FLUE PIPE SHALL TERMINATE IN A VERTICAL SECTION OF A MINIMUM OF 61 CM (2 FT) LONG AND SUFFICIENT DRAFT SHALL BE CREATED TO ASSURE SAFE AND PROPER OPERATION OF THE HEATER.



HIGH ALTITUDE INSTALLATIONS

Installation of this appliance at altitudes above 610 m (2,000 ft) shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.

MAINTENANCE

PERIODIC MAINTENANCE

- Every construction heater must be inspected before each use, and annually by a qualified service technician. Incorrect maintenance may result in improper operation of the heater and serious injury could occur
- Service and maintenance must be performed by a qualified service technician
CAUTION: DO NOT TAMPER WITH UNIT; HAVE A COMPETENT SERVICE PERSON MAKE ADJUSTMENTS ETC
- The flow of combustion and ventilation air must be free of any obstructions
- Be sure to check the fan assembly and ensure that the motor and blade are operating properly
- The unit must be kept clear and free from combustible materials, fuels, or flammable vapours and liquids
- Compressed air can be used to keep components free of dust and dirt
Note: Do not use the compressed air inside any piping or regulator components
- The Fan Limit Switch should be replaced if the fan motor does not shut off after the heat exchanger has cooled down
- The High Limit Switches should be checked each season. These limit switches will ensure the burner shuts down if the temperature exceeds 66° C (150° F) at the burner and 121° C (250° F) at the outlet of the heater
- Ensure the heat exchanger is clear of smokey air, even after heater settings have been verified
- A visual inspection of all hose assemblies must be conducted to ensure no excess wear or damage. If the hose assemblies are damaged, you must replace them

OPERATION

START UP INSTRUCTIONS

1. Position the heater on level surface
2. Toggle switch must be in the "OFF" position
3. Leak test all connections
4. Connect gas supply to heater
5. Select the fuel type, propane or natural gas, on the fuel selector valve
6. Ensure burner "air gate" is properly set: propane @ 4.8, natural gas @ 4.0
7. Ensure electrical cord is grounded and plugged into a 120 Vac / 60 Hz / 15 A outlet, ensuring adequate cord size:
3 × 4 mm² up to 15 m (12/3 AWG up to 50 ft)
3 × 6 mm² from 15 m to 30 m (10/3 AWG from 50 ft to 100 ft)
8. Verify voltage supply by looking at voltmeter on heater
9. Either:
 - Move switch to "MANUAL" position for manual control
 - Move switch to "THERMOSTAT" position for thermostatic control (thermostat must be plugged into heater)
10. Once the burner has started, you will need to verify and set the manifold pressure; refer to the rating plate for manifold pressure
11. Use a manometer to verify manifold pressure is correct; if needed, correct the manifold pressure by adjusting the set screw on the regulator on the manifold

Notes:

- When changing between manual and thermostat modes, the heater must be left in the "OFF" position for at least 30 seconds to prevent the burner from locking out
- When using a generator as an electrical source, make sure that:
 - the generator is properly grounded
 - the AC frequency is 60 Hz at the output
 - if the generator runs out of fuel, the heater switch is in the "OFF" position before restarting the generator; failure to do so may damage the heater

SHUT DOWN INSTRUCTIONS

1. Shut off the main gas supply valve while the heater is still operating
2. Move Burner switch to "OFF" position
Note: Fan will continue to operate after the burner shuts down. Once the heat exchanger cools down, the fan will stop. Do not disconnect the power supply until the heat exchange has cooled
3. Disconnect the fuel supply from the heater

IF HEATER FAILS TO START

1. Press the Manual Reset button at rear of burner
2. Check the gas pressure and ensure that it is adequate, according to the rating plate
3. Ensure proper power supply and extension cord is being used and that they are securely connected
4. Review the TROUBLESHOOTING section for further information
5. If the heater fails to ignite after 3 attempts, call you supplier for service

SAFE OPERATION PRECAUTIONS

- For use with propane or natural gas only
- Do not use any fuel other than those listed on rating plate
- Use the toggle switch to shut down the heater
- Do not try to shut down the heater by unplugging the electrical cord
- Do not plug anything other than the thermostat into the "Thermostat" plug
- Follow electrical requirements shown on rating plate and/or electrical requirements section of this manual
- Before removing any guards or performing any maintenance, be sure that the main power supply is disconnected

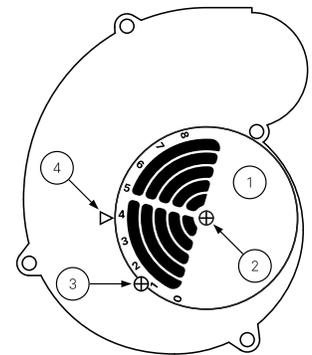
COMBUSTION AIR ADJUSTMENTS

The air adjustment should be made to achieve 10% CO₂ on natural gas and 12% CO₂ on propane.

Proper combustion air adjustment must be achieved using a certified combustion analyzer and smoke tester to ensure complete combustion.

SETTING THE AIR ADJUSTMENT PLATE

1. Regulation of the combustion air flow is made by adjustment of the manual AIR ADJUSTMENT PLATE (1) after loosening the FIXING SCREWS (2 & 3). The initial setting of the air adjustment plate should be made according to Column 5 in the Burner Set-up Chart
2. The proper number on the manual AIR ADJUSTMENT PLATE (1) should line up with the SETTING INDICATOR (4) on the fan housing cover. Once set, the air adjustment plate should be secured in place by tightening SCREWS 2 and 3
3. The final position of the air adjustment plate will vary on each installation. Use instruments to establish the proper settings for maximum CO₂



Note: Variations in flue gas, smoke, CO₂ and temperature readings may be experienced when the burner cover is put in place. Therefore, the burner cover must be in place when making the final combustion instrument readings, to ensure proper test results.

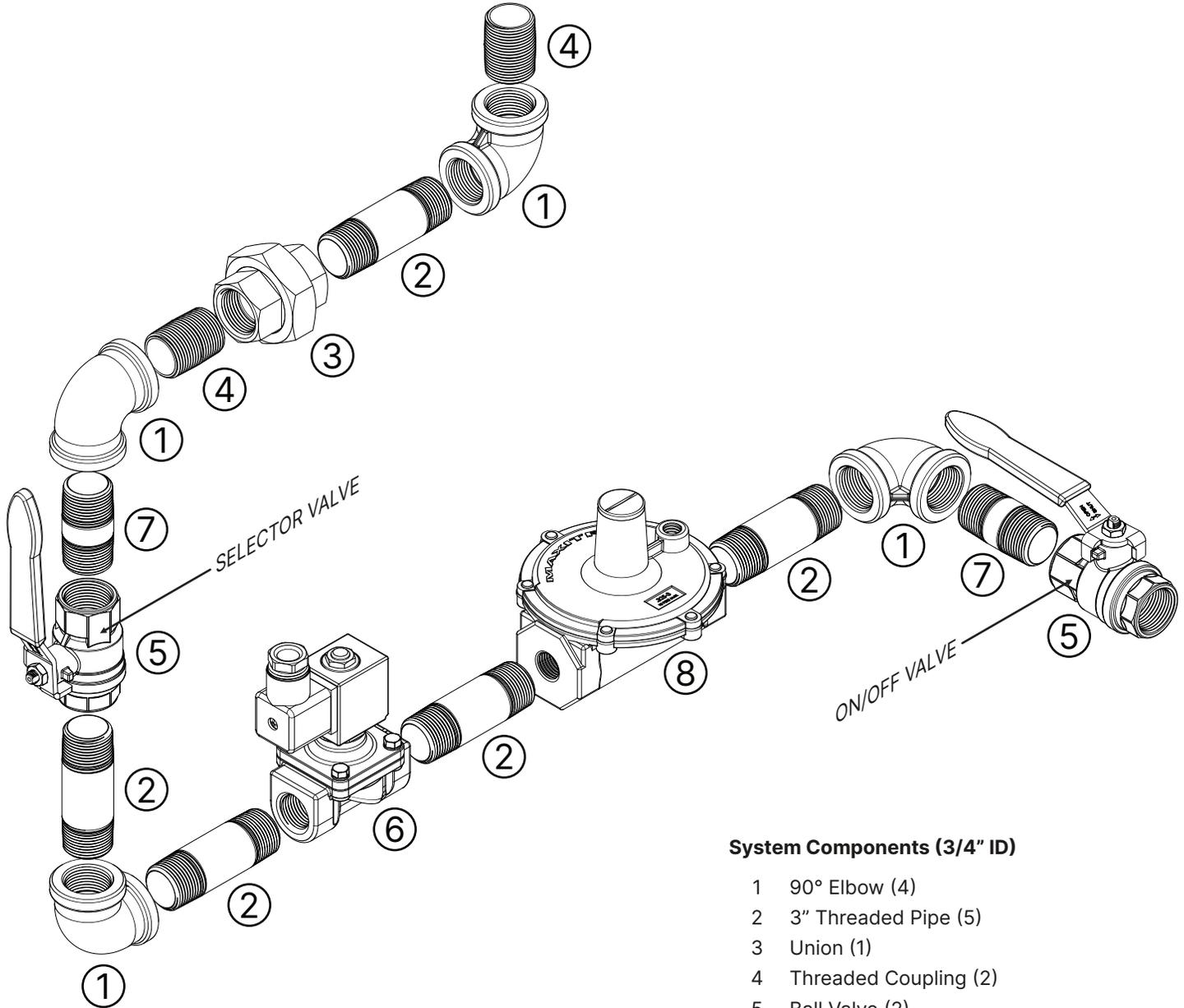


HD-400(R) INDIRECT FIRED SPACE HEATER USER INSTRUCTIONS MANUAL

BURNER SET UP CHART

1	2	4	5
Firing Rate (BTUH)	Orifice - NG	Head Setting	Air Damper Setting
395,000	PN 2.2	5	4.8 LP 4.0 NG

GAS TRAIN LAYOUT

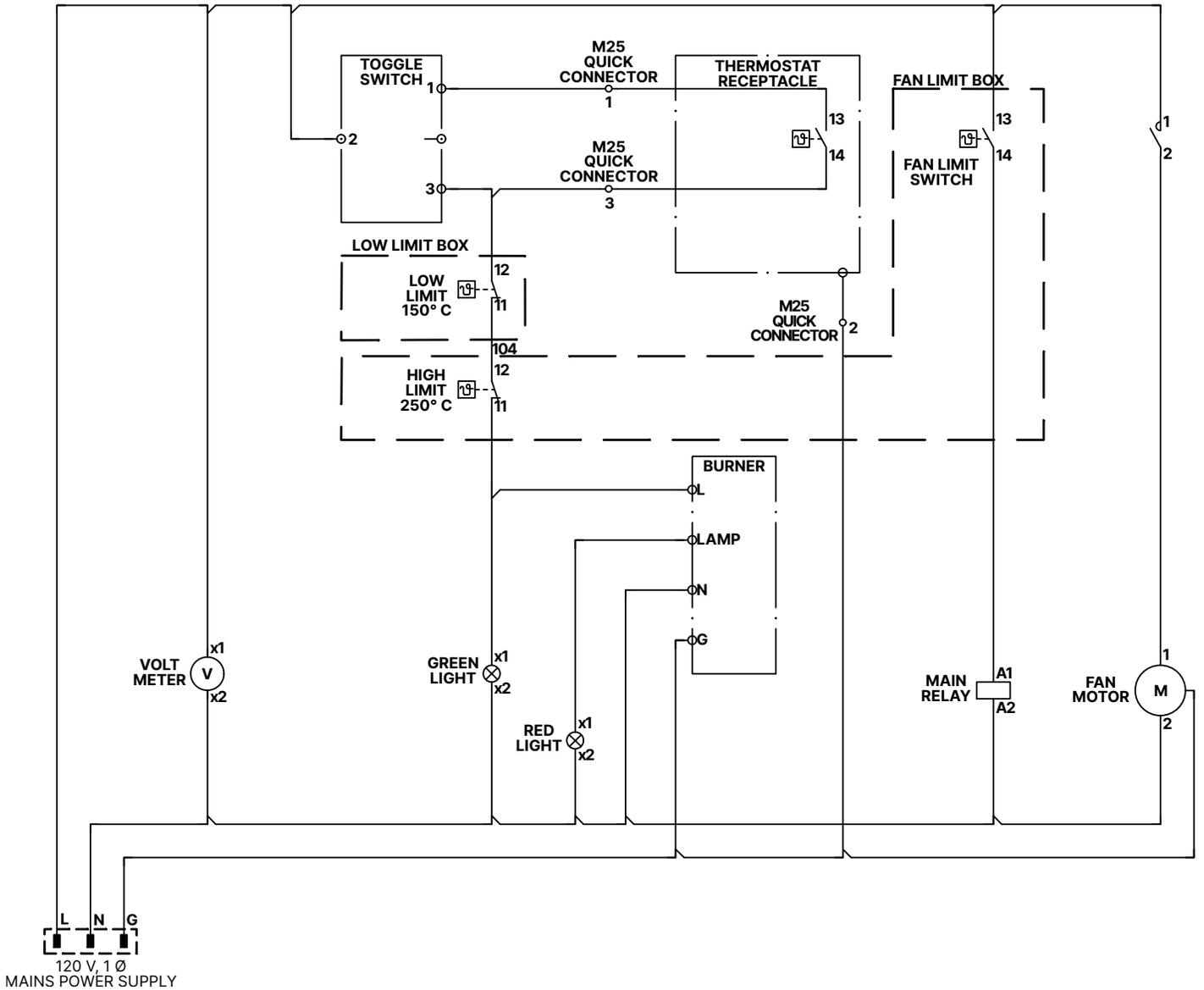


System Components (3/4" ID)

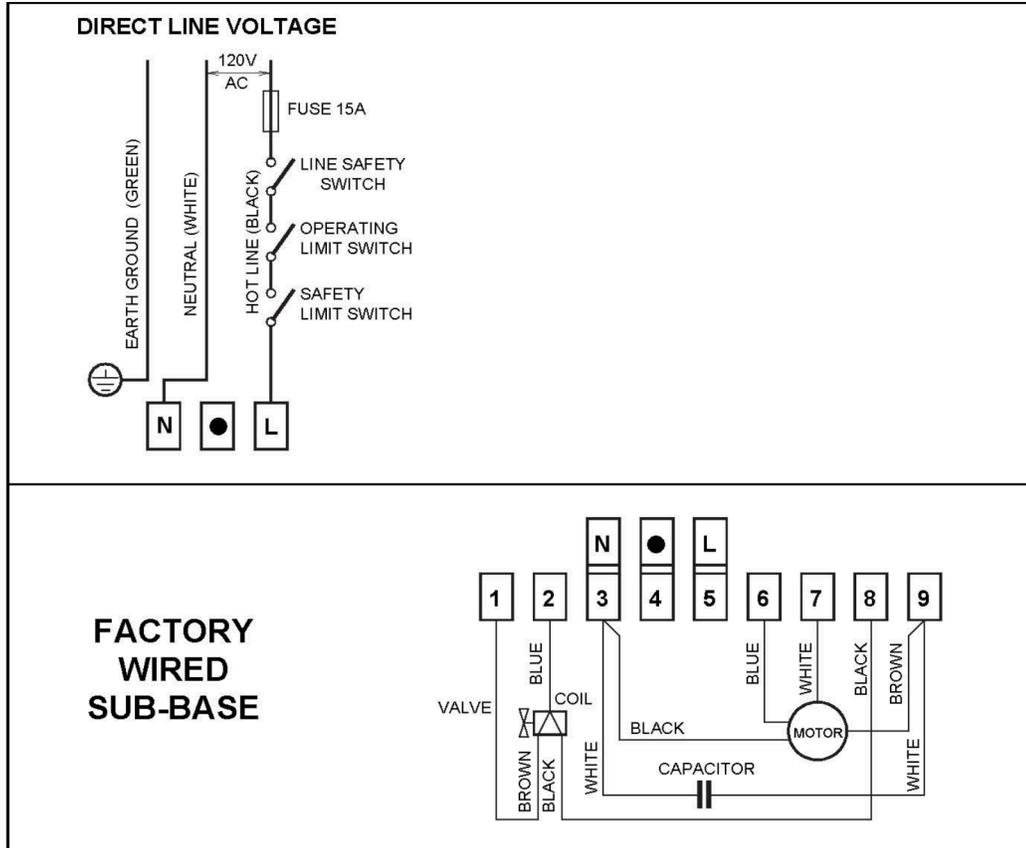
- 1 90° Elbow (4)
- 2 3" Threaded Pipe (5)
- 3 Union (1)
- 4 Threaded Coupling (2)
- 5 Ball Valve (2)
- 6 Solenoid (1)
- 7 2" Threaded Pipe (2)
- 8 Regulator (1)

HD-400/R WIRING

FACTORY WIRING DIAGRAM



FIELD WIRING DIAGRAM



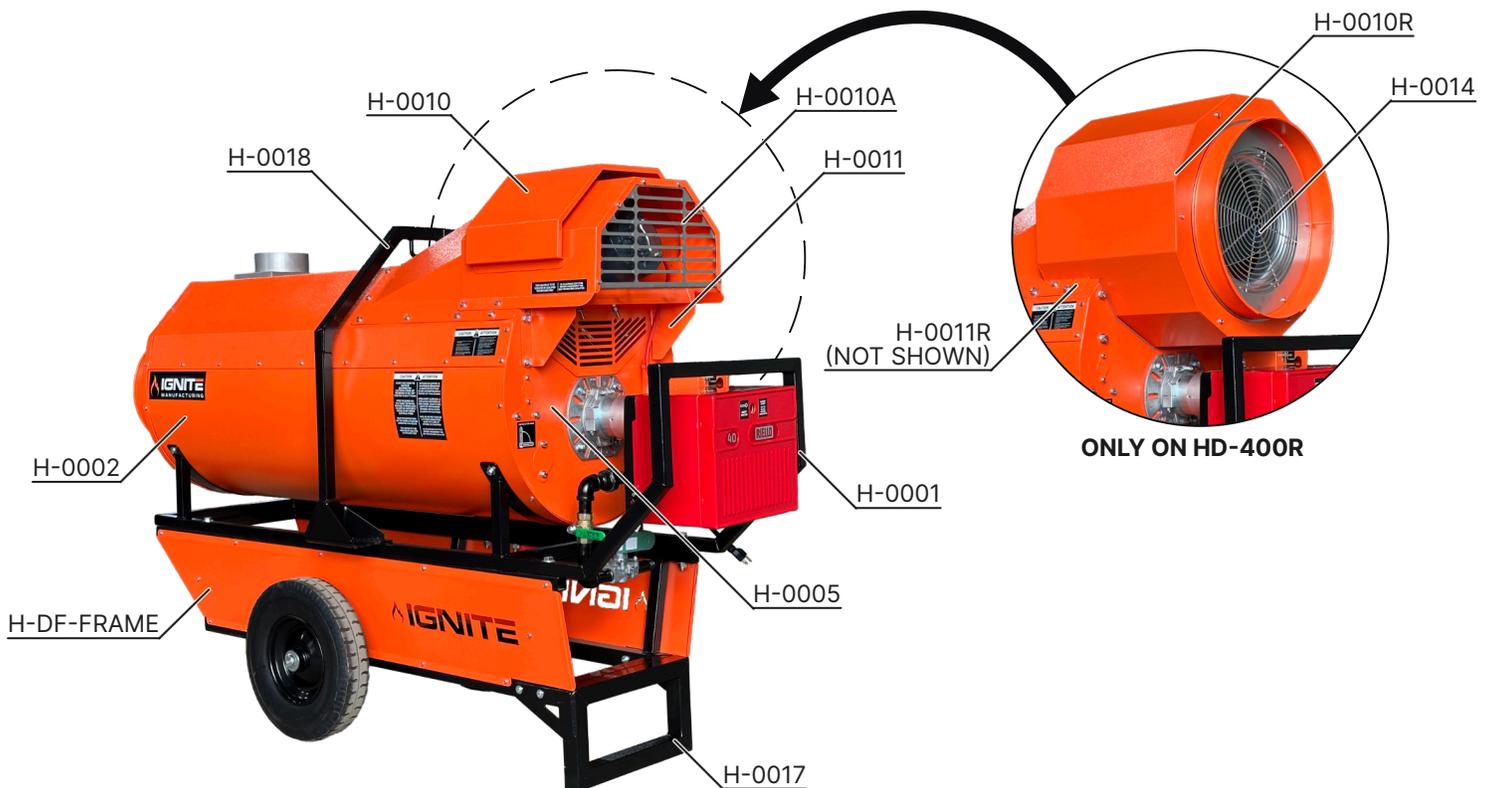
REMOTE SENSING OF SAFETY LOCKOUT: The SAFETY LIMIT SWITCH in the CONTROL BOX is equipped with a contact allowing remote sensing of burner lockout. The electrical connection is made at terminal 4 (●) on the SUB- BASE. Should lockout occur the 530SE CONTROL BOX will supply a power source of 120 Vac to the connection terminal. The maximum allowable current draw on terminal 4 is 1 A.

WARNING

If a neutral or ground lead is attached to this terminal, the CONTROL BOX on the burner will be damaged should lockout occur.

SPARE PARTS

PARTS DIAGRAM



PARTS LIST

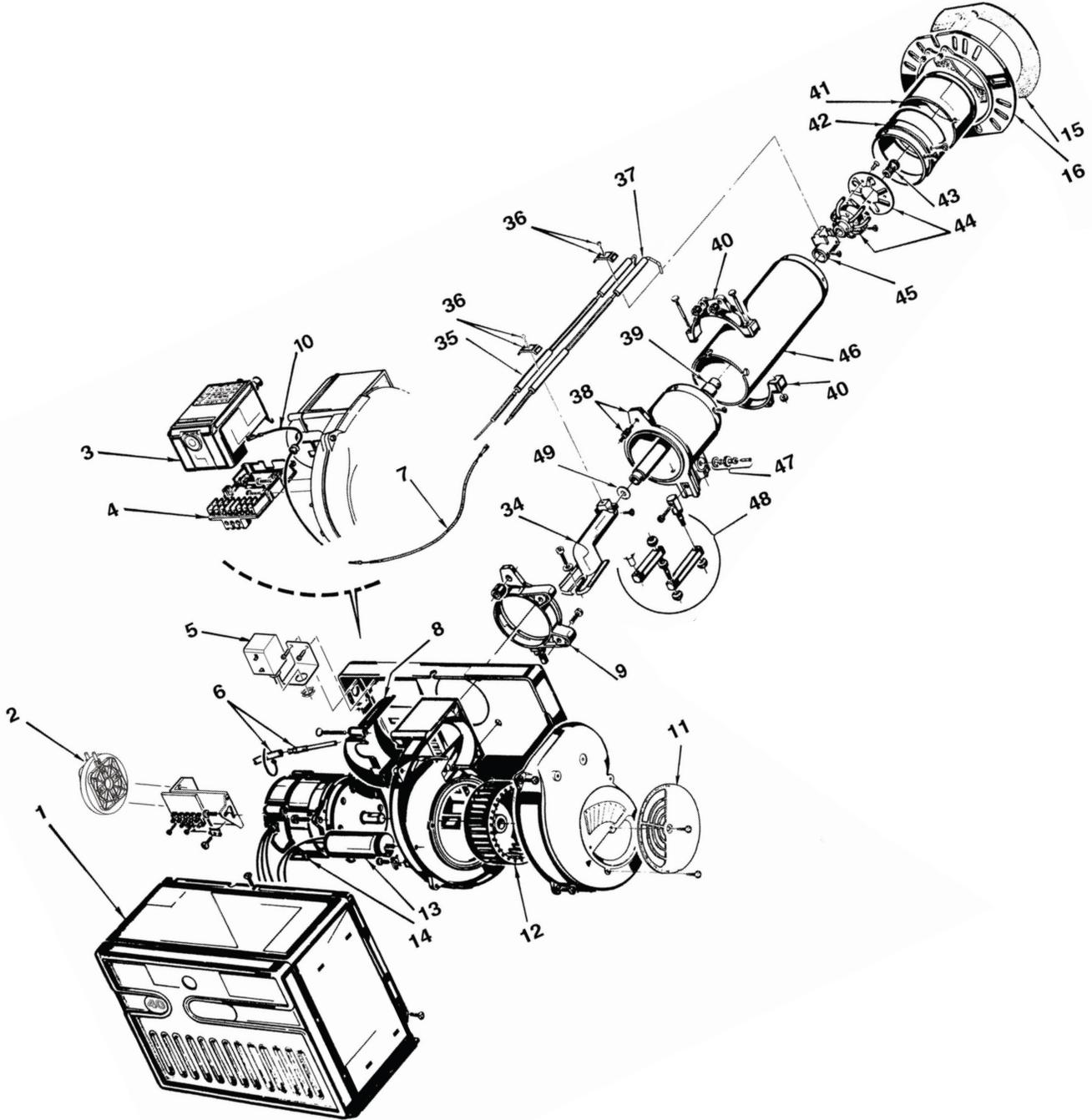
PART NUMBER	PART DESCRIPTION
H-0001	BASE FRAME
H-0002	BOTTOM BODY PANEL
H-0003	TOP BODY PANEL
H-0004	12" DUCTING OUTLET
H-0004A	16" DUCTING OUTLET
H-0005	BURNER MOUNT PANEL
H-0006	SINGLE HOLE LIMIT BOX
H-0007	DOUBLE HOLE LIMIT BOX
H-0008	MAIN ELECTRICAL BOX
H-0009	H-400 FAN SHROUD
H-0010A	H-400 FAN CANOPY
H-0010R	R-400 FAN CANOPY
H-0011	H-400 MOTOR MOUNT
H-0011R	R-400 MOTOR MOUNT
H-0012	SS HEAT EXCHANGER
H-0013	16" 5 BLADE FAN
H-0014	16" R FAN BLADE
H-0014B	R FAN VENTURI
H-0015	16" WHEEL
H-0016	WHEEL AXLE
H-0017	SUPPORT LEG
H-0018	LIFTING HARNESS
H-0019	RAIN CAP AND CABLE TO ATTACH IT
H-0040	POWER CORD 120 V PLUG END
H-0041	MAIN RELAY
H-0042	LOW LIMIT 150°
H-0043	HIGH LIMIT 250°
H-0044	FAN LIMIT (ADJUSTABLE)
H-0045	FAN LIMIT SILICONE GASKET
H-0046	FEELER GAUGE
H-0047	GREEN LIGHT

PARTS LIST (CONT)

PART NUMBER	PART DESCRIPTION
H-0048	RED LIGHT
H-0049	TOGGLE SWITCH
H-TH	25' THERMOSTAT
H-0051	THERMOSTAT PLUG
H-0052	TERMINAL BLOCK
H-0053	BURNER GASKET WITH CLAMP
H-0054	FOAM FOR UNDER R HOOD, 350°
H-0055	GAS TRAIN, BLACK PIPE
H-0056	MAXTROL REGULATOR
H-0057	ASCO SOLENOID VALVE
H-0058	3/8" BALL VALVE - CIL
H-0059	3/4" BALL VALVE - LP/NG
H-0061	G-400 REILLO GAS BURNER
H-0062	3/4 HP FAN MOTOR
H-0063	1 HP FAN MOTOR - R MODEL
H-0068	1/2" X 7" SS NIPPLE & 1/2" SS CAP HEAT EXCHANGE DRAIN
H-DF-FRAME	DUAL FUEL HEATER FRAME

BURNER SPARE PARTS

PARTS DIAGRAM (RIELLO G400)



BURNER PARTS LIST

REF	PART NUMBER	PART DESCRIPTION
1	R3020509R-LPNG	STEEL BURNER COVER
2	R3020321	AIR PRESSURE SWITCH
3	R3001162	PRIMARY CONTROL BOX
4	R3002307	PRIMARY CONTROL SUB-BASE
6	R3007288	AIR SWITCH TUBE AND CONNECTER
7	R3007310	IONIZATION LEAD
8	R3007293	AIR TUBE COVER PLATE
9	R3006688	CHASSIS MOUNTING COLLAR
10	R3007448	GROUND LEAD AND CONNECTER
11	R30007205	MANUAL AIR SHUTTER (AIR GATE)
12	R3005788	BURNER FAN
13	R20087022	CAPACITOR (SAME AS 3005834)
14	R3005843	BURNER MOTOR
16	R3006356	UNIVERSAL MOUNTING FLANGE
34	R3006696	DRAWER ASSEMBLY ELBOW
35	R3007276	ELECTRODE ASSEMBLY
36	R3007265	ELECTRODE AND IONIZATION CLAMP
37	R3020208	IONIZATION ASSEMBLY (SAME AS 3007277)
38	R3007300	MANIFOLD
39	R3007290	NATURAL GAS TUBE
40	R3005854	SEMI FLANGE, 2 REQUIRED
41	R3006693	END CONE
42	R3007282	END CONE ADAPTOR
43	R3006702	NATURAL GAS DIAPHRAGM
44	R3006699	DISTRIBUTOR HEAD AND MIXING PLATE
45	R3007303	ELECTRODE SUPPORT
46	R3007285	AIR TUBE, LONG
47	R3005447	GAS TEST POINT
48	R3000870	HINGE ASSEMBLY
49	R3020229	DRAWER ASSEMBLY DIAPHRAGM

CAUTIONS

- **Pipe Fittings**
When any pipe fittings are loosened, tightened, or replaced, an approved thread sealing compound should be applied to the threads to ensure that they are leak proof and pressure tight
- **Flare Fittings**
Thread sealing compound is not required on SAE flare fittings
- **Post-Service Leak Checks**
The entire valve train should be checked for leaks using a soapy water solution or an approved leak detector solution whenever the heater is serviced
- **Installation & Maintenance**
Heaters are to be installed and operated in accordance with CGA Standard B149.1 Installation Code and to any provincial or local codes. Service should only be carried out by a qualified propane gas fitter
- **Placement**
The heater should only be fired on a level surface. Minimum clearances (see **Technical Specifications section**) should always be respected
- **Combustibles**
Do not store or use flammable products (gases, liquids, or solids) within the vicinity of the heater. Minimum clearances (see **Technical Specifications section**) should always be respected
CAUTION: DO NOT OPERATE THE UNIT IN CLOSE PROXIMITY TO COMBUSTIBLE SURFACES OR MATERIALS

TROUBLESHOOTING

BURNER FAILS TO PRE-PURGE

- Check for power to the unit
- Check the operation of the air pressure switch:
 1. Remove air pressure switch cover
 2. Bypass the switch by carefully shorting the **C** and **NC** terminals with a jumper wire
 3. If the motor starts, replace the air pressure switch
- Check for the correct voltage at both the rear and outlet High Limit switches using a voltmeter

BURNER DOES NOT LIGHT AFTER PRE-PURGE

- Check the ignition module:
 1. Remove the ground wire from the ignition module and turn the heater on
 - If the burner locks-out, check the flame rod and wire
 2. If the heater remains in pre-purge without lighting, check voltage at the sub-base:
 - If meter reads 120 Vac, replace the ignition module
 - If meter does not read 120 Vac, check the air pressure switch

BURNER LOCKS-OUT 5 SECONDS AFTER THE FLAME IGNITES

- Check for a good power and ground connections
- Check for 120 Vac from the control module:
 1. Disconnect the flame rod wire with red spade connector
 2. Connect voltmeter to wire from control module
 3. Power on the heater and check that the voltage reading is between 108 and 132 Vac
 4. If the voltage reading is not correct, replace the control module
- Check the gap between the mixing plate and the flame rod: angled rod = 4 mm gap, straight rod = 38-40 mm gap
- Check for adequate current to the flame rod by placing a multimeter in series with the flame wire: if not reading at least 5 μ A, replace the rod
- Ensure the air gate has been properly set for the fuel in use

FAN MOTOR IS NOT OPERATING

- Check the operation of the fan limit switch by bypassing it with a jumper to see if the motor starts
- Check the motor capacitors

TECHNICAL SPECIFICATIONS

Model	HD-400 & HD-400R
Fuel	Propane Natural Gas
Input	390,000 BTUH
Manifold Pressure	1.5" W.C. Propane 2.0" W.C. Natural Gas
Maximum Inlet Pressure	13.0" W.C. Propane 10.0" W.C. Natural Gas
Approval(s)	cETLus
Weight	460 lbs 209 kg
Dimensions	70" x 30" x 52" 178 x 76 x 132 cm
Air Inlet Diameter	16" (R) 40.6 cm (R) N/A (Standard)
Air Outlet Diameter	2x12" or 1x16" 2x30.5 or 1x40.6 cm
Fuel Consumption / Hr	18 lbs/hr Propane 390 cf/hr Natural Gas
Maximum Duct Temperature (Above Ambient)	180° F 82° C
Electrical	120 Vac, 15 A, 60 Hz
Ignition	Direct Spark
Temperature Control	Thermostat
CFM	3,500 (R) 2,500 (Standard)

CLEARANCE FROM COMBUSTIBLES

Top	3 ft 1 m
Front	10 ft 3 m
Sides	3 ft 1 m
Rear	3 ft 1 m
Flue Pipe	3 ft 1 m