



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

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

FIRE, BURN, INHALATION, AND EXPLOSION HAZARD. 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

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.

TESTING AGENCY





HD-400/R INDIRECT FIRED SPACE HEATER

USER INSTRUCTIONS MANUAL

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 2017 / CSA 2.14-2017.

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.

The intended use of this heater is for the temporary heating of a building or structure under construction, alteration, or repair.

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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.

- $3 \times 4 \text{ mm}^2$ up to 15 m (12/3 AWG up to 50 ft)
- $3 \times 6 \text{ mm}^2$ from 15 m to 30 m (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. Be sure to close the cylinder valve 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 Liquified 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. Sizing of supply piping must be determined using the length of pipe run as a well as total BTUH rating of the appliance(s). Appropriate piping tables must be used to determine size of supply piping, dependent on the length of run from source.

PRESSESSES

Maximum inlet pressures:

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

Minimum inlet 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

Heater duct with a minimum temperature handling of 300° F. Including wire reinforcement to prevent collapsing. Heater is designed for use with 2 x 12" diameter ducts equipped with pin lock couplings.

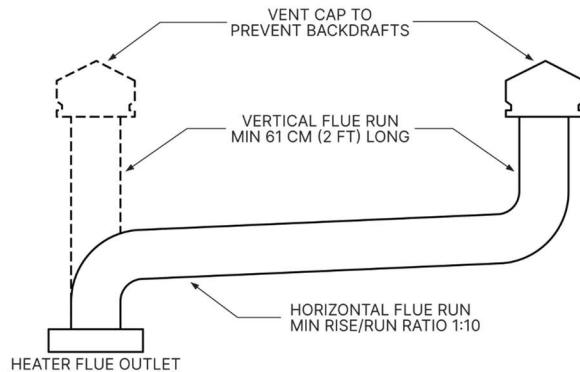
Install ducting to outlet on the heater using pin locks provided on collar of ducting. Ducting should be inspected periodically for tearing and or Weir marks. Ducting should be stored in a dry area when not in use.

HOSES

All hoses used to connect this heater to fuel supplies must be 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 should be inspected before each use, and at least annually by a qualified service technician; Incorrect maintenance may result in improper operation of the heater and serious injury could occur
- Service and maintenance only to 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 not be obstructed
- 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 should be used to keep components free of dust and dirt buildup
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 rear of unit and 121° C (250° F) at the outlet
- Heat Exchanger should be cleaned if smokey conditions continue even after the air adjustments on the burner are made
- The hose assemblies shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or the hose is damaged, it must be replaced prior to the heater being put into service. The replacement hose assembly must be that specified by the manufacturer

OPERATION

START UP INSTRUCTIONS

1. Position the heater on level surface
2. Ensure the toggle switch is in the "OFF" position
3. Connect gas supply to heater
4. Leak test all connections
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 x 4 mm² up to 15 m (12/3 AWG up to 50 ft)
3 x 6 mm² from 15 m to 30 m (10/3 AWG from 50 ft to 100 ft)
8. Ensure that the power indicator light is green, indicating proper power supply. If there is a red light, refer to the Power Supply Indicator section of this manual, or to the sticker on the unit to identify and correct the issue before proceeding with these Start Up Instructions
9. Select your desired operating mode:
 - Move switch to "MANUAL" position for manual control
 - Move switch to "THERMOSTAT" position for thermostatic control
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. Using a manometer, verify that the manifold pressure is correct; if needed, correct the manifold pressure by adjusting the set screw on the regulator on the manifold

Notes:

- If using the thermostat mode, the heater must be started with the fuel selector valve in the Thermostat position
- 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 your 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

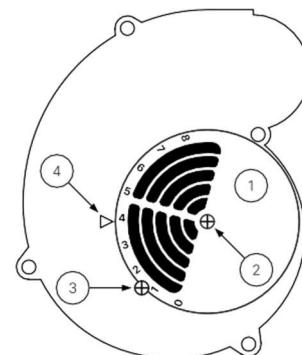
COMBUSTION AIR ADJUSTMENTS

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.



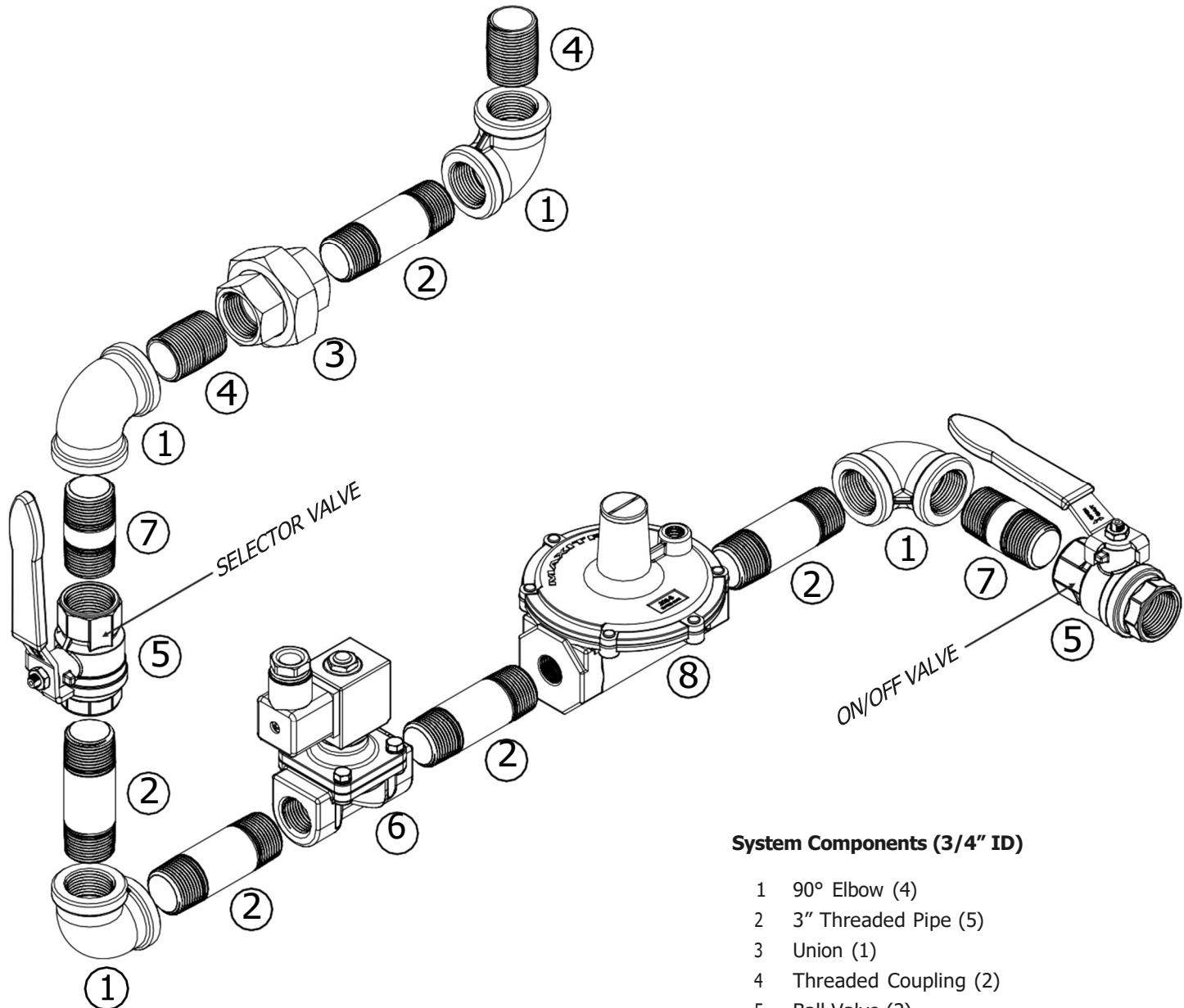
HD-400/R INDIRECT FIRED SPACE HEATER

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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

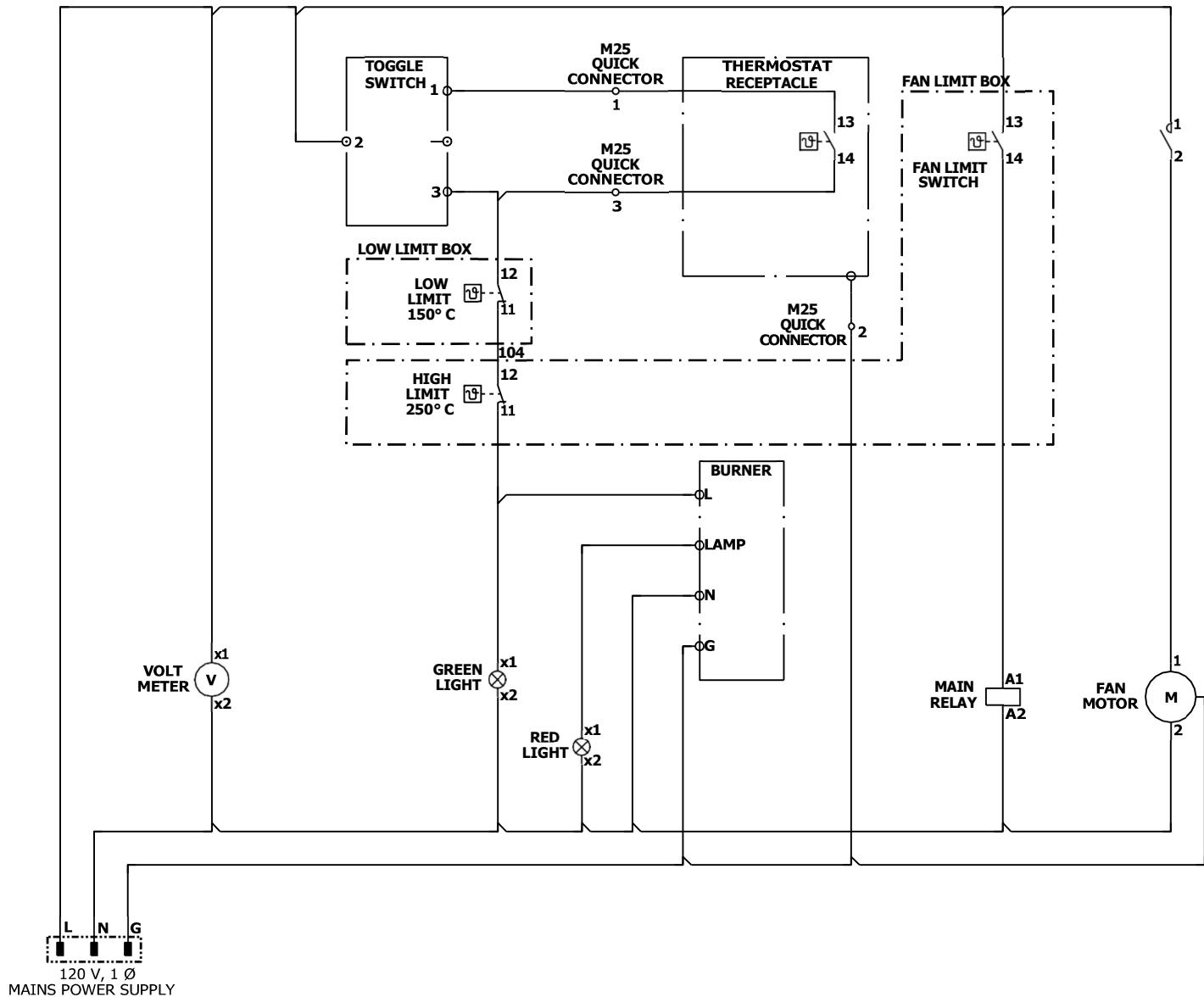


System Components (3/4" ID)

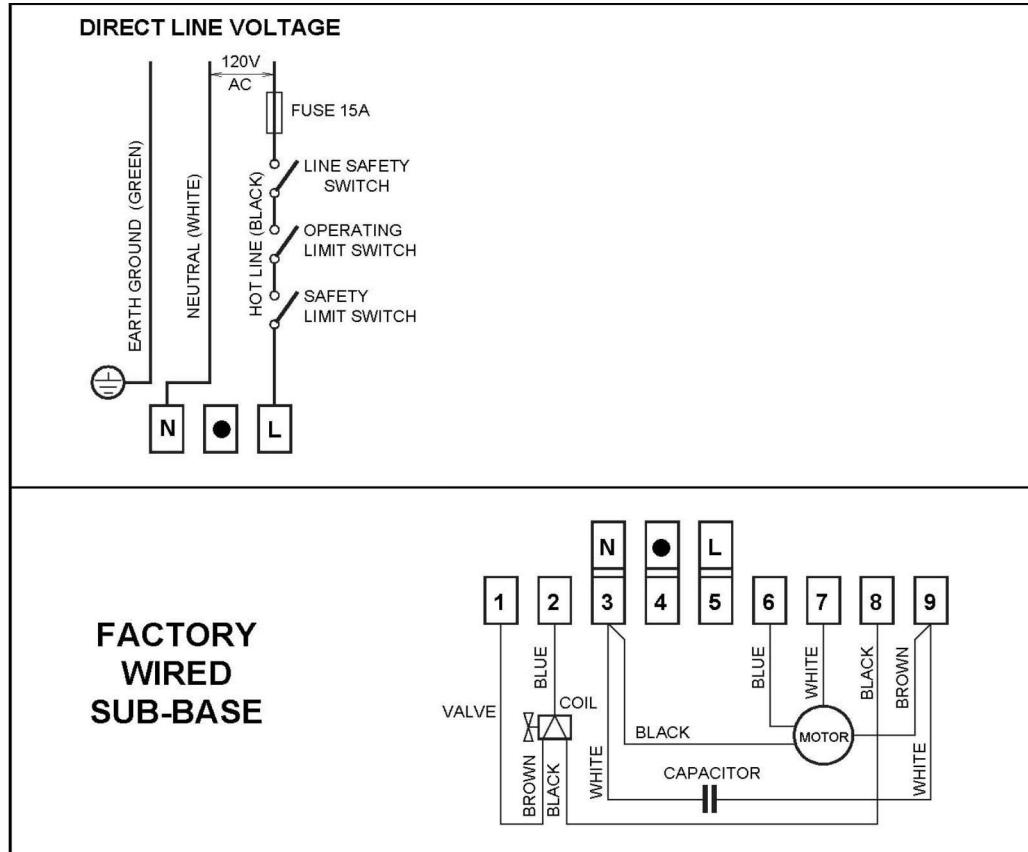
- 1 90° Elbow (4)
- 2 3" Threaded Pipe (5)
- 3 Union (1)
- 4 Threaded Coupling (2)
- 5 Ball Valve (2)
- 6 Solenoid (1)
- 7 2" Threaded Pipe (2)
- 8 Regulator (1)

HD-400/R WIRING

FACTORY WIRING DIAGRAM



FIELD WIRING DIAGRAM



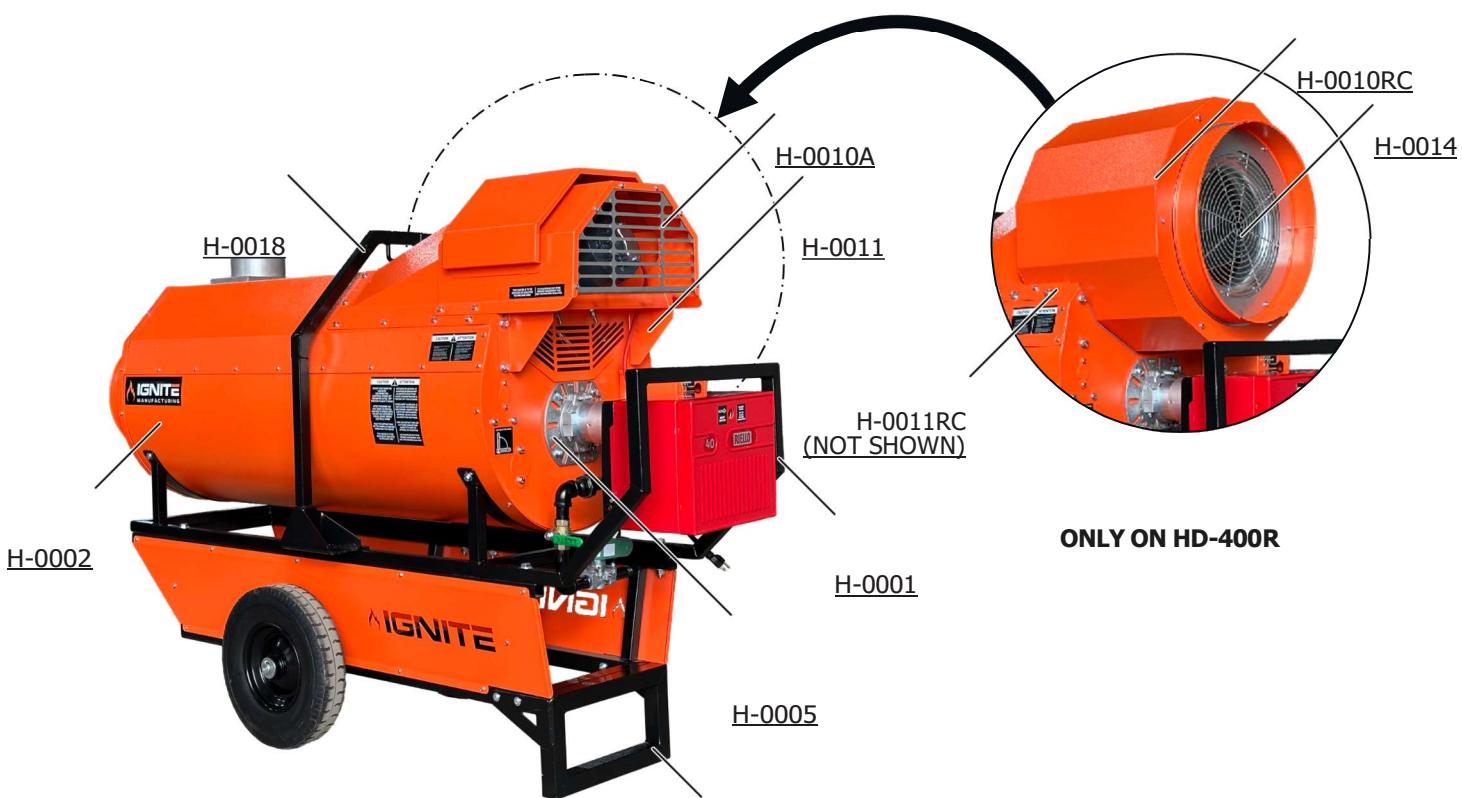
REMOTE SENSING OF SAFETY LOCKOUT: The SAFETY LIMIT SWITCH in the CONTROL BOX is equipped with a contact allowing remote sensing of burner lockout. The electrical connection is made at terminal 4 (●) on the SUB- BASE. Should lockout occur the 530SE CONTROL BOX will supply a power source of 120 Vac to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





HD-400/R INDIRECT FIRED SPACE HEATER

USER INSTRUCTIONS MANUAL

PARTS LIST

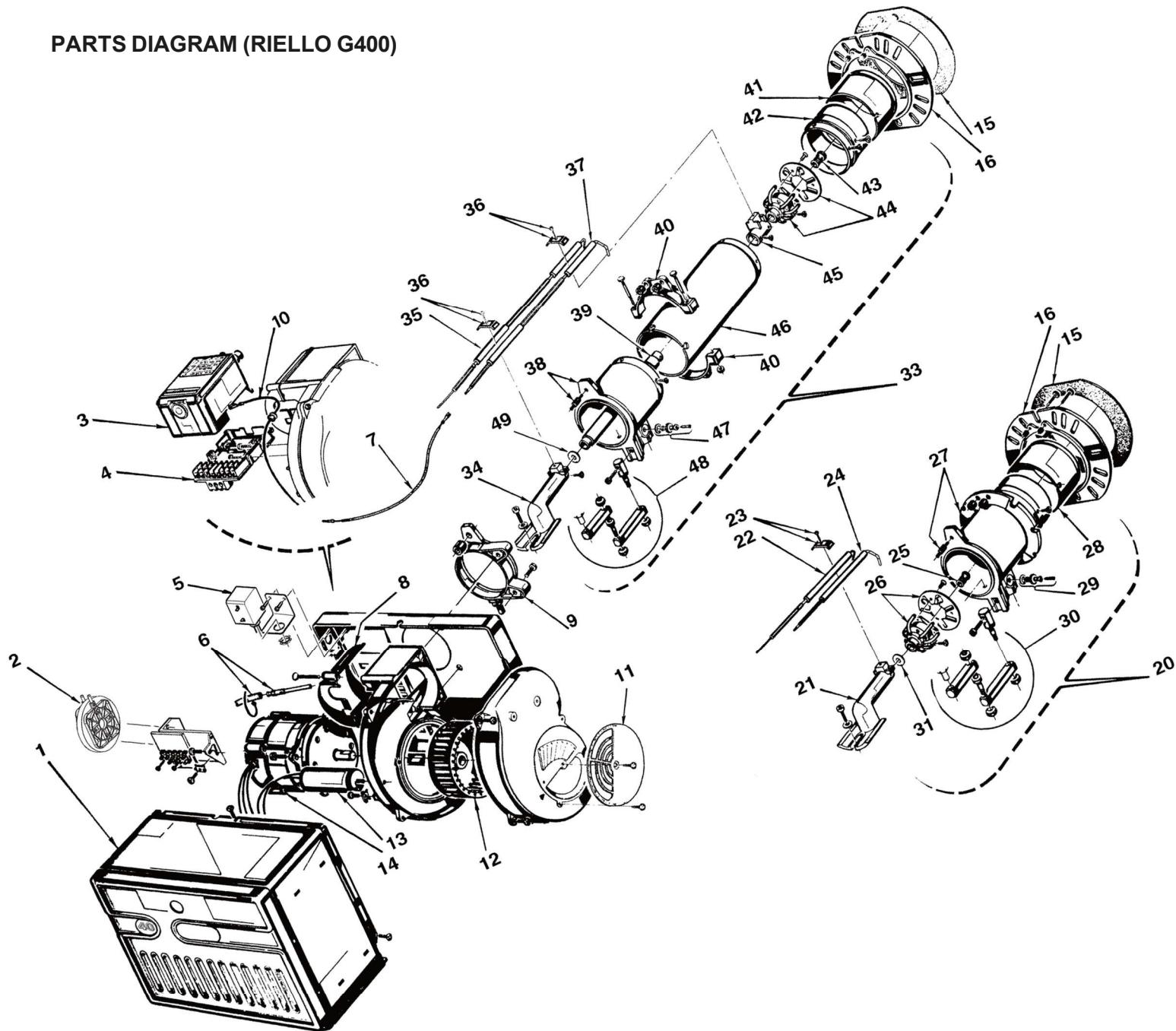
PART NUMBER	PART DESCRIPTION
H-0001	BASE FRAME
H-0002	BOTTOM BODY PANEL
H-0003	TOP BODY PANEL
H-0004	DUCTING OUTLET
H-0005	BURNER MOUNT PANEL
H-0006	SINGLE HOLE LIMIT BOX
H-0007	DOUBLE HOLE LIMIT BOX
H-0008	MAIN ELECTRICAL BOX
H-0009	H-400 FAN SHROUD
H-0010	H-400 FAN CANOPY
H-0010RC	RC-400 FAN CANOPY
H-0011	H-400 MOTOR MOUNT
H-11RC	RC-400 MOTOR MOUNT
H-0012	SS HEAT EXCHANGER
H-0013	16" 5 BLADE FAN
H-0014	16" RC FAN BLADE
H-0014B	RC FAN VENTURI
H-0015	16" WHEEL
H-0016	WHEEL AXLE
H-0017	SUPPORT LEG
H-0018	LIFTING HARNESS
H-0019	RAIN CAP
H-0040	120 V PLUG IN
H-0041	MAIN RELAY
H-0042	LOW LIMIT
H-0043	HIGH LIMIT 230°
H-0044	FAN LIMIT (ADJUSTABLE)
H-0045	FAN LIMIT SILICONE GASKET
H-0046	FELLER GAUGE
H-0047	GREEN LIGHT
H-0048	RED LIGHT

PARTS LIST (CONT)

PART NUMBER	PART DESCRIPTION
H-0049	TOGGLE SWITCH
H-0050	25' THERMOSTAT
H-0051	THERMOSTAT PLUG
H-0051A	CABLES AND CONSUMABLES
H-0052	TERMINAL BLOCK
H-0053	BURNER GASKET WITH CLAMP
H-0054	FOAM FOR UNDER RC HOOD, 350°
H-0055	GAS TRAIN, BLACK PIPE
H-0056	MAXTROL REGULATOR
H-0057	ASCO SOLENOID VALVE
H-0058	3/8" BALL VALVE
H-0059	3/4" BALL VALVE
H-0061	G-400 REILLO GAS BURNER
H-0062	3/4 HP FAN MOTOR
H-0063	1 HP FAN MOTOR
H-0068	1/2" X 7" SS NIPPLE G 1/2" SS CAP
H-DF-FRAME	DUAL FUEL FRAME

BURNER SPARE PARTS

PARTS DIAGRAM (RIELLO G400)



BURNER PARTS LIST

REF	PART NUMBER	PART DESCRIPTION
1	3007234	Burner back cover
2	3020321	Air pressure switch
3	3001162	Primary control box 525 SE/A
4	3002307	Primary control sub-base
6	3007288	Air switch tube and connecter
7	3007310	Ionization lead
8	3007293	Air tube cover plate
9	3006688	Chassis mounting collar
10	3007448	Ground lead and connecter
11	30007205	Manual air shutter (air gate)
12	3005788	Fan
13	20087022	Capacitor
14	3005843	Burner motor
15	3005856	Mounting gasket
16	3006356	Universal mounting flange
20	3950371	Short combustion head (279T1)
21	3006696	Drawer assembly elbow
22	3007275	Electrode assembly
23	3007265	Electrode and ionization clamp
24	3020207	Ionization assembly
25	3006702	Natural gas diaphragm
26	3006699	Distributor head and mixing plate
27	3007299	Manifold
28	3006693	End cone
29	3005447	Gas test point
30	3000870	Hinge assembly
31	3020229	Drawer assembly diaphragm
33	3950372	Long combustion head (279T2)
34	3006696	Drawer assembly elbow
35	3007276	Electrode assembly

BURNER PARTS LIST (CONT)

REF	PART NUMBER	PART DESCRIPTION
36	3007265	Electrode and ionization clamp
37	3020208	Ionization assembly
38	3007300	Manifold
39	3007290	Natural gas tube
40	3005854	Semi flange, 2 required
41	3006693	End cone
42	3007282	End cone adaptor
43	3006702	Natural gas diaphragm
44	3006699	Distributor head and mixing plate
45	3007303	Electrode support
46	3007285	Air tube, long
47	3005447	Gas test point
48	3000870	Hinge assembly
49	3020229	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

CLEARANCE FROM COMBUSTIBLES

Model	HD-400 G HD-400R	Top	3 ft 1 m
Fuel	Propane Natural Gas	Front	10 ft 3 m
Input	390,000 BTUH	Sides	3 ft 1 m
Manifold Pressure	1.5" W.C. Propane 2.0" W.C. Natural Gas	Rear	3 ft 1 m
Maximum Inlet Pressure	13.0" W.C. Propane 10.0" W.C. Natural Gas	Flue Pipe	3 ft 1 m
Approval(s)	ANSI Z83.7 • CSA 2.14 (2017)		
Weight	460 lbs 209 kg		
Dimensions	70" x 30" x 52" 178 x 76 x 132 cm		
Air Outlet Diameter	12" or 16" 30.5 or 40.6 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		
Air Circulation	2,500 cfm 70.8 m ³ /min		