FROST Fighter

GAS - FIRED CONSTRUCTION HEATER

MODEL

IHS1000 (LP/NG)

Installation - Operation Maintenance Instructions and Parts List

READ INSTRUCTIONS PRIOR TO STARTING HEATERS

FROST Fighter PORTABLE HEATERS

FROST FIGHTER INC.
125 FURNITURE PARK
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C SA® US

REV. 1.1.0
SEPT. 2024 TO PRESENT

FROSTFIGHTER WARRANTY

Frost Fighter Inc. warrants the Frostfighter heater to be free from defects in workmanship and materials for a period of twelve (12) months from date of initial service not to exceed fifteen (15) months from date of shipment.

If during the warranty period, the heat exchanger fails under normal use and service due to a defect in material or workmanship said heat exchanger will be repaired or replaced free of charge F.O.B. the Winnipeg Factory..

All mechanical and electrical components are covered by a one (1) year limited warranty. Normal maintenance items are excluded under the warranty. The warranty does NOT include any freight, labor or sales taxes incurred by the purchaser and is subject to the following conditions:

1. The heater shall be operated in accordance with the manufacturer's operating and maintenance manual.

2. The heater shall be subject to normal use in service and shall not have been misused, neglected, altered or other wise damaged.

3. The unit shall be operated within the rated capacities and with the prescribed fuel.

4. The unit has not been allowed to exceed its proper temperature limits due to control malfunction or inadequate air circulation.

5. There is no evidence that the unit has been subject to tampering or deliberate destruction.

No representative of Frost Fighter Inc., nor any of its distributors or dealers, is authorized to assume for Frost fighter Inc. any other obligations or liability in connection with this product, not alter the terms of the warranty in any way. This warranty is limited to the express provisions contained herein and does not extend to liability for labor costs incurred in replacing defective parts.

Parts can be obtained from Frost Fighter Inc., Winnipeg, Manitoba on the basis that credit will be issued if the defective parts returned qualify for replacement pursuant to the terms and conditions of this warranty. Authorization to return any alleged defective parts must be first obtained from the factory prior to transporting the part. The transportation charges for the alleged defective part must be prepaid by the owner. Frost Fighter Inc. will not accept charges for parts purchased unless the conditions of this warranty have been satisfied and prior authorization to purchase the parts has been received from the factory.

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R2G 1B9, (204) 775-8252, 1-888-792-0374

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HAZARD DEFINITIONS & SAFETY

GENERAL HAZARD WARNING

FAILURE TO COMPLY WITH PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER CAN RESULT IN 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 HEATING UNIT.

IF YOU REQUIRE ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTION MANUAL, LABELS, ETC., CONTACT THE MANUFACTURER.

WARNING

FIRE, BURN INHALATION, AND EXPLOSION HAZARD. KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIAL, PAPER AND/OR CARDBOARD A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, ACETONE, DUST PARTICLES AND/OR UNKNOWN CHEMICALS.

THIS PRODUCT IS NOT INTENDED FOR HOME OR RECREATIONAL VEHICLE USE.

FOR YOUR SAFETY

DO NOT USE THIS HEATER IN A SPACE WHERE GASOLINE OR OTHER LIQUIDS HAVING FLAMMABLE VAPOURS ARE STORED OR USED.

GENERAL NOTES:

STANDARD: ANSI Z83.7 - CSA 2.14

ALL GAS INSPECTION AUTHORITIES IN CANADA REQUIRE THAT THE INSTALLATION AND MAINTENANCE OF HEATER AND ACCESSORIES SHALL BE ACCOMPLISHED BY A QUALIFIED GAS FITTER.

THE INTENDED USE OF THIS HEATER IS FOR THE TEMPORARY HEATING OF BUILDINGS OR STRUCTURES AND THOSE UNDER CONSTRUCTION, ALTERATION OR REPAIR.

INSTALLERS RESPONSIBILITY

Installer please note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer's responsibility to inspect and correct any problems that may be found.

NOTICE **Concealed damage** – If you discover damage to the burner or the controls during installation, notify the carrier at once and file the appropriate claim.

OWNERS RESPONSIBILTY

WARNING Installation and adjustment of the burner requires technical knowledge and the use of combustion test instruments. Do not tamper with the unit or controls. Call your qualified service technician. Incorrect operation of the burner could result in severe personal injury, death or substantial property damage.

Have your equipment inspected and adjusted annually by your qualified service technician to assure continued proper operation.

Never store gasoline or combustible materials near the heating equipment. This could result in explosion or fire, causing severe personal injury, death or substantial property damage.

SPECIFICATIONS

IHS1000 LP/NG SPECIFICATIONS	
FUEL TYPE	**NATURAL GAS or VAPOR PROPANE**
MAX. INPUT RATING	**900,000 BTU/hr. / 835,000 BTU/hr.**
FUEL CONSUMPTION	**NATURAL GAS: 905 Cu. Ft./hr - 9.1 Therms/hr.** **PROPANE: 360 Cu. Ft./hr. - 10 US GPH - 42 Lbs./hr.**
SUPPLY PRESSURE	**MINIMUM - 7 inch w.c.** **MAXIMUM - 14 inch w.c. (1/2 PSI)**
MANIFOLD GAS PRESSURE (High Fire)	**NAT. GAS 2.0" w.c. - 2.2" w.c.** (1.0" w.c. - 1.2" w.c. at 4 sec. LF startup) **PROPANE 1.0" w.c. - 1.2" w.c.** (0.4" w.c. - 0.6" w.c. at 4 sec. LF startup)
NORMAL BURNER AIR SETTINGS	**AIR BAND - 5** **AIR SHUTTER - 3 - 5** (Depending on Conditions)
POWER SUPPLY REQUIREMENTS	**208V/230V 1 PH - 50 AMP. -----** **208V/230V 3 PH - 40 AMP. -----** W/ 1PH / 3PH POWER SELECTION **460V/480V 3 PH - 30 AMP. -----** IHS1000 480V 3PH UNITS **575V/600V 3 PH - 20 AMP. -----** IHS1000 600V 3PH UNITS
SUPPLY AIR PERFORMANCE	**HIGH SPEED - 8000 SCFM* @ 2.0" w.c.** **LOW SPEED - 6000 SCFM* @ 2.0" w.c.** *Per DIN 24163 **MAXIMUM CFM** (@250°F) **- 12,300 CFM.** **MAXIMUM STATIC PRESSURE - 8.0" W.C.**
AGENCY APPROVAL	C US
CLEARANCES TO COMBUSTIBLES	**SIDES: 6 inches /15 cm** **TOP: 18 inches / 46 cm** **FLUE (VENTING): 18 inches / 46 cm** **DISCHARGE END: 48 inches / 1.2 m** **BURNER ACCESS: 36 inches / 0.9 m** **FLOOR: Combustible - Level and rated for load.**

To the owner/installer -

WARNING - Read all the instructions before proceeding. Follow all instructions completely. Failure to follow these instructions could result in equipment malfunction, causing severe personal injury, death or substantial property damage.

This equipment must be installed, adjusted and started only by a qualified service technician, an individual or agency licensed and experienced with all the codes and ordinances, who is responsible for the installation and adjustment of the equipment. The installation must comply with all local codes and ordinances.

NOTICE Air settings may need to be adjusted for elevation changes as well as extreme temperature changes. Lower temperatures may require less air and higher elevations may require more air.

NOTICE High altitude installations – Accepted industry practice requires no de-rating of burner capacity up to 2000 feet (610 m) above sea level. For altitudes higher than 2000 feet (610 m), de-rate burner capacity 4% for each 1000 feet (305 m) above sea level. Air settings will also need to be adjusted for elevation changes as well as extreme temperature changes.

This heater is not intended to be used at temperatures above 70°F (21°C). Operating this heater above this temperature may result in the burner locking out on the high limit switch or adversely affecting critical components.

PRE-INSTALLATION CHECKLIST

LEVELING THE HEATER

- Ensure the surface the heater is to be placed on does not slope more than 5 degrees in any direction.
- If the surface slopes more than 5 degrees either level the surface or place supports under the heater base frame to ensure the heater is level.

COMBUSTION AIR SUPPLY

The burner requires combustion air and ventilation air for reliable operation. Assure that the Building and/or combustion air openings comply with National Fuel Gas Code NFPA 54/CSA B149. For appliance/ burner units in confined spaces, the room must have an air opening near the top of the room plus one near the floor, each with a free area at least one square inch per 1000 Btu/hr input of all fuel burning equipment in the room. For other conditions, refer to NFPA 31 (CSA B1139-M91 in Canada).

If there is a risk of the space being under negative pressure or of exhaust fans or other devices depleting available air for combustion and ventilation, the appliance/burner should be installed in an isolated room provided with outside combustion air.

CLEARANCES

The unit must be installed with minimum clearances per the requirements.

6 inches (15 cm) on the sides.
18 inches (46 cm) from the top of the unit.
18 inches (46 cm) from the flue or any venting.
48 inches (1.2 m) from the discharge end.
36 inches (0.9 m) from the burner access side.
The unit must be installed on a level floor.

Determine the type of gas and the pressure available that will be supplied to the heater and utilize the correct type and capacity of regulator(s) to ensure the supply pressure is between 7"- 8" w.c. MINIMUM and 14" w.c. MAXIMUM. Ideally a supply pressure of 10" w.c. to 12" w.c. is recommended.

GENERAL NOTES:

1. The heater is designed and approved for use as a construction heater under ANSI Z83.7 / CSA 2.14.
2. Frost fighter Inc cannot anticipate every use, which may be made of our heaters. CHECK WITH YOUR LOCAL FIRE AND SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT SAFE APPLICATIONS.
3. Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about this issue.
4. Please retain this instruction manual for future reference.
5. The primary application of this heater is for temporary heating of construction sites and/or applications of this type.
6. Check Rating Plate on heater for set up specifications.
7. For information about replacement parts call toll free 1-888-792-0374

ELECTRICAL NOTES:

All electrical connections and grounding shall be in compliance with the National Electrical Code, ANSI/NFPA70 and/or the Canadian Electrical Code (CSA Standard C22.1).

ADDITIONAL INSTRUCTIONS FOR VAPOR PROPANE GAS:

1. The installation must conform with local codes or in the absence of local codes with the Standard for the *Storage and Handling of Liquified petroleum Gases, ANSI/NFPA 58* and/or the *National Standards of Canada CAN/CGA B149.2 installation codes for propane gas.*
2. The heater must be located more than ten (10) feet (3.05 meters) away from the propane source or propane tank.
3. When the heater is not in use insure to shut off the gas supply from the propane source or propane tank.
4. Disconnect the heater from the propane source or propane tank when storing the heater indoors.
5. Minimum tank size 400 lbs (360 litres)
6. Connect the tank to the unit using appropriately sized regulators to reduce the tank pressure ensuring the heater is not supplied with less than 7" w.c. of gas pressure and no more than 14" w.c. of gas pressure.
7. The heater must not discharge toward any propane gas container within 20 feet (6m).

CONNECTING TO THE GAS SUPPLY

1. The gas connection on the heater is 1" NPT. Ensure you have the proper fittings to connect to the heater.

2. The maximum supply pressure to the heater is 14" W.C. (1/2 PISG).

3. Ensure the proper regulators are installed to reduce the tank pressure in order to supply the heater with a gas pressure of 14" W.C. max. and 7" W.C. min.

4. Perform gas leakage test. Close the main valve on the heater and open all manual valves upstream of the heater. Check all connections for leaks with soap solution. Formation of bubbles indicates gas leakage. Retighten and seal all connections or replace connectors if warranted.

ADJUSTING THE INPUT RATE FOR BOTH NATURAL GAS OR PROPANE

The input rate should only be adjusted by qualified personnel familiar with this system.

The location of the manifold test port is shown in photo 1. Remove the threaded plug in the test port and install a suitable fitting such as the one shown to connect the test instrument. To adjust the manifold pressure connect a pressure gauge (0-15" W.C.) to the test port and bring the heater to fire. Adjust the gas pressure at the regulating valve as shown in photo 2 so the gauge reads the pressure indicated on the rating plate. Ensure red handle changeover valve is in the correct position for the type of gas being used.

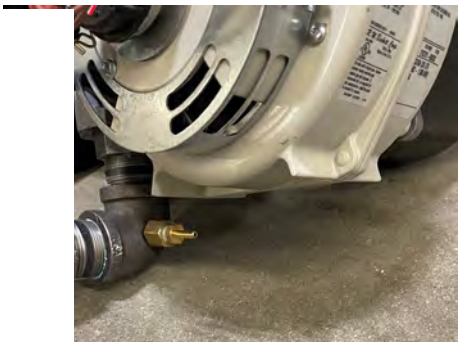
This is a 2 stage gas valve with both a High and Low adjustment. The heater will start up in low fire (lower manifold pressure) and once a flame is established it will switch to high fire (higher manifold pressure) within 4 seconds. The high "HI" setting is the operating manifold pressure the heater will run at to provide the rated input capacity. Ensure the pressure reading has stabilized before adjusting the pressure. The low "LO" setting is for initial start up and should only be adjusted if the heater is experiencing ignition issues in colder temperatures. The low "LO" setting may have to be increased somewhat to compensate for higher air densities in cold conditions. For either the high or low settings, the "TORX" type adjuster under the silver cap is turned clockwise to increase the pressure and counter- clockwise to decrease it.

- Test location for manifold gas pressure.
- Port will have factory supplied plug. Install suitable fitting for test instrument

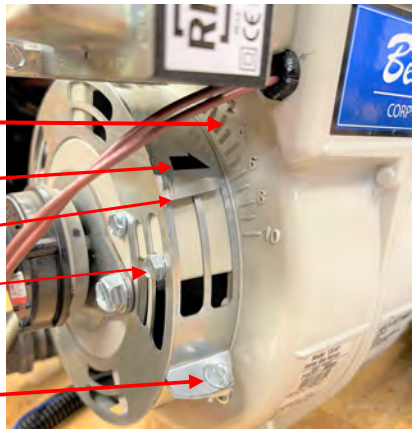
Adjustment of manifold pressure for high setting under threaded cap.

Adjustment of manifold pressure for low (ignition) setting under threaded cap.

Use TORX #40 driver

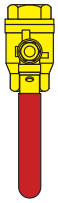


ADJUSTING AIR BAND & SHUTTER



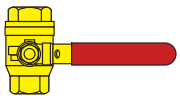
Larger air adjustments are made with with the AIR BAND
Smaller air adjustments are made with the AIR SHUTTER
Adjust the shutter first before adjusting the band to achieve proper combustion results.

CONVERSION VALVE



Typical manifold pressure reading high-fire NATURAL GAS

CONVERSION VALVE



Typical manifold pressure reading high-fire PROPANE

INSTALLATION INSTRUCTIONS:

1. The installation shall conform with local codes, or, in the absence of local codes, with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, or the *National Gas and Propane Installation Code, CSA B149.1.*
2. Inspect the heater before each use and have it annually inspected by a qualified agency.
3. The hose assembly 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 cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be specified by the manufacturer. The hose assembly shall be protected from traffic, building materials and contact with hot surfaces both during use and while in storage.
4. When firing the unit in an enclosed area, five square feet (0.47 square meters) must be provided to allow free entry of the air required for operation.
5. Do not operate the unit in partly ventilated areas without a flue pipe connected to the unit.
6. Do not operate the unit in close proximity to combustible surfaces, materials, gasoline, and other flammable vapours and liquids.
7. After installation, check the manifold assembly for gas leaks by applying a water and soap solution to each connection.
8. The heater must be installed on level ground.
9. Minimum gas supply pressure is 8" W.C. and the maximum gas supply pressure is 14" W.C. (1/2 PSIG)

GAS LEAKAGE TESTING

After removal for service or replacing components on the gas manifold a gas leakage test must be performed.

1. Close main gas firing valve on the gas manifold.
2. Connect your source gas to the gas manifold.
3. Once connections are tightened, open source gas, fire unit.
4. On each connection and fitting, apply soap solution and check for bubbles. This will indicate a gas leak if bubbles continue to form.
5. Fix any leaks that are found by applying pipe dope to the leaking fitting or connection and re-tighten. Check for leaks once repairs, if any, are made.
6. Open main gas firing valve and start the unit.
7. Once the unit is operating and burner is running, redo the soap test to insure gas fittings are tight.
8. Fix any leaks found.

DUCTING:

- Duct diameter is 16 inches
- Use belt cuff ducting. Slide the cuff overtop of the duct inlet/outlet and tighten with the belt.
- The top two connections are the heated supply air into the building.
- The bottom two duct connections are for cold air or return air into the heater.
- The heater is approved use with or without ducting.
- Maximum duct length is 100 feet per supply opening. If return air ducting is used the length of the return air duct must be subtracted from the allowable supply ducting length (i.e. if the return air duct length is 30 feet the maximum supply duct length is reduced to 70 feet).
- Supply ducts should be rated for 300°F minimum. Recommended return air ducting is 3" pitch.

HIGH LIMITS

- The heater is supplied with auto/manual high limits located behind marked panels on the left side of the heater - SEE PAGES 10 and 12
- The high limit contacts are normally closed and will open on the high limit temperature condition.
- There are two automatic reset high limits and one manual reset high limit. If a high limit trips allow the heater to cool down and reset. The PLC control will indicate a high limit condition on the display. The manual high limit will also illuminate the red reset button on the control panel and must be manually reset by pressing the button once the heater has cooled.
- Repeated high limit trips must be investigated to determine the cause.

VENT SYSTEM

The flue gas venting system must be in good condition and must comply with all the applicable codes. The IHS1000 is a category III appliance.

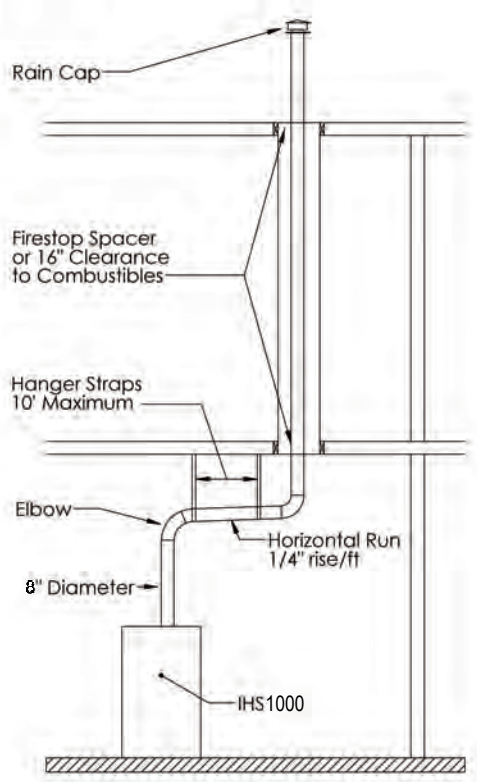
OUTDOOR INSTALLATIONS:
For outdoor installation a 36" pipe extension and vent cap installed & fastened is recommended.

INDOOR INSTALLATIONS:
Must be done in accordance to NFPA 54 (or CSA B149) with local authorities having jurisdictions.

1. The flue must be securely attached to the unit with tight joints.
2. The flue must not be sized to have a cross-sectional area less then that of the flue collar at the unit.
3. Other appliances must not be connected so as to vent through the vent of this unit.
4. Do not use 90-degree tees or elbows greater than 45 degrees, (UNLESS NOTED).
5. Do not support the weight of the stack on the flue connection of the heating system.
6. The maximum flue gas temperature can reach 600° F. "A" vent, or single wall steel pipe must be used. Do not use B vent.
7. Minimize connecting pipe length and the number of bends by locating the unit as close to the flue pipe as possible.
8. Maintain clearances between the flue pipe and combustible materials that are acceptable to the Federal, Provincial and local authorities having jurisdiction.
9. Unit must be connected to a flue having sufficient draft to ensure proper operation of unit.

VERTICALLY VENTED UNITS

1. Maximize the height of the vertical run of vent pipe. A minimum of 3 ft. (1m) of vertical pipe is required. The top of the vent must extend at least 2 ft. (0.61m) above highest point on the roof. A weatherproof vent cap must be installed to the vent termination.
2. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of 10 ft. (3m). Horizontal runs should be pitched upward ¼" per foot (21 mm) and should be supported at 3 foot (1m) maximum intervals.
3. Design vent pipe to minimize the use of elbows. Each 90° is equivalent to 5 ft. (1.5m) of straight vent pipe run.
4. 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" (12.7mm) thick foil faced fiberglass, minimum 1-½ lb. density.
5. Dampers must not be used in vent piping runs. Spillage of flue gases into the occupied space could result.
6. Vent pressure must be negative.
7. The vent must be terminated vertically.
8. The total run length should not exceed 25 ft. (7.6m)



Vent installations shall conform with local codes, or, in the absence of local codes, with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, or the *National Gas and Propane Installation Code, CSA B149.1*

HORIZONTALLY VENTED UNITS

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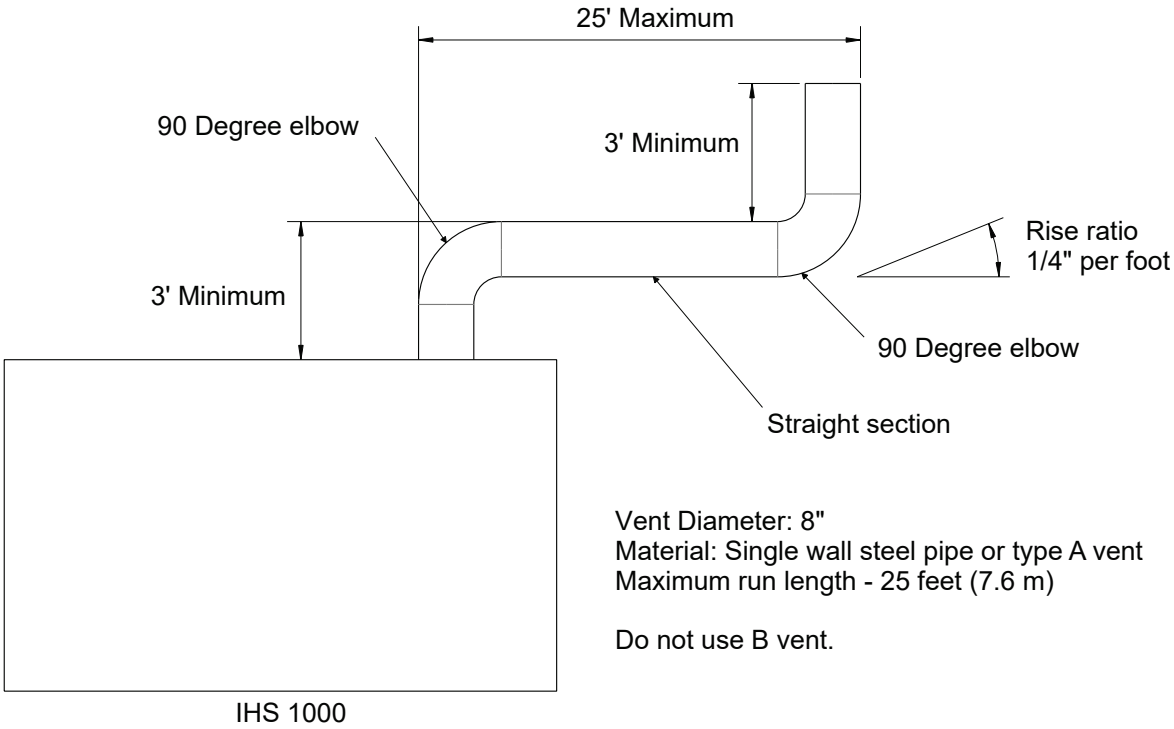
Pressures in Category 111 venting systems are positive and therefore care must be taken to avoid flue products from entering the heated space. Use only vent material and components that are UL listed and approved for Category 111.

WARNING: Do not use Type B vent.

1. All vent pipe joints must be sealed to prevent leakage into the heated space.
2. An approved vent cap must be used.

HORIZONTAL FLUE VENTING



Vent Diameter: 8"
Material: Single wall steel pipe or type A vent
Maximum run length - 25 feet (7.6 m)

Do not use B vent.

Vent installations shall conform with local codes, or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the National Gas and Propane installation Code, CSA B149.1

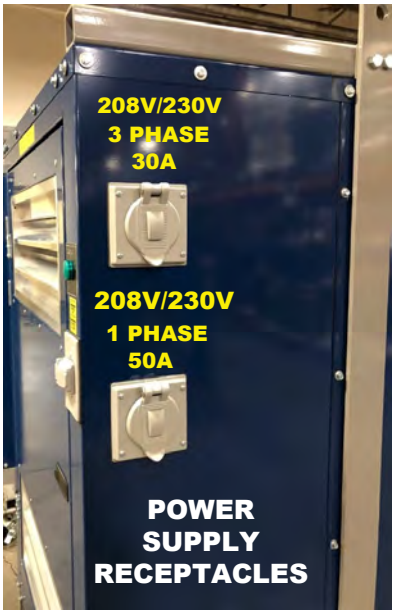
ELECTRICAL SUPPLY

- Verify that the power supply & connections available are correct for the unit. All power supplies MUST be grounded.
- 208V/230V 1PH/3PH models can operate from 200VAC to 240VAC. There are separate power inlets for 1PH or 3PH. The "Power Selector/ Disconnect Switch" has 3 positions "1PH/OFF/3PH) which selects which power inlet receptacle supplies power to the controls.
- 480VAC & 575/600VAC units are models are only capable of operating from 3PH power sources and are equipped with an "On/Off Power Disconnect Switch"
- All power must be supplied through the POWER SUPPLY RECEPTACLES and through the POWER SELECTOR /DISCONNECT SWITCH
- The selector / disconnect switch has three positions OFF / 1 PHASE / 3 PHASE. This selects between which power supply receptacle will be supplying power to the unit. Regardless of which type of power is being supplied, the VFD in the heater will always ensure correct fan rotation direction and reduce the power inrush by starting the fan motor slowly.

INSTALLING THE OPTIONAL THERMOSTAT

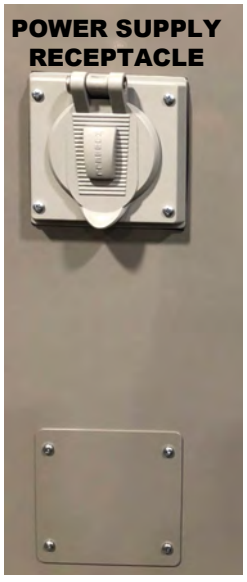
Plug the thermostat directly into the marked receptacle. The thermostat will control the burner through the PLC when the System Switch is in the THERMOSTAT position. The thermostat must be a line voltage type rated for 120VAC 10 AMPS minimum.

WARNING The remote thermostat receptacle is for connecting a remote thermostat ONLY. It is NOT a 120V power source



208V/230V 1PH/3PH MODELS

Refer to Specifications for Power Requirements



480V/600V 3PH ONLY MODELS

IHS1000 MAIN CONTROL PANEL

SYSTEM SWITCH

MANUAL	Turns on heating system (burner) to operate continuously.
OFF	Heat system (burner) is off. Blower may continue to operate in cool-down sequence.
THERMOSTAT	Heating system (burner) is controlled by remote thermostat when connected.

BLOWER SWITCH

ON	Main blower operates continuously (Ventilation Mode).
AUTO	Main blower operates based on the heating cycles with timing controlled by the PLC.

POWER IN SWITCH

208V	Supplies optimum control voltage when incoming line voltage is 200VAC – 215VAC.
230V	Supplies optimum control voltage when incoming line voltage is 220VAC – 240VAC.

FAN SPEED SELECTOR

LOW	Blower operates at 55.0 HZ producing lower air flow rate for max. heat rise & air outlet temp.
HIGH	Blower operates at 60.0 HZ to producing max. air flow rate for max. airflow and static pressure.

HIGH TEMPERATURE LIMIT Illuminates red if manual reset high limit is tripped. Press button to reset.

CONVENIENCE LIGHT Momentary pushbutton controls the compartment convenience lighting.

TO ACTIVATE LIGHTING:

- Push once	Lighting is provided for 5 minutes and will automatically shut off.
- Push and hold for 5 seconds	Lighting is provided for 20 minutes and will automatically shut
- Push anytime light is on	off. This will turn the lighting off.

OPTIONAL HIGH INTENSITY LED STATUS BEACON

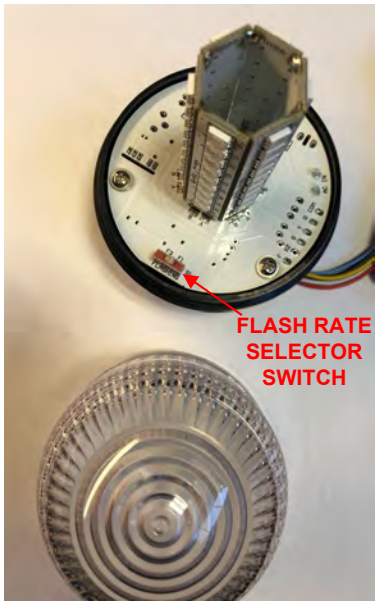
- Available with quick mount magnetic base or can be permanently mounted
- UL ((US/CAN) Approved - IP65 weatherproof / RoHS Compliant
- Beacon can be added to heater at any time using connector on control box

LED STATUS BEACON DISPLAY:

- Displays SOLID AMBER when desired power is connected & power selector/disconnect switch is in 1PH or 3PH position.
- Displays FLASHING GREEN on a call for heat (Manual or Thermostat) during pre-purge when burner begins operating.
- Displays SOLID GREEN when burner is firing. (Fuel valve signal applied).
- Displays FLASHING AMBER (1 second ON & 1 second OFF) during cool-down cycle.
- Displays FLASHING AMBER (2 second ON & 2 seconds OFF) in ventilation mode.

- Displays FLASHING RED (after approx. 75 sec.) if burner goes into Lockout or the burner control is in a "recycle" sequence or when High Limit Alarm is triggered.

The flash rate of RED ALARM alert can be changed if desired from 80 flashes/min to 240 flashes/min with the switch under beacon's screw on lens.



HIGH LIMIT SWITCHES & LOCATIONS

PREPARATION FOR START UP

TYPICAL START UP SCREENS DISPLAYED WHEN POWER SUPPLIED TO HEATER AND POWER SELECTOR SWITCH IS PLACED TO EITHER THE 1PH OR 3PH POSITION.

VFD will display 0.0 when power is supplied and main fan is not running

Display will indicate running frequency (speed) of the fan.
Fan is controlled by the heating cycle to run when the BLOWER switch is in the "AUTO" position or continuously with the switch in the "ON" position.

The speed selector will control the fan speed in both modes and will display 55.0 or 60.0 indicating the fan speed is either set to LOW (55.0 HZ) or HIGH (60.0 HZ)

PLC DISPLAY BEHIND MAIN CONTROL BOX COVER.

IHS1000 models will indicate IHS1000 on display as well as well as the the fuel type

STANDBY MODE displayed whenever heater is connected to power with main power selector on and the System Switch is in the "Off" position.

OPERATING INSTRUCTIONS IHS1000(LPNG)

TO START HEATER

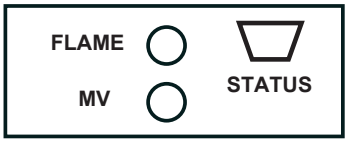
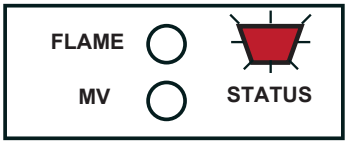
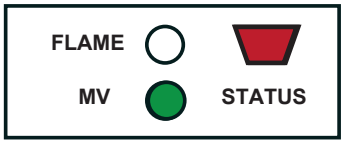
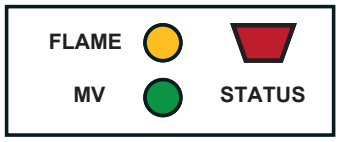
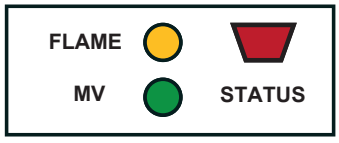
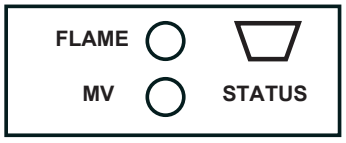
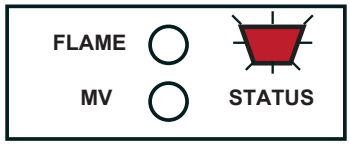
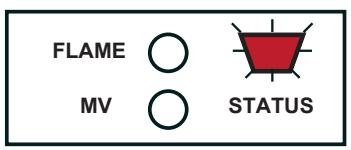
1) Ensure the gas supply line is securely attached to the heater. Maximum fuel supply pressure is 14” W.C. Minimum fuel supply pressure is 8” W.C.
2) The gas supply must be bled up to the heater to ensure a steady gas supply is present at the heater.
3) Check the fuel conversion valve to ensure it is in the proper position. Refer to the label on the heater for proper positioning.
4) Ensure correct electrical power is supplied to the corresponding inlet receptacle electrical power supply. Refer to the heater rating plate for the required voltage.
5) Turn on the fuel and electrical supplies. Set the heater selector switch to "MANUAL" or "THERMOSTAT" and the burner should begin operation. The PLC control inside the main control panel will display current sequence of operation. A thermostat must be connected and call for heat in "THERMOSTAT" setting in order for the burner to begin operation.
6) There is a 60 second pre-purge sequence before an ignition trial begins. The ignition duration is for 4 seconds and the burner must light in this time or the burner will go into a recycle sequence which will take 5 minutes before it will attempt the next 4 second ignition trial.
7) If the heater does not start check for proper electrical and gas supply. Check the manifold gas pressure is correct at the manifold (which can be read during the 4 second trial for ignition & during firing at the test point). The low pressure gas switch will not permit burner operation with supply pressures below 5" W.C. Reset the burner control by momentarily pressing red illuminated button on top of the control if it is flashing at a rate of 3 flashes per second indicating a control lockout.

TO STOP THE HEATER

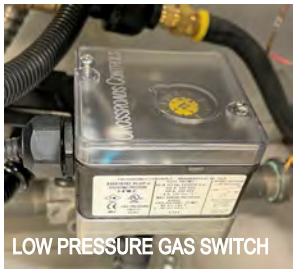
1) Turn the heater selector switch to off. The supply fan will continue to run to cool down the heat exchanger. This cool down period is fixed at 3 minutes.
2) To prevent damage to the heat exchanger do not disconnect the power supply until the supply fan stops and has completed the cool down period.

TYPICAL SEQUENCES OF OPERATION AND DISPLAYS

LED Key:
- ○ = OFF
- ● = ON
- ✹ = FLASHING

PLC CONTROL DISPLAY	BURNER CONTROL INDICATOR LIGHTS	DESCRIPTION OF SEQUENCE
		**NO CALL FOR HEAT** System switch on "OFF" OR System switch on "THERMOSTAT" & no call for heat by thermostat ALL CONTROL INDICATOR LIGHTS ARE OFF
		**CALL FOR HEAT** Burner in pre-purge sequence - Approx 60 seconds RED "STATUS" INDICATOR FLASHING SLOWLY AT 1 FLASH / SECOND
		**TRIAL FOR IGNITION** Gas valves open and ignition occurs for 4 seconds RED "STATUS" INDICATOR ON STEADY & MV INDICATOR ON
		**FLAME ESTABLISHED** Burner firing RED "STATUS" INDICATOR, "MV" INDICATOR AND "FLAME" INDICATOR ALL ILLUNIMATED STEADY PLC main blower fan delay begins and fan will start after delay time has completed.
		**BURNER AND BLOWER ARE OPERATING** Burner and blower will continue to operate until the call for heat ends by turning the system switch to "OFF" or if the switch is in "THERMOSTAT" position and a thermostat is used, the thermostat ends the call for heat. RED "STATUS" INDICATOR, "MV" INDICATOR AND "FLAME" INDICATOR ALL ILLUNIMATED STEADY
		**COOLDOWN PERIOD AFTER CALL FOR HEAT ENDS** The burner will continue to run in a post-purge cycle and the main blower with run until the "COOLDOWN" period of 3 minutes has ended. ALL CONTROL INDICATOR LIGHTS ARE OFF
		**RECYCLE** If the burner fails to prove a flame on the first trial for ignition, it will begin an inter-trial for ignition after a 5 minute purge cycle. If ignition fails again the burner control will lock-out and a manual reset will need to be done by pressing the red status indicator/reset button The PLC display regarding the burner status is only informative relative to the valve signal and does not specifically indicate the exact burner status but only indicates the valve(s) did not remain open after 60 -75 seconds of activation. RED "STATUS" INDICATOR FLASHING SLOWLY AT 1 FLASH / SECOND
		**BURNER LOCKOUT** If the burner fails to prove a flame after the inter-trial for ignition then the control will lockout with no further trials for ignition and the burner motor will not be running. The cause of the ignition failure will have to be determined before the control should be reset by pressing the RESET/STATUS button. RED "STATUS" INDICATOR FLASHING AT 3 FLASHES / SECOND

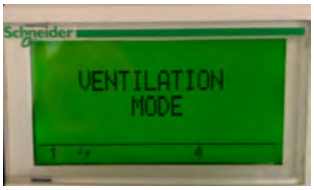
OTHER DISPLAY SCREENS ON THE IHS1000 PLC



The IHS1000 has a low pressure gas switch which will prevent the burner from operating with insufficient gas pressure supplied to the heater. Placing the SYSTEM SWITCH into the "MANUAL" or "THERMOSTAT" position with insufficient gas pressure prevent power from being supplied to the burner and there will be a "LOW GAS PRESSURE ALARM" message on the PLC.

If this condition occurs or persists check the incoming gas supply pressure to ensure it is at least 7" w.c.- 8" w.c.

This switch must not be adjusted and will be set to 5" w.c.



VENTILATION MODE

The IHS1000 has a "Blower On" switch (See page 10) which permits the fan to run continuously independent of the burner. The PLC will show "VENTILATION MODE" when this switch is in the ON position to indicate this. The PLC display will not indicate which fan speed is selected. Fan speed will be displayed on the VFD as either 55.0 (LOW) or 60.0 (HIGH)

Note: The display will indicate VENTILATION even with this switch in the AUTO position when the burner is operating with the BLOWER ON DELAY activated, as fan operation then overrides this display.

HIGH LIMIT ALARMS

The PLC in the IHS1000 monitors the high limit switch circuit providing a visual indication that one or more of the high limit switches has open contacts which will normally be caused by a high limit temperature condition. A high limit condition indicates that the heater is operating above the permitted maximum temperatures and this will stop the burner operation until the heater cools sufficiently for the high limit(s) to reset. The PLC will indicate this HIGH LIMIT ALARM condition and will return to the appropriate screen once burner operation resumes.

An additional high limit switch is provided in the IHS1000 which will open the contacts should the other high limit switches fail to stop the burner in an over-temperature condition. This high limit switch activation condition will indicate on the PLC control as MANUAL HIGH LIMIT ALARM as well as UNIT OFF and PRESS RESET BUTTON. This high limit alarm condition will not reset automatically and will also be indicated by a red light flashing in the "HIGH TEMPERATURE RESET BUTTON" on the control panel cover.

This condition requires that the reset button be pressed once the unit has cooled down to acceptable operating temperature. The reset will not occur and the light will continue to flash until the heater cools down regardless of attempts to reset it.

CAUTION: Repeated automatic or manual reset high limit alarm conditions is an indication that there may be a problem with airflow which may be causing these high limit events or possibly a high limit switch malfunction and the cause of this should be determined and corrected before resuming operation.

MAINTENANCE AND SERVICE

WARNING

Operation and adjustment of the burner requires technical knowledge and the use of combustion test instruments. Do not tamper with the burner or controls. Failure to comply could result in failure or the burner or system, resulting in severe personal injury, death or substantial property damage.

Like all precision equipment, your burner will require periodic maintenance.

ANNUAL SERVICE

Have the burner inspected; tested and started at least annually by a qualified service technician. This annual test/inspection should include at least the following:

- Clean burner and blower wheel (to remove dust and debris).
- Test ignition and combustion and verify air damper settings.
- Test gas lines and all connections.
- Inspect combustion air and vent systems.
- Oil motor (if not permanently lubricated).

Additionally, you should have the burner checked as indicated below, by your local authorized dealer.

- Check burner distributor head and mixing plates. Clean if necessary.
- Check ignition electrode. Clean, adjust or replace as necessary.
- Check the flame sensor rod (ionization rod) for dirt or carbon build up. Clean, adjust, or replace as necessary.
- Check manifold gas pressure.
- Check all burner adjustments.
- Generally clean all exposed parts and components.
- Repeat combustion tests.

EVERY 2 MONTHS

- Check and clean the air intake screens to remove any buildup of debris, dust, etc.

MONTHLY MAINTENANCE

- Observe combustion air openings and vent system for integrity. Openings must be clean and free of obstructions.
- Check the gas piping and fittings to verify there is no apparent problems or leaks or if you smell raw gas.
- Observe burner's performance to verify smooth operation.
- Shut the system down if you observe abnormal or questionable operation. Call a qualified service agency for professional inspection and service.
- Grease the main supply blower bearings.

BEARING INSTALLATION AND MAINTENANCE

NOTE: To prevent premature failure – please ensure greasing instructions below are applied. As well, tighten bearing set screws, collars, and wheel lugs every four to six months.

ENGINEERING – BALL & ROLLER BEARINGS LUBRICATION

For bearings that are equipped with a hydraulic grease fitting threaded into the housing for ease of lubrication, the proper amount of lubricant in the bearing is important. Both excessive and inadequate lubrication may cause failure. The bearings should be re-lubricated while they are rotating (if it is safe to do so);; the grease should be pumped in slowly until a slight bead forms around the seals..The bead in addition to acting as an indicator of adequate re-lubrication provides additional protection against the entry of foreign matter and helps flush out contaminates in the bearing.

If necessary to re-lubricate while the bearing is idle, refer to the recommended re-lubrication grease chart tables on the following page for various sizes of the bearings.

LUBRICANT- STANDARD BEARINGS

All bearing units are prelubricated at the factory This lubricant is satisfactory for an operating temperature range of -40° to +250° F.

Select synthetic or standard industrial grade greases that conform to the following specification for optimum bearing performance:

Premium Duty Ball & Roller;
58-75 SUS @ 210° F
50-750 SUS @ 100° F

Premium Duty Ball & Roller;
68-75 SUS @ 210° F
600-750 SUS @ 100° F

Premium Duty Ball & Roller;
82 SUS @ 210° F
886 SUS @ 100° F

NOTE: For heavy loaded roller bearing applications, grease with EP additives are often recommended for optimum performance.

TABLE I. RECOMMENDED LUBRICATION

Ball Bearings		**Roller Bearings**	
Shaft Size (inches)	Grease Charge (ounces)	Shaft Size (inches)	Grease Charge (ounces)
1 – 1 ½	0.15	1 – ½ to 1 – 1 1/16	0.32

A high quality synthetic wide temperature range grease is recommended.

Under most circumstances the fan bearings of the IHS700P will be operating within the 1500-2800 RPM range and will be at temperatures at or below 120°F - 130°F. Therefore typical lubrication frequency of the bearings will be every 2 to 5 months. In very dirty air environment the frequency of lubrication should increase.

The following chart gives the frequency of re-lubrication based upon continuous operation for various operating temperatures and can be used as a satisfactory guide for determining when bearings should be re-lubricated.

TABLE II. LUBRICATION FREQUENCY

Speed	**Temperature**	**Cleanliness**	**Greasing Interval**
1500 -2800 RPM	Up to 120° F	Clean	3-5 Months
1500 -2800 RPM	Up to 130° F	Clean	2 Months
1500 -2800 RPM	Up to 200° F	Clean	1 Month
Any speed	Up to 150° F	Dirty	1 Month
Any speed	Over 150° F	Dirty	1 - 2 weeks
Any speed	Any temperature	Extreme conditions	Weekly

TENSIONING V-BELT DRIVES

1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions.
2. Check tension frequently during the first 24-48 hours of operation.
3. Over-tensioning shortens the belt and bearing life under-tensioning reduces belt life and will decrease performance and waste energy.
4. Keep belts free from foreign material that may cause slip.
5. Make V-drive inspection on a periodic basis. Tension belts when slipping. Never apply belt dressing as this will damage the belt and cause early failure.

Check and tighten belt tension. The following procedure is recommended for tightening belts:

a) Measure span “X” shown in Figure A.
b) At the center of span length “X”, apply a force perpendicular to the span and large enough to deflect belt 1/64” for each inch of span length. Example- the required deflection for a 40” span would be 40/64” or 5/8”.
c) Compare the force applied with the values given in Table III. If force is between the minimum and maximum range shown, the drive tension should be satisfactory. A force below the minimum value indicates an under tightened belt and force that exceeds the maximum value indicates an over tightened belt.

FIGURE A

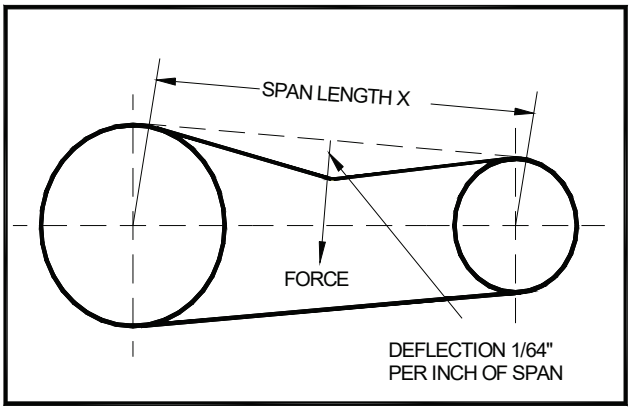


TABLE III

BELT CROSS SECTION (Marked on Belt)	MOTOR PULLEY PITCH DIAMETER	DEFLECTION FORCE	
		MINIMUM	MAXIMUM
B	4.4” – 5.6”	4.0 lbs.	5.87 lbs.

NOTE: The IHS1000 belt drive consists of these parts:

Drive (motor) pulley - 2B64SDS + SDS bushing
Driven (fan) pulley - 2B40SH + SH bushing
Belts (qty. 2) - B53 / BX53

BASIC TROUBLE SHOOTING GUIDE

The equipment has been fully tested prior to shipment. However, during transit, misadjustment of controls and loose wires could develop. Do not assume a control is defective until it and its associated wiring is checked.

CORRECT GAS PRESSURE AND SUFFICIENT POWER ARE CRITICAL FOR PROPER OPERATION.

This equipment has many items supplied to us by outside vendors. The heater is accompanied by information sheets and manuals (where applicable) on most of these items should be referred to for detailed service and troubleshooting information.

The following is an list of items that could cause field problems; however, it does not cover all problems encountered and is meant to be used as a guide only.

1. BURNER MOTOR FAILS TO RUN, CONTROL RELAY DOES NOT FUNCTION:

A. Breakers off at power source. Power selector switch in OFF position or switched to incorrect incoming power.
B. Control relay off on flame failure (Lockout). Push reset button on control for 3 seconds.
C. Thermostat not calling for start-up. Defective control.
D. Transformer supply breakers off or tripped. If no display on PLC, fuse for PLC may be blown.
E. Loose wire or low supply voltage.
F. Controls in high limit circuit defective or tripped.
G. Low gas pressure switch contacts open due to insufficient gas pressure.
H. Excessive gas pressure preventing the valves from operating.
I. Control transformer defective

2. BURNER MOTOR RUNS, NO IGNITION OR MAIN FLAME. PRIMARY RELAY LOCKS OUT ON FLAME FAILURE.

A. Gas ball valve(s) manually closed.
B. Incorrect manifold pressure
C. Ignition transformer or pilot defective. Defective or improperly gapped ignition electrodes.

3. BURNER MOTOR RUNS, IGNITION AND MAIN FLAME BUT MAIN FAN MOTOR FAILS TO OPERATE.

A. Motor overcurrent protector on VFD tripped. Check VFD display for codes.

BURNER STARTING DIFFICULTIES AND THEIR CAUSES:

1. The burner goes to lockout after the prepurge period because the flame does not ignite.

- Air has not been purged from gas supply lines.
- Gas supply pressure too low or too high. Manifold pressure too low or high
- The gas valve is passing too little gas.
- Burner air settings incorrect
- The ignition spark is irregular or not present.
- The gas valve(s) are defective

2. The burner does not start when there is a call for heat.

a. The automatic or manual high limits are tripped.
b. There is no gas or insufficient gas pressure in the supply line to activate the low pressure gas switch.
c. the system switch is on OFF or is in THERMOSTAT position with no thermostat attached calling for heat.
d. The burner has gone off on safety (Lockout).
e. The burner control has failed or is defective.

3. The burner goes through pre-purge, ignition is established, the burner fires for 2 -4 seconds, then goes to lockout.

a. Insufficient manifold gas pressure to establish a stable flame sensed by the flame rod.
b. The flame rectification rod (flame rod) has shorted to ground or has excessive resistance or is defective.
c. Earth ground is not properly connected.
d. The ionization current is weak (lower than 3 micro-amps).

ATV320VFD

The ATV320 Frequency Drive is configured at the factory to display fan motor operating frequency

MONITORING DISPLAYS CAN BE CONFIGURED TO PROVIDE OTHER INFORMATION AS SHOWN BELOW.

FOLLOW THE STEPS BELOW TO CONFIGURE THE DISPLAY PARAMETERS. **(PROCEED ONLY IF YOU ARE CONFIDENT IN DOING SO.)**

TO SAVE THE DESIRED DISPLAY PARAMETERS - PRESS & HOLD THE BUTTON FOR 3 SECONDS UNTIL DISPLAY FLASHES THEN PRESS ESC (ESCAPE) AS MANY TIMES AS NEEDED TO RETURN TO THE HOME SCREEN "0.0"

DEFAULT DISPLAY WITH POWER APPLIED

PRESS BUTTON ONCE

REFERENCE

ROTATE BUTTON TO RIGHT

MONITORING

PRESS BUTTON ONCE

FREQ. REFERENCE

ROTATE BUTTON TO RIGHT

OUTPUT FREQUENCY INDICATES MOTOR FREQ.

Factory Setting for VFD Display

ROTATE BUTTON TO RIGHT

MAINS VOLTAGE

VOLTAGE FROM DC BUS.

ROTATE BUTTON TO RIGHT

MOTOR THERMAL STATE

TYPICALLY NOT RELEVANT

ROTATE BUTTON TO RIGHT

DRIVE THERMAL STATE

100%=NORMAL 118%=OHF THRESHOLD

ROTATE BUTTON TO RIGHT

MONITOR MOTOR

PRESS BUTTON ONCE

MOTOR SPEED RPM

ESTIMATED

ROTATE BUTTON TO RIGHT

MOTOR VOLTAGE

ESTIMATED

ROTATE BUTTON TO RIGHT

MOTOR POWER (ESTIMATED)

100% = NOMINAL MOTOR POWER

ROTATE BUTTON TO RIGHT

MOTOR TORQUE(ESTIMATED)

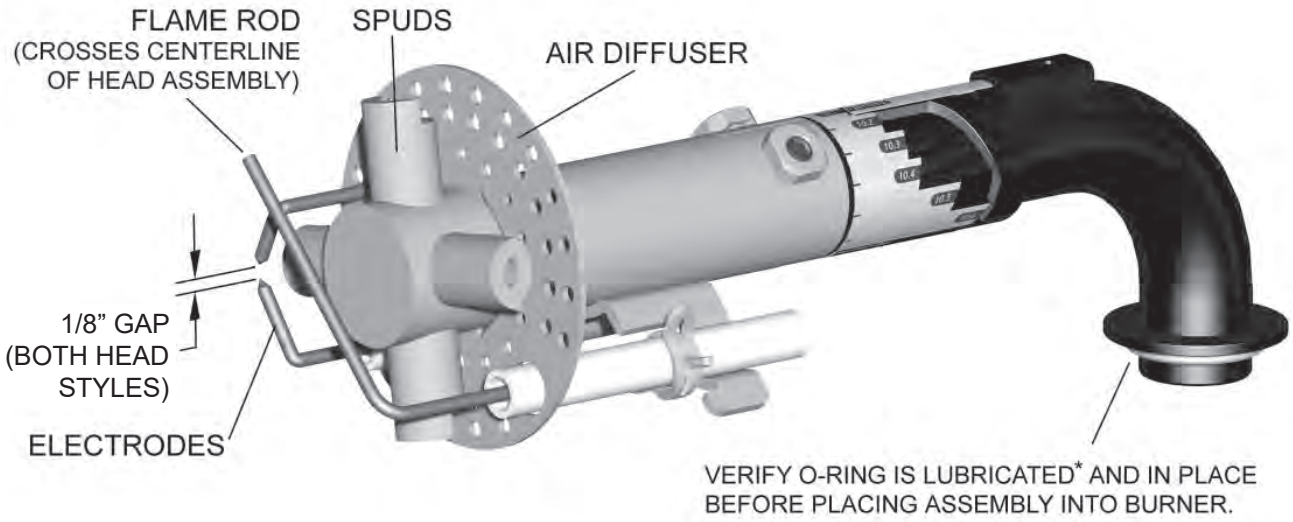
100% = NOMINAL MOTOR TORQUE

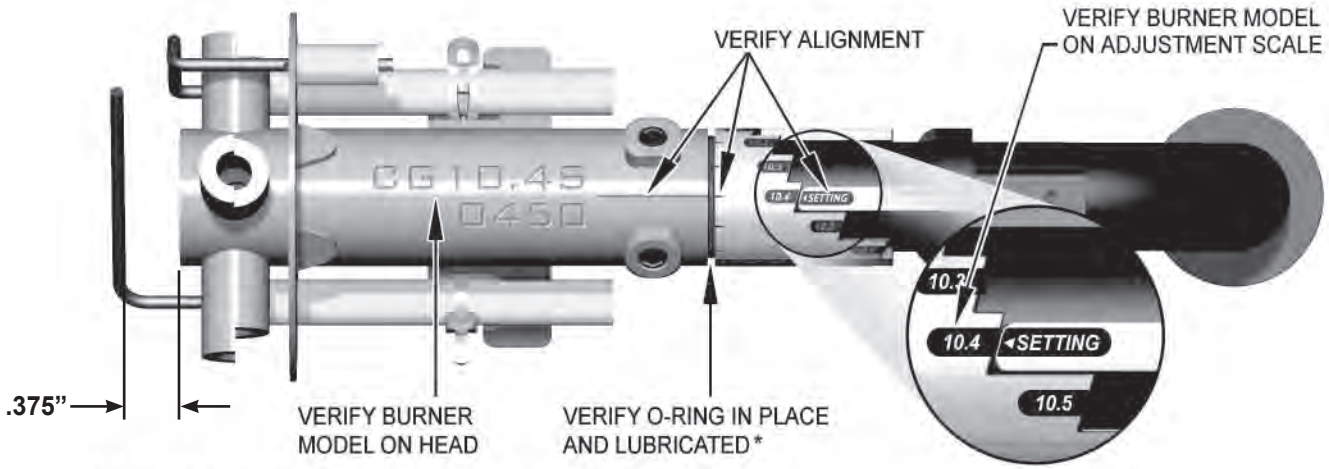
ROTATE BUTTON TO RIGHT

MOTOR CURRENT

ESTIMATED

ESC (Escape) can be pressed at any time to return back to the start & begin again.





** Automotive chassis or bearing grease is a satisfactory o-ring lubricant.*
- Disassembly of gas gun is not required for cleaning.

Burner Head Adjustment - There is an optimum gas orifice size and burner head setting for each firing rate of the CG10 burner. The gas orifice size sets the gas flow velocity; the head setting establishes the airflow velocity. When those velocities are properly matched the burner provides its best performance and stability.

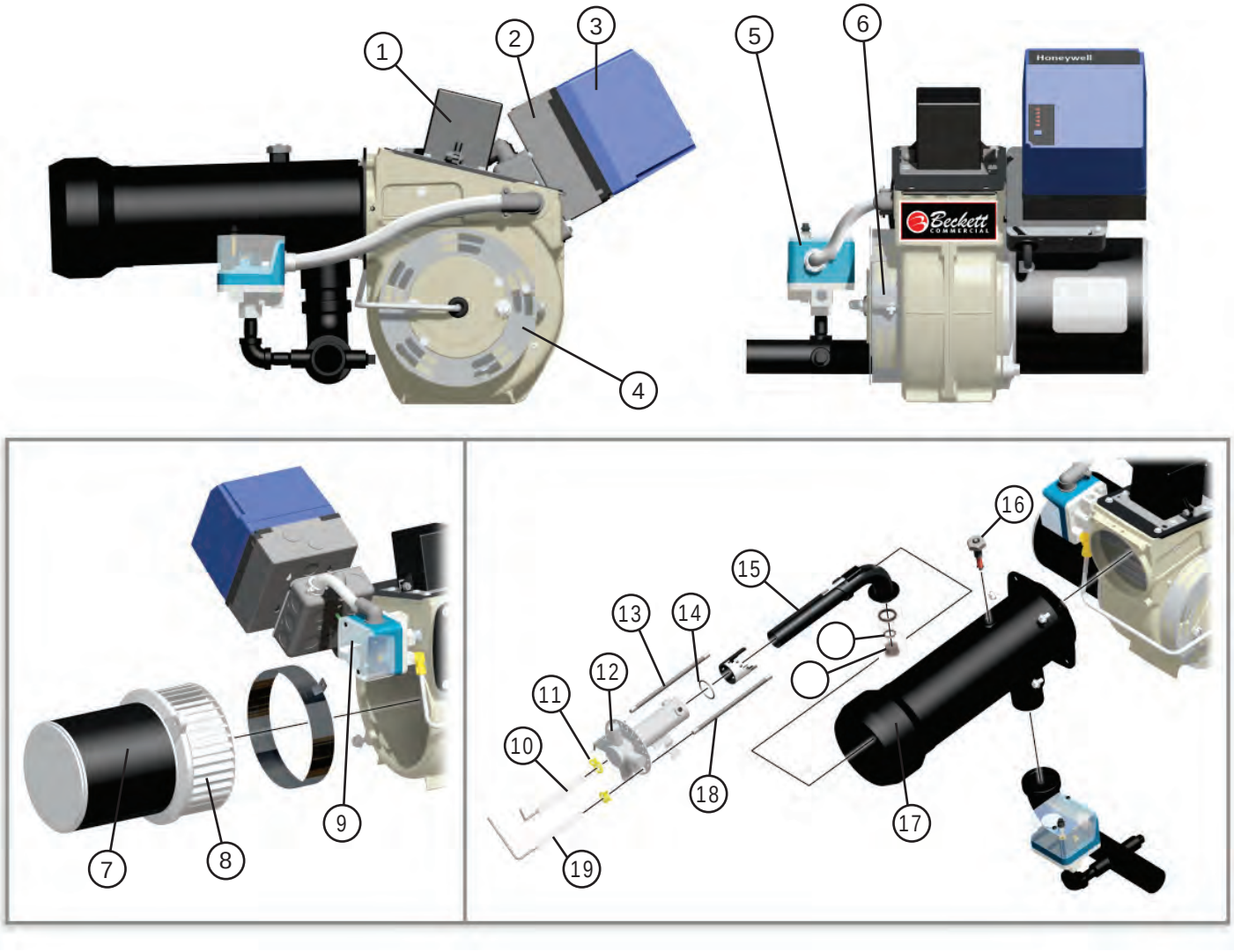
The gas orifice size is built into the burner head. You can verify the correct selection by looking for the burner model number stamped on the top centerline of the stainless steel tube that forms the base of the burner head. It should match the model number on the Beckett burner data label on the blower housing.
The head setting is established by a notched sleeve on the gas tube that can be rotated to positions on a scale marked by the burner's model number. The scale should normally be set to the model number on the Beckett burner data label. (If specific application requirements dictate an alternate head setting it will be noted by a label on the gun assembly.)

For normal service requirements it is not necessary to disassemble the head from the gas tube. If you disassemble the gas gun, make sure that when you re-assemble it:

1. The adjustment scale is set to the correct position as indicated by the burner model number or Gun Label.
2. The alignment marks on the head, scale and stop are in alignment.
3. The O-ring between the head and the adjustment scale is in place, is lubricated with grease, and is compressed between the head and scale as the setscrews that retain the head are tightened.

Replacement Parts

For best performance specify genuine *Beckett* replacement parts.



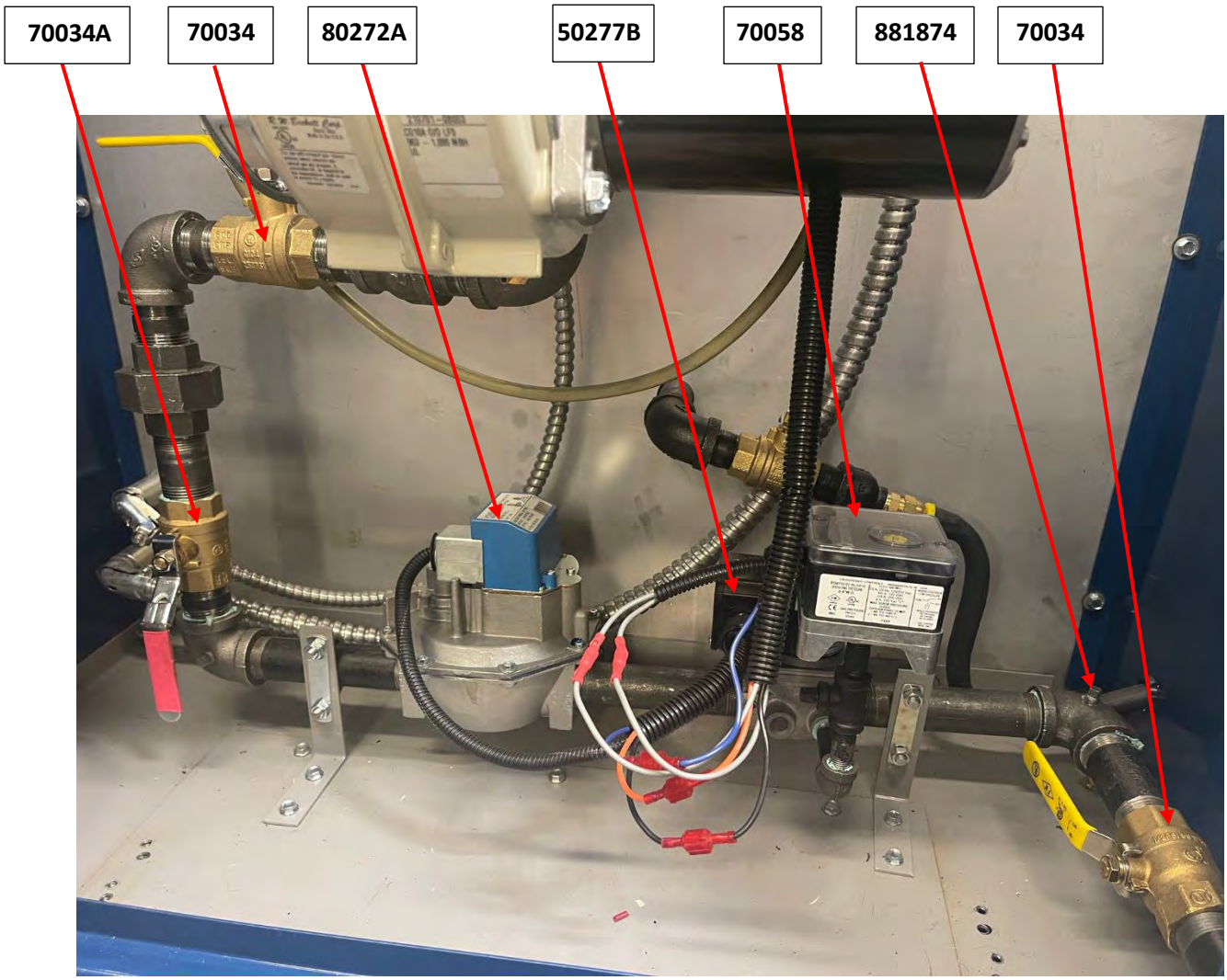
Item	Description	Part #
1	Ignition Transformer	7503U
2	Control Subbase	See Note 1
3	Primary Control	See Note 1
4	Shutter	3215U
5	Gas Pressure Switch	Per Application
6	Air Band	3819A
7	Motor - 120v	21341U
8	Blower Wheel - CG10A or CG10B	21339U
9	Air Proving Switch	2190901U
10	Electrode Set	Spec. Applic.

Item	Description	Part #
11	Spring Clamps (4 in pckg.)	3236501U
12	Head	Spec. Applic.
13	Cable, Ignition Electrode	5990130U
14	O-ring set (2 in package)	32264U
15	Gas Tube assembly	5193201U
16	Jacking Screw	5193401U
17	Air Tube	Spec. Applic.
18	Cable, Flame Rod Flame	5990280U
19	Rod	2191301U

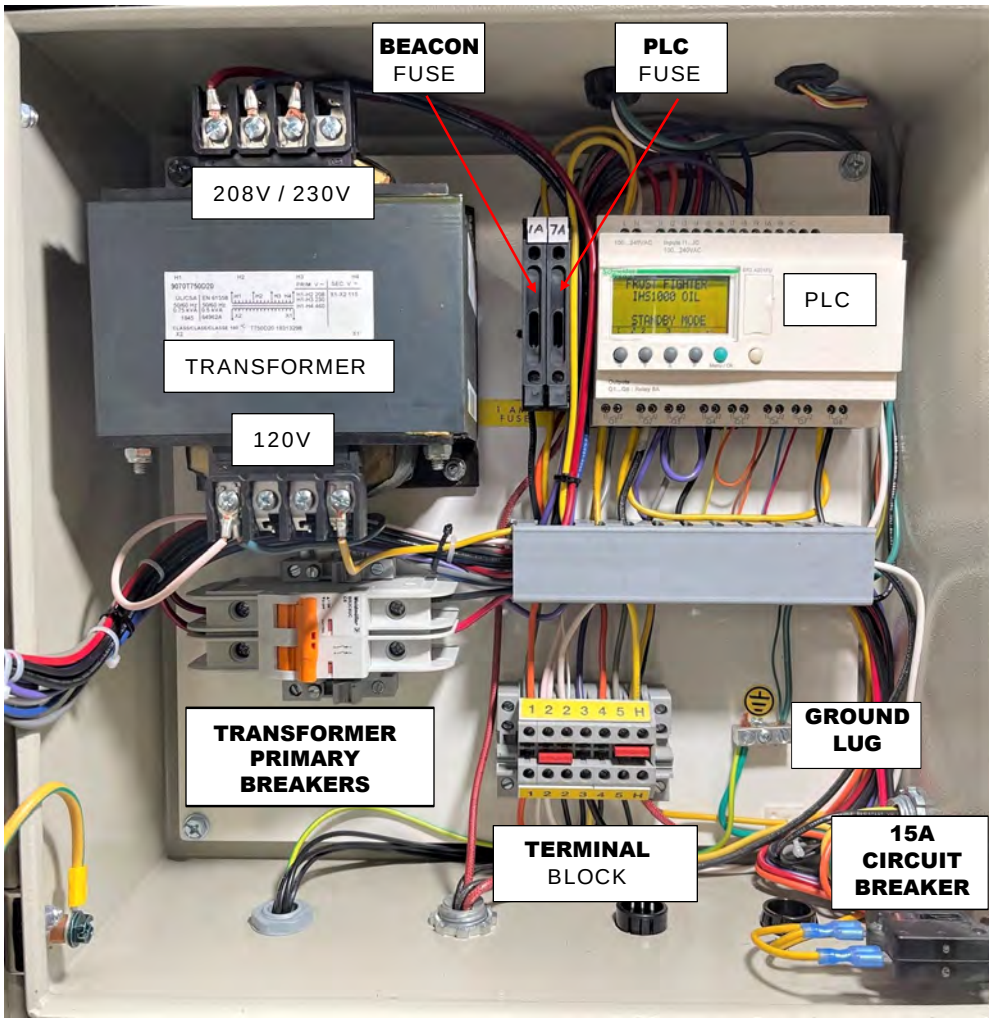
Note 1: *Refer to the UL Label for controller model number.*

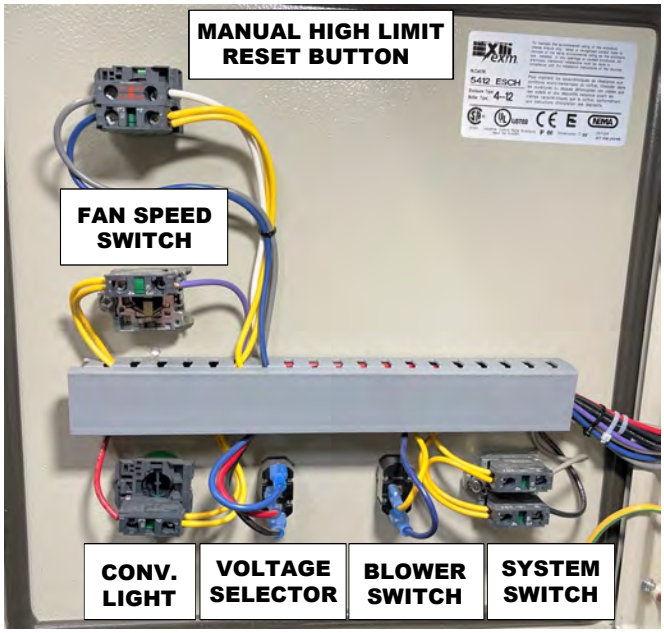
Manifold

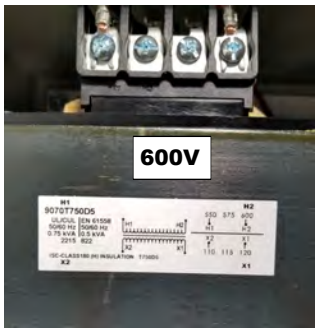
IHS1000



MAIN CONTROL PANEL ELECTRICAL COMPONENTS

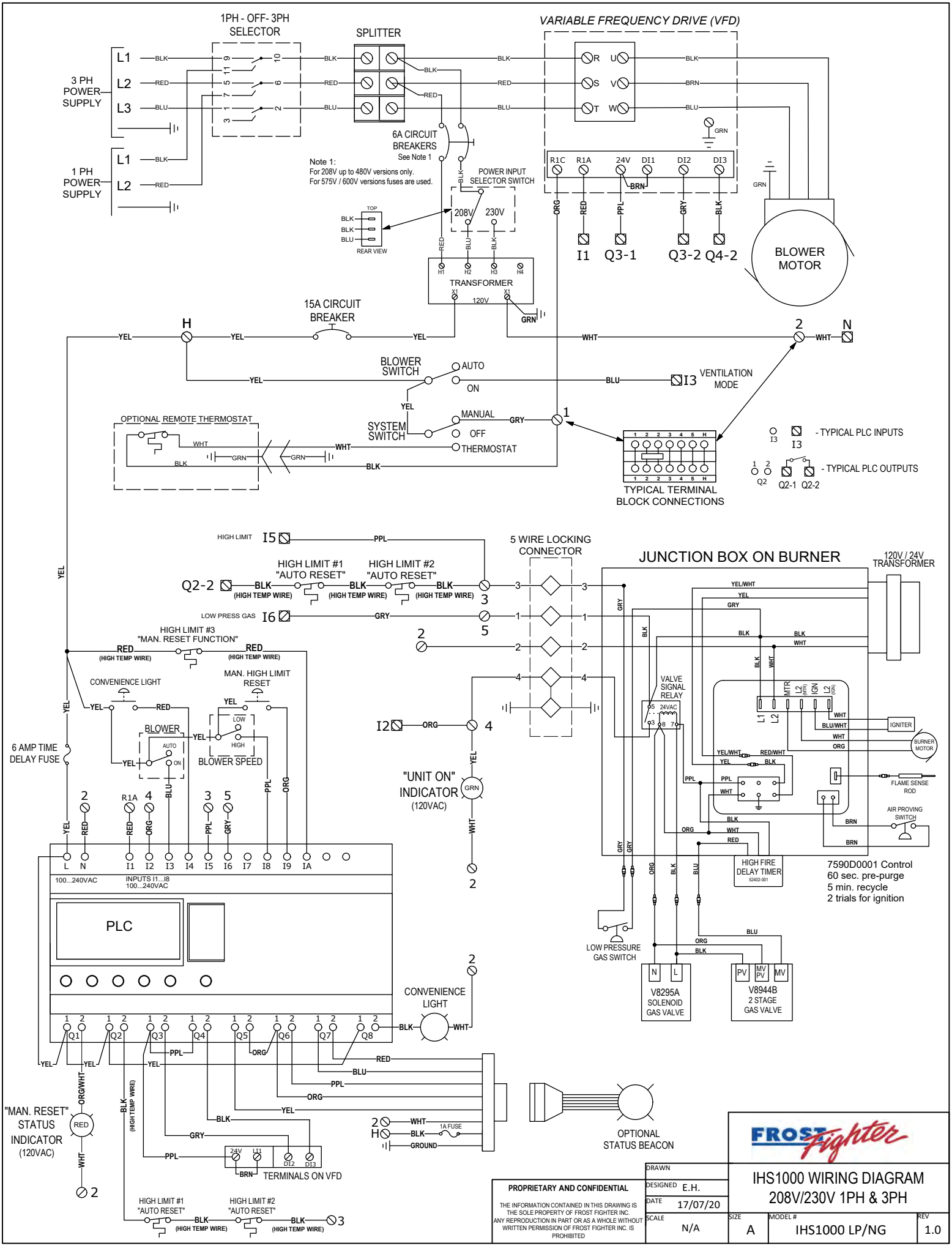






480V 3PH ONLY MODEL - TRANSFORMER PRIMARY WIRING
NO VOLTAGE SELECTOR SWITCH USED

600V 3PH ONLY MODEL - TRANSFORMER PRIMARY WIRING
SINGLE INPUT TRANSFORMER USED


1PH - OFF- 3PH SELECTOR
SPLITTER
VARIABLE FREQUENCY DRIVE (VFD)
3 PH POWER SUPPLY
1 PH POWER SUPPLY
L1
L2
L3
6A CIRCUIT BREAKERS
See Note 1
Note 1:
For 208V up to 480V versions only.
For 575V / 600V versions fuses are used.
POWER INPUT SELECTOR SWITCH
208V
230V
TOP
REAR VIEW
TRANSFORMER
120V
15A CIRCUIT BREAKER
BLOWER MOTOR
R1C
R1A
24V
DI1
DI2
DI3
I1
Q3-1
Q3-2
Q4-2
BLOWER SWITCH
AUTO
ON
VENTILATION MODE
I3
SYSTEM SWITCH
MANUAL
OFF
THERMOSTAT
OPTIONAL REMOTE THERMOSTAT
TYPICAL TERMINAL BLOCK CONNECTIONS
- TYPICAL PLC INPUTS
- TYPICAL PLC OUTPUTS
Q2
Q2-1
Q2-2
HIGH LIMIT
I5
HIGH LIMIT #1 "AUTO RESET"
HIGH LIMIT #2 "AUTO RESET"
(HIGH TEMP WIRE)
LOW PRESS GAS
I6
HIGH LIMIT #3 "MAN. RESET FUNCTION"
5 WIRE LOCKING CONNECTOR
JUNCTION BOX ON BURNER
120V / 24V TRANSFORMER
CONVENIENCE LIGHT
MAN. HIGH LIMIT RESET
BLOWER
BLOWER SPEED
LOW
HIGH
6 AMP TIME DELAY FUSE
VALVE SIGNAL RELAY
IGNITER
BURNER MOTOR
FLAME SENSE ROD
AIR PROVING SWITCH
I2
"UNIT ON" INDICATOR
(120VAC)
HIGH FIRE DELAY TIMER
52402-001
7590D0001 Control
60 sec. pre-purge
5 min. recycle
2 trials for ignition
LOW PRESSURE GAS SWITCH
V8295A SOLENOID GAS VALVE
V8944B 2 STAGE GAS VALVE
PLC
100...240VAC
INPUTS I1...I8 100...240VAC
CONVENIENCE LIGHT
"MAN. RESET" STATUS INDICATOR
(120VAC)
TERMINALS ON VFD
1A FUSE
GROUND
OPTIONAL STATUS BEACON
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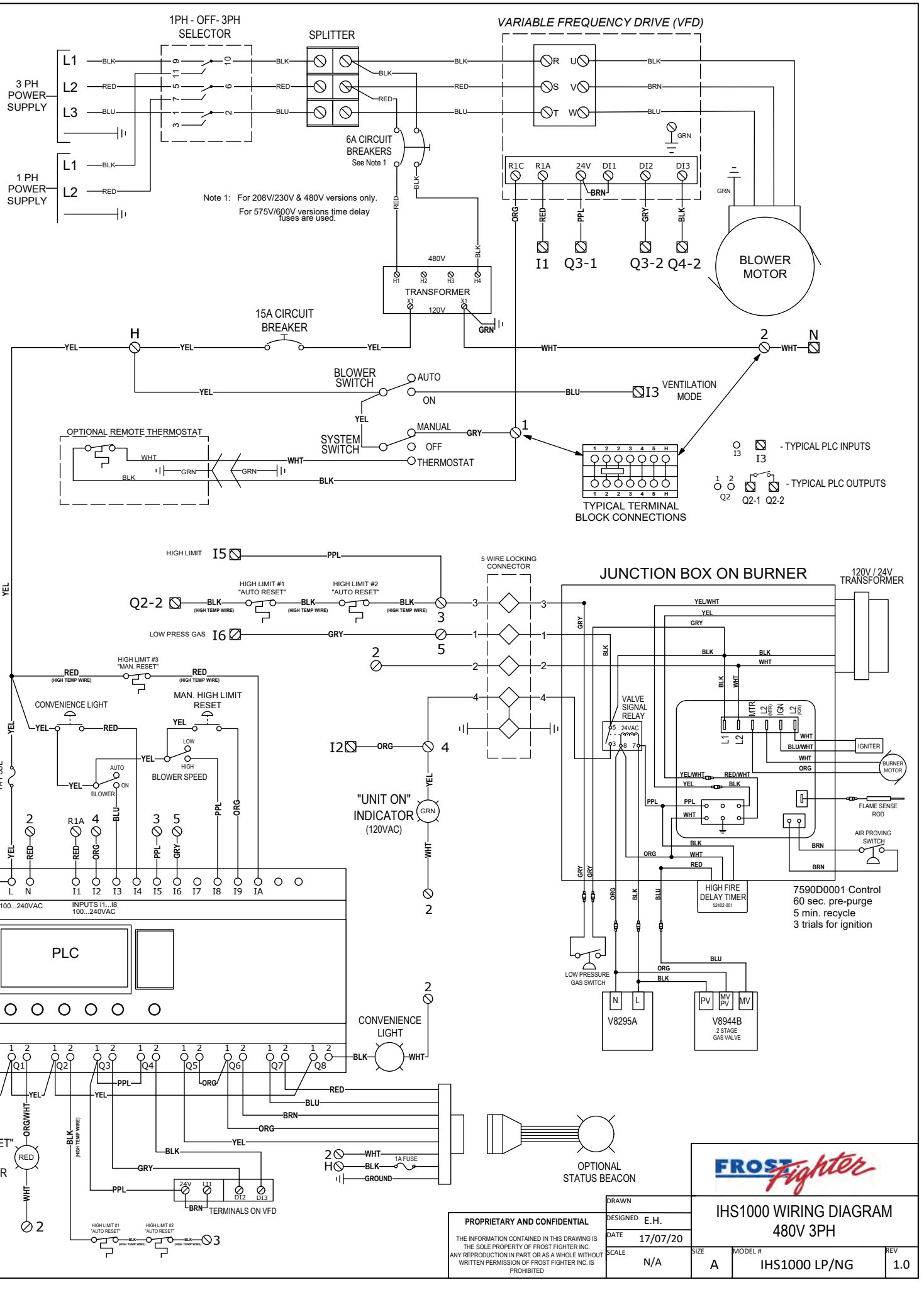
DRAWN
DESIGNED E.H.
DATE 17/07/20
SCALE N/A
IHS1000 WIRING DIAGRAM
208V/230V 1PH & 3PH
SIZE A
MODEL # IHS1000 LP/NG
REV 1.0



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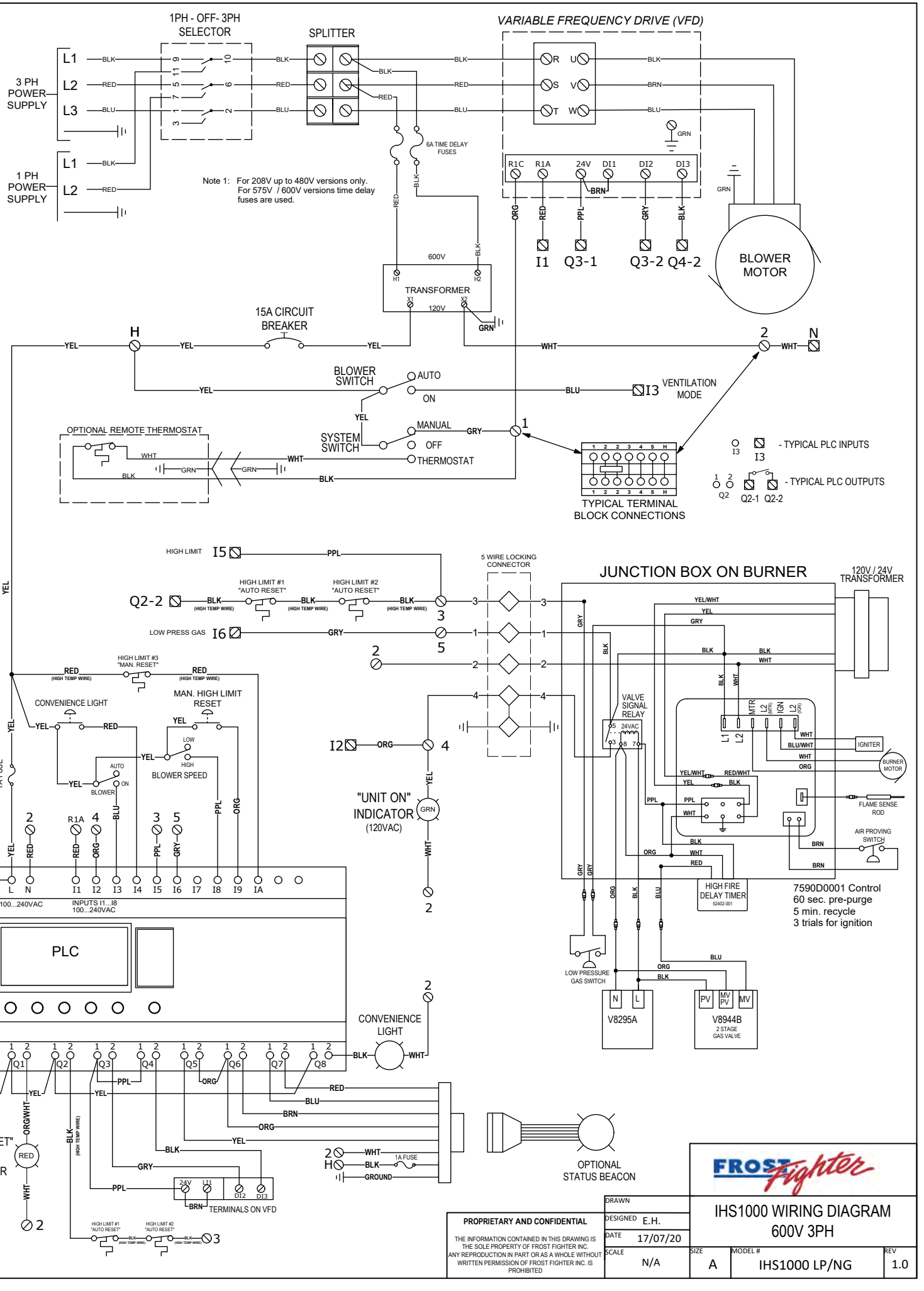
DRAWN	
DESIGNED	E.H.
DATE	17/07/20
SCALE	N/A

IHS1000 WIRING DIAGRAM 480V 3PH

SIZE	MODEL #	REV
A	IHS1000 LP/NG	1.0



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DRAWN	
DESIGNED	E.H.
DATE	17/07/20
SCALE	N/A

IHS1000 WIRING DIAGRAM 600V 3PH

SIZE	MODEL #	REV
A	IHS1000 LP/NG	1.0

IHS May 2009	MATERIAL N/A	FROST Fighter	
TOLERANCES X.X ± .1 FRACTIONS ±1/32 X.XX ± 0.2 DRAFT ANGLE 3° X.XXX ±.005 RADIUS 1/8	DATE 05/09		
	SCALE N/A	SIZE A	MODEL # IHS700P
			REV 0