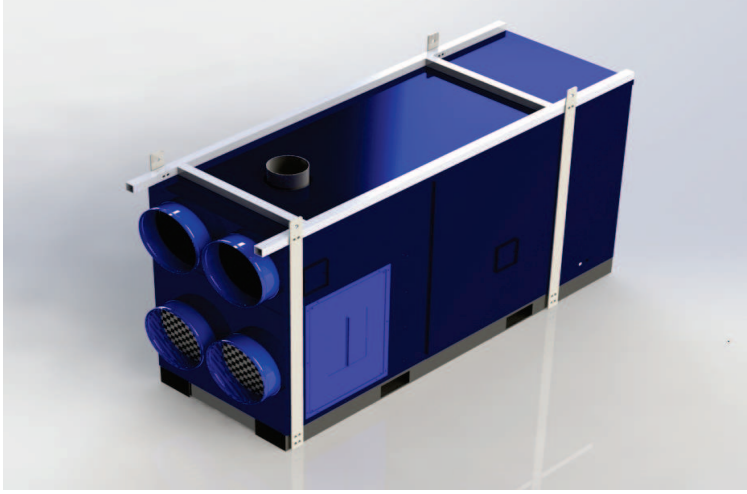
FROST Fighter

OIL - FIRED CONSTRUCTION HEATER



MODEL IHS 700
JULY 2008
TO PRESENT

Installation - Operation Maintenance Instructions and Parts List

READ INSTRUCTIONS PRIOR TO STARTING HEATERS

FROST Fighter PORTABLE HEATERS

FROST FIGHTER INC.
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C SA® US

FEB, 2016

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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 replace 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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R3P 0E9, (204) 775-8252, 1-888-792-0374

INSTRUCTION MANUAL
INDIRECT FIRED CONSTRUCTION HEATER

HAZARD DEFINITIONS

The following will be used throughout this manual to bring attention to hazards and their risk factors, or to special information.

DANGER Denotes presence of a hazard which, if ignored, will result in severe personal injury, death or substantial property damage.

WARNING Denotes presence of a hazard, which, if ignored, could result in severe personal injury, death or substantial property damage.

CAUTION Denotes presence of a hazard, which, if ignored, could result in minor personal injury, or property damage.

NOTICE Intended to bring special attention to information, but not related to personal injury or property damage.

To the owner-

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.

WARNING Never burn garbage or refuse in your heating appliance or try to light the burner by tossing burning material into the appliance. This could result in severe personal injury, death or substantial property damage.

Never restrict air openings on the burner or to the room in which the appliance is located. This could result in fire hazard or flue gas leakage, causing severe personal injury, death or substantial property damage.

THE INSTALLATION OF THE UNIT SHALL BE IN ACCORDANCE WITH THE REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION - Refer to CSA Standard B139 or NFPA 31, Installation Code for Oil-Burning Equipment for recommended installation practice.

SPECIFICATIONS

MODEL	IHS-700
FUEL TYPES	#1 or #2 Fuel Oil / Diesel Fuel
NOZZLE SIZE	4.00 USGPH 45' B (SOLID)
PUMP PRESSURE	140 P.S.I.g *
AIR SETTING	Band: 6 Shutter: 8 Burner Slide Plate Setting: 4.5
APPROVAL AGENCY	C US

*** Pressure at the bleeder port. Subtract 10 PSI if measured at the pump discharge port. See unit rating plate for exact specifications.**

To the owner-

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 and with the National Fire Protection Standard for Oil-Burning Equipment, NFPA 31 (or CSA B139-04).

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

NOTICE High altitude installations – Accepted industry practice requires no derate of Burner capacity up to 2000 feet above sea level. For altitudes higher than 2000 Feet, derate burner capacity 4% for each 1000 feet above sea level.

This heater is not intended to be used at temperatures above 50'F (10'C). Use of this heater at above this temperature will result in the burner locking out on the over temperature switch.

PRE-INSTALLATION CHECKLIST

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 B139 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 of 6 inches on the sides, 18 inches from the top of the unit and 36 inches from the burner access side. The unit can be installed on a level combustible floor. Flue clearance is 18".

DUCT INSTALLATION

- 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 for 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).
- Ducts should be rated for 300 F. minimum.

HIGH LIMITS

- The heater is supplied with manual reset high limits located behind marked panels on the left side of the heater
- The high limit contacts are normally closed and open on the over temperature condition
- If a high limit trips allow the heater to cool down and then reset the high limit by manually depressing the reset button located in the centre of the high limit.

VENT SYSTEM

The flue gas venting system must be in good condition and must comply with all the applicable codes.

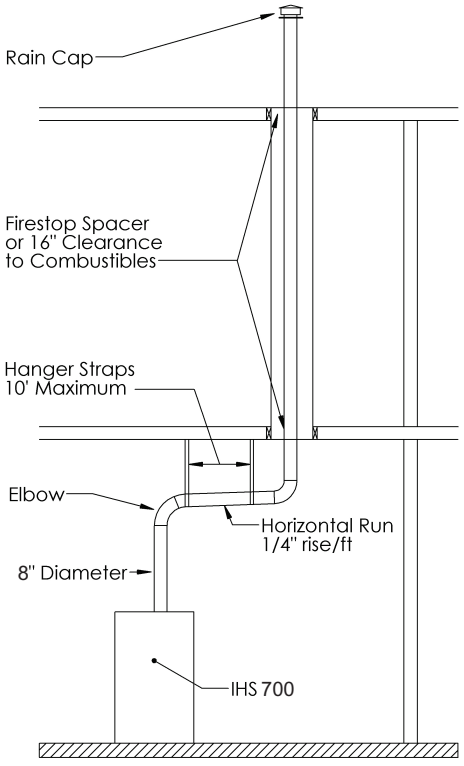
OUTDOOR INSTALLATIONS:
For outdoor installation, vent cap must be installed and fastened.

INDOOR INSTALLATIONS:
Must be done in accordance to NFPA 54 (or CSA B139) 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.
5. Do not support the weight of the stack on the flue connection of the heating system.
6. The maximum flue gas temperature is 550 F. "A" vent, or single wall steel pipe must be used.
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 five (3) feet (1m) of vertical pipe is required. The top of the vent must extend at least two (2) feet (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 ten (10) feet (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 feet (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 fibreglass, minimum 1 ½# 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.



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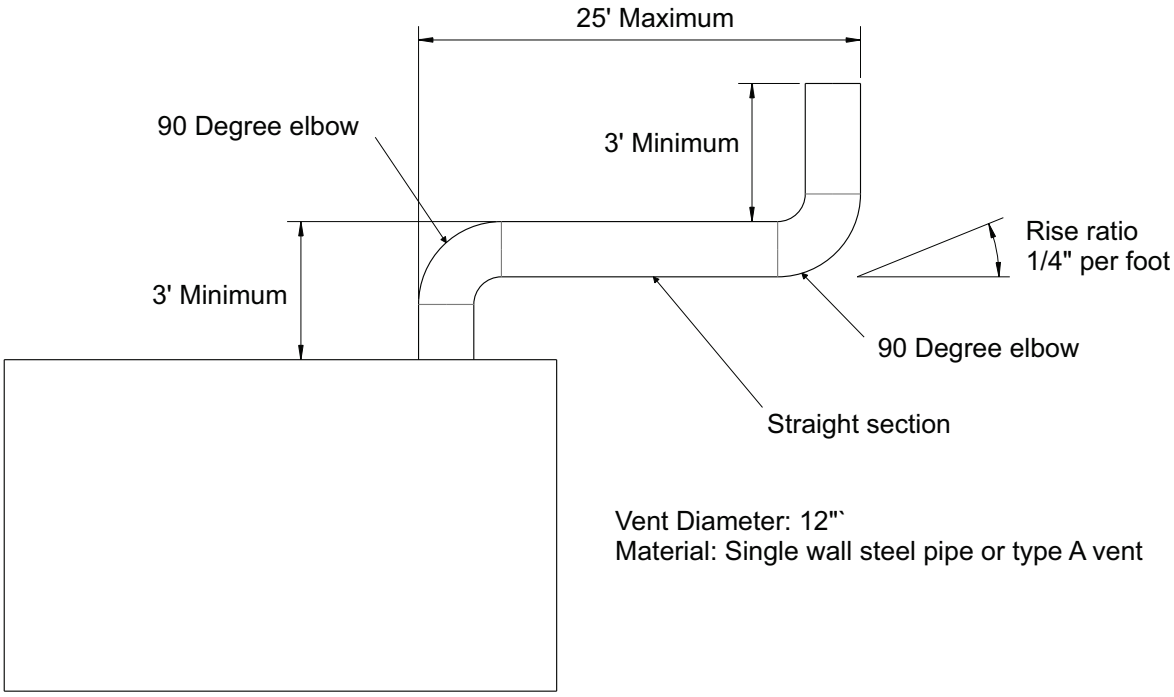
Pressures in Category 111 venting systems are positive and therefore care must be taken to avoid flue products from entering the heated space. Use only vent material and components that are UL listed and approved for Category 111.

WARNING: Do not use Type B vent within a building on horizontally vented units.

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: 12"`
Material: Single wall steel pipe or type A vent

IHS 700

Vent installations shall conform with local codes, or, in the absence of local codes, with the National Fire Protection Standard for Oil-Burning Equipment, NFPA 31, or oil-burning equipment installation Code, CSA B139-04

ELECTRICAL SUPPLY

Verify that the power connections available are correct for the Unit. All power must be supplied through the disconnect.

INSTALLING THE OPTIONAL THERMOSTAT
Plug the thermostat directly into the receptacle. WARNING: THE RECEPTACLE IS USED FOR INSTALLING THE THERMOSTAT ONLY! THIS IS NOT A POWER SOURCE.

CONNECT THE FUEL LINE(S) - REFER TO CHART BELOW FOR FUEL LINE LENGTH

WARNING Install the oil lines using the following guidelines. Failure to comply could lead to equipment damage and present a risk of sever personal injury, death or substantial property damage due to leakage of oil and potential fire hazard.

Use only flare fittings at joints and connections. Never use compression fittings.

Install fittings only in accessible locations to assure any leak will be detected.

Where joint sealing is needed, use only pipes dope. Never use Teflon tape. Tape strands can break free and damage the fuel unit.

On two-pipe oil systems verify that the suction line vacuum does not exceed the fuel manufacturer's recommendation.

WARNING Do not operate the burner unless a return line or a by-pass loop is installed. Failure to follow this guideline will cause damage to the fuel seals and consequent fuel leakage. This could result in severe personal injury, death or substantial property damage.

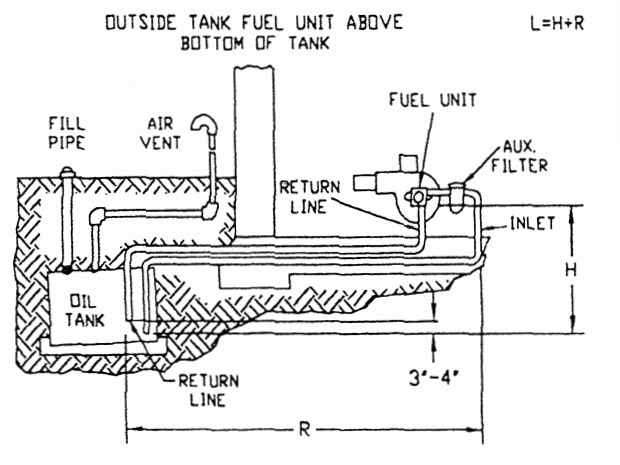
OIL SUPPLY / RETURN LINES

Install the oil tank lines in accordance with all applicable codes.

Use continuous lengths of heavy wall copper tubing, routed under the floor, where possible. Do not attach fuel lines to the fuel unit or to the floor joists if possible. This reduces vibration and noise transmission problems.

Install a high quality shut-off valve in an accessible location on the oil supply line. Locate one valve close to the tank.

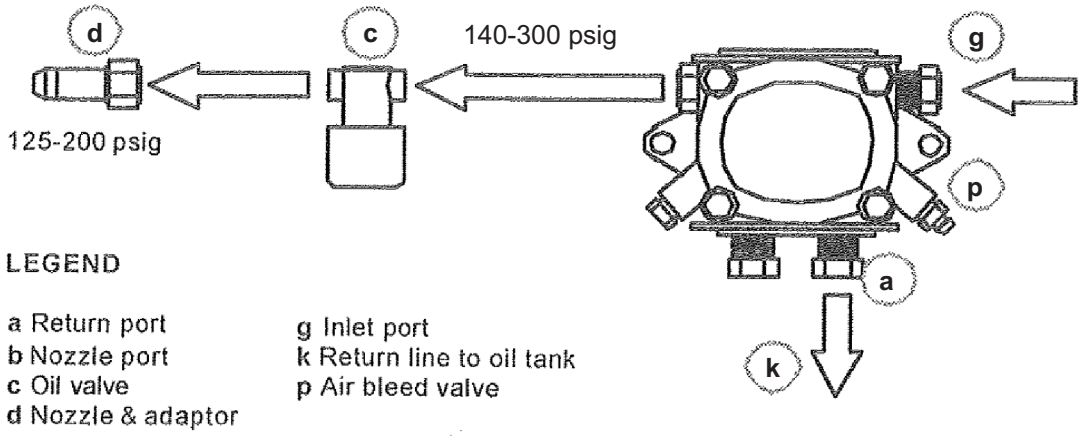
TWO-PIPE SYSTEM - (Bypass plug installed in pump)



TWO-STAGE TWO-PIPE MAXIMUM LINE LENGTH (H + R)

Lift "H"	3450 RPM Motor Speed
	3/8" OD Tubing @ 7 GPM
0'	80'
2'	73'
4'	66'
6'	59'
8'	52'
10'	45'
12'	38'
14'	31'
16'	80'

Two-pipe oil flow with "B" pump



LEGEND

a Return port	g Inlet port
b Nozzle port	k Return line to oil tank
c Oil valve	p Air bleed valve
d Nozzle & adaptor	

SEQUENCE OF OPERATION – TYPICAL

1. Turn the unit switch to manual.
2. Power is applied to the Genisys black (BK) and red (RD) wires.
3. After 5 seconds, the Genisys applies 120 volts to the orange wire (OR), activating the burner motor (M1) and the ignition transformer (TR). The oil pump is operated by the burner-motor, so oil pressure is delivered to the oil valve inlets.
4. Power is applied to the oil valve circuit. After a ten second pre-purge. When the timer times out, the oil valve is activated, allowing oil to flow to the nozzle.
5. Trail for ignition (TFI). A flame should be established within the 15-second lockout time. If no flame is sensed after 15 seconds, the Genisys will terminate all power to the blower and oil circuits, shutting the burner down. The control will electrically lock out and has to be manually reset. If the control locks out three times in a row, the control enters restricted lockout. Call a qualified service technician.
6. After the flame is established, there is a 30 second warm-up. After the 30 seconds the main blower starts.
7. When the call for heat signal terminates (at the black wire of the Genisys), the Genisys terminates power to all circuits, closing the oil valve and stopping the burner motor. The main blower motor stays in operation for 3 minutes, then the blower shut down.

(Optional)
If a thermostat is used, the thermostat is plugged into the receptacle on the side of unit. The sensor unit should be placed in the heated space. On a call for heat the unit will be activated as above.

PREPARE THE BURNER FOR START-UP

Start-up checklist – Verify the following before attempting to start burner

- o Combustion air supply and venting have been inspected and verified to be free of obstruction and installed in accordance with all applicable codes.
- o Fuel connection to nozzle line assembly is secure.
- o Fuel supply line is correctly installed, the oil tank is sufficiently filled, and shut-off valves are open.

START THE BURNER

WARNING Do not proceed unless all prior steps in this manual have been completed. Failure to comply could result in severe personal injury, death or substantial property damage.

WARNING Do not attempt to start the burner when excess oil has accumulated, when the appliance is full of vapor or when the combustion chamber is very hot. Do not attempt to re-establish flame with the burner running if the flames should be extinguished during start-up, venting or adjustment. Allow the unit to cool off and all vapors to dissipate before attempting another start. Failure to comply with these guidelines could cause an explosion or fire, resulting in severe personal injury, death or substantial property damage.

PUMP PRESSURE

The pump pressure is 150 PSI for the IHS 600 and 140 PSI for the IHS 700. The pump pressure is adjusted on the side of the pump. (See page 8 Two-pipe oil flow)

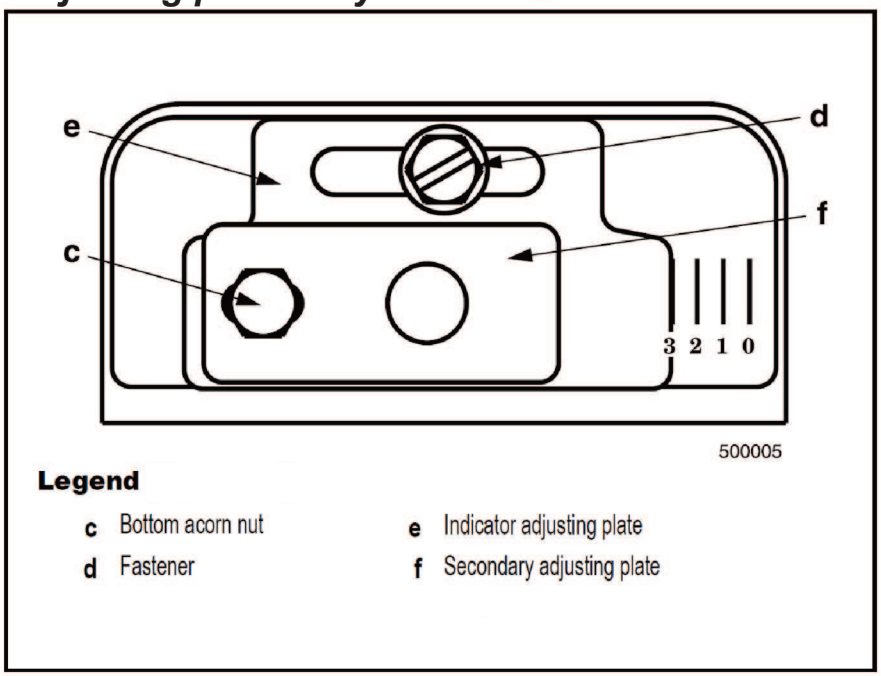
AIR SETTING

The air settings should be set to 6 on the band and 8 on the air shutter. In some cases these air-setting needs to be adjusted. To do this insert your flue gas analyzer into the flue, 6 inches above the top of unit. Measure you excess O2% and CO2% levels. Set your air shutter to bring your O2% levels between 4-5%. Your CO2% will be between 10-11% and your CO levels should be around zero.

SET “Z” DIMENSION

The air slider (z dimensions) settings should be set at 4.5 on the Adjusting plate assembly, which is located on the right hand side of the burner.

Adjusting plate assy.



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.

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 lint and debris).
- Test ignition and combustion and verify air damper settings.
- Test fuel lines and all connections
- Inspect combustion air and vent systems.
- Oil motor (if not permanently lubricated).

MONTHLY MAINTENANCE

- Observe combustion air openings and vent system for integrity. Openings must be clean and free of obstructions.
- Check the fuel lines and fittings to verify there are no leaks.
- Observe burner ignition and 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.

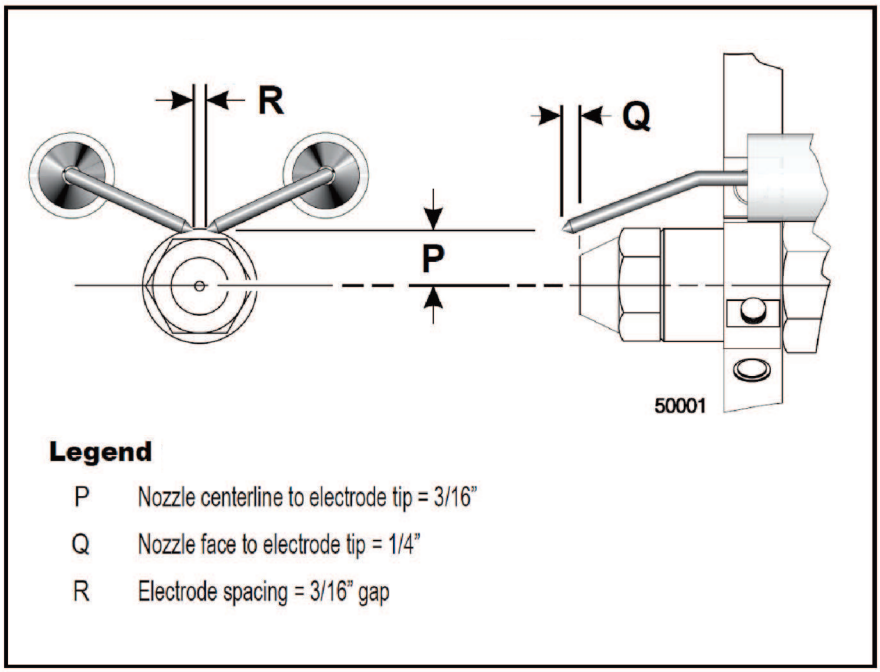
INSTALL NOZZLE

Install the oil nozzle in the nozzle adaptor. Use a ¾" open-end wrench to steady the nozzle adaptor and use a 5/8" open-end wrench to turn the nozzle. Tighten securely but do not over-tighten.

Verify that the oil tube assembly and electrodes are in good condition, with no cracks or damage.

WARNING Failure to properly set and maintain the electrode and nozzle spacing dimensions can cause incorrect burner ignition or poor combustion. This could result in severe personal injury, death or substantial property damage.

Nozzle and Nozzle Line Assembly



Legend

P	Nozzle centerline to electrode tip = 3/16"
Q	Nozzle face to electrode tip = 1/4"
R	Electrode spacing = 3/16" gap

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.

By the time the slight bead is formed, it will be noticed that the bearing temperature will rise. It is not uncommon for the temperature to rise as much as 30 degrees Fahrenheit after re-lubrication. 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 pre-lubricated at the factory with a lithium soap grease which is compatible with multi-purpose grease readily available from local suppliers. The lubricant selected for factory lubrication uses a highly refined mineral oil with a high viscosity index, thickened with lithium soap to conform to NLGI grade 2 consistency. A suitable additive package is added to protect the highly polished rolling contact surfaces from corrosion and oxidation of the lubricant. The lubricant is satisfactory for an operating temperature range of –30 F to +250 F.

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

General Duty Ball & Roller;
58-75 SUS @ 210 F
450-750 SUS @ 100 F

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

Heavy Duty Roller Bearing;
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

Frequency of re-lubrication depends upon operating conditions. The bearing operating temperature is the best index for determining a re-lubrication schedule. 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
100 RPM	Up to 120 F	Clean	5 months
500 RPM	Up to 130 F	Clean	2 months
1000 RPM	Up to 210 F	Clean	2 weeks
1500 RPM	Over 150 F	Clean	Weekly
Any speed	Up to 150 F	Dirty	1 week to 1 month
Any speed	Over 150 F	Dirty	Daily to 1 week
Any speed	Any temperature	Very dirty	Daily to 1 week
Any speed	Any temperature	Extreme conditions	Daily to 1 week

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.
4. Keep belts free from foreign material that may cause slip.
5. Make V-drive inspection on a periodic basis. Tension 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

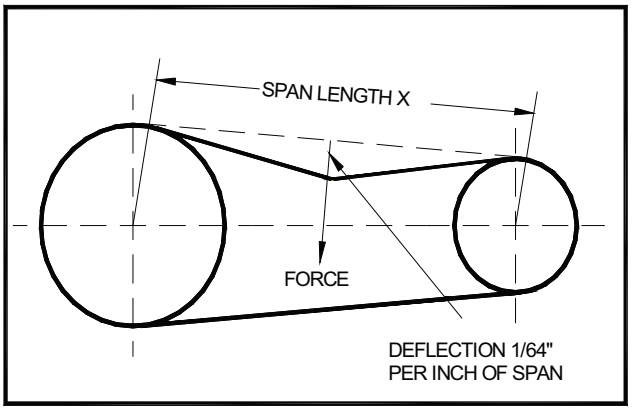


TABLE III

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.

SEQUENCE OF OPERATION

1. SYSTEM SWITCH “MANUAL”
After a forty five second purge period, the burner fires. Thirty seconds after the burner fires the supply fan starts.

2. SYSTEM SWITCH “THERMOSTAT” (the Heat Switch is inoperative in this mode)
On a call for heat from the thermostat, after a forty five second purge period, the burner fires. Thirty seconds after the burner fires the supply fan starts. When the call for heat from the thermostat is satisfied the burner shuts down and the supply fan will continue to run for three minutes to cool down the heat exchanger.

3. SYSTEM SWITCH “OFF”
The heater is inoperative.

NOTES:

- When the “VENTILATION SWITCH” is in the “ON” position the supply fan will run continuously.
- When the system switch is turned off the supply fan will continue to run for three minutes to cool down the heat exchanger
- Do not shut down the heater by disconnecting the power supply to the heater as this could damage the heater. To shut down the heater turn the SYSTEM SWITCH to the “OFF” position and wait for the three minute cool down cycle to complete before disconnecting the power supply.

SEQUENCE OF OPERATION

Burner States
1. Standby: The burner is idle, waiting for a call for heat. When a call for heat is initiated, there is a 2-6 second delay while the control performs a safe start check.
2. Valve-on Delay: The igniter and motor are on while the control delays turning on the oil solenoid valve for the programmed time (15 seconds).
3. Trial for ignition: The oil solenoid valve is energized. A flame should be established within the factory set 15-second trial for ignition time ”lockout time” (30 seconds on some models).
4. Lockout: The control has shut down for one of the following safety reasons:
a. The trial for ignition (lockout) time expired without flame being established
b. The cad cell detected flame at the end of the Valve on Delay state.
To reset the control from lockout click the button 1-second.
NOTE: A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a Hard Lockout state that must be reset only by a qualified service technician.
To reset from Hard Lockout, hold the reset button for 45 seconds.
5. Ignition Carryover: Once flame is established, the igniter remains on for 10 additional seconds to ensure flame stability.
6. Run: The flame is sustained until the call for heat is satisfied. The burner is then sent to Motor-Off Delay, if applicable, or it is shut down and sent to Standby.
7. Recycle: If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The flame is lost three times in a row. The control locks out to prevent cycling with repetitious flame due to poor combustion.
8. Motor-Off Delay: If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motor-off delay time before the control returns to standby.
9. Pump Prime: The igniter and motor are on with the oil solenoid valve energized for 4 minutes. During Pump Prime mode, the cad cell is disregarded, allowing the technician to prime the pump without having to jumper the cad cell.

Sequence of Operation for Genisys Controller

Burner States

Standby: The burner is idle, waiting for a call for heat.

Valve-On Delay: The igniter and motor are on while the control delays turning on the oil solenoid valve for 45 seconds..

Trial For Ignition: The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time ("lockout time").

Lockout: The control has shut down for one of the following safety reasons:
a. The trial for ignition (lockout) time expired without flame being established.
b. The cad cell detected flame at the end of the Valve On Delay state.

To reset the control from lockout click the button 1-second.

NOTE: A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a Hard Lockout state that must be reset only by a qualified service technician. To reset from Hard Lockout, hold the reset button for 15 seconds until the yellow light turns on.

Ignition Carryover: Once flame is established, the igniter remains on to ensure flame stability.

Run: The flame is sustained until the call for heat is satisfied. The burner is then sent to Motor-Off Delay, if applicable, or it is shut down and sent to Standby.

Recycle: If the flame is lost while the burner is firing, the control shuts down the burner,enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to Recycle each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into Hard Lockout instead of recycle. This feature prevents excessive accumulation of oil in the appliance firing chamber.

Motor-Off Delay: If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motor-off delay time before the control returns to standby.

Pump Prime: The igniter and motor are on with the oil solenoid valve energized for 4 minutes. During Pump Prime mode, the cad cell is disregarded, allowing the technician to prime the pump without having to jumper the cad cell.

TROUBLE SHOOTING GUIDE

ALWAYS DOUBLE CHECK FOR SUFFICIENT POWER , GAUGE OF CORD (SEE TOP OF PAGE #5) AND PROPER FUEL SUPPLY. POWER AND FUEL SUPPLY MUST BE SHUT OFF/DISCONNECTED BEFORE REMOVING OR REPLACING ANY COMPONENTS ON THE HEATER.

1. **Unit is turned on, nothing happens after 5 second safe start.**
   a. Ensure proper voltage coming in.
   b. Check for power on both sides of the toggle switch. If power on one side, replace. If power on both sides, go to **c.**
   c. Check black wire from primary control. If no power there, remove high limit cover & check for power on both sides of high limit. If power on one side only, reset or replace high limit. If power on both sides, go to **d.**
   d. Ensure thermostat contacts on primary control (T and T) are jumpered out.
   e. Make sure light on primary control is not flashing. If so, push button to reset.
   f. Check manual reset button on motor and wiring connection to motor. If reset pushed and power going to motor, nothing is happening, replace burner motor.
   g. On neutral line (white wires) make sure all connections are tight and secure, and unit is properly grounded. With AC voltage tester, check white (neutral lines) for power (one on ground, one on neutral). If over 5 volts, check polarity. If polarity correct, check wires individually for power to determine leak source, then replace leak source.
   h. If power coming into black wire on primary control, but no power out to orange wire, replace primary control.
   i. If green light on primary control stays on, check to ensure transformer door is closed properly as cad cell is detecting light. Check cad cell is working. If light stays on and no obvious areas open, check OHM reading across two yellow wires. If you get a reading, replace cad cell. If you get no OHM reading from cad cell, replace primary control if light still on.
2. **Burner motor starts but unit will not fire.**
   a. Check for power on blue wire on primary control going to ignitor. If no power there, replace primary control if powered, go to **b**.
   b. Remove electrode assembly and check isolators for cracks or chips in the porcelain. Make sure electrode setting is proper. For electrode adjustments, please turn to page 9.Clean assembly if there is any soot or oil..
   c The nozzle should be checked and ensure it is not clogged or blocked. Make sure nozzle is not loose.
   d. Ensure air shutters are properly set to factory specifications.
   e. Check for power on violet line on primary control. After pre-purge, if no power sent to violet line, replace primary control. If power on violet line, remove copper fuel line at electrode assembly to ensure fuel is coming out. If no fuel there, replace solenoid valve.
   f. At the bleeder screw, check for proper out pump pressure. If low or no pump pressure, go to **g**
   g Check oil filter, oil pick up tube and oil lines to ensure free flow and they are not clogged or dirty.
   h Check electrical polarity and grounding.
3. **Burner fires then locks out.**
   a. Check oil pressure to ensure solenoid valve is opening. Check oil flow system, filter, pick up tubes and lines.
   b. The nozzle should be checked to ensure it is clean and emitting a good spray pattern, as this could affect the cad cell operation.
   c. Cad cell (flame detector) could be defective. Disconnect yellow cad cell wires from primary control. Start unit and when it fires, connect jumper across connections on primary control. If unit continues to run, then check cad cell alignment with burner, clean face with a soft cloth and ensure no external light is affecting it. With an ohmmeter, check resistance across cad cell leads with machine running and primary control cad cell leads jumpered out. If resistance over 1200 OHMS, cad cell should be replaced. If unit locks out with jumper, replace primary control.

TROUBLE SHOOTING GUIDE

3.

d. Wires between cad cell and primary control should be checked to see that they are not pinched or crimped..

e. Prime fuel pump by loosening bleeder screw till steady stream of fuel comes out to ensure no air or bubbles in fuel line..

f. **If unit locks out three times in succession, it will go into restricted lock out mode. To reset, hold down reset button for 15 seconds until LED flashed twice. The unit will then resume in normal operating mode.** After verifying primary control is not in lockout & light continues to flash, replace primary control.

g. Check ground. Voltage must be between 108-132v AC.

h. Make sure high limit is functioning properly.

4. **Smoky fire**

a. Check nozzle, make sure is tight and not clogged.

b. Check combustion chamber for cracks or burnt out.

c. Check air band settings. (Air shutter and/or air band may be closed too much-restricting combustion air.

d. Check pump pressure.

e. Check slide plate to make sure it is in correct position.(See page 9 for settings)If necessary, open slightly.

f. Check recommended settings if using #2 fuel in cold ambient teMperatures

5. Delayed ignition

a. Check for proper electrode setting.

b. Check the isolators for cracks or a conducting coat of soot or oil. Cracks sometimes occur under the electrode bracket, causing a short circuit.

c. Check to see that the air shutter is not overly open-too much air will blow out flame.

d. Check to ensure pump pressure is properly set..

e. Change nozzle.

f. Check fuel filter, replace if necessary.

g. Ensure that draft or wind is not blowing out flame-add 3' stack.

6. Main fan will not come on, unit shuts down on high limit.

a. Check temperature feeler, make sure it is in properly.

b. Jumper out fan switch to test motor. If you have voltage to motor and still does not start, replace motor. Check line voltage to ensure proper voltage. Also checks amp draw on motor, motor may be running too hot and not run due to thermal overload being tripped.

c. Replace fan switch if you have power on one side after unit heating up it does not make

d. Replace high limit as it may be tripping too soon and not giving fan switch time to engage.

e. Ensure fan switch temperature is correct for weather conditions (see page 8 for settings)

7. **Unit on, but cycles on high limit**

a. Check air flow, ensure both ducts are in place and clear of obstruction and straight.

b. Check pump pressure, unit could be over firing.

c. Check nozzle that proper size of nozzle is installed.

d. Change high limit.

e. **Maximum duct length is 100 feet.**

f. Fuel type- #2 will increase BTU output @cold ambient temperatures resulting in overheating.

g. Return air duct length must be subtracted from fresh air duct length.

8. Combustion chamber turns red.

a. Nozzle may be firing side ways (replace or adjust)

b. Clogged nozzle (replace)

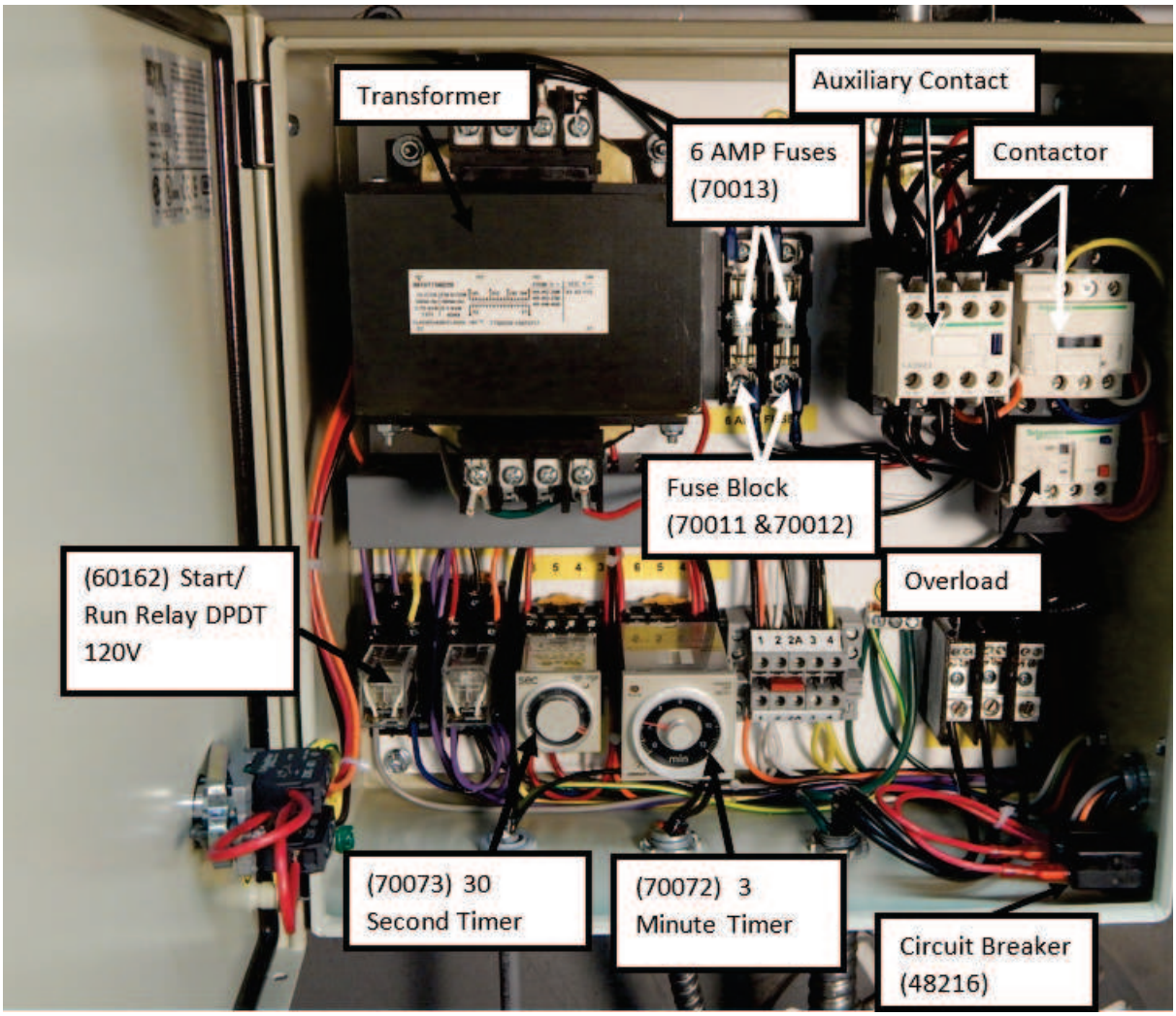
c. Temperature feeler not on properly or missing (Must be touching heat exchanger)

d. High limit not functioning (replace)

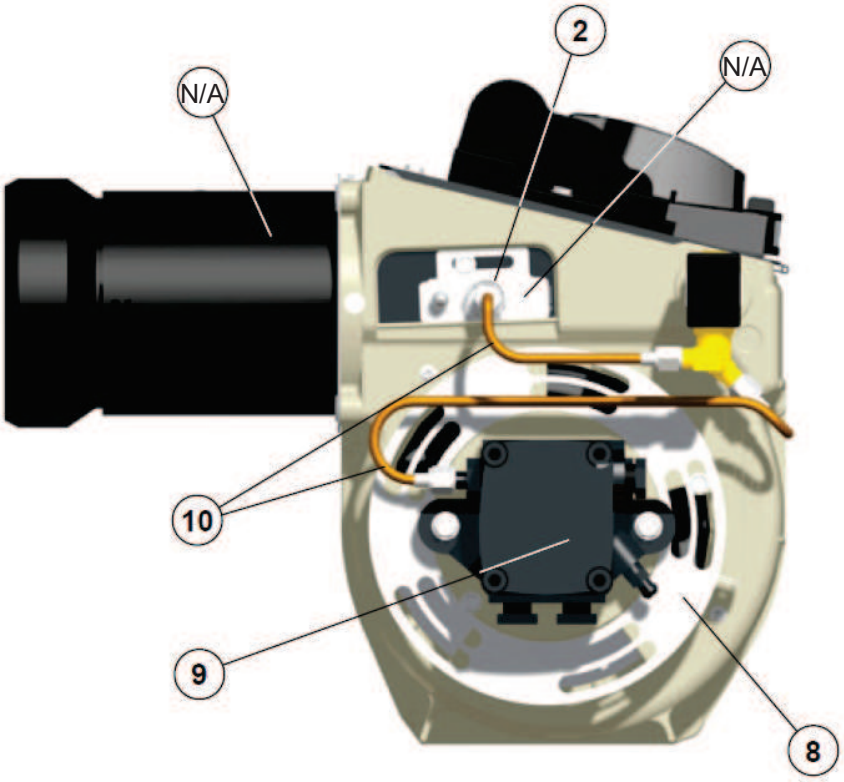
e. Excessive pump pressure. Check and reset if necessary

f. Fuel type.

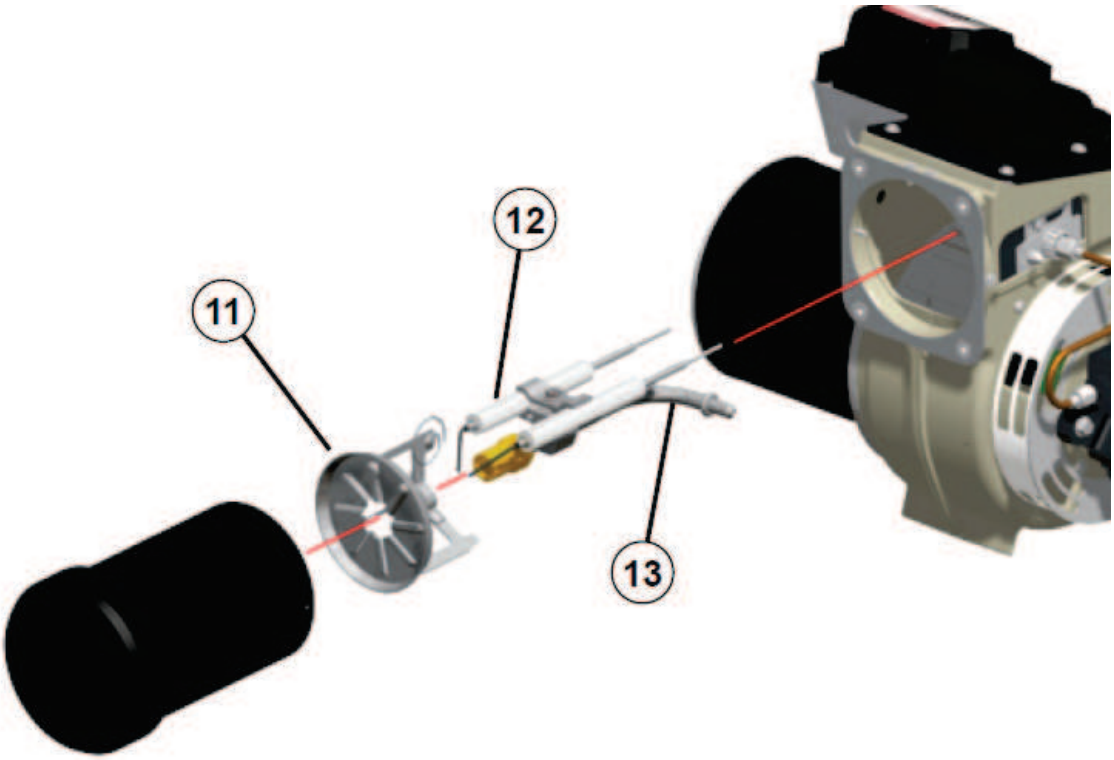
IHS 700 Wiring Panel

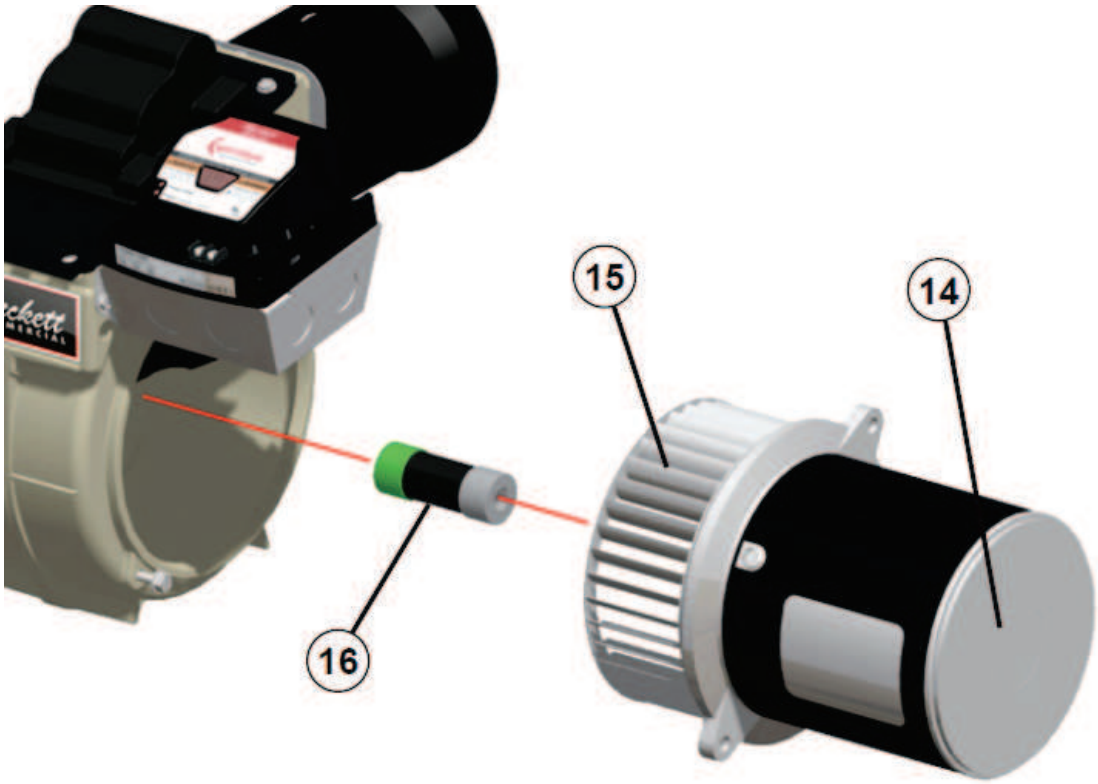


REPLACEMENT PARTS



REPLACEMENT PARTS





REPLACEMENT PARTS

ITEM #	PART #	DESCRIPTION
2	B48267	KNURLED NUT (BECKETT)
4	B30798	HSG MOUNT SOL VALVE - 21789U
5	B48138A	BECKETT IGNITIOR "S" 51824U
6	50147	CONTROLLER/GENISYS POTTED 120V
8	B48254	AIR SHUTTER
9	48139	SUNTEC "A" OIL PUMP 2591U
10	48152	8" OIL DELIVERLY TUBE 5394
11	B48264	HEAD ASSEMBLY
12	B70262	ELECTRODES IHS 700 OIL
13	B60256	6" AIR TUBE COMBO FOR CF800
14	48140	1/3 HP BURNER MOTOR
15	B30141A	BLOWER WHEEL - 21339U
16	48187	FLEX COUPLING
	70007A	190' AUTO RESET HIGH LIMIT DISCHARGE
	70007	200' MANUAL HIGH LIMIT DISCHARGE
	48110C	250' AUTO RESET HIGH LIMIT BLOWER
	B48154	CAD CELL
	70291	4.0 x 45 NOZZLE

IHS-700 OIL WIRING SCHEMATIC