

EASY-KLEEN

PRESSURE SYSTEMS LTD.

MANUFACTURER OF HIGH PRESSURE CLEANING EQUIPMENT

Owner's Manual

WOLVERINE SERIES Dry Steam Generator



1-800-315-5533 • service@easykleen.com • www.easykleen.com

Easy-Kleen Pressure Systems

1-800-315-5533

**This manual contains operational information that is specific for
the Perma Steamer dry steam unit.**

**Read the following instructions carefully before attempting to assemble,
install, operate or service this unit. Failure to comply with these
instructions could result in personal injury and/or property damage.**

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IMPORTANT SAFETY INFORMATION

The safe operation of our pressure washing systems is the **FIRST** priority of Easy-Kleen. This will only be achieved by following the operation and maintenance instructions as explained in this manual and all other enclosed manuals.

This manual contains essential information regarding the safety hazards, operations, and maintenance associated with this machine. The manual should always remain with the machine, including if it is resold.

ALL CAUTIONS AND SAFETY WARNINGS MUST BE FOLLOWED TO AVOID INJURY OR DAMAGE TO EQUIPMENT.

THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS AND MUST ALWAYS BE ATTENDED DURING OPERATION.



WARNING: To reduce the risk of injury, read operating instructions carefully before using.

1. Read the instructions in this manual carefully before attempting to assemble, install, operate or service this pressure washer. Failure to comply with the instructions could result in personal injury and/or property damage.



WARNING: Use protective eyewear and clothing when operating equipment in order to avoid personal injuries.



WARNING: This machine exceeds 85db. Appropriate ear protection must be worn.



WARNING: Risk of explosion. Operate only where open flame or torch is permitted.

WARNING: Flammable liquids can create fumes which can ignite, causing property damage or severe injury.

2. Be thoroughly familiar with all controls and know how to stop the machine in the event of an emergency.



WARNING: Risk of fire. Do not add fuel when operating machine.

3. Never use gasoline, crankcase draining, or waste oil in your burner fuel tank. The minimum clearance to any combustible material is 12 inches.



WARNING: Keep water spray away from electrical wiring.

4. All electrically powered equipment must be grounded at all times to prevent fatal electric shots. Do not spray water on or near electrical components. Do not touch electrical components while standing in water or when hands are wet. Always make sure machine is disconnected from power source before servicing.



WARNING: Risk of asphyxiation. Use this product only in a well ventilated area.

5. Use equipment in a well-ventilated area to avoid carbon monoxide poisoning or death. This machine must never be connected to a Type B gas vent.



WARNING: Risk of injection or severe injury to persons. Keep clear of nozzle spray.

6. High pressure spray can cause serious injuries. Never point pressurized spray at any person or animal. Handle the spray assembly with care.



WARNING: Risk of injury. Hot surfaces can cause burns.



WARNING: Hot discharge fluid. Do not touch or direct discharge stream at persons.



WARNING: Risk of injury from falls when using ladder.

7. Do not overreach or stand on anything unstable. Keep a good balance and make sure to keep a steady footing at all times.



WARNING: Protect from freezing.

8. It is important to keep your machine from freezing in order to keep it in its best working condition. Failure to protect your machine from freezing may cause damage to the machine and personal injuries may occur as a result.

9. Do not pass acids or other caustic or abrasive fluids through the pump.

10. Never run pump dry of water or oil or let the pump run with the trigger gun released for more than 2 minutes.

11. Do not attempt to operate this machine if fatigued or under the influence of alcohol, prescription medications, or drugs.

12. Some of the maintenance procedures involved in this machine require a certified technician (these steps are indicated throughout this manual). Do not attempt to perform these repairs if you are not qualified.



WARNING

CALIFORNIA Proposition 65

Detectable amount of chemicals known to the State of California to cause cancer, birth defects or other reproductive harm may be found in pressure washing equipment, accessories and exhaust.

California Health and Safety Code 25249.5

For More Information Visit

www.p65warnings.ca.gov

D01-00612

If you need further explanation of any of the information in this manual, suspend any activity involving the equipment and call our toll free number for assistance, 1-800-315-5533.

OPERATING INSTRUCTIONS

1. Perform pre-start maintenance inspection on all applicable systems prior to operating the machine. This is essential for the safe, effective and efficient operation. You will get optimum performance from your system **ONLY** if these instructions and inspections are followed. Any indication that system was not operated and maintained according to these instructions may cancel the manufacturers' warranty.

Location – Be sure to install in an area that has sufficient air ventilation to support combustion of oil in burner.

Controls – Make sure all controls turned to the off position.

Pump – Oil level - Level the pressure washer. Be sure oil level in the pump is correct on dip stick. If the level is low, add the correct oil to the proper level. **USE ONLY SAE 30 W NON-DETERGENT OIL OR HYDRAULIC 68. DO NOT OVER FILL.**

Oil Fired Burner - Oil Tank Level – #2 Furnace oil is recommended for the burner oil tank, as it burns cleaner and the burner requires less maintenance. Diesel fuel may be used as an alternative. Do not overfill burner tank.

Visually inspect all electrical components to assure they are in good condition, showing No signs of exposure, breakage or splicing.

Visually inspect all fittings are in working condition.

2. Ensure steam hose is used for connections. NOTE: Never use quick couplers, ball valves, or trigger gun with steam units.

3. Connect water source to the inlet of the water pump. The water source must be attached with a good quality standard garden type hose (1/2" minimum is required). Connect male fitting into the female pump inlet fitting. Make sure that the inlet screen/filter is intact and fitted correctly. Turn on water source. **WATER MUST BE IN SUFFICIENT SUPPLY, AND PRESSURE MUST BE BETWEEN 20 –60 PSI TO ENSURE PROPER AND SAFE OPERATION.** Specific attention should be given if using a well water supply to ensure water is in constant flow.

4. Start electric motor. Ensure that the internal fuel tank is sufficiently full. Turn BURNER switch to 'PUMP'. Adjust burner thermostat to 340°F (171°C), then turn BURNER switch to 'BURNER'.

5. Burner operation

Be sure water is flowing through water heater coil before turning on BURNER switch. Turn thermostat to desired temperature. Burner will ignite and remain in operation as long as there is sufficient water flow to satisfy the flow switch and temperature control.

IF YOU EXPERIENCE IGNITION FAILURE, DO NOT ATTEMPT TO RESTART

BURNER! EXCESS FUEL AND VAPORS MAY HAVE ACCUMULATED AND THE CHAMBER MAY BE HOT. THE UNIT MUST COOL DOWN BEFORE RESTART CAN BE ATTEMPTED.

Warning: Condensation on Coil

When cold water is being pumped through the heater coil and the burner is firing, condensation may form at times on the coil and drip down into the burner compartment. This can be particularly noticeable on cold, humid days giving the false appearance of a leaking coil.

6. Pressure adjustment - The pressure regulator is located on the pump (see diagram). It controls the pressure being generated by the steamer. This regulator may be adjusted to the desired pressure by turning the adjustment knob. Turning the adjustment knob clockwise will increase the pressure. **NEVER OPERATE SYSTEM AT A HIGHER PSI THAN THE MAXIMUM RATING.** This machine has been adjusted to operate at a specific maximum pressure as per the machine specifications. Pressure may be reduced for lighter use by turning the Pressure Regulator counter clockwise. If continuing to turn the unloader clockwise does not increase the pressure, then this implies the maximum has been reached for the system. Any further turning of the regulator will have no further effect. Turn back the unloader until it no longer exceeds the maximum pressure rating for the machine.

7. You are now ready to start the steaming operation – Observe the deviation meter (dial above adjustable thermostat). This indicates the difference between the set temperature on the thermostat and the actual measured temperature of the water in the coil. When first turning on the unit, the deviation meter dial will be to the left, indicating that the machine has not yet reached desired temperature. For best results, wait until the dial reaches approximately '0' or close to it. The steam pressure and temperature depend on the size and length of the outlet tube. The smaller and longer the tube, the higher the temperature and pressure will be. **DO NOT LEAVE UNIT RUNNING WHEN NOT IN USE.**

8. To stop steam operation: shut thermostat off and turn BURNER switch to 'PUMP'. Let the temperature cool down below 180°F (82°C), then shut off pump by turning BURNER switch to 'OFF'.

9. Prior to storage – Inspect pressure washer for any damage or required maintenance. If your machine is to be exposed to cold weather, please refer to winter pump/coil instructions found in this manual. If possible, do not allow unit to remain outside in the elements.

10. Warning – If unit is left running while not in use, pump damage may occur. Do not leave unit running while not in use!

GENERAL MAINTENANCE

Burner Maintenance

NOTE: Repair of the burner is to be done by authorized and trained burner professionals only.

The oil filter cartridge should be replaced every year to prevent fuel contamination and plugging of fuel pump and nozzle of oil burner. The nozzle should also be replaced at least once every year or twice if used daily and if poor combustion begins to occur. See the included burner manual for more information on burner.

Final adjustments to burner include fuel pressure adjustment for controlling water temperature (tighten fuel pressure adjustment screw slightly to increase desired output temperature) and air band adjustment for combustion efficiency. A combustion test kit should be used for these final adjustments. Check the label on your steamer unit for the proper burner oil pressure, and be sure not to exceed this pressure. See included burner manual for more information and a parts break down of the burner.

If the burner floods with oil: run machine with heat on until all excess oil is burned off (this can take up to a couple of hours). If excess oil is not properly dealt with, the ceramic casing can absorb excess oil, causing a fire hazard. **DO NOT LEAVE MACHINE UNATTENDED WHILE MACHINE IS FLOODED.**

General Maintenance and Care

If the water heater is likely to be exposed to freezing weather then it should be winterized according to the winter pump/coil protection procedure in the previous section. Alternate methods may not completely protect the components. Damage from freezing is not a warrantable item.

Water Condition

Use a softener on your water system if local water is known to be high in mineral content. The advantages of soft water are very beneficial: prevents scale buildup in heater coil, cleans better with considerably less detergent, prevents streaking on painted surfaces and glass when rinsing.

Descaling Heater Coil Procedure

NOTE: Descaling of the heater coil is to be done by authorized and trained burner professionals only.

The best way to acidize the coil is with a circulation pump capable of handling acids.

1. Fill a plastic container with a suitable acid diluted with water to desired strength.

2. Connect discharge from the circulating pump to the hot water outlet on the water heater with a suitable hose. Connect the inlet of the circulating pump to the acid container with suction hose from the pump module and use it as a return hose to the acid container. As acid dissolves the scale it becomes neutralized, so about every five minutes add more acid to the container until all the scale has been removed from the coil. Flush out coil thoroughly with water after descaling.

MAINTENANCE CHECKLIST

Daily

1. Check pump oil for proper level and adjust accordingly.
2. Examine the quality of the oil.
3. Check pump for oil and/or water leaks.
4. Inspect and clean inlet filters.

Weekly

1. Examine all fittings, components, hoses, connections, and nozzles for damages, loose parts, or leaks. – Replace accordingly—

Recommendation for Oil Changes and Component Replacement

1. Change the oil in the pump after the first 50 hours and every 500 hours after the initial oil change. Use SAE 30 W Non-Detergent for GP Pumps and Hydraulic 68 for EK Pumps.
2. Change all other components on the pump as needed.

GLOSSARY OF TERMS

PSI – Pounds per square inch. Pressure washers are designed and rated to operate at a specific PSI. Operating at pressures exceeding the maximum rating could result in damage to the unit and/or SEVERE PERSONAL INJURY.

GPM – Gallons per minute. The orifice on the pressure wand assembly has been selected to deliver up to the maximum GPM for your machine.

PUMP – The pump moves the water through the system and delivers it to the pressure wand assembly.

UNLOADER VALVE – Is a valve located at the head of the pump for unloading water back into the bypass when the trigger gun is shut off. It also reduces the load on pump when gun is off.

OIL, PUMP – The oil used within the pump to lubricate its operation. Important to use only SAE 30 W Non Detergent (GP Pump) or Hydraulic 68 (EK Pump) in the pump (see diagram).

BURNER – The burner heats the water in hot water pressure washers. It is located under the coil and may be powered by furnace oil or diesel fuel.

BACK FLOW PREVENTER – Device to prevent flow backwards into potable water supply.

MAXIMUM WORKING PRESSURE The water heater coils are designed to operate safely at normal working pressures. Each machine is equipped with a safety pressure relief valve which prevents over pressurization of the high pressure system. It is an important safety device and must not be tampered with in any way.

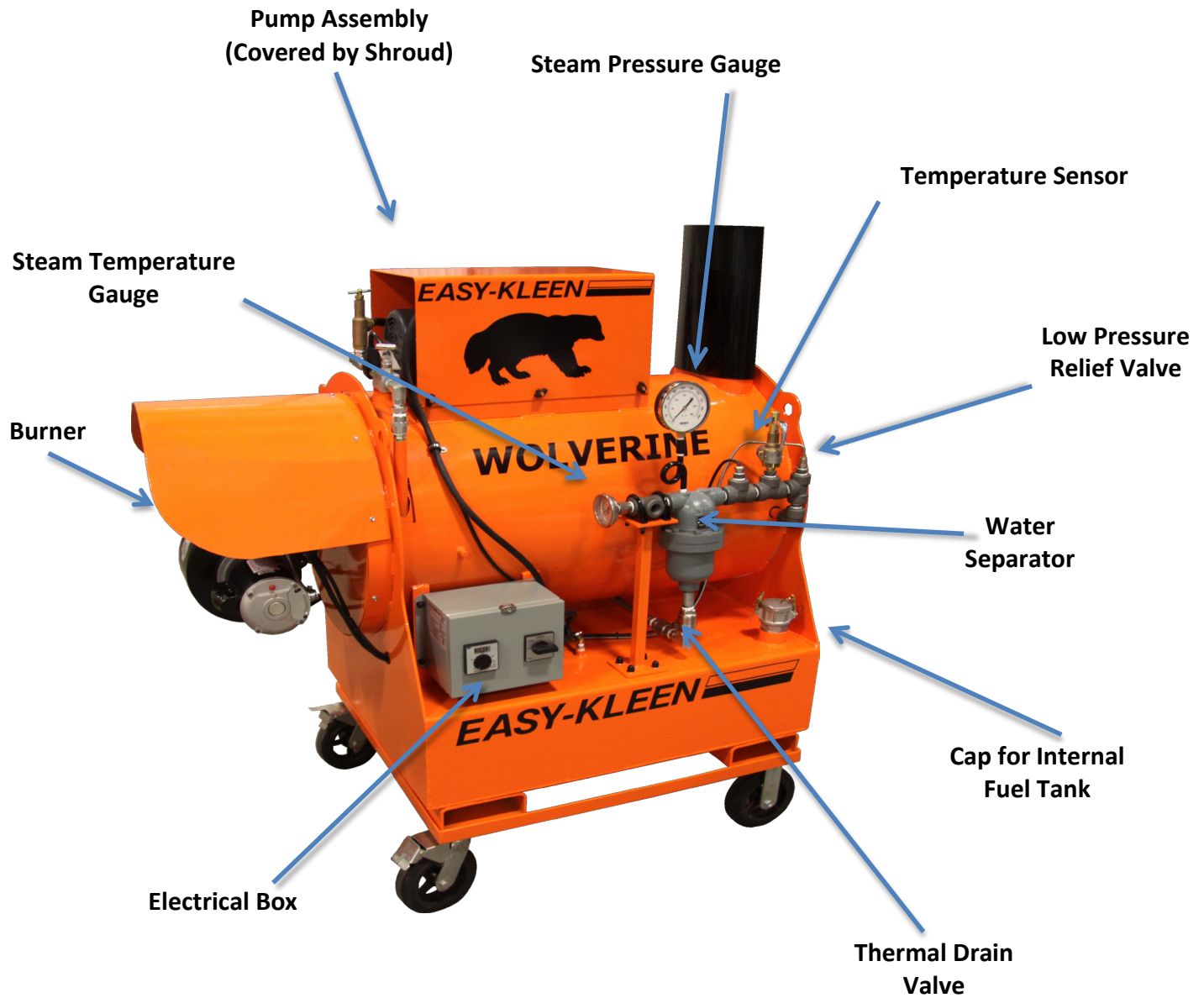
TEMPERATURE CONTROL- The water heater is equipped with a temperature control which shuts down the burner in the event of excessive outlet temperature caused by insufficient water flow through the heater coil.

WATER SEPARATOR – This device, located near the steam outlet, helps to separate the water from the steam to ensure only steam is being outputted from steam gun.

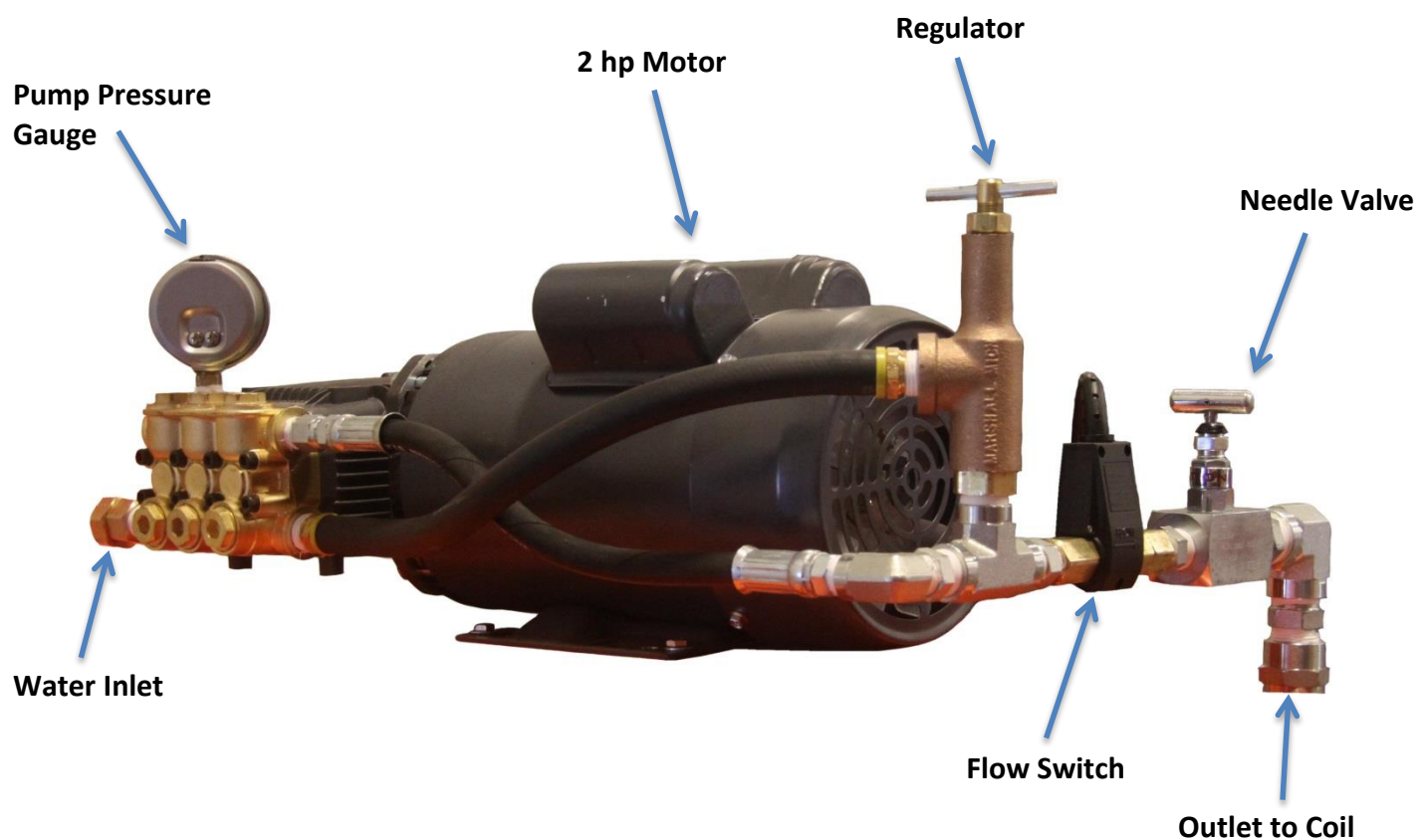
PRESSURE SWITCH - A high pressure switch is used to control the burner. It is part of the burner control system (see diagram).

FLOW SWITCH – A flow switch is installed on the outlet of the high pressure pump and will shut off the pump and motor in the absence of water flow as well as turning it back on when flow is detected (by squeezing the trigger).

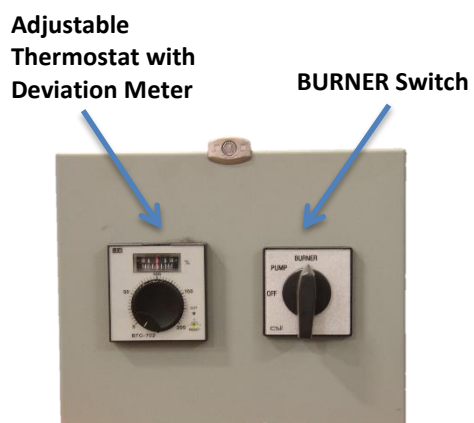
COMPONENT IDENTIFICATION



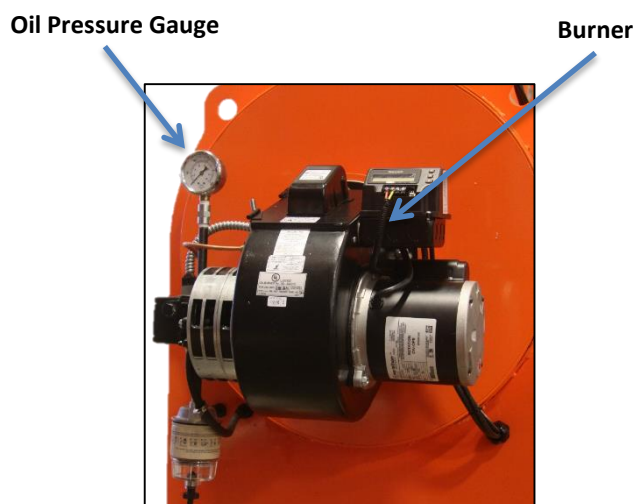
Pump Assembly:



Electrical Box



Burner Side View



EASY-KLEEN®

PRESSURE SYSTEMS LTD.

MANUFACTURER OF HIGH PRESSURE CLEANING EQUIPMENT

Oct 6th, 2020

MANUFACTURER'S WARRANTY

Thank you for your purchase of an Easy-Kleen pressure cleaning system. All original equipment are warrantied for a specific period and on the conditions set forth, that the product is free from defect in materials and workmanship as follows:

Electric Motors	1Phase	18 Months
	3 Phase	24 Months
	For warranty for these items manufacturer needs to be contacted	
Oil Burners	Igniters, Fuel Solenoid, Burner Motor, Fuel Assembly, Drive Shaft, Electrodes Blower, Wheel Fuel Pump	1Year Parts
Propane / Natural Gas Burners	Burner Rings, Gas Valves, Gas Valve Control Board	1Year
Fitting	All Fittings, Brass Stainless Steel, Steel, Etc.	30 Days
Heating Coils	All Coils	1Year Replacement
	Under 5100 PSI- 5 Year Prorated	25% Year each year for 4 Years
Gas Motors	Honda and Kohler have manufacturer's warranty. Manufacturer does not cover fuel systems.	
Lifan Motor	Contact Easy-Kleen for Warranty	1Year (for commercial use)
Frames	Limited warranty on Frames, Belt Guard, Welds due to manufacture defect.	
	Paint is not covered under the manufacturer's warranty due to the aggressive environment or natural wear.	
Plastic Tanks	Water or Fuel	1Year
Accessories/Wear Items	Unloader, Regulating Valves, Safety Valves, Jetter Valves, Check Valves, Foot Valves, Pulsation Dampeners, Trigger Guns, Rotary Nozzles, Chemical Injectors, Hose (Jetter Hose Not Included), Hose Reels, Sandblast Kits, Surface Cleaner, Water Broom, Water Strainer, Belts, Ball Valves, Swivels, Balanced Relief Valves, Accumulator Lances	90 Days
Electrical Components	Switches, Time Over Loads, Contactors, Transformer, Thermostat, Vacuum Switches, Flow and Pressure Switches, Relays, Primary Controls	90 Days
No Warranty Items	Fuel Filters, Nozzles, O- Rings, Thermo Relief Valves (Pump Seals, Valves, Plungers)	
ANY PARTS NOT LISTED ABOVE CALL FOR WARRANTY TIME FRAMES		

NOTE* Due to original equipment manufacturer's requirements, Easy-Kleen is not permitted to perform warranty repairs or claims for electrical motors, gas, or diesel engines. Please contact Easy-Kleen service department for a local warranty representative.

LIMITATIONS OF LIABILITY

Easy-Kleen liability for special, incidental, or consequential damages is expressly disclaimed. In no event shall Easy-Kleen's liability exceed the purchase price of the product in question. Easy-Kleen makes every effort to ensure that all illustrations and specifications are correct, however, these do not imply a warranty that the product is merchantable or fit for a particular purpose, or that the product will actually conform to the illustrations or specifications. Our obligation under this warranty is expressly limited at our option to the replacement or repair at our manufacturer location, is such part or parts at inspection shall disclose to have been defective. Easy-Kleen does not authorize any other party, to make any representation or promise on behalf of Easy-Kleen or to modify the terms, conditions, or limitations in any way. It is the buyer's responsibility to ensure that the installation and use of Easy-Kleen products conform to local codes. While Easy-Kleen attempts to ensure that its products meet national codes, it cannot be responsible for how the customer chooses to use or install the product. THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY.

Easy-Kleen reserves the right to make any changes to an Easy-Kleen product at any time without incurring any obligation with respect to any product previously, ordered, sold, or shipped.

PUMP WARRANTY TIME LINE		
Cat Pumps	Direct Drive Pumps	2 Years
	Car Wash Pumps (Including all models used in Car Wash or Portable Fresh Water Pressure Cleaning applications)	5 Years
	All other pumps not listed above	1 Year
Giant Pumps	Pressure Washer and Self- Serve Car Wash Applications	5 Years
	All other Giant Pumps, Industrial and Consumer Pumps	1 Year
	Lifetime on Manifolds due to Manufacture defects	
AR Pumps	Plunger Pumps	5 Years
	Axial Pumps	1 Year
	AR Accessories	90 Days
General Pumps	Manifolds	5 Years
	Pressure Washer Pumps	5 Years
EK Pumps	Manifolds	5 Years
	Pumps	1 Year
	Accessories	90 Days
	Manufacturer does not cover wet end of Pump Seals, Valves, and Plungers.	

WARRANTY REPAIRS

Warranty claims must first contact Easy-Kleen's Service Department to be issued a preauthorized repair number (PARN). You will need a copy of your invoice and the equipment serial number.

If new parts are needed, they will be invoiced to you as normal. Defective parts are to be sent to us PREPAID for warranty consideration. If a part is found to be defective, a credit will be issued to cover the costs of parts. All work is to be performed at the manufacturers' place of business when returned PREPAID. This warranty will not cover labor if warranty work is conducted at the customer's place of business. Road service will be charged at the normal rate in these situations.

WARRANTY DOES NOT COVER:

- When warranty part is warranted the warranty time frame does not re-start.
- Warranty freight cost will be covered by Easy-Kleen for the first 30 days of sale of the machine due to manufacture defect or workmanship.
- Neglect of the periodic maintenance as specified in the owner's manual.
- Improper repair or maintenance.
- Operating methods other than those indicated in the owner's manual.
- The use of non-genuine Easy-Kleen parts or accessories other than those approved by Easy-Kleen
- Exposure of chemical agents, such as: Sea Water, Sea Breeze, Salt, or other environmental phenomenon.
- Collision, fuel contamination or deterioration, neglect, unauthorized alteration or misuse.
- Warranty does not cover travel or time if a service call is needed.
- Warranty does not apply when pump or accessory is altered or used in excess of recommended speeds, pressure, temperatures, or handling fluids not suitable for pump or accessory material.
- Construction warranty does not apply to normal wear.
- Warranty does not apply to normal wear (such as but limited to seals, packing valves, plungers and sealing O-Rings), freight damage, freezing damage or damage caused by parts or accessories not supplied by Easy-Kleen.
- After 30 days freight will become chargeable.
- Warranty covers In-House Labour and Parts if manufacture defect is repaired at an Easy-Kleen approved Service Center.

WARRANTY DOES NOT COVER DEFECTS CAUSED BY:

- Improper or negligent operation or installation, accident, abuse, misuse, neglect, unauthorized modifications, including, but not limited to, the failure of the customer to comply with recommended product maintenance schedules.
- Improper repairs
- Neglected maintenance/incorrect operation (specified in the Owner/Operator's Manual)
- Unapproved devices or attachments
- Water sediments, rust corrosion, thermal expansion, scale deposits or a contaminated water supply or use of chemicals not approved or recommended by Easy-Kleen Pressure Systems Ltd.
- Improper voltage, sudden voltage spikes or power transients in the electrical supply
- Usage which is contrary to the intended purpose of the equipment
- Natural calamities or disasters including, but not limited to, floods, fires, wind, freezing*, earthquakes, tornados, hurricanes and lightning strikes

*Includes damage done to components that come in contact with water as a result of freezing in a non-winterized machine.

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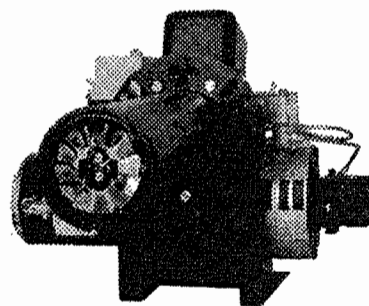
DATE		02 OCT 2015				MATERIAL		SPEC.	TREATMENT	FINISH	SHEET No.	ITEM No.
											PART No.	
								WIRING,PERMA STEAM 1000				0945
SCALE		NTS										



801 GLASGOW AVE.
FORT WAYNE, IN 46803

MODEL FH OIL BURNERS

Manual 21827-001
Publication Date 12/28/2010 Revision 8



WARNING

ELECTRIC SHOCK HAZARD

HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT. FOLLOW THESE RULES TO AVOID ELECTRIC SHOCK.

- ▲ Use only a properly grounded circuit. A ground fault interrupter is recommended.
- ▲ Do not spray water directly on burner.
- ▲ Turn off power before servicing.
- ▲ Read the owner's manual before using.



WARNING

OVERHEATING HAZARD

SHOULD OVERHEATING OCCUR:

- ▲ Shut off the manual oil valve to the appliance.
- ▲ Do not shut off the control switch to the pump or blower.

WARNING

NEVER ATTEMPT TO USE GASOLINE AS A FUEL FOR THIS BURNER, AS IT IS MORE COMBUSTIBLE AND COULD RESULT IN A SERIOUS EXPLOSION.

SPECIFICATIONS

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

FUELS

Use No. 1 or No. 2 heating oil (ASTM D-396) only.

- * NEVER burn garbage or refuse in the heating unit.
- * NEVER try to ignite oil by tossing burning paper or other material into the heating unit
- * NEVER burn waste or crankcase oil in the heating unit.

FIRING CAPACITIES - MODEL FH

4.00 to 13.00 GALLONS PER HOUR
560,000 TO 1,820,000 BTU/HR INPUT

DIMENSIONS (STANDARD)

HEIGHT16"
WIDTH22 1/2"
DEPTH12"
CENTER LINE
OF TUBE TO FLOOR9 1/2"

FUEL UNIT

Suntec

MOUNTING

Adjustable Flange or Base Mount

ELECTRICAL

Power Supply115V / 60HZ / 1 PH
Motor3450 RPM, N.E.M.A. Flange, Manual Reset Overload Protection
Ignition.....10,000V / 23MA secondary, Continuous Duty-Shielded Interrupted

INSTALLATION OF BURNER

INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FIRE PROTECTION STANDARD FOR OIL-BURNING EQUIPMENT, NFPA NO. 31, AND IN COMPLETE ACCORDANCE WITH ALL LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.

A QUALIFIED INSTALLER IS THE PERSON WHO IS RESPONSIBLE FOR THE INSTALLATION AND ADJUSTMENT OF THE EQUIPMENT AND WHO IS LICENSED TO INSTALL OIL-BURNING EQUIPMENT IN ACCORDANCE WITH ALL CODES AND ORDINANCES.

**THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER
OR ADJACENT TO THE HEATING APPLIANCE.**

TO THE HOMEOWNER

Since 1928, Wayne has supplied the Homeowners of the world with oil burners. You are obtaining a quality burner unsurpassed in engineering design and product development. It will provide you with many years of efficient, trouble-free operation, if properly installed and serviced. Please read this manual carefully.

Wayne warrants its burners specifically to those who have purchased it for resale, including your dealer. If, in any case, you have a problem with your burner, or its installation, you should contact your dealer for assistance.

APPROVALS

This burner complies with ANSI/UL Standard 296 and is for use with No. 1 or No. 2 fuel oil and is U/L listed for use with Group I or Group II primary safety controls. State and local approvals are shown on burner rating label. All burners should be installed in accordance with the National Fire Protection Association, and in complete accordance with all local codes and authorities having jurisdiction. Regulation of these authorities take precedent over the general instructions provided in this manual.

GENERAL INFORMATION

When installing the appliance and/or burner be sure to provide adequate space for easy service and maintenance. Prior to installation of the oil burner, the heating system should be carefully inspected for defects and cleanliness. The flue passages and heat absorbing surfaces must be clean to assure maximum heat transfer, soot acts as an insulator retarding the transfer of heat. The combustion chamber, flue gas passages, and all doors and openings must be sealed tight to eliminate air infiltration. Excess air, decreases CO₂ levels and thus lowers efficiency. Inspect the flue and chimney for leaks and obstructions, be sure the chimney is of adequate size and height. Install a draft regulator the same size as the flue pipe (see paragraph under Draft Regulators).

COMBUSTION CHAMBER

The purpose of a combustion chamber is to maintain a high flame temperature, by reflecting the heat back into the flame. A high temperature assures greater combustion efficiency and lower stack losses. An insulating refractory or a Fiber Fax type chamber can be used with this burner. It is important to select and install, if necessary, the correct size chamber on a conversion job. On the Flamelock conversion burners the atomized oil burns just off the Flamelock. On all oil burners the atomized oil must not touch the sides or bottom of chamber, or smoke will result. To eliminate the smoke, excess air will be required, resulting in high stack temperature and lower combustion efficiency. Install burner so the face of air cone of burner is set 1/4" behind the inside front wall of the chamber (See Figure 3, page 6). Caution on installing Flamelock burners in stainless steel chambers should be taken, because of the higher temperature levels produced by high performance flame retention burners. The temperature may exceed the temperature ratings of the stainless steel chamber and can result in chamber burn outs. When you are replacing a standard burner with a flame retention burner, take the following precautions: (1) use pliable Ceramic Liner to line the inside of chamber, (2) adjust burner (See column under "Final Adjustments").

FUEL PUMPS AND OIL LINES

The Model FH oil burner is provided with a two stage 3450 RPM fuel pumps with the by-pass plug removed for a single pipe installation. This is satisfactory where the fuel supply is on the same level, or above burner, permitting gravity flow of oil. Never exceed 3 PSI pressure to the suction side of fuel pump. A pressure over 3 PSI may cause damage to the shaft seal and allow it to leak oil. When it is necessary to lift the oil to the burner, a return line should be run between fuel pump and oil supply. (If lift exceeds 10 feet, a two stage fuel pump must be used with a return line.) When a two line installation is made, the by-pass plug must be installed. This is supplied with the burner attached to fuel pump, along with an information pump data sheet in a plastic bag. When oil lines are continuous runs of heavy wall copper tubing is recommended. Be sure that all connections are absolutely air-tight. Check all connections and joints. Flared fittings are recommended. Do not use compression fittings. Avoid running tubing against the appliance and across ceiling or floor joist; if possible install under floor. Avoid using fittings in inaccessible locations. If possible, avoid running oil lines overhead. Specific information on piping, connections, lift capabilities and tank installations is provided in the instruction sheet of the fuel pump manufacturer. Use an oil filter of adequate size for all installations. Install inside the building between the tank shutoff valve and the burner. Install shutoff valve in oil supply line in accessible locations, one close to the tank, another close to the oil burner but ahead of the filter. NOTE: If the maximum burner firing rate exceeds the integral fuel pump strainer rating, an external U/L listed filter/strainer must be placed in the fuel line between the fuel tank and burner fuel pump.

TANKS AND PIPING

Local codes and regulations must be followed regarding tank and burner installation. Check existing tanks for water and sludge accumulation, clean if necessary. Also clean or replace existing piping.

WIRING

All wiring must comply with the National Electric Code and local ordinances. Refer to diagram supplied with burner or controls, making sure the burner and controls are wired correctly and that the line switch is properly connected to a 20 amp fused service.

AIR SUPPLY FOR COMBUSTION

A burner shall not be installed in an area where facilities for normal air circulation or infiltration are so limited as to interfere with ready obtainment of all air necessary for proper combustion and venting. When the heating appliance is installed in a confined space, two permanent openings shall be provided. One near the top of the enclosure and one near the bottom. Each opening shall have a free area of not less than one square inch per 1000 BTU per hour (140 square inch per gph) of the total input rating of all the appliances in the enclosure. When the house is out of unusually tight construction, has a kitchen ventilating system, exhaust fans, clothes dryer or vented fireplaces, it is recommended that combustion air be supplied through two permanent openings. The openings shall communicate directly, or by means of ducts, with outdoors or to such spaces (attic or crawl) that freely communicate with outdoors. For additional information, refer to ANSI standard NFPA 31.

CHIMNEY

Follow the recommendations of the appliance manufacturer. A chimney shall be capable of producing a draft as required by the appliance and as recommended by the appliance manufacturer. It must be properly designed, of adequate size, and should be above the surrounding objects, tile-lined, with no obstructions, and be in good state of repair. The smoke pipe should set flush with the inside of tile and be cemented in place. All cleanout doors should be sealed. A draft inducer may be used to overcome inadequate draft conditions. If a draft inducer is used, provisions must be made to insure the burner does not operate if the draft inducer fails.

DRAFT REGULATORS

A draft regulator shall be provided unless otherwise specified by the appliance manufacturer. The draft regulator shall be installed in accordance with local codes and regulations or in the absence of local codes, with the American National Standard NFPA31. Refer to appliance manufacturer's instructions for recommended overfire and stack draft.

NOZZLE AND AIR CONE SELECTION

The FH oil burner typically fires well with a solid or semi-solid nozzle with a spray angle of 80, 70 or 60 degrees. In most upgrading or conversion installations, the use of an 80 degree solid nozzle is the best way to start with. Always use the proper nozzle size, spray cone type and spray angle the appliance manufacturer recommends. Should this information not be available, your own good judgement will prevail. Under no circumstances attempt to fire the FH oil burner under its 4.00 gph minimum or over its 13.00 gph maximum input ratings.

FH oil burners are built with a 4.00 to 11.00 GPH H-1 rating as standard. To convert to the 11.00 to 13.00 GPH H-2 rating:

1. Change the 4-3/16" I.D. cast iron cone (P/N 13127) installed to the 4-3/8" I.D. cast iron air cone (P/N 13128) supplied.
2. To change air cones, remove the phillips head counter sunk 8-32 screw securing the existing air cone in the air tube end, remove the air cone.
3. Install the larger air cone.

Once the proper cast air cone has been installed the nozzles can be installed from the air tube end into the Flamelock/nozzle adaptor. Thread each nozzle into the adaptor finger tight then tighten securely with a nozzle wrench. CAUTION: DO NOT OVER TIGHTEN. At this time position the Flamelock flush with the cast iron air cone face. To position the Flamelock gun assembly forward, loosen the gun assembly 3/8-24 hex lock nut and 5/16" hex slotted slot cover screw. Once in the the required position, retighten the hex lock nut and slot cover screw.

To remove the Flamelock gun assembly once the burner has been installed on the appliance, remove the copper oil line where it attaches with the gun assembly oil line adaptor fitting and remove the 9/16" hex gun assembly locknut. Next, remove the ignition transformer hold down the clip and swing open the ignition transformer to the left. Now grasp the rear of the gun assembly where the oil line fitting adaptor exits thru the housing and pull the oil line adaptor to the right out of the housing slot and slot cover. Gently lift, do not force, the rear of the gun assembly, rotating the oil line fitting adaptor up at 45 degrees pulling the entire gun assembly out of the housing opening.

Remove and install nozzles finger tight in the regular or Flamelock™ nozzle adaptor, then securely tighten nozzles with a nozzle wrench. Check electrodes for proper position (see Figure 1, page 6). Reinstall the Flamelock gun assembly into the burner by repeating the above steps for removal in reverse order. Once reinstalled, securely tighten the 3/8-24 hex gun assembly lock nut and the 7/16" hex oil line flare nut to the oil line fitting adaptor.

CAUTION: Close the ignition transformer and assure there is positive spring contact with the brass buss bars. Take care not to pinch the ignition transformer lead wires between the housing and cover plate. Reinstall the ignition transformer hold down clip and tighten the clip screw securely.

**CAUTION**

Care should be taken when closing the transformer not to pinch the lead wires between the housing and cover plate.

STARTING PROCEDURE

STARTING BURNER

Be sure main switch is in "OFF" position, thermostat is substantially above room temperature, the oil tank is filled, all valves are open, and controls set for operation. Adjust air supply on burner by loosening screw on interlocking air bands, and open partially. Open the inspection door and turn on switch. Prime pump according to the pump manufacturer's recommendations and check pressure. If safety lockout occurs, reset after one or two minutes. Do not run fuel unit dry for more than five minutes or damage to the pump may result. When flame is established make a temporary air adjustment for a clean combustion flame, reduce air supply until flame tips appear slightly smoky, then readjust so flame tips are clean looking. Leave inspection door open until chamber is dry. When normal temperature are reached, close inspection door. (See paragraph under "Draft Regulators").

FINAL ADJUSTMENTS

At this point a final adjustment should be made by the use of a COMBUSTION TEST KIT. After operating ten minutes to warm up unit, a smoke tester should be used to take a smoke reading. Smoke test should read no greater than #1 (Shell Bacarach scale), and less than a #1 smoke is desired. At times, a new heating unit requires more time than this to burn clean due to the oil film on the new heater unit surfaces. Recheck draft and take a CO₂ reading over the fire and in the stack. If a large differential between CO₂ readings is noted, air leakage is the most common cause. CO₂ readings must be taken ahead of draft control, if used. The CO₂ measured in the stack should be at least 10% for oil rates over 1.00GPH. Units should be started and stopped several times to assure good operation. Open inspection door, turn off valve, and check out safety timing of combustion control. Check operation of limit controls and thermostat. Check for oil leaks. NOTE: ALL NEW INSTALLATIONS SHOULD BE REINSPECTED AFTER ONE OR TWO WEEKS OF NORMAL OPERATION.

SETTING COMBUSTION EFFICIENCY

(A) Selecting firing rate desired. (B) Install proper nozzles for appliance (see paragraph under "Nozzle and Air Cone Selection"). (C) Fire burner, adjust interlocking air bands for yellow tips above combustion chamber. (D) Record CO₂ and smoke. If CO₂ is low, adjust gun setting back 1/32" and repeat CO₂ and smoke test. Continue this adjustment until desired CO₂ and smoke is obtained. Record stack temperature. (E) Check lighting with cold and hot chamber. (F) Lock all adjustment screws.

FINAL CHECKS

Be sure all screws are locked, and the controls on heating unit are adjusted in accordance with the heater and control manufacturer's instruction sheets.

MAINTENANCE

OILING MOTOR – Proper lubrication of the motor will prolong its service life. Oil sleeve bearing motors with 6 drops of SAE 20 oil once a year. DO NOT OVER OIL. Ball-bearing motors do not require oiling under normal service conditions. The bearing type is printed on the motor nameplate.

FILTER – The oil filter cartridge should be replaced once a year so the fuel oil will not become contaminated and plug up fuel pump and nozzle of oil burner.

NOZZLES – The nozzles should be changed at least once a year before the start-up of the heating season. Replace with proper nozzles.

COMPONENTS – If for any reason any of the burner parts have to be replaced, always use parts recommended by the manufacturer. Specify part numbers and description when ordering. (IN ALL COMMUNICATIONS STATE BURNER MODEL, SPECIFICATION NUMBER, SERIAL NUMBERS AND APPLIANCE MANUFACTURERS AND APPLIANCE MODEL DESIGNATION).

ELECTRODE SETTINGS – This is very important for reliable ignition of the oil; check these once a year in accordance with the instructions provided in this manual. Replace electrodes if worn excessively or if porcelain insulator is oil soaked or cracked.

FAN & BLOWER HOUSING – This must be kept clean, free of dirt and lint; open transformer to check fan blades from above. CAUTION: Be sure the electric power is off on burner when the transformer is opened up for this inspection.

EFFICIENCY CHART FOR NO. 2 FUEL OIL NET STACK TEMPERATURE (DEGREES F°)

	300°	350°	400°	450°	500°	550°	600°	650°	700°	750°	800°	850°	900°
15	87½	86½	85¼	84¼	83¼	82	81	79¾	78¾	77½	76½	75½	74¼
	87½	86¼	85	84	83	81¾	80¾	79¾	78½	77¾	76	75	73¾
14	87¼	86	84¾	82¾	82¾	81½	80¼	79	78	76¾	75½	74½	73
	87	85¾	84½	83½	82½	81¼	80	78¾	77½	76¾	75¾	74	72¾
13	86¾	85½	84¼	83¼	82	80¾	79½	78¾	77	75¾	74½	73½	71¾
	86½	85¼	84	83¼	81½	80¾	79	77¾	76½	75¾	73¾	72¾	71
12	86¼	85	83¾	82½	81¼	79¾	78½	77¾	75¾	74½	73	71½	70¼
	86	84¾	83½	82	80¾	79¾	78	76½	75¾	73¾	72¾	70¾	69½
11	85¾	84½	83	81½	80¾	78¾	77¼	75¾	74½	73	71½	70	68½
	85½	84	82½	81	79½	78	76½	75	73¾	72	70½	69	67½
10	85	83¾	82	80½	78¾	77¼	75¾	74¾	72¾	71	69½	68	66¼
	84½	83	81½	79¾	78	76½	75	73¾	71¾	70	68¾	66¾	65
9	84	82¾	80¾	79	77¾	75¾	74	72¾	70¾	68¾	67	65¾	63½
	83½	81¾	80	78¾	76½	74¾	73	71¾	69½	67½	65½	63¾	62
8	83	81	79¾	77½	75½	73¾	71¾	70	68	66	64	62	60
	82¾	80¾	78½	76½	74¾	72½	70¾	68½	66½	64¾	62¾	60	58
7	81½	79½	77¾	75¾	73¾	71	69	67	64¾	62½	60¾	57¾	55½
	80¾	78½	76¾	74	71¾	69½	67¾	65	62¾	60¾	57¾	55½	53
6	79¾	77¾	75	72½	70	67¾	65¾	62¾	60¾	57½	55½	52½	50
	78½	76	73½	71	68	65½	63	60¾	57½	54¾	51¾	49	46½
5	77¾	74½	71¾	69	65¾	63	60	57	54	51	48	45½	42½
	75½	72½	69	66¾	63	60	56¾	53½	50¾	47	43½	40¾	36¾
4	73¾	69¾	66¾	62¾	59¾	55¾	52	48½	45	41¾	37½	33¾	30

INTERMITTENT IGNITION

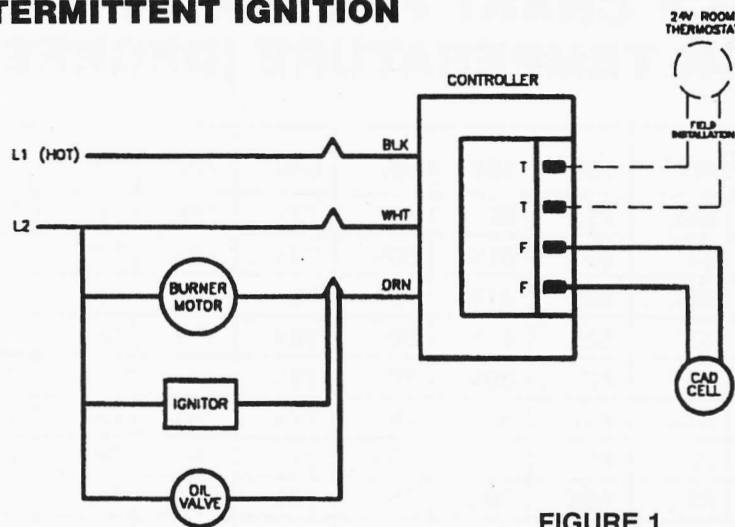


FIGURE 1

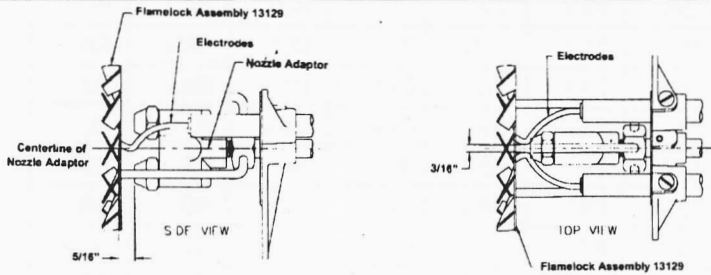
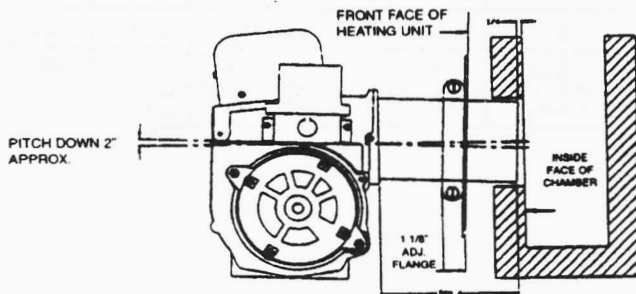


FIGURE 2

TO DETERMINE THE AIR TUBE LENGTH



The Air Tube Length (Dim. A) is the distance from the front of Air Tube Retainer Flange to the face of Air Cone. Note adjustable flange width.

FIGURE 3

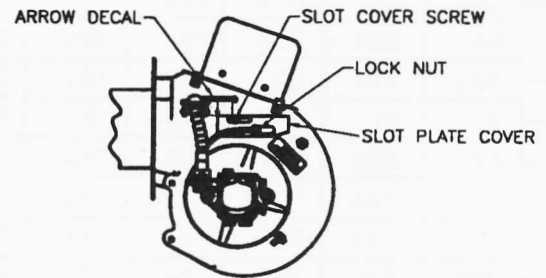


FIGURE 4

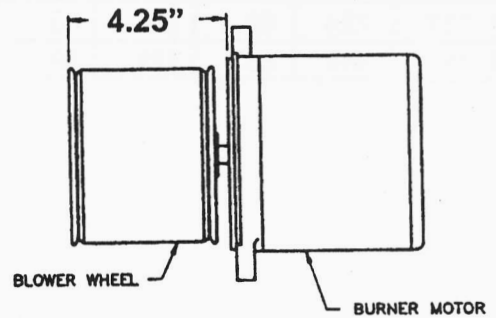


FIGURE 5

STANDARD MODEL FH OIL BURNER PARTS LIST

DESCRIPTION	PART NO.
MOTOR, 1/2HP - 120V/60HZ, 3450RPM	21819-002
MOTOR MOUNTING SCREWS	12701
FAN	21702-002
COUPLING	13142-002
PUMP-SUNTEC B2TB8261	101201-001
PUMP MOUNTING SCREWS	12701
VALVE-HONEYWELL V4046A1009	13135
VALVE MOUNTING NIPPLE	13384
VALVE MOUNTING NIPPLE LOCKNUT	12910
PUMP AND VALVE ELBOW	12091
OIL LINE ASSEMBLY-9 3/4"	13153
TRANSFORMER KIT (120V/60HZ)	23101-FH
TRANSFORMER HINGE SCREW	13036
TRANSFORMER COVER SCREW	16156
CONTROL-15 SECOND	101266-001
CAD CELL-HONEYWELL C554A1216	13666
HOUSING ASSEMBLY (INCL J-BOX)	31141-001
J-BOX ONLY	20369
J-BOX CHASE NIPPLE	12909
J-BOX LOCKNUT	12901
J-BOX ATTACHMENT SCREW	16156
WIRE CLIPS	12651
WIRE CLIP SCREWS	16156
WIRE CLIP NUTS	100601-001
OIL LINE SLOT COVER	14995
OIL LINE SLOT COVER SCREW	12697
OIL LINE LOCKNUT	12342
AIR BAND-INNER	2669-002

DESCRIPTION	PART NO.
AIR BAND-OUTER	2668-002
AIR BAND SCREW	12701
AIR TUBE/FLANGE-STD 10" BURNER	31143-012
AIR TUBE/FLANGE-STD 15" BURNER	31145-012
AIR CONE-4 3/8" ID (4.00-11.00GPH)	14203
AIR CONE- 4 13/16" ID (OVER 11 GPH)	13127
AIR CONE MOUNTING SCREW	12699
GUN ASSEMBLY-STD 10" UNIT	30728-002
GUN ASSEMBLY-STD 15" UNIT	30728-008
NOZZLES (AS SPECIFIED/REQUIRED)	VARIES
DUAL NOZZLE ADAPTER	12573
FLAMELOCK ASSEMBLY	13129
TRIPOD ELECTRODE SUPPORT	12596
ELECTRODE SUPPORT BUSHINGS	12408
ELECTRODE SUPPORT SET SCREWS	12693
ELECTRODE LOCKING SCREWS	12694
DISC-2 1/2" SOLID	13409
DISC MOUNTING SCREW	100603-028
CAD CELL MOUNTING BRACKET	13078
ELECTRODE STEM-RIGHT HAND	13149
ELECTRODE STEM-LEFT HAND	13150
ELECTRODE INSULATOR	100005-002
ELECTRODE ASSEMBLY NUTS	13110
BUSS BAR	100004-036
BUSS BAR SUPPORT	13276-002
ADJUSTABLE FLANGE W/GASKET	20471-SER
FLANGE GASKET ONLY	20529
BASE ASSEMBLY	20095

OIL BURNER CERTIFICATE
AS REQUIRED BY COMMERCIAL STANDARD CS75-56

The _____ Oil Burner Model No. _____, Serial No. _____, installed at _____
(Make) (Address of Installation)

has a label evidencing compliance with commercial Standard CS75-56, and has been installed in accordance with the instructions in the manufacturer's installation manual and in conformity with local regulations, codes, and ordinances.

The boiler (), furnace (), is a _____ No. _____, and the heating load consists of:

1. _____ Btu, or _____ square feet steam (), hot water (), radiation; and
2. _____ Btu, or _____ square feet of equivalent steam (), hot water (), radiation in domestic hot water load; or
3. _____ Btu, or _____ square inches of cross-sectional area of warm air supply pipes measured at the furnace take off; or
4. _____ Btu, or _____ square feet of equivalent steam (), hot water (), radiation in the following special load:

All necessary permits have been secured, and the installation has been tested in accordance with the test procedure of Commercial Standard CS75-56 and the following reading taken:

CO	{ Over Fire _____ At Breaching _____	Stack Temperatures at breeching _____ °F
Draft	{ Over Fire _____ At Breaching _____	Firing Rating _____ Gals/hr.

All controls and limiting devices have been checked for proper operation _____

Fuel used, Grade No. _____ of Commercial Standard CS12-48. Field service equipment smoke scale reading _____

The above test results are certified to be true: _____
(Name of Company making installation)

For Service Call:

_____	Per _____
(Name)	(Signature)
_____	_____
(Address)	(Address)
_____	_____
(Telephone)	(Telephone)

te _____

**DIRECTIONS FOR THE OPERATION AND CARE OF
OIL BURNER**

Read Instructions Carefully and Hang This Card Near Burner for Future Reference

(A) TO START BURNER:

1. Check for oil in the storage tank.
2. Fuses in the main switch must be good.
3. Have oil burner switch open.
4. Set room thermostat about 10 degrees higher than room temperature to make sure the thermostat contacts are made. Limit control must be set high enough to make contact also.
5. Oil valve at the tank should be open and the check valve in return line properly installed so oil can return to tank.
6. Be sure nozzle of proper size for heater is in the adapter and tightly screwed down, and that the electrodes are properly spaced (See Manual). With heating plant door open, close the burner switch; and if wiring is properly done and all controls properly installed and adjusted, the burner should start. If not, check primary relay first to be sure it is properly set; and if burner does not start, recheck wiring and all controls thoroughly.
7. If burner is installed with a single oil line, the fuel unit will have to be purged of the entrapped air in the oil lines and fuel unit before the oil will flow to the nozzle (See fuel unit instruction sheet for this operation). If a return line is used, purging will not be necessary, although this will speed the starting of the burner if done. If this is done, the pump should pick up its oil in less than a minute (which is the setting for the lockout switch in the primary control). If ignition does not take place during this time, check the nozzle and electrodes.

STARTING BURNER AFTER IGNITION FAILURE.

1. Do not attempt to restart burner when excess oil has accumulated, when heating unit is full of vapors, or when the combustion chamber is very hot.
2. Press reset button on primary control and burner should start. Do not attempt this more than twice. If burner fails to operate call serviceman.

(B) FUEL OIL SPECIFICATIONS:

1. This burner is approved for oil not heavier than No. 2. The Commercial standards for this oil are: Flash 110° minimum or legal; Maximum 230°F; Pour point 20°F; Water and sediment not more than 0.1%; Distillation temperature 600°F minimum and 675°F maximum at 90% of recovery. Viscosity at 100°F Saybolt Universal of 40 seconds maximum.

CAUTION

1. Check the gauge in oil storage tank periodically. Keep tank filled.
2. Don't attempt to burn garbage or reuse in your heating unit.
3. Don't fill storage tank while burner is operating.
4. Don't start burner if there is oil or vapor in the hating unit.
5. Don't attempt to burn crankcase drainings or crude oil.

6. DON'T TAMPER WITH BURNER OR CONTROLS - CALL YOUR SERVICEMAN. DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE.

(C) LUBRICATION:

1. The two oil cups on the oil burner motor should be lubricated every three months with a few drops of good grade light motor oil, No. 10 or 20 S.A.E.

(D) AT THE END OF THE HEATING SEASON:

1. Shut off electric current to burner at oil burner switch.
2. If oil strainer has not been cleaned recently, it should be removed and cleaned (consult instructions card furnished with fuel unit).
3. Oil storage tank should be kept filled to prevent water vapor from collecting. It is suggested the valve in the suction line be closed and oil burner switch opened. Oil storage tank should be cleaned every 2 or 3 years to remove any sediment or water that has collected in the tank. Your Fuel Oil Dealer has the equipment to do this.

(E) AT THE START OF THE HEATING SEASON:

1. It is advisable to have the Dealer inspect and service your burner for the coming heating season.
2. Heating plant, smoke pipe and chimney should be cleaned and checked for repairs.
3. Lubricate burner as directed under "C" above.
4. It is advisable to have the entire electrical system inspected before putting the burner into operation after it has been standing idle for the summer months. This should include primary relay, limit control, thermostat (clean dust from contact points), and check the electrodes for carbon and cracks in insulators, and corrosion on all terminals of the electrodes and transformer.

(F) EMERGENCY STOPS:

1. CUT OFF ALL CURRENT TO THE BURNER BY MOVING LEVER ON THE OIL BURNER ELECTRIC SWITCH TO THE "OFF" POSITION.

DEALER

Burner Serial No. _____

Day Phone _____

Night Phone _____

Date Installed _____

BE SURE TO GIVE US SERIAL NUMBER OF BURNER WHEN ORDERING REPAIR PARTS