



ENG ELP

OPERATOR'S MANUAL

■ ENG/ELP4-2000 ■ ENG/ELP4-3000 ■ ENG/ELP6-3000 ■ ENG/ELP8-3000



For technical assistance or the dealer nearest you consult our web page at www.landa.com
or call 800-LANDA-4-U (800-526-3248) or (360) 833-9100

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Model Number _____

Serial Number _____

Date of Purchase _____

The model and serial numbers will be found on a decal attached to the pressure washer. You should record both serial number and date of purchase and keep in a safe place for future reference.

INTRODUCTION

Thank you for purchasing a Landa Pressure Washer.

This manual covers the operation and maintenance of the ENG/ELP4-2000A,B,C,G,H; 4-3000A,B,C,G,H; 6-3000B,C,F,H and 8-3000B,C,F,H washers. All information in this manual is based on the latest product information available at the time of printing.

Landa, Inc. reserves the right to make changes at any time without incurring any obligation.

The ENG/ELP Series was designed for maximum use of 4 hours per day, 5 days per week.

Owner/User Responsibility:

The owner and/or user must have an understanding of the manufacturer's operating instructions and warnings before using this Landa pressure washer. Warning information should be emphasized and understood. If the operator is not fluent in English, the manufacturer's instructions and warnings shall be read to and discussed with the operator in the operator's native language by the purchaser/owner, making sure that the operator comprehends its contents.

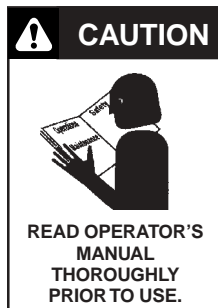
Owner and/or user must study and maintain for future reference the manufacturers' instructions

This manual should be considered a permanent part of the machine and should remain with it if machine is resold.

When ordering parts, please specify model and serial number.

IMPORTANT SAFETY INFORMATION

WARNING: When using this machine basic precautions should always be followed, including the following:



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

1. Read the owner's manual thoroughly. Failure to follow instructions could cause malfunction of the machine and result in death, serious bodily injury and/or property damage.

2. All installations must comply with local codes. Contact your electrician, plumber, utility company or the selling distributor for specific details.

To comply with the National Electrical code (NFPA 70) and provide additional protection from risk of electric shock, this pressure washer is equipped with a UL approved ground fault circuit interrupter (GFCI) power cord for machines rated 250V 30 amp or less, single phase.

3. Know how to stop the machine and bleed pressures quickly. Be thoroughly familiar with the controls.
4. Stay alert. Watch what you are doing.



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

5. Risk of explosion - Do not spray flammable liquids or operate in an explosive location. Operate only where open flame or torch is permitted.



WARNING: Keep water spray away from electrical wiring or fatal electric shock may result. Read warning tag on electrical cord.

6. To protect the operator from electrical shock, the machine must be electrically grounded. It is the responsibility of the owner to connect this machine

to a UL grounded receptacle of proper voltage and amperage ratings. Do not spray water on or near electrical components. Do not touch machine with wet hands or while standing in water. Always disconnect power before servicing.

WARNING: Spray gun kicks back. Hold with both hands.

7. Grip cleaning wand securely with both hands before starting the cleaner. Failure to do this could result in injury from a whipping wand.



WARNING: Equipment can produce a high pressure stream of fluid that can pierce skin and its underlying tissues, leading to serious injury and possible amputation.

8. High pressure developed by these machines can cause personal injury or equipment damage. Use caution when operating. Do not direct discharge stream at anyone or at any part of the body, or severe injury or death will result. This machine is to be used only by qualified operators.



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

- Never make adjustments on machine while in operation.



WARNING: High pressure can cause paint chips or other particles to become airborne and fly at high speeds.

- Eye safety devices and foot protection must be worn when using this equipment.



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

- When the machine is working, do not cover or place in a closed space where ventilation is insufficient.
- Machines with spray guns should not be operated with the

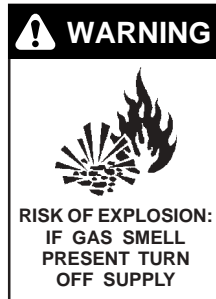
trigger in the off position for extensive periods of time as this may cause damage to the pump.

- Protect from freezing.
- Be certain all quick coupler fittings are secured before using pressure washer.
- Do not allow acids, caustic, or abrasive fluids to pass through the pump.
- Inlet water must be cold and clean fresh water.
- To reduce the risk of injury, close supervision is necessary when a machine is used near children. Do not allow children to operate the pressure washer. **This machine must be attended during operation.**
- The best insurance against an accident is precaution and knowledge of the machine.
- Do not operate this product when fatigued or under the influence of alcohol or drugs. Keep operating area clear of all persons.
- Do not replace LP tank while machine is running. Serious injury could result.



WARNING: Use only vapor fuel.

- This equipment is designed to run on vapor fuel. Do not use liquid fuel. Have a qualified serviceman install and service your equipment.
- Never expose a spark or flame where unburned gas may be present.
- Never attempt to light pilot unless pilot manual valve has been shut off for 5 minutes.
- A conversion kit, as supplied by the manufacturer, shall be used to convert natural gas to propane.
- L.P. gases are heavier than air and will spill out on the floor. Therefore always provide adequate space and ventilation around these machines. Install machine 18" above the floor.
- Landa will not be liable for any changes made to our standard machines, or any components not purchased from Landa.
- Do not overreach or stand on unstable support. Keep good footing and balance at all times.
- Follow maintenance instructions specified in the manual.
- When making repairs disconnect from electrical source and shut off gas valve.
- Turn burner off and cool to 100° F before turning machine off.
- If gas odor is present extinguish any open flame and test all joints with a soap solution. If odor persists, call your gas supplier immediately.
- Not suitable for connection to Type B gas vent if the stack temperature exceeds 243° C (470° F).
- A draft hood shall be installed if this machine is going to be permanently installed and vented to the outside of the building.



INSTALLATION

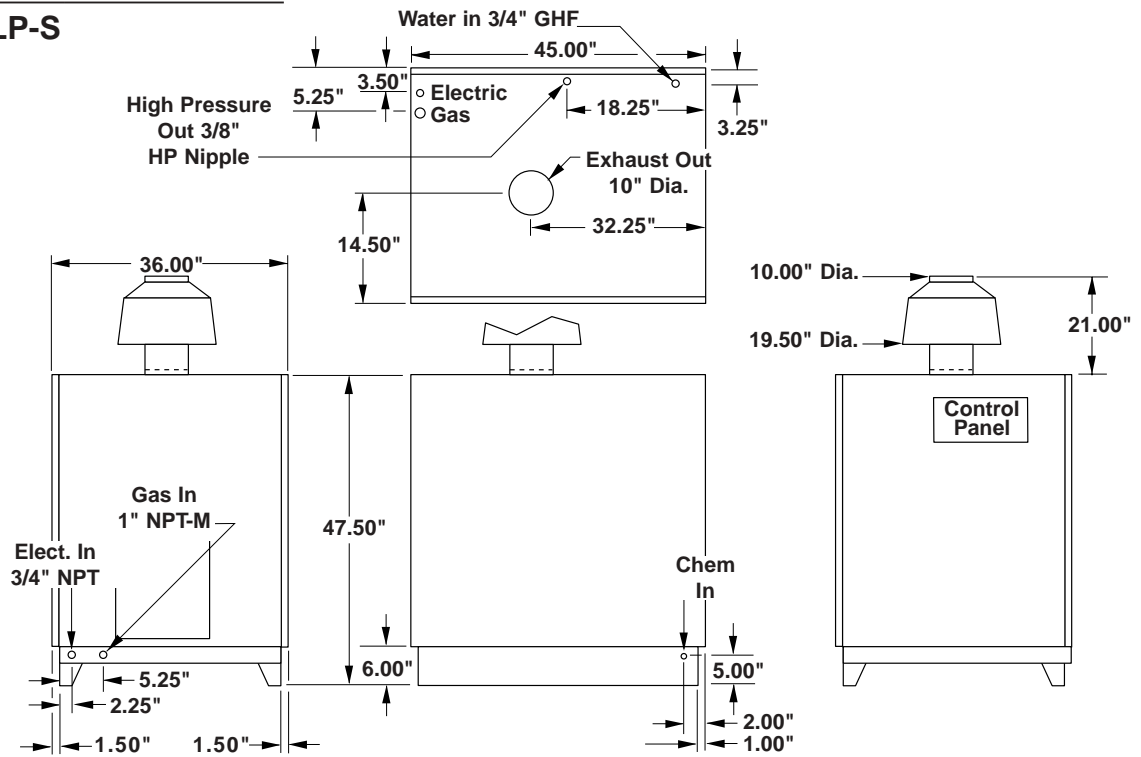
Place machine in a convenient location providing ample support, drainage and room for maintenance (see page 5).

Location:

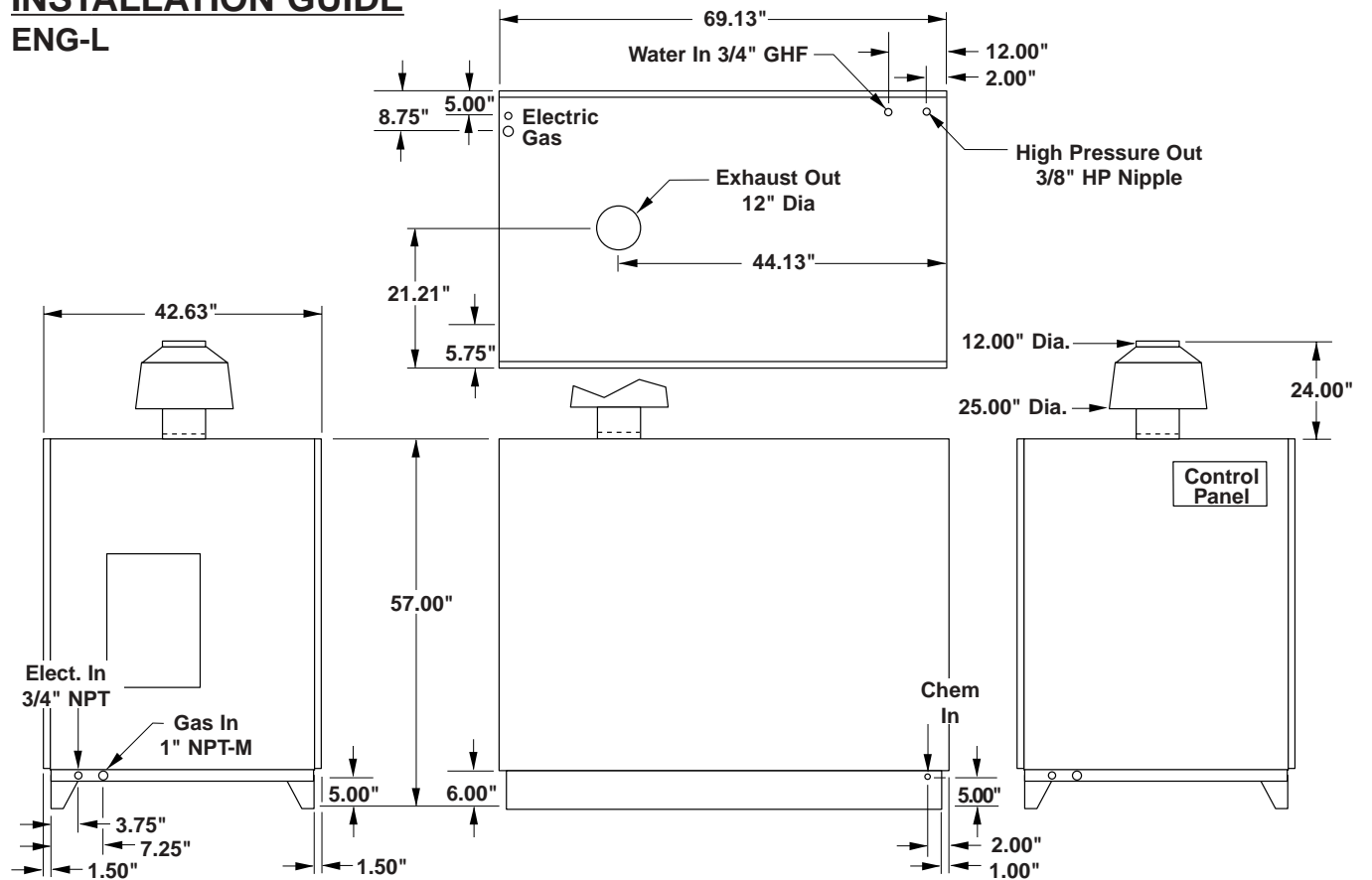
The location should protect the machine from damaging environmental conditions, such as wind, rain and freezing.

- The machine should be run on a level surface where it is not readily influenced by outside sources such as strong winds, freezing temperatures, rain, etc. The

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machine should be located considering accessibility for the replacing of components and the refilling of detergents, adjustments and maintenance. Normal precautions should be taken by the operator of the machine to prevent excess moisture from reaching the power unit or electrical controls.

- It is recommended that a partition be made between the wash area and the machine to prevent direct spray from the spray gun from coming in contact with the machine. Excess moisture reaching the power unit or electrical controls will reduce the machine's life and may cause electrical shorts.
- During installation of the machine, beware of poorly ventilated locations or areas where exhaust fans may cause an insufficient supply of oxygen. Sufficient combustion can only be obtained when there is a sufficient supply of oxygen available for the amount of fuel being burned. If it is necessary to install a machine in a poorly ventilated area, outside fresh air may have to be piped to the burner and a fan installed to bring the air into the area.
- Do not locate near any combustible material. Keep all flammable material at least 20 feet away.
Allow enough space for servicing the machine.

Local code will require certain distances from floor and walls. (Two feet away should be adequate).

WARNING: Avoid small areas or near exhaust fans.

Gas Codes:

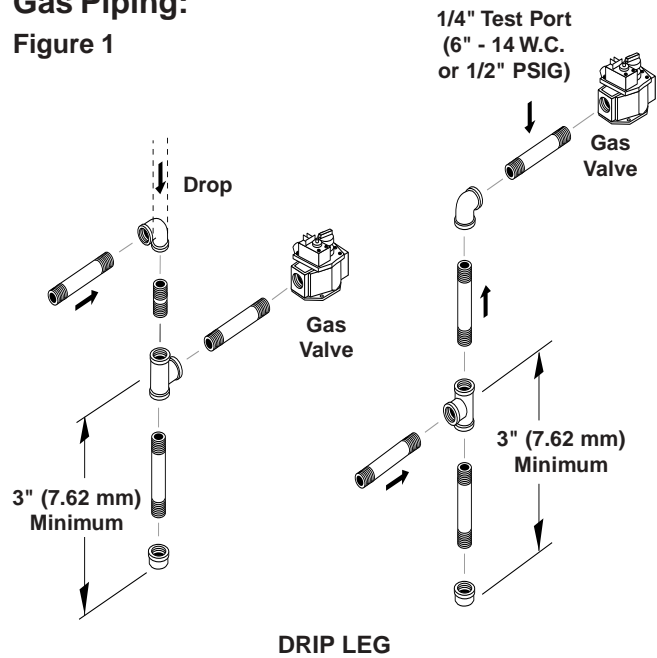
Confer with local gas company and with proper municipal officials regarding any specific code or regulations governing the installation. The installation must conform to local codes.

Electrical:

The machine, when installed, must be electrically grounded in accordance to local codes. Check for proper power supply using a volt meter; check the serial plate for the correct requirements.

Gas Piping:

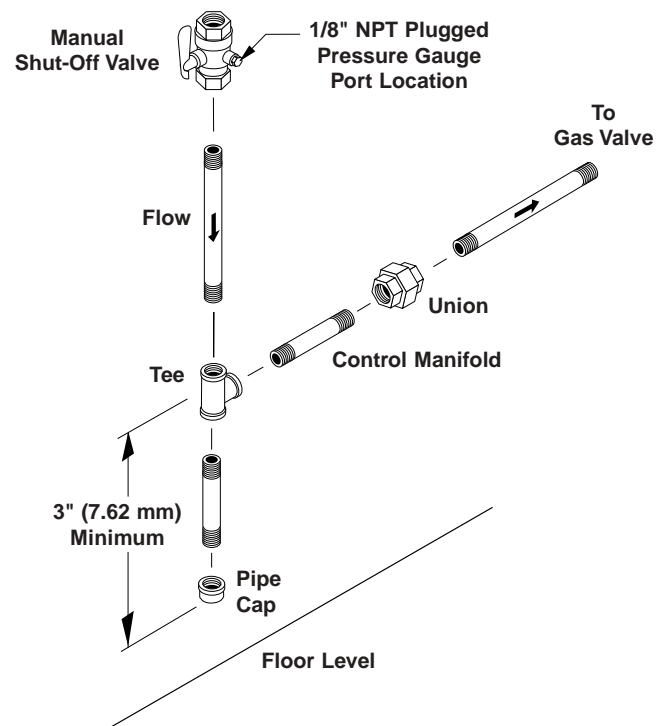
Figure 1



Sediment trap (drip leg) must be installed in the supply line.

Install a union in the gas line adjacent to and upstream from the control manifold and downstream from the manual main shut-off valve. A 1/8" NPT plugged tapping accessible for test gauge connection shall be installed immedi-

Figure 2



ately upstream of the gas supply connection for the purpose of determining the gas supply pressure to the burner, and to prevent damage to gas valve.

If a manual gas shut off valve is not in the gas supply line within six feet of the machine and in an accessible location, one shall be installed.

The following pipe and stack sizes are just recommendations. Always consult a local plumber and venting contractor for local codes and regulations during installation.

The following tables are maximum capacity of final stage pipe in thousands of Btu/hr of commercial propane

From first stage regulator (at tank) to second stage regulator

The chart below is based on incoming gas pressure of 10 PSI and a pressure drop of 1 PSI. Numbers are for straight schedule 40 pipe; fittings further reduce capacity.

Propane

Length of Pipe (ft.)	Iron Pipe Size	
	1/2"	3/4"
10	3339	6982
20	2295	4799
30	1843	3854
40	1577	3298
50	1398	2923
60	1267	2649
70	1165	2437
80	1084	2267
90	1017	2127
100	961	2009
150	772	1613
200	660	1381
250	585	1224
300	530	1109
350	488	1020
400	454	949
450	426	890
500	402	841

From second stage regulator to machine.

This is based on incoming gas pressure of 11" WC and a pressure drop of .5" WC. Numbers are for straight schedule 40 pipe; fittings further reduce capacity.

Propane

Length of pipe (ft.)	Iron Pipe Size		
	1/2"	3/4"	1"
10	291	608	1146
20	200	418	788
30	161	336	632
40	137	287	541
50	122	255	480
60	110	231	435
70	102	212	400
80	94	198	372
90	87	185	349
100	84	175	330

The chart below is based on gas pressure in the range 0-.5 PSI, specific gravity of .6, and pressure loss of .5WC. Numbers are for straight schedule 40 pipe; fittings further reduce capacity.

Natural Gas

Length of Pipe (ft.)	Iron Pipe Size				
	3/4"	1"	1 1/4"	1 1/2"	2"
10	360	680	1400	2100	3950
20	250	465	950	1460	2750
30	200	375	770	1180	2200
40	170	320	660	990	1900
50	151	285	580	900	1680
60	138	260	530	810	1520
70	125	240	490	750	1400
80	118	220	460	690	1300
90	110	205	430	650	1220
100	103	195	400	620	1150
150	84	160	325	500	950
200	72	135	280	430	800

Venting:

If the machine is used indoors, regulations or ventilation concerns may call for a chimney or furnace pipe.

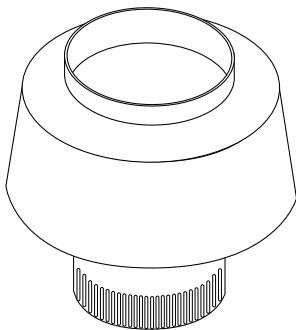
When venting the machine, if the machine is to be in an enclosed area with a chimney on it, be sure the chimney is the same size as the stack on the machine. Poor draft will cause the machine to soot and not operate efficiently. When placing the machine for installation, position the stack to be as straight as possible and to protrude through the roof of the building at a proper location and at sufficient height to eliminate down-draft. The chimney of a gas fired machine shall be installed with a down-draft diverter located about 3 ft. above machine.

Input - BTU Per Hour	Draft Hood & Flue Pipe Size
250,000 - 320,000	8 inch
320,000 - 410,000	9 inch
410,000 - 600,000	10 inch
600,000 - 750,000	12 inch

NOTE: If the flue pipe exceeds 10 ft. in length, or contains more than two elbows, use next size larger pipe and draft hood or the burner will not ignite. No movable flue pipe damper should be used on any installation.

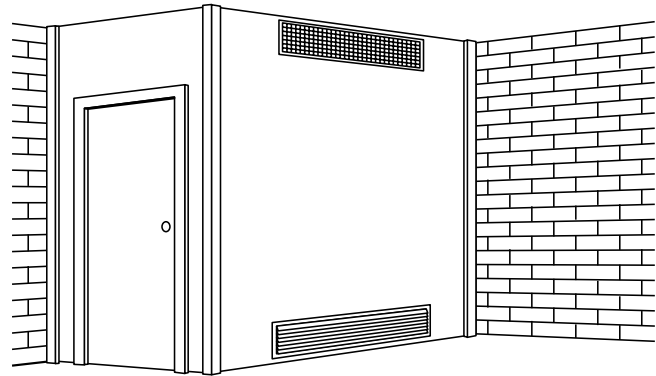
Draft Diverter:

Install the draft diverter above the heating coil. The diverter enhances the draft through the burner by severing the chimney effect created in sections of furnace pipe positioned below. It also helps prevent freezing of the coil due to wind chill factors.

Figure 3

When the heating appliance is installed in a tightly closed room without ventilation openings to the outdoors or other rooms, provisions shall be made for supplying air for combustion through special openings, one near the floor line and the other near the ceiling, each to be sized on the basis of one square inch or more of free area for each 1,000 BTU input per hour (see Figure 4).

When a room is of unusually tight construction and has a kitchen and/or bathroom ventilating fan, which may be used for exhausting air outdoors -or has a vented fire-place — it is recommended that combustion air be supplied to the enclosed room through intakes extending to the outside of the building and terminating in down-turned fittings. These should be suitably arranged to prevent obstruction from snow or rain, and include a protecting screen not smaller than 1/4 inch mesh.

Figure 4

Ventilating Air Opening.
1 square inch for each
1000 BTU per hour input.

Illustration showing air openings necessary to supply air for combustion when installed in an enclosed room.

Water Source:

The water source for the machine should be supplied by a 5/8" I.D. garden hose with a city water pressure of not less than 30 PSI. If the water supply is inadequate, or if the garden hose is kinked, the machine will run very rough and the burner will not fire.

Water Connection:

Connect the high pressure hose by pulling the coupler collar back and then inserting it onto the discharge nipple. Secure it by pushing the collar forward.

Attach the wand into the spray gun using teflon tape on the pipe threads to avoid leaks.

Inspection and Testing Gas Piping:

The building structure should not be weakened by installing the gas piping. The piping should not be supported by other piping, but should be firmly supported with gas hooks, straps, bands or hangers. Butt or lap welded pipe should not be run through or in an air duct or clothes chute.

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic foot test dial for 5 minutes for any movement or by soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs and repeat the above test.

Defective pipes or fittings should be replaced and not repaired. Never use a flame or fire in any form to locate gas leaks — use a soap solution.

After the piping and meter have been checked completely, purge the system of air. **DO NOT** bleed the air inside an enclosed room.

During pressure testing of the system at test pressures in excess of 1/2 PSIG, the appliance and its individual shut-off valve must be disconnected from the gas supply piping system or damage to the gas valve will occur.

Gas Pressure:

The ideal incoming gas pressure is 11 w.c.i. (water column inches). The minimum is 9 w.c.i., maximum is 14 w.c.i. or 1/2 PSIG. The correct operating manifold pressure for natural gas is 3.5 w.c.i. The operating manifold pressure for propane gas is 10 w.c.i. By adjusting the gas valve pressure regulator between 3 and 4 w.c.i. a side range can be achieved for natural gas.

If the desired input rating cannot be obtained within the above manifold pressure adjusting range, then the next size larger or smaller burner orifice should be used.

5. **DO NOT** insert any object other than suitable pipe or tubing in the inlet or outlet of the gas valve. Internal damage may occur and result in a hazardous condition.
6. **DO NOT** grip gas valve body with a pipe wrench or vise. Damage may result causing gas leakage. Use inlet or outlet bosses or a special body wrench.
7. **DO NOT** short the gas valve terminals.
8. **DO NOT** allow any flame to impinge on the regulator vent tubing if supplied. It may clog and cause gas valve malfunction.
9. **DO NOT** use the gas cock to adjust gas flow.
10. If main burner fails to shut off, turn off gas supply.
11. Keep all combustible materials away from gas appliances. **DO NOT** allow lint or dust to collect in burner area.
12. Dials must only be operated by hand. Never use pliers, wrenches or other tools to turn dials.
13. Leak test with a soap solution after installation or service with the main burner on. Coat pipe and tubing joints, gaskets, etc.
14. If the machine is installed in an enclosed room, care should be taken to ensure that an adequate supply of air is available for combustion and ventilation. (1 sq. inch per 1000 BTU).

START-UP



WARNING: Read and follow instructions carefully when installing or servicing machine. Failure to do so may result in damage to property or personal injury.

1. Installation or servicing of gas appliances and controls must only be performed by qualified personnel. After installation or servicing, test manual valve, operating valves, pressure regulation, and automatic shut-off valve for proper operation.
2. Install in a suitable dry location. The machine must be located in an area properly protected from the weather.
3. Shut off gas and electricity before starting installation or service. Turn back on to test or operate.
4. **DO NOT** connect appliances before pressure testing the gas piping. Damage to gas valve may result. (9 - 14 w.c.i. or 1/2 PSIG)

Check List Before Starting:

CAUTION! If "NO" is checked on any of the following sixteen questions, do not operate this machine.

	YES	NO
Has gas supply been inspected by an authorized contractor to meet local codes?		
Is machine protected from downdraft and excessive wind?		
Is machine shielded from moisture or water spray?		
Is the voltage correct and are the circuit breaker and supply cord adequate according to specifications and serial plate notation?		
Is the machine electrically grounded?		
Is there ample water supply?		
Have all flammable liquids or gases been removed from installation location?		
Is there adequate gas supply for the BTU rating of the burner?		
Is incoming gas supply pressure between 6 - 14 water column inches or 1/2 PSIG?		
Has the proper gas regulator been installed for pressure and volume?		
Is the machine properly vented to allow adequate air flow?		
Are the propane tanks large enough, according to rating to prevent freezing?		
Have gas lines been checked for gas leaks?		
Have gas lines been checked with local codes?		
Have all operators using this machine been instructed properly & have they read the manual?		
Has the machine been installed according to operator's manual instructions?		

FOR YOUR SAFETY READ BEFORE LIGHTING**WARNING**

If you do not follow these instructions exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.

A. This appliance has a pilot which must be lighted by hand. When lighting the pilot, follow these instructions exactly.

B. BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

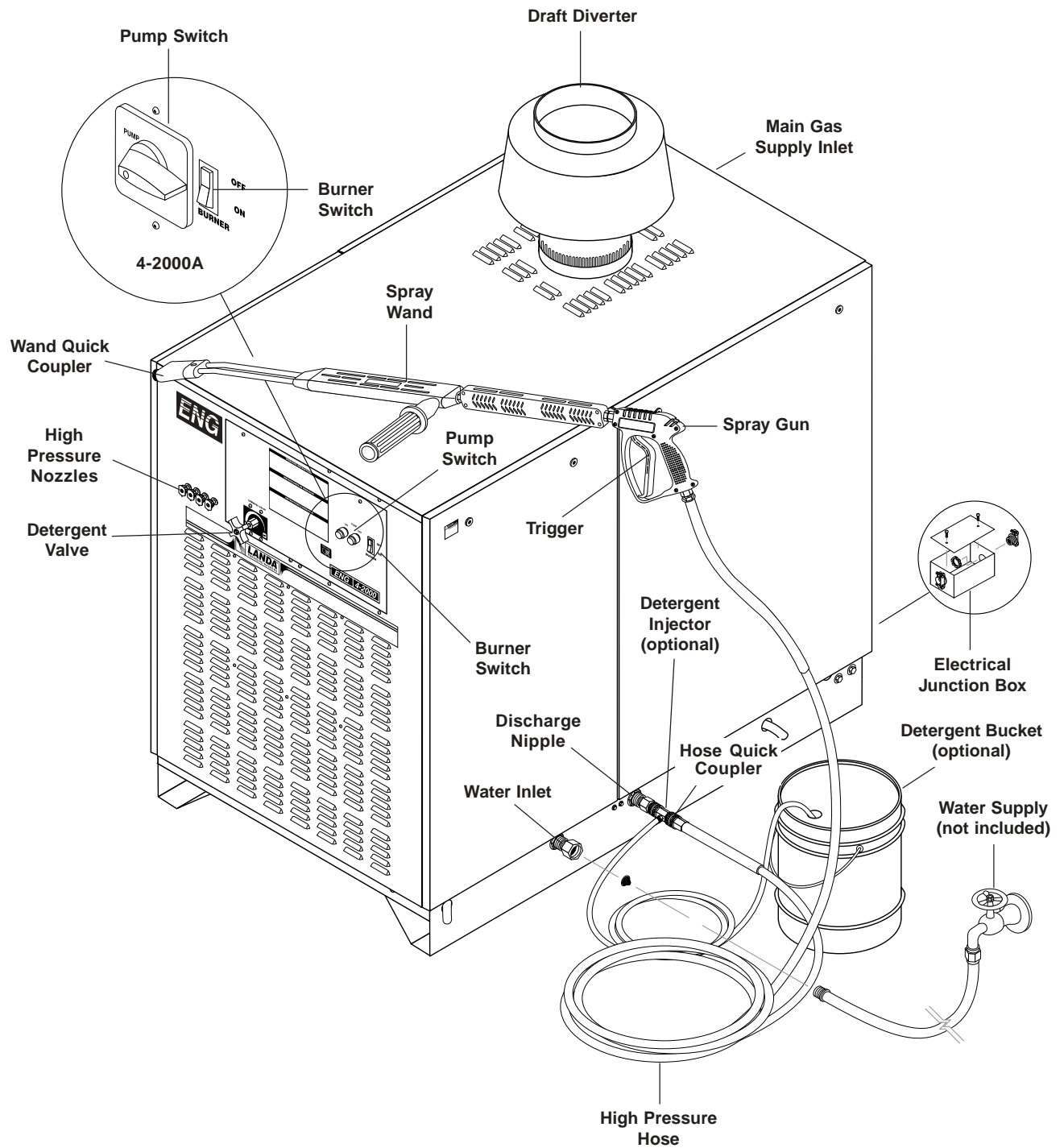
**FOR YOUR SAFETY
"WHAT TO DO IF YOU SMELL GAS"**

- Do not try to light any appliance.
- Do not touch any electrical switch, do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your supplier, call the fire department.

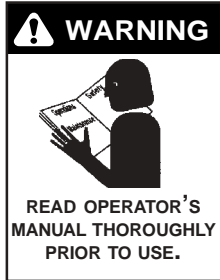
C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it; call a qualified service technician. Forced or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

COMPONENT IDENTIFICATION



OPERATING INSTRUCTIONS



WARNING: STOP! Read operators manual before operating this machine.

1. Failure to read operation and warning instructions may result in personal injury or property damage.
2. Turn all switches off.
3. Review installation instructions.
4. Connect the water supply hose to the inlet connector and turn the water on. Check for water leaks and tighten as needed.
5. Have an electrician connect power supply into junction box according to information shown on the serial plate.
6. Turn on the main gas supply.
7. Partially depress and turn control knob to the "OFF" position (see fig.5 on page 14).
8. Wait five minutes to allow gas, which may have accumulated in the main burner compartment, to escape.
9. Turn gas cock dial to "PILOT" position.
10. Depress the control knob all the way and hold it in. After five (5) seconds, depress the red ignitor until you hear a loud click. Repeat 3 or 4 times if necessary until pilot is lit. If pilot does not remain lit, repeat the operation allowing a longer period of time before releasing the gas valve knob. After the pilot lights, continue to hold the control knob down for about one (1) minute before releasing.

NOTE: Sufficient time must be allowed for a proper size pilot flame to heat the thermocouple and hold the safety magnet in a locked-up position. Also, time must be allowed for air to escape from the lines during the first operation.
11. Release dial and turn to full "ON".
12. Attach the desired high pressure nozzle into the wand quick coupler by pulling the coupler collar back and then inserting the nozzle and securing it by pushing the coupler collar forward.
13. Push "ON" switch, or turn to pump position and pull the trigger on the spray gun allowing cold water to flow.
14. To activate the gas control valve for hot water, push the burner switch to the "ON" position and pull the trigger on the spray gun.
15. To apply detergent, open the detergent valve counter clockwise making sure that the detergent pick up tube is in the detergent solution and not sucking air.

16. **To Stop:** Turn the burner switch "OFF" and place the detergent pick up tube into fresh water. Open the detergent valve and spray gun allowing detergent lines to be flushed and the burner to cool. Otherwise coil damage will result.
17. After water has cooled, push or turn pump switch to OFF position. If the machine is going to be off for an extended period of time, put the gas cock dial on the gas valve into the "OFF" position.
18. Turn water off. Prevent from freezing.

PREVENTATIVE MAINTENANCE

1. Check to see that the water pump is properly lubricated.
2. Follow Winterizing Procedures to prevent freeze damage to the pump and coils.
3. Always neutralize and flush detergent from system after use.
4. If water is known to be high in mineral content, use a water softener in your water system or descale as needed.
5. Do not allow acidic, caustic or abrasive fluids to be pumped through system.
6. Always use high grade quality Landa cleaning products.
7. Never run pump dry for extended periods of time.
8. Periodically delime coils per instructions.

It is advisable, periodically, to visually inspect the burner. Check air inlet to make sure it is not clogged or blocked. Wipe off any oil spills and keep this equipment **clean and dry**.

The areas around the Landa washer should be kept clean and free of combustible materials, gasoline and other flammable vapors and liquids.

The flow of combustion and ventilating air to the burner must not be blocked or obstructed in any manner.

GENERAL WASHING TECHNIQUES

If dirt comes off relatively easy and no grease and oil are present, cleaning with cold water will normally suffice. However, when grease and oil are present, hot water will greatly speed up the process.

Clean with the spray nozzle a foot or so from the surface being cleaned. For more difficult cleaning, move the nozzle in closer.

If the machine is equipped with a shut-off spray gun and various nozzle patterns, use the wide patterns for easy soil removal jobs and the narrow patterns on the more difficult jobs or for tight areas such as cracks and holes.

In most cases, faster results and better detergent economy is obtained by applying the detergent and letting it "set" for a few minutes, prior to rinsing. This enables the detergent to do its soil penetrating and loosening work.

Most cleaning work terminates with a high pressure rinse as part of the normal cleaning procedure. In some cases, however, the last operation may be application of a detergent (a sanitizer, for example). After such work, run the machine for 20-30 seconds to clear pump and lines.

MAINTENANCE AND SERVICE

Spray Nozzles:

Each machine is equipped with one or more spray nozzles, depending on the model. Different spray nozzles are calibrated for each machine, depending on the flow and pressure of that particular model. Spray nozzles vary in bore size and angle of spray. Popular spray angles are 0°, 15°, 25°, 40°. When ordering, please specify size and angle of nozzle. Nozzle size for each machine is located on the serial plate.

Unloader Valves:

Unloader valves relieve pressure in the line when a spray gun is closed. Unloader valves are preset and tested at the factory before shipping. Occasional adjustment of the unloader may be necessary to maintain correct pressure. For valve adjustment contact your nearest Landa dealer or call Landa technical support.

Winterizing Procedure:

Damage due to freezing is not covered by warranty. Adhere to the following cold weather procedures whenever the washer must be stored or operated outdoors under freezing conditions.

It is necessary to protect your machine against freezing when temperatures drop below 32° F. Siphoning a small amount of antifreeze into the system is recommended. This is done by pouring a 50-50 mix of antifreeze and water into the float tank and then siphoning 100% antifreeze through the detergent line with the pump on. If compressed air is available, an air fitting can be screwed into the float tank strainer fitting, and by injecting compressed air, all water will be blown out of the system. The use of a draft diverter will prevent the wind chill factor from freezing the coil.

Low Pressure Diagnosis:

(Machines with spray gun)

Refer to Troubleshooting Chart for low pressure. If the trouble is found to be either the unloader or the pump, your next step is to determine which is the problem. This can be done by eliminating the unloader from the system and attaching the 50' discharge hose directly to the pump. If high pressure is developed in this manner, the pump is good and the unloader needs to be repaired or replaced. If low pressure is still present, then the pump needs repairing.

CAUTION: When using this procedure to test components keep the spray gun open at all times.

High Limit Hot Water Thermostat:

For safety, each machine is equipped with a high limit control switch. In the event the temperature of the water should exceed its operating temperature, the high limit control will turn the burner off until the water cools.

Pumps:

Use only SAE30 weight non-detergent oil. Change oil after first 50 hours of use. Thereafter, change oil every three months or at 500 hour intervals. Oil level should be checked through use of the dipstick found on the top of the pump or by the red dot visible through the oil gauge window. Oil should be maintained at that level.

HEATING COILS

To Check Water Heater Coil for Leaks:

With the main burners "OFF" start the pumping unit and allow it to run for a few minutes. With a drop light or flashlight check the burner compartment. If no leaks are visible, and water is dripping from the coils then it is condensation from the flue gases when the burners are on.

Condensation from Heating Coil:

When cold water is being pumped into the water heater coils, and the burners are on, condensation will form on the coils and drip down into the burner compartment, giving the appearance of a leaking coil, particularly on cold humid days.

Deliming Coils:

In alkaline water areas, lime deposits can accumulate rapidly inside the coil pipes. This growth is increased by the extreme heat build up in the coil. The best prevention for liming conditions is to use high quality cleaning detergents. In areas where alkaline water is an extreme problem, periodic use of Landa Deliming Powder (part #9-028008) will remove lime and other deposits before coil becomes plugged. (See Following Instructions for use of Landa Deliming Powder.)

Periodic flushing of coils is recommended.

1. Fill a container with 4 gallons of water, then add 1 lb. of deliming powder. Mix thoroughly.
2. Remove nozzle from spray gun assembly and put spray gun into container. Secure the trigger on the spray gun into the open position.
3. Attach a short section (3-5 ft.) of garden hose to machine to siphon solution from an elevated container, or add mixture to the float tank. Turn pump switch on allowing solution to be pumped through coils and back into the container. Solution should be allowed to circulate 2-4 hours.
4. After circulating solution, flush entire system with fresh water. Reinstall wand assembly to spray gun.

Gas Valve Regulator Adjustment:

(See Fig. 5)

Adjustment of the built-in regulator isn't normally necessary, since it is preset at the factory. However, field adjustment may be accomplished as follows:

1. Attach manometer at pressure tap port.
2. Remove regulator adjustment screw cap.
3. With small screwdriver, rotate adjustment screw clockwise to increase or counterclockwise to decrease gas pressure.
4. Replace regulator adjustment screw cap.

Figure 5

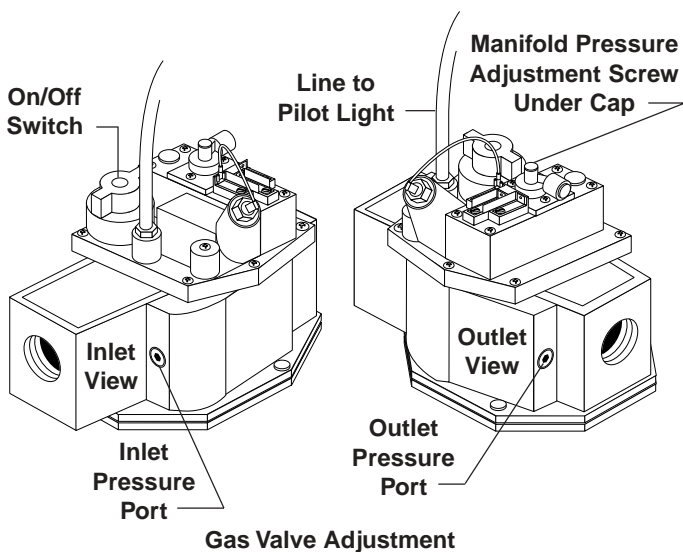
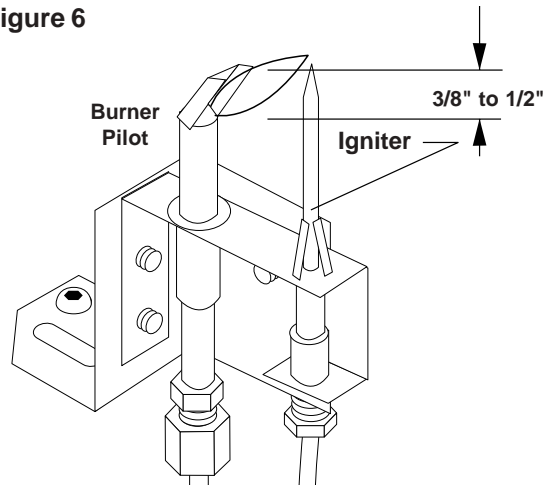


Figure 6



Pilot Burner Adjustment:

1. Remove pilot adjustment cap.
2. Adjust pilot key to provide properly sized flame.
3. Replace pilot adjustment cap.

Pressure Relief Valve:

Each machine is equipped with a relief valve to relieve pressure in the system when higher than normal operating pressures are encountered. Unusually high pressures are caused by an object plugging the spray nozzle. This problem is easily remedied by removing the obstruction. If operating pressure of machine is found to be normal and relief valve continues to leak, repair or replace the valve.

CAUTION: Open this valve annually to prevent obstruction.

PROPANE GAS (Vapor Fuel Only)

General Safety Precautions:

Have a qualified gas service person assist in any gas burner installation or service. Few maintenance people or mechanics are knowledgeable in gas controls or related safety practices. Since propane gas is heavier than air, unburned propane gas will gravitate to the floor rather than rise out of the stack. Hence, adequate floor space and good ventilation are especially important with propane systems.

Gas Pressure Requirements:

All propane fired machines operate on gas phase only. They are designed to operate at a pressure of 11 w.c.i. (between 1/3 and 1/2 of one PSI), and are often operated at even higher pressures when extra heat is needed.

Exterior regulators are needed to control the system. Propane bottles are not included with the machine. A high pressure regulator should be installed on the propane bottle and a low pressure regulator attached to the pressure washer.

Propane Cylinder Capacity:

An important consideration with propane systems is the capacity of the supply cylinder relative to the needs of the burner. The burner operates on propane as a gas. As gas is used from the propane cylinder, the liquid in the cylinder boils to maintain gas pressure. This boiling process cools the liquid, and in a heavy, continuous-demand situation, the liquid temperature can fall to the point at which it cannot provide gas as rapidly as is needed. In this case, it may be necessary to warm the propane cylinder by directing a warm spray, not over 120°, on the cold cylinder, or by manifolding two propane bottles together to increase total vaporization capacity. It is recommended that a minimum 100 lb. propane bottle be used on the machine, depending on the length of running time desired.

BURNER FEATURES

Operated Automatic Valve:

This machine is equipped with a thermopile self-powered combination gas control. This system is designed as a constant burning pilot. Lighting of the pilot is accomplished by manually lighting the pilot. A thermostat and flow switch control the main solenoid valve.

Care of Main Burner:

Due to condensation from heater coils dripping down on the burners, a scale buildup may occur in the burner jet orifices.

1. TO REMOVE BURNER MANIFOLD FROM WATER HEATER COIL:

Turn off the gas at the main burner by turning the knob to the "OFF" position on the gas valve and main gas supply.

Disconnect the pilot and ignition lines from the gas valve. Disconnect union in main burner line. Slide burner manifold out through shell opening.

2. TO CLEAN BURNER JETS:

Select proper size drill for type of gas involved. Use vise to hold drill and ream out each jet orifice.

If the water heater will be exposed to freezing weather, an antifreeze solution should be circulated through the coils by whatever means are available for the particular system the water heater is used on.

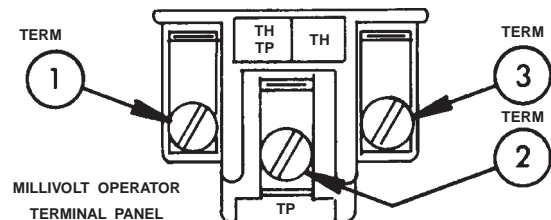
BURNER TROUBLESHOOTING

Millivolt System Check:

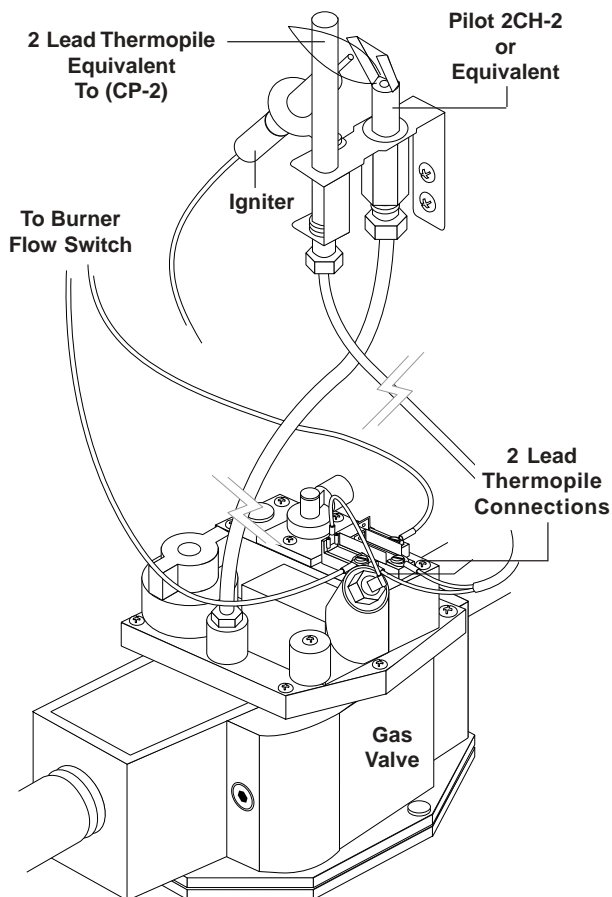
This machine has a thermopile self-powered combination gas control. Before checking the millivolt system, the following operations should be performed and observations made:

1. Inspect system for proper wiring.
2. The switch leads and all wire connections should be cleaned and tightened to eliminate all unnecessary resistance.
3. Clean and/or adjust pilot for maximum flame impingement on the thermopile.
4. If pilot will not remain lit when gas cock dial is released, check automatic pilot (Step D).

The millivolt system and individual components may be checked with a DC millivolt meter having a 0-1000 MV range. Conduct each check as shown in the chart below by connecting the meter test leads to terminals as indicated. All readings are closed circuit.



Check Test	To Test	Connect Meter Leads To Terminals	Switch Flow & Burner Contacts	Meter Reading Should Be
A	Complete System	2 & 3	Closed	100 MV or More
B	Thermopile Output	1 & 2	Open	Greater than 250
C	System Resistance	1 & 3	Closed	Less than 35
D	Auto/Pilot Dropout	1 & 2	Open	Between 120 - 30 MV



A. Complete Millivolt System Check

("A" Reading = Switch contacts CLOSED - Gas Cock Dial "ON" - Main burner should come ON).

1. If the reading is more than 100 millivolts and the automatic valve still does not come on, replace the automatic valve operator.
2. If the closed circuit reading ("A" Reading) is less than 100 millivolts, determine cause for low reading - proceed as follows:

B. Thermopile Output Reading Check

("B" Reading = Switch contacts OPEN - Main burner OFF).

If the minimum 250 millivolt reading is not obtainable, readjust pilot for maximum millivolt output. If millivolt reading is still below minimum specified, replace thermopile.

C. System Resistance Check

("C" Reading = Switch contacts CLOSED - Gas Cock "ON" - Main burner should be ON)

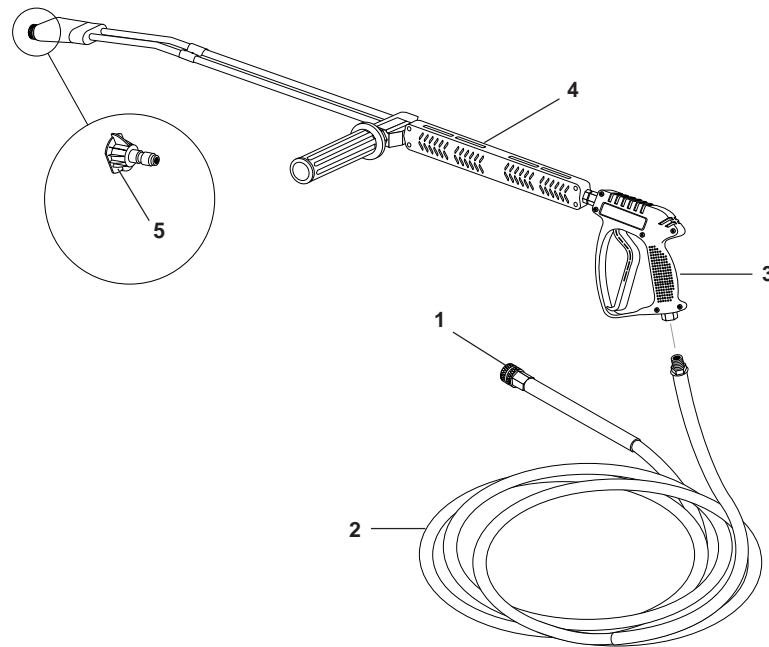
If the "C" Reading is more than that specified for the system being checked, this indicates the resistance in the system is excessive and must be reduced. To correct:

- a. Clean and tighten switch leads and connections.
- b. Shorten switch lead wires and/or replace with heavier gauge wire.
- c. Cycle switch rapidly to clean contacts.

D. Automatic Pilot Dropout Check

1. Hold gas cock dial depressed in pilot position until maximum output is observed. Then extinguish pilot and observe meter.
2. Dropout of automatic pilot magnet (sound should be audible) should occur between 120 millivolts and 30 millivolts. If dropout occurs outside these limits, change the automatic pilot magnet assembly.

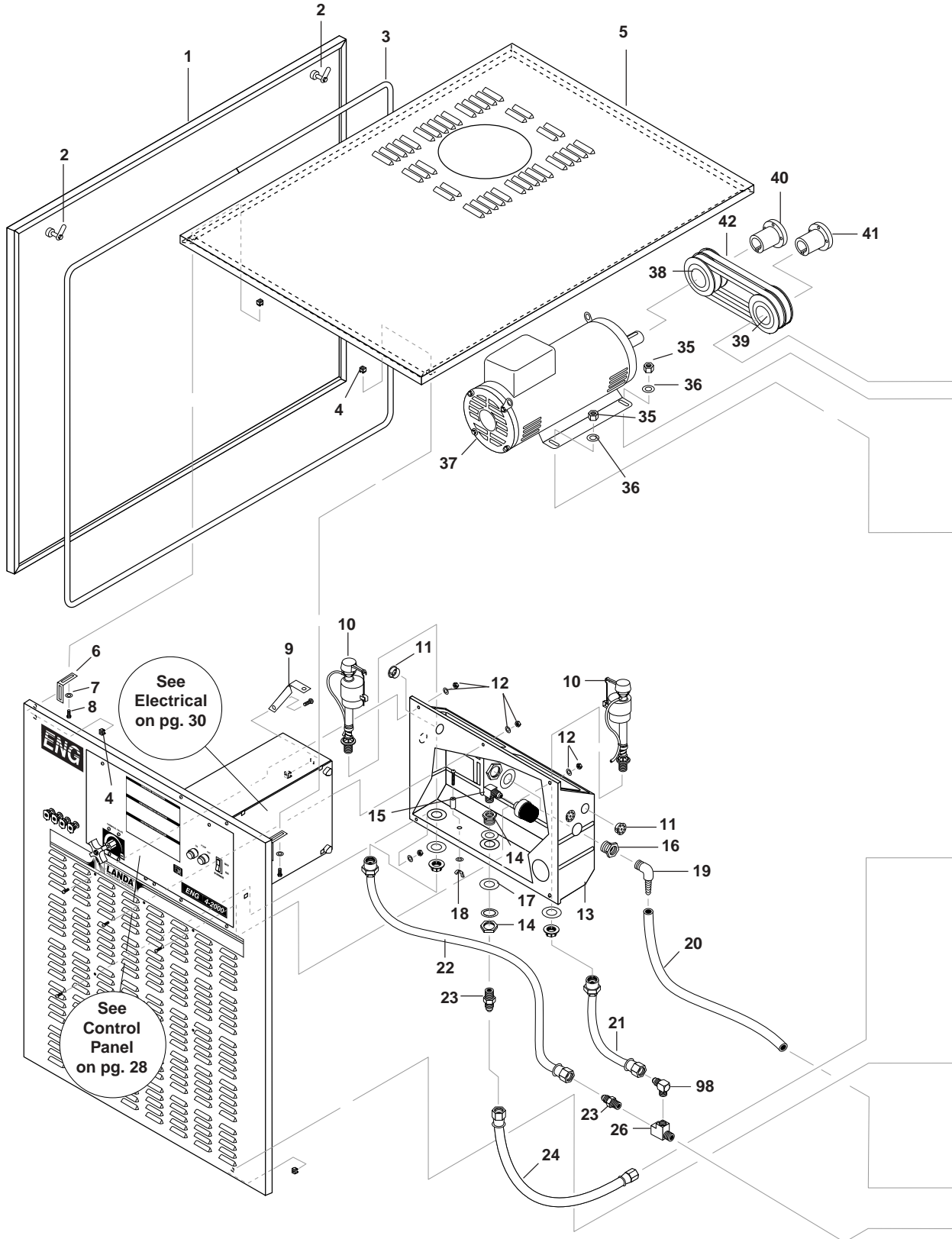
HOSE & SPRAY GUN ASSEMBLY ALL MODELS



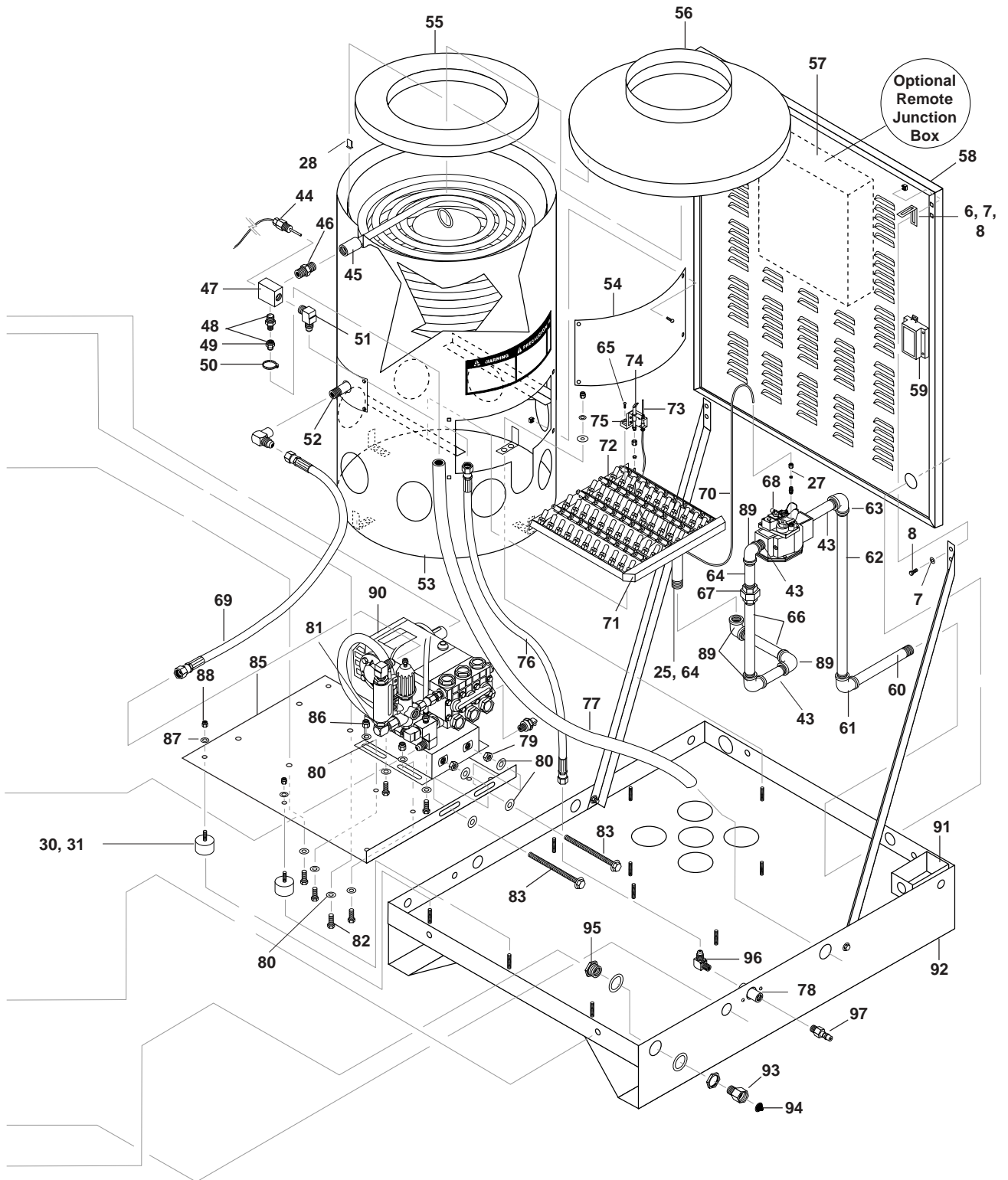
ITEM	PART NO.	DESCRIPTION	QTY
1	2-2002	Coupler, 3/8" Female	1
2	4-02033450C	Hose 50' x 3/8", 1 Wire w/Coupler, Tuff Skin (4-2000, 4-3000, 6-3000)	1
	4-02063450C	Hose 50' x 1/2", 2 Wire w/Coupler, Tuff Skin (8-3000)	1
3	4-01212	Spray Gun, Shut-Off Series 2000	1
4	4-0111351A	Wand, V.P. 1/4" Zinc	1
5	4-12805500	Nozzle, 0005.5, Red (4-2000)	1
	4-12805515	Nozzle, 1505.5, Yellow (4-2000)	1
	4-12805525	Nozzle, 2505.5, Green (4-2000)	1
	4-12805540	Nozzle, 4005.5, White (4-2000)	1
	4-12804500	Nozzle, 0004.5, Red (4-3000)	1
	4-12804515	Nozzle, 1504.5, Yellow (4-3000)	1
	4-12804525	Nozzle, 2504.5, Green (4-3000)	1
	4-12804540	Nozzle, 4004.5, White (4-3000)	1

ITEM	PART NO.	DESCRIPTION	QTY
5	4-12804000	Nozzle, 0004, Red (4-3000F, 4-4000)	1
	4-12806500	Nozzle, 0006.5, Red (6-30021)	1
	4-12806515	Nozzle, 1506.5, Yellow (6-30021)	1
	4-12806525	Nozzle, 2506.5, Green (6-30021)	1
	4-12806540	Nozzle, 4006.5, White (6-30021)	1
	4-12807000	Nozzle, 0007, Red (6-30024)	1
	4-12807015	Nozzle, 1507, Yellow (6-30024)	1
	4-12807025	Nozzle, 2507, Green (6-30024)	1
	4-12807040	Nozzle, 4007, White (6-30024)	1
	4-12809000	Nozzle, 0009, Red (8-3000)	1
	4-12809015	Nozzle, 1509, Yellow (8-3000)	1
	4-12809025	Nozzle, 2509, Green (8-3000)	1
	4-12809040	Nozzle, 4009, White (8-3000)	1

**ENG/ELP
EXPLODED VIEW
LEFT SIDE**



ENG/ELP EXPLODED VIEW RIGHT SIDE



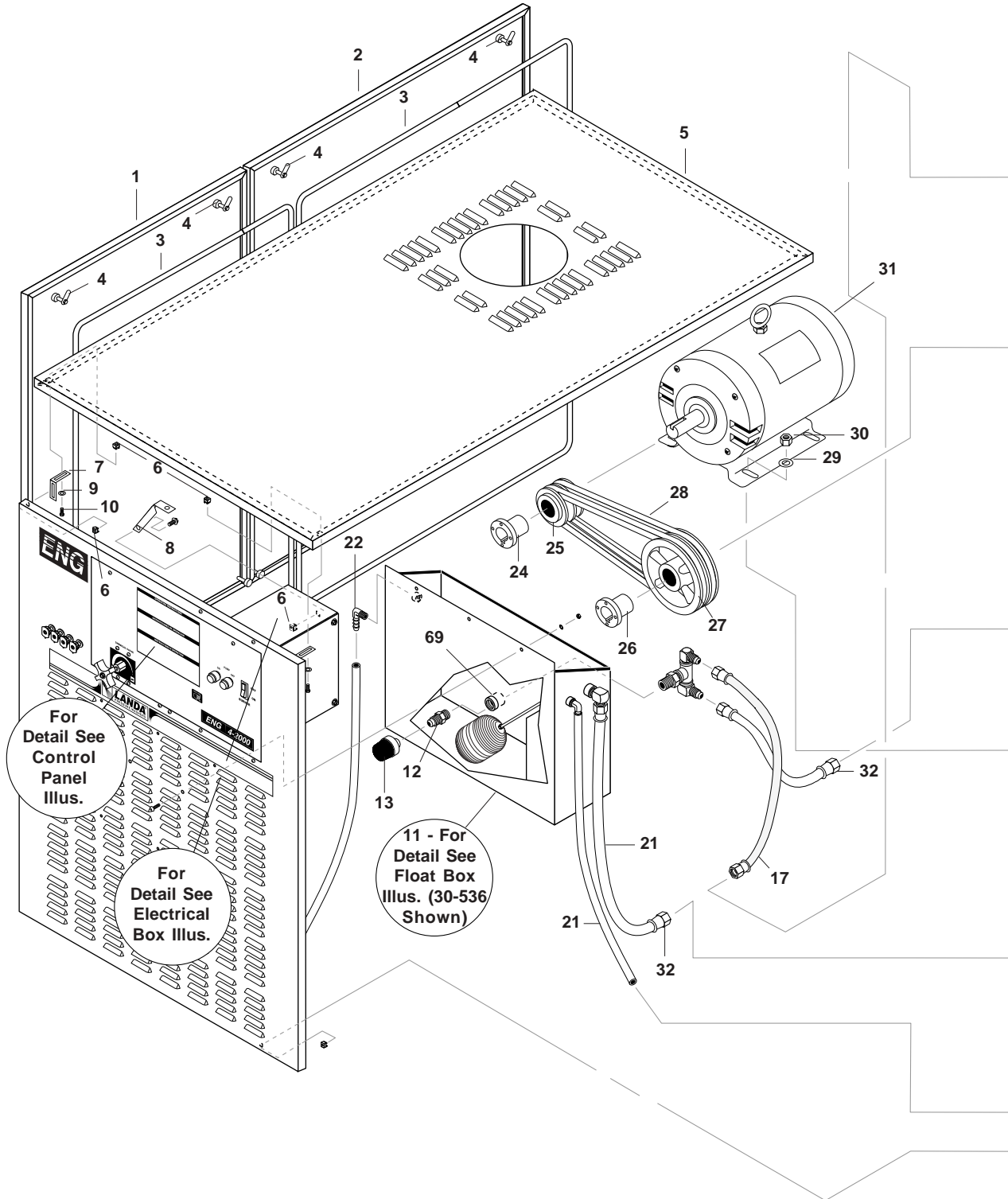
ENG/ELP**EXPLODED VIEW PARTS LIST**

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	95-07163062	Panel, Side VNG-S	2	37	Motor, See Motor Specifications Pages 32-35		
2	90-50033	Latch, Vise Action	4	6-0105	▲ Service Cord, SEO, 12/4 Coleman (4-2000B,C,F,H)	4.25 ft.	
3	2-011041	Trim, 1/16", w/Sponge	6 ft.	6-0109	▲ Service Cord, SEO 10/4 Coleman (4-3000B,C, H)	4.25 ft.	
4	90-2022	Nut, Cage, 1/4" x 16 Gauge	16	6-0108	▲ Service Cord, 10/3 4-2000A,G)	4.25 ft.	
5	95-07163057	Panel, Top, VNG-S	1	6-0105	▲ Service Cord, 8/3 (4-3000A,G)	4.25 ft.	
6	95-07163034	L-Bracket, VNG-SS	4	6-0105	▲ Service Cord, 12/4 (4-3000N)	4.25 ft.	
7	90-40001	Washer, 1/4", Flat, SAE	16	38	Pulley, Motor, See Specifications Pages 32-35		
8	90-1001	Bolt, 1/4" x 3/4", NC	16	39	Pulley, Pump, See Specifications Pages 32-35		
9	95-07163032	Brace, Electrical Box, VNG	1	40	Bushing, Motor, See Specifications Pages 32-35		
10	2-3014	Valve, Fluidmaster, 400A	2	41	Bushing, Pump, See Specifications Pages 32-35		
11	2-0147	Plug, Overflow, Float Tank	2	42	Belt, Pump/Motor, See Specifications Pages 32-35		
12	90-017	Nut, 10/32" Keps	6	43	2-00163 Nipple, 3/4" x 2", Blk Pipe	3	
13	2-01164	Tank, Plastic Universal, Float	1	44	4-0509 Switch, Snap 225° Hi Limit	1	
14	2-11041	Connector, 1/2", Anchor	1	45	95-07121220 Coil, Dura, 20" Dia. as of 4/99	1	
15	2-10062	Nipple, 3/16", Modified Close (8-3000)	1	46	2-0008 Nipple, 1/2" Hex Steel	1	
	2-1053	Nipple, 1/2" JIC x 1/2" Pipe (4-2000,4-3000)	1	47	95-07101226 Block, Discharge 1/2" x 1/2", Brass	1	
16	2-010058	Bulkhead, 3/4", Poly Pro	1	48	2-3408 Rupture Disk Assy, 8000 PSI	1	
17	90-4017	Washer, 1-3/16" x 2-1/4" SIT RBR	1		2-3400 Adapter, Burst Seal	1	
18	2-0151	Plug, Float Tank	1	49	2-3480 Replacement Rupture Disk, 8000 PSI	1	
19	2-0100379	Adapter, 3/4" x 3/4" MT x Insert	1	50	2-90041 Clamp, Screw #16	1	
20	4-02120000	Hose, 3/4" Push-On	2 ft.	51	2-0054 Elbow, 1/2" JIC x 1/2" MPT	1	
21	4-02100013	Inlet Hose, 13" Water Supply	1		90-2002 ▲ Nut, 3/8" ESNA	4	
22	4-02100030	Inlet Hose, 30" Water Supply	1		90-4002 ▲ Washer, 3/8"	4	
23	2-1053	Nipple, 1/2" JIC x 1/2" Pipe	2		90-4007 ▲ Washer, 3/8" Fender	4	
24	4-02110000	Hose, 1/2" Push-On	2 ft.	52	2-0012 Nipple, 1/2" x 5" Black Pipe	1	
25	2-00135	Bushing, 1" x 3/4"	1	53	95-07163094 Wrap, Outer Assembly 20" Coil	1	
26	2-1042	Tee, 1/2" Street	1		90-2002 ▲ Nut, 3/8" ESNA	4	
27	2-3006	Valve, Ball, 1/4" Female x 1/4"	1		90-4002 ▲ Washer, 3/8"	4	
28	90-50045	Clip, Retainer	3		90-4007 ▲ Washer, 3/8" Fender	4	
29	2-9040	Clamp, Hose, UNI .46 - .54	2	54	95-07163097 Cover, Burner Access 20" Coil	1	
30	2-01011	Isolator, 5/16 Threads	6	55	7-01415 Insulation, Tank Head 20" Coil	1	
31	90-10331	Stud, 5/16 x 18	6	56	95-07163099 Top, Burner Wrap 20" Coil	1	
32	2-00602	Elbow, 1/2" JIC x 1/2" 90°	1	57	6-03901 Box, Metal Junction, Remote (Option)	1	
33	4-02110000	Hose, 1/2" Push-On	2	58	95-07163060 Panel, Burner, End	1	
34	2-1105	Swivel, 1/2" JIC Fem, Push-on	2				
35	90-2002	Nut, 3/8" ESNA, NC	8				
36	90-4002	Washer, 3/8" Flat, SAE	16				

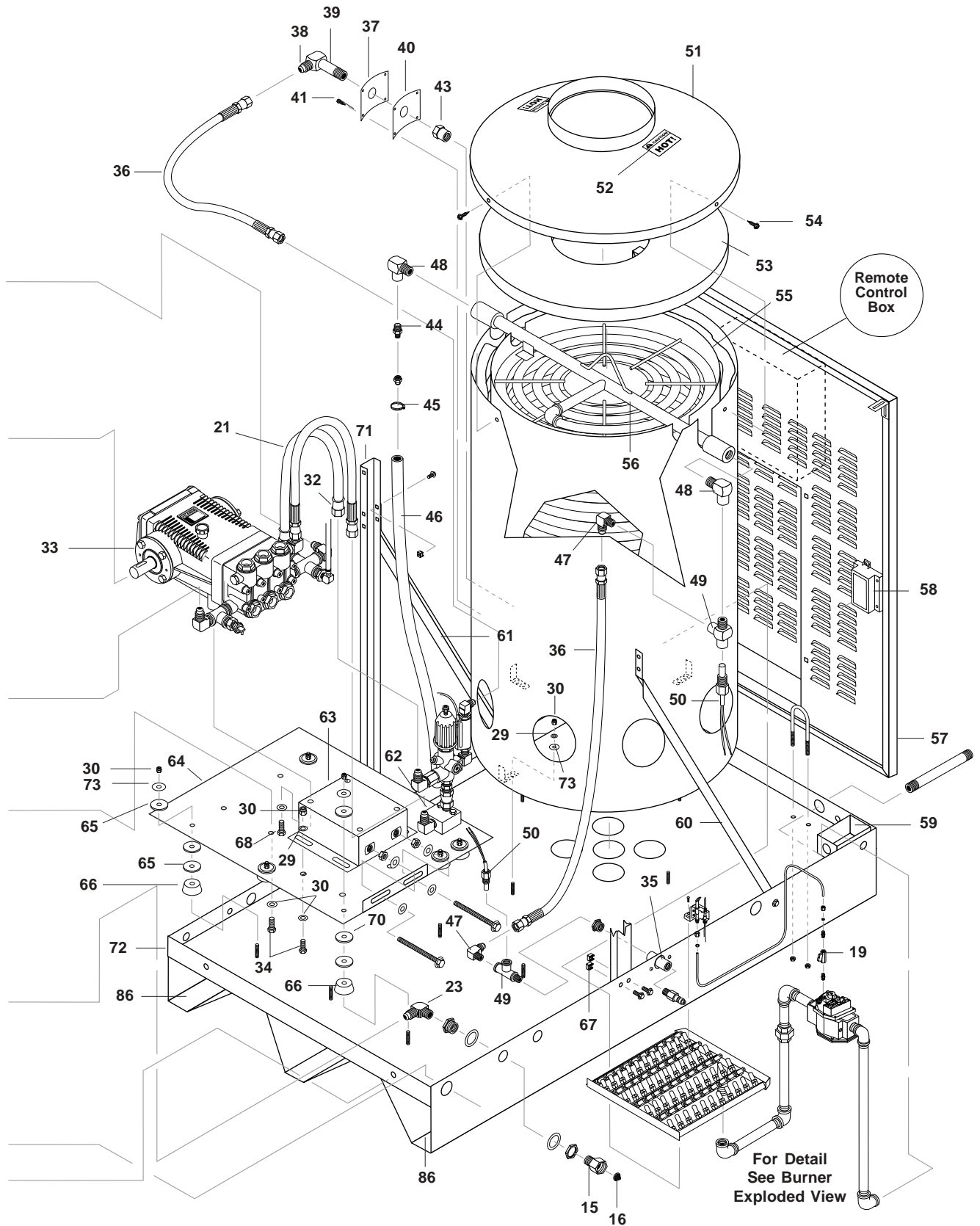
ENG/ELP EXPLODED VIEW PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
59	7-70151	Ignition, Electric Control (Option)	1	79	90-2007	Nut, 3/8" Hex, NC	2
60	2-00132	Nipple, 1" x 6" Pipe, Black	1	80	90-4002	Washer, 3/8" Flat, SAE	8
61	2-00291	Elbow, 1" Black Pipe, 90°	1	81	90-2002	Nut, 3/8" ESNA NC	16
62	95-07163077	Pipe, 1" NPT x 18", Black	1	82	90-1016	Bolt, 3/8" x 1" NC	16
63	2-00295	Elbow, 1" x 3/4" Reducing, 90°	1	83	90-10220	Bolt, 3/8" x 3-1/2" Tap (4-3000)	2
64	2-00162	Nipple, 3/4" x 3" Black Pipe	1		90-1025	Bolt, 3/8" x 5-1/2" NC HH Tap (All Models Except 4-3000)	2
65	90-199940	Screw, 10/32" x 1/4" Hex	2	84	2-0031	Elbow, 3/8" Street	1
66	2-00164	Nipple, 3/4" x 6" Black Pipe	2	85	95-071210136	Platform, Motor 3/16" VNG	1
67	2-0087	Union, 3/4" Black Pipe	1	86	95-07121112	Rail, Pump / Generator Comb.	1
68	7-7000HC	Valve, Gas 7000 MVRHC Millivolt	1	87	90-4001	Washer, 5/16"	6
	7-70002	Valve, Gas 7000 DERHC Electric (option)	1	88	90-2001	Nut, 5/16" ESNA	6
69	4-02047725	Hose, 3/8" x 25" Pressure Loop	1	89	2-00293	Elbow, 3/4" Black Pipe, 90°	4
70	7-0150	Tubing, 1/4" Aluminum	36	90		Pump, See Pump Specifications Pages 32-35	
71	95-031610/54	Burner Assembly, Square Small/#54	1	91	6-04110	Box, Junction 3 Hole 3/4"	1
	95-031610/65	Burner Ring w/Jets "65" (LP Option)	1		11-1042	▲ Label, Ground	1
72	7-7030	Jet Orifice #54 NG	46	92	95-07163052	Base, VNG-S	1
	7-7022	Jet Orifice #69 LP	46	93	2-10942	Swivel, 1/2" MP x 3/4" GHF	1
73	7-7036	Thermopile, VNG	1		90-30021	▲ Screw, Tek, #14 x 3/4"	2
74	7-70237	Pilot, Natural Gas	1	94	2-1902	Strainer, Inlet Garden Hose	1
75	95-07162027	Bracket, Hood Pilot Light	1	95	2-11041	Connector, 1/2" Anchor	1
76	4-02047760	Hose, 3/8" x 40"	1	96	2-0054	Elbow, 1/2" JIC x 1/2" 90°	1
77	4-02130050	Hose, 7/8" Push-On Conduit	3	97	2-2017	Nipple, 1/2" Male	1
78	95-07163036	Discharge Coupler Assembly	1	98	2-1062	Elbow, 1/2" JIC x 1/2" Pipe, 90°	1
	90-2000	▲ Nut, 1/4" ESNA	2			▲ Not Shown	
	90-1998	▲ Screw, 1/4" x 3/4" BH SOC SS	2				

**ENG-L EXPLODED VIEW
LEFT SIDE**



**ENG-L EXPLODED VIEW
RIGHT SIDE**



ENG-L EXPLODED VIEW PARTS LIST

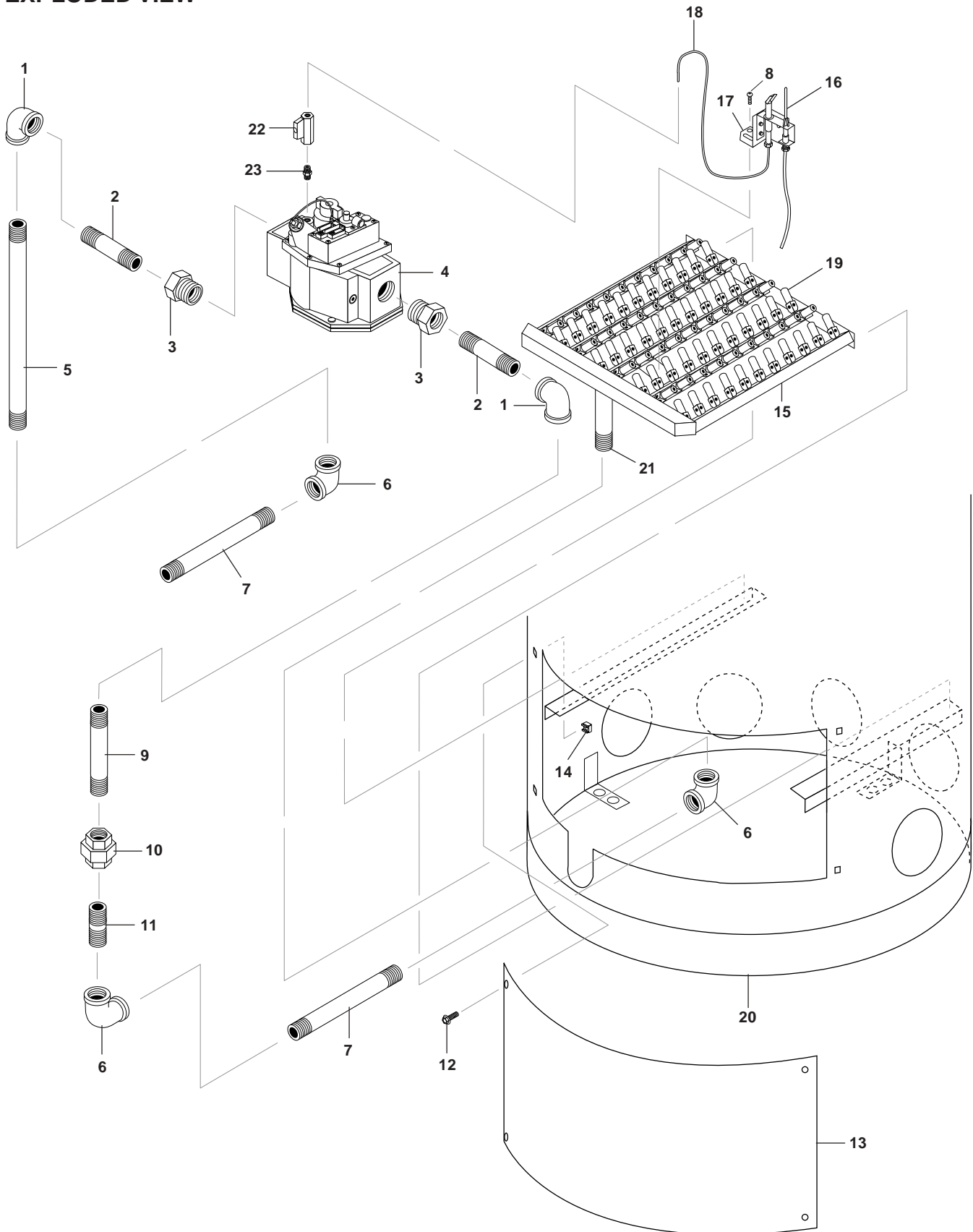
ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	95-07163020	Panel, Side, Small, VNG-L	2	31	6-0109	▲ Service Cord, SEO 10/4, (6-3000C; 8-3000C,F)	8.25 ft.
2	95-07163018	Panel, Side, Large, VNG-L	2		6-05171	▲ Strain Relief, 1" (All Large Models)	24
3	2-011041	Trim, 1/16", w/Sponge	4 ft.	32	2-11050	Swivel, 3/4" Fem., Push-On	2
4	90-50033	Latch, Vise Action	8	33		Pump, See Pump Specifications Pages 32-35	
5	95-07163010	Panel, Top, VNG-L	1	34	90-1016	Bolt, 3/8"	8
6	90-2022	Nut, Cage, 1/4" x 16 Gauge	8	35	95-07163036	Discharge Coupler Assy	1
7	95-07163034	L-Bracket, VNG	8		90-2000	▲ Nut, 1/4" ESNA	6
8	95-07163032	Brace, VNG, Electrical Box	1		5-31034	Unloader, Giant, 13 GPM, 3500 PSI (8-3000)	1
9	90-4001	Washer, Flat, SAE	17	36	4-02067746	Hose, 1/2" x 46", 2 Wire, Pressure Loop	2
10	90-1001	Bolt, 1/4" x 3/4"	17	37	95-07121113	Insulation Retainer Plate	1
11	95-07163021	Float Tank Assy., SS (For 6-3000, see page 18 for float tank assy)	1	38	2-00602	Elbow, 1/2" JIC x 1/2" Fem., 90°	1
12	2-1053	Nipple, 1/2" JIC x 1/2" Pipe	1	39	2-00120	Nipple, 1/2" x 5", Sch 80	1
13	2-1906	Strainer, 1/2" Basket	1	40	7-0144	Gasket, Burner Plate	1
14	30-539	Float Tank Assy., S.S.	1	41	90-2999	Tek Screw, #10 x 1/2"	4
15	2-10942	Swivel, 1/2" MP, 3/4" GHF	1	42	2-00270	Elbow, 3/8" Male Pipe	1
16	2-1902	Strainer, Inlet	1	43	2-006810	Bushing, 3/4" x 1/2"	1
17	4-02120055	Hose, 1" 100R4, Push-On	2.2 ft.	44	2-3408	Rupture Disk Assy, 8000 PSI	1
18	90-2002	▲ Nut, 3/8" ESNA	4		2-3480	Replacement Rupture Disk, 8000 PSI	1
	90-4002	▲ Washer, 3/8"	4	45	2-90041	Clamp, Screw, #16	1
	90-10201	▲ Bolt, 3/8"	4	46	4-02130050	Hose, 7/8" Push-On	4 ft.
	90-4007	▲ Washer, Fender 3/8"	4	47	2-0054	Elbow, 1/2" JIC x 1/2" Pipe	4
19	2-3006	Valve, Ball, 1/4" Female x 1/4"	1	48	2-0032	Elbow, 1/2" Street	2
20	2-9040	Clamp, Hose, .46 - .54	2	49	2-0046	Tee, 1/2" Street	2
21	4-02120000	Hose, 3/4" Push-On	6 ft.	50	4-0509	Switch, Snap, 225° Hi-Limit	2
22	2-0100379	Adapter, 3/4" x 3/4" MT Insert, 90°	1	51	95-071630751	Top, Burner Wrap, 30" ENG/VNG Large	1
23	2-10630	Elbow, 3/4" JIC x 1/2", 90°	1	52	10-02025A	Label, Hot/Caliente	2
24		Bushing, Motor, See Specifications Pages 32-35		53	7-014834	Insulation, Tank Head 30"	1
25		Pulley, Motor, See Specifications Pages 32-35		54	90-300210	Screw, Tek #14 x 1"	3
26		Bushing, Pump, See Specifications Pages 32-35		55	7-014844	Insulation Blanket, Die-Cut	1
27		Pulley, Pump, See Specifications Pages 32-35		56	95-07121222	Coil, 25" Dia. VNG-L	1
28		Belt, Pump/Motor, See Specifications Pages 32-35		57	95-07163014	Panel, Burner End, VNG-L	1
29	90-4002	Washer, 3/8" Flat	20	58	7-70151	Ignition Control, Electric	1
30	90-2002	Nut, 3/8" ESNA, NC	25	59	6-04110	Box, Junction, 3 Hole	1
31		Motor, See Motor Specifications Pages 32-35			6-041100	▲ Box, Junction 1" (8-3000)	1
	6-01021	▲ Service Cord, SO, 6/4 (6-3000B,H)	8.5 ft.		11-1042	▲ Label, Ground	1
	6-01033	▲ Service Cord, SO, 4/4 (8-3000B,H)	8.25 ft.		6-0517	▲ Strain Relief, 3/4"	1
	6-0105	▲ Service Cord, SEO, 12/4, Coleman (6-3000F)	8.25 ft.		6-05171	▲ Strain Relief, 1" (8-3000)	1

**ENG-L EXPLODED VIEW
PARTS LIST (CONTINUED)**

ITEM	PART NO.	DESCRIPTION	QTY
60	95-07163026	Brace, Right Side, VNG-L	1
61	95-07163024	Brace, Left Side, VNG-L	1
62	95-0710121S/B	Block, Unloader, 1/2" x 1/2", Brass	1
63	95-071211125	Rail, Pump Combo, Heavy Duty1	
	95-071211129	Rail, Pump, Legacy KKV (8-3000)	1
64	95-07163042	Power Platform, VNG-L	1
65	2-1018	Bumper Pad, Engine	21
66	2-01041	Pad, Soft Rubber	7
67	90-2020	Cage Nut, 3/8" x 12 Gauge	6
68	90-10343	Bolt, 10mm x 20mm	4
69	2-1081	Bushing, 3/4" x 1/2" Pipe	1
70	90-400910	Washer, 7/16" Lock	4
70	2-30082	Pump Protector, 1/2"	1
71	95-07163022	Vertical Brace, VNG-L	2
72	95-07163000	Base, VNG-L	1
73	90-4007	Washer, 3/8" x 1-1/2" Fender	3

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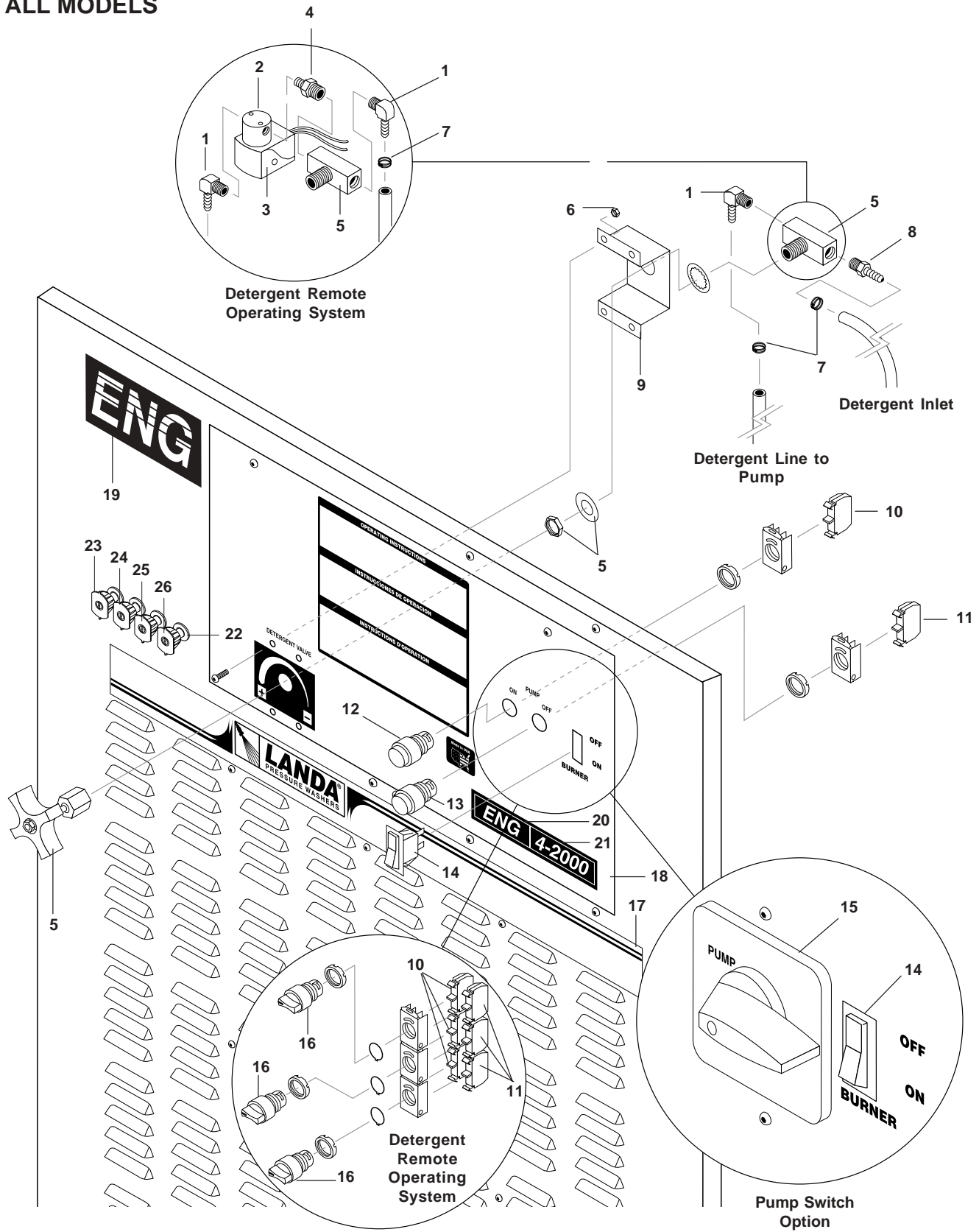
**ENG-L BURNER ASSEMBLY
EXPLODED VIEW**



**ENG-L BURNER ASSEMBLY
PARTS LIST**

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	2-00295	Elbow, 1" x 3/4" Reducing, Blk	2	14	90-19710	Nut, Cage, 1/4" x 12 Gauge	4
2	2-00162	Nipple, 3/4" x 3", Black Pipe	2	15	95-031610/54L	LRG. SQ Burner Ring/#54	1
3	2-001359	Bushing, 1" x 3/4" Black Steel Hex	2		95-031610/65L	Burner Ring w/Jets "65" (LP Option)	1
4	7-70002	Valve, Gas, 7000 DERHC (option)	1	16	7-70237	Pilot, Natural Gas, Electronic	1
	7-7000HC	Valve, Gas, 7000 MVRHC	1		7-7036	Thermopile, VNG	1
5	95-07163077	Pipe, 1" NPT x 18 Blk Sch.40	1	17	95-07163085	Splash Guard, Pilot Light ENG/VNG	1
6	2-00291	Elbow, 1", Black Pipe, 90°	3	18	7-0150	Tubing, Aluminum 1/4"	48"
7	2-00139	Nipple, 1" x 8" Black Pipe	2	19	7-2030	Jet Orifice #54 NG	99
8	90-199940	Screw, 10/32" x 1/4" Hex	2		7-2022	Jet Orifice #69 LP (See Chart)	99
9	95-07163078	Pipe, 1" NPT x 11", Black Pipe, Sch.40	1	20	95-07163087	Module, Wrap, Outer, Large Coil	1
10	2-0086	Union, 1", Black Pipe	1	21	2-00134	Pipe, 1" x 4"	1
11	2-00172	Nipple, 1", Close, 3500 PSI	1	22	2-3006	Valve, 1/4" Jomar T-91LP Ball	1
12	90-19710	Screw, 1/4" x 3/4" HH NC, Whiz Loc	4	23	2-1118	Connector Tube, 1/4" x 1/4" MPT	1
13	95-07163084	Door, Burner, Large, ENG/VNG	1				

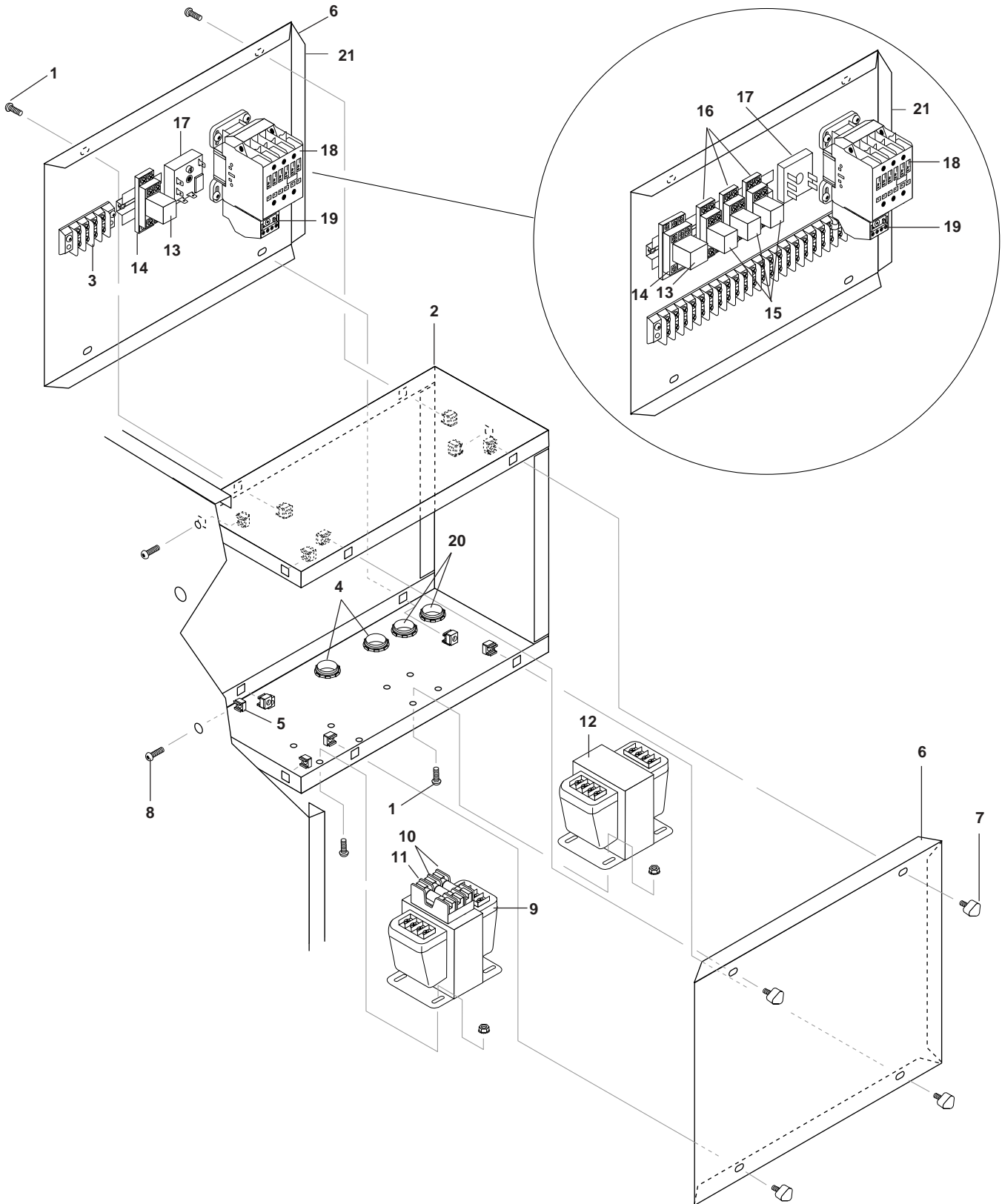
**ENG/ELP CONTROL PANEL
ALL MODELS**



ENG/ELP CONTROL PANEL ALL MODELS PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	2-1089	Hose Barb, 1/4" x 1/4" Pipe 90° (Detergent Remote Option)	1 2	21	10-2042000	Label, 4-2000	1
2	6-1401590	Valve, Detergent Less Coil	1		10-2043000	Label, 4-3000	1
3	6-140160	Solenoid Coil, 120V	1		10-2063000	Label, 6-3000	1
4	2-10013	Nipple, 1/4" Hex	1		10-2083000	Label, 8-3000	1
5	2-3015	Valve, Control/Metering, Flow	1	22	2-0103	Grommet, Rubber, Nozzle Holder	4
6	90-017	Nut, 10/32" Keps	4	23	4-12805500	Nozzle, 0005.5, Red (4-2000)	1
7	2-9040	Clamp, Hose, UNI .46 - .54	2		4-12804000	Nozzle, 0004, Red (4-3000)	1
8	2-1085	Hose Barb, 1/4" x 1/4" Pipe	1		4-12806500	Nozzle, 0006.5, Red (6-3000)	1
9	95-07163038	Support, Metering Valve VNG	1		4-12809000	Nozzle, 0009, Red (8-3000)	1
10	6-2001	Block, Contact N/O (Option)	2	24	4-12805515	Nozzle, 1505.5, Yellow (4-2000)	1
11	6-2000	Block, Contact N/C (Option)	1		4-12804015	Nozzle, 1504, Yellow, (4-3000)	1
12	6-2021	Switch, Green PB CH	1		4-12806515	Nozzle, 1506.5, Yellow, (6-3000)	1
13	6-2022	Switch, Red PB CH	1		4-12809015	Nozzle, 1509, Yellow, (8-3000)	1
14	6-020252	Switch, Curvette, 120V/230V	1	25	4-12805525	Nozzle, 2505.5, Green (4-2000)	1
15	6-020204	Switch, 2 Pos. 120V/600V, 1Ph/3Ph (4-2000)	1		4-12804025	Nozzle, 2504, Green (4-3000)	1
16	6-2020	Switch, Selector Red Lever Remote (option)	3		4-12806525	Nozzle, 2506.5, Green (6-3000)	1
17	10-99079	Label, Stripe	1		4-12809025	Nozzle, 2509, Green (8-3000)	1
18	10-990240	Label, ENG Control Panel	1	26	4-12805540	Nozzle, 4005.5, White (4-2000)	1
	10-99034	Label, ENG Control Panel (Remote)	1		4-12804040	Nozzle, 4004, White (4-3000)	1
19	10-99017	Label, ENG Logo	1		4-12806540	Nozzle, 4006.5, White (6-3000)	1
	10-990171	Label, ELP Logo (LP option)	1		4-12809040	Nozzle, 4009, White (8-3000)	1
20	10-020ENG	Label, ENG	1				
	10-020ELP	Label, ELP (LP option)	1				

**ENG/ELP ELECTRICAL BOX
ALL MODELS**

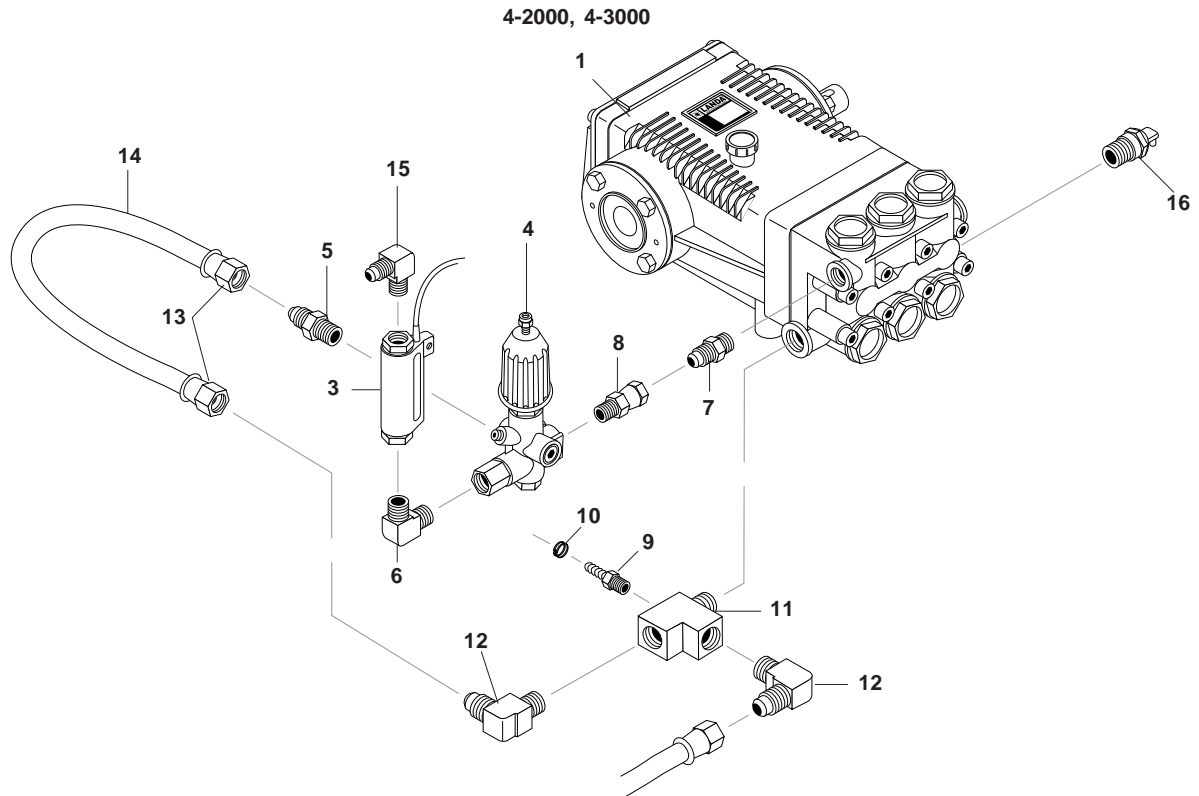


ENG/ELP ELECTRICAL BOX ALL MODELS PARTS LIST

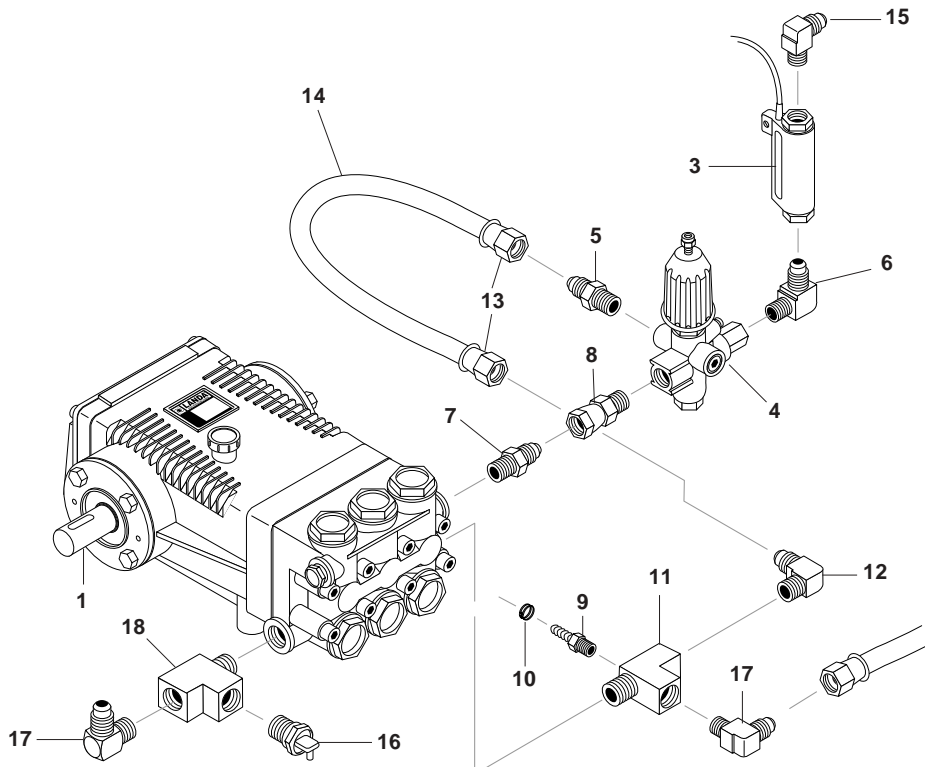
ITEM	PART NO.	DESCRIPTION	QTY
1	90-1991	Screw, 10/32" x 1/2" BHSOC Black	4
2	95-07163028	Electrical Box, VNG	1
3	6-0504	Block, Terminal 4 Pole	1
4	6-0516	Strain Relief, 1/2"	4
5	90-2022	Nut, Cage 1/4" x 16 Gauge	4
6	95-07163030	Panel, Electrical Box Side VNG	2
7	90-19942	Screw, 10/32" x 3/4" Hex	4
8	90-1998	Screw, 1/4" x 3/4" BHSOC Black	4
9	Transformer Micron 240V/480V - 120V .075 KVA See Specifications Pages 32-35		1
10	Fuse, Primary, See Specifications Pages 32-35		
11	Fuse, Secondary, See Specifications Pages 32-35		
12	Transformer 120V/240V - 24V (option), See Specifications Pages 32-35		1
13	6-036210	Relay, Latch 2, Idec, Auto Start (option)	1
14	6-035210	Socket Relay, Idec, Auto Start (option)	1
15	6-03621	Relay, 120V Remote (option)	3
16	6-03541	Base, Relay, Remote (option)	3
17	6-03688	Timer, Solid State 120V, Adjustable 5-60 min, Lockout Auto Start (option)	1
	6-03700	Timer, Multi Function 24 - 120 - 240V, 1 Option	1
18	Contactor, 120V CH See Specifications Pages 32-35		

ITEM	PART NO.	DESCRIPTION	QTY
19	Overload Relay, See Specifications Pages 32-35		
	6-0108	▲ Service Cord, 10/3 (4-2000A,G; 4-3000A)	6 ft.
	6-0105	▲ Service Cord, 12/4 (4-2000B,C,F,H)	10 ft.
	6-0109	▲ Service Cord, 10/4 (4-3000B,C,F,H; 8-3000C,F)	10 ft.
	6-01021	▲ Service Cord, 8/4 (6-3000C)	10 ft.
	6-0102	▲ Service Cord, SO, 8/3 Coleman (4-3000 G)	6 ft.
	6-01031	▲ Service Cord, SO, 6/4 (6-3000B,H)	5.5 ft.
	6-01033	▲ Service Cord, SO, 4/4 8-3000B,H)	8.5 ft.
	6-0105	▲ Service Cord, SEO, 12/4 Coleman (6-3000F)	6 ft.
	6-0109	▲ Service Cord, SEO, 10/4 Coleman (6-3000C; 8-3000C,F)	6 ft.
20	6-05171	Strain Relief, 1" (8-3000)	2
21	90-1994	▲ Screw, 10/32" x 1-1/4"	1
	90-017	▲ Nut, 10/32" Keps (Qty Depends on Option)	4/6
		▲ Not Shown	

**ENG/ELP 4-2, 4-3, 6-3 PUMP ASSEMBLIES
EXPLODED VIEW**



6-3000



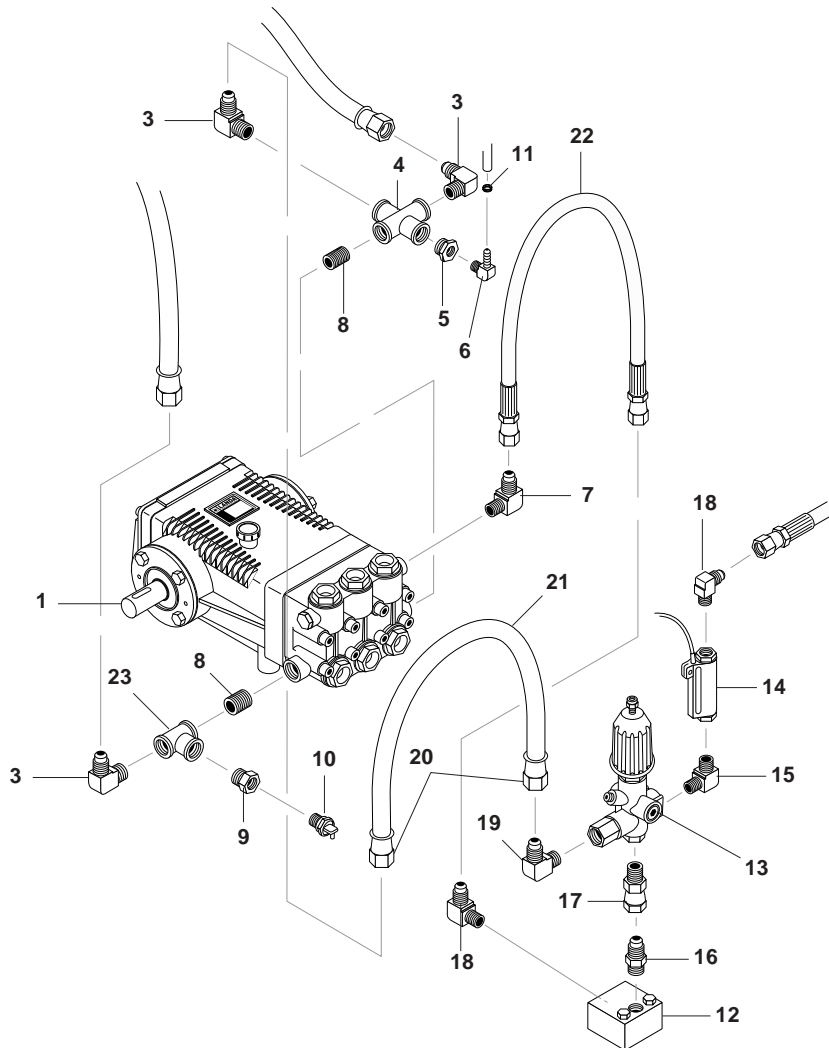
ENG/ELP 4-2, 4-3, 6-3 PUMP ASSEMBLIES**PARTS LIST**

ITEM	PART NO.	DESCRIPTION	QTY
1	See Parts Specifications Pages 36-37		
2	95-07121112	▲ Rail, Pump Legacy KT	1
3	6-021730	Switch, Flow, MV60, Yellow	1
4	5-3208	Unloader, AL-VRT607, 7.8GPM	1
5	2-1052	Nipple, 1/2" JIC x 3/8" Pipe	1
6	2-00270	Elbow, 3/8", Male, Pipe	1
7	2-0051	Nipple, 1/2" JIC x 3/8" Pipe	1
8	2-0079	Swivel, 1/2" JIC Fem, 3/8" Male	1
9	2-1084	Hose Barb, 1/4" Barb x 1/8" Male Pipe	1

ITEM	PART NO.	DESCRIPTION	QTY
10	2-9040	Clamp, Hose, UNI .46 - .54	1
11	2-10421	Tee, 1/2" Street w/2 Holes	1
12	2-1062	Elbow, 1/2" JIC x 1/2", 90° (4-2000, 4-3000) (6-3000)	2 1
13	2-1105	Swivel, Fittings, JIC	2
14	4-02110000	Hose, 1/2" Push On	12"
15	2-0053	Elbow, 1/2" JIC x 3/8" Male	1
16	2-30082	Pump Protector, 1/2" PTP	1
17	2-10630	Elbow, 3/4" JIC x 1/2" MPT (6-3000)	2
18	2-10630	Elbow, 3/4" JIC x 1/2" MPT (6-3000)	1

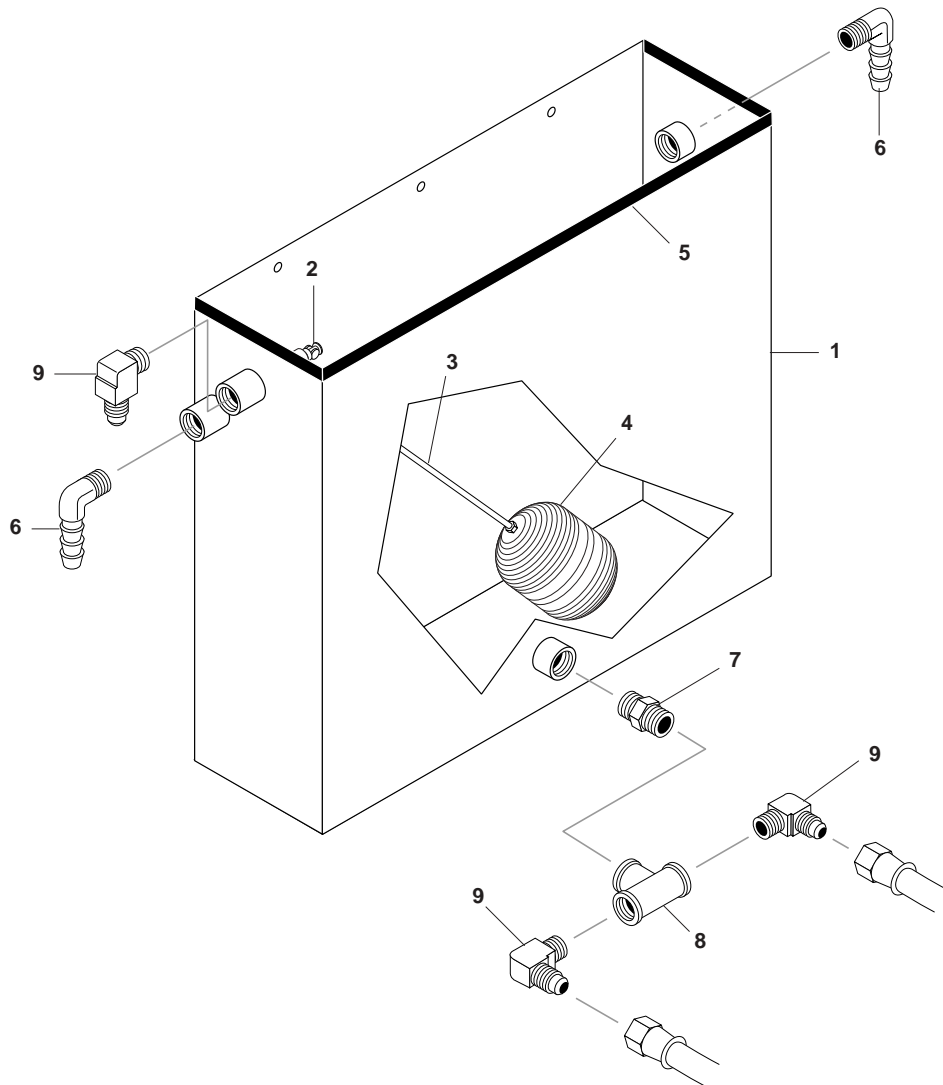
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ENG/ELP 8-3 PUMP ASSEMBLIES EXPLODED VIEW & PARTS LIST



ITEM	PART NO.	DESCRIPTION	QTY	ITEM	PART NO.	DESCRIPTION	QTY
1	5-1743	Pump, Landa LX8030/L	1	13	5-3208	Unloader, AL607 7.8 GPM	1
2	95-071211129	▲ Rail, Pump Combo	1	14	6-021730	Switch, Flow, MV60, Yellow	1
3	2-10620	Elbow, 3/4" SAE x 3/4", 90°, Brass	3	15	2-00270	Elbow, 3/8" Male	1
4	2-1036	Cross, 3/4" Female Pipe	1	16	2-0051	Nipple, 1/2" JIC x 3/8" MPT	1
5	2-1079	Bushing, 3/4" x 1/4" Pipe	1	17	2-0079	Swivel, 1/2" JIC Female x 3/8" Male	1
6	2-1089	Hose Barb, 1/4" Barb x 1/4" Pipe, 90°	1	18	2-0053	Elbow, 1/2" JIC x 3/8"	2
7	2-0054	Elbow, 1/2" JIC, 1/2" 90°	1	19	2-10622	Elbow, 3/4" JIC x 3/8" MPT	1
8	2-1008	Nipple, 3/4" Close	2	20	2-11050	Swivel, 3/4" SAE Female, Push-On	2
9	2-1081	Bushing, 3/4" x 1/2" Pipe	1	21	4-02120000	Hose, 3/4" Push-On	24"
10	2-30082	Pump Protector, 1/2" PTP	1	22	4-02067728	Hose, 1/2" x 28", 2 Wire	1
11	2-9040	Clamp, Hose, UNI .46 - .54	1	23	2-1033	Tee, 3/4"	1
12	95-07101216/B	Block, Unloader, 3/82" x 3/8"	1			▲ Not Shown	

ENG/ELP FLOAT TANK (#30-536) EXPLODED VIEW AND PARTS LIST



ITEM	PART NO.	DESCRIPTION	QTY
1	95-07163021	Assy., Float Tank S.S.	1
2	2-30110	Valve, 3/4" Brass Float	1
3	2-1112	Stem, 10" Float	1
4	2-0102	Ball, Float, Black Plastic	1
5	2-01104	Trim, 750 B2 x 1/16" Black	3 ft.
6	2-0100379	Adapter, 3/4" x 3/4" MT x Insert 90°	2

ITEM	PART NO.	DESCRIPTION	QTY
7	2-1009	Nipple, 3/4" Hex	1
8	2-1033	Tee, 3/4" Female Pipe	1
9	2-10620	Elbow, 3/4" SAE x 3/4", 90°, Brass	3
10	2-1081	▲ Bushing, 3/4" x 1/2" Pipe	1
11	2-1906	▲ Strainer, 1/2" Basket	1
12	2-1053	▲ Nipple, 1/2" JIC x 1/2" Pipe	1
		▲ Not Shown	

PARTS SPECIFICATIONS: LANDA PUMP

Machine Model	PUMP						MOTOR						
	Pump Model	Part #	Pulley Part #	Bushing Part #	Size	Voltage/PH	Hertz	Part #	Pulley Part #	Bushing			
4-20024A	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	6 HP	230V/1PH	60	5-10401	2AK41H	5-40204101	1-1/8"
4-20024B	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	6 HP	230V/3PH	60	5-1011	2AK41H	5-40204101	1-1/8"
4-20024C	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	6 HP	460V/3PH	60	5-1011	2AK41H	5-40204101	1-1/8"
4-20024F	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	5 HP	575V/3PH	60	5-1027	2AK34H	5-40203401	1-1/8"
4-20024G	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	6 HP	208V/1PH	60	5-10402	2AK41H	5-40204101	1-1/8"
4-20024H	LT5030	5-1728	2AK84H	5-40208401	25mm	5-512025	6 HP	208V/3PH	60	5-10111	2AK41H	5-40204101	1-1/8"
4-30024A	LT5030	5-1728	2BK80H	5-40508001	25mm	5-512025	8 HP	230V/1PH	60	5-1082	2BK34H	5-40503401	1-3/8"
4-30024B	LT5030	5-1728	2BK80H	5-40508001	25mm	5-512025	8 HP	230V/3PH	60	5-1083	2BK34H	5-40503401	1-3/8"
4-30024C	LT5030	5-1728	2BK80H	5-40508001	25mm	5-512025	8 HP	460V/3PH	60	5-1083	2BK34H	5-40503401	1-3/8"
4-30024F	LT5030	5-1728	2BK90H	5-40509001	25mm	5-512025	7.5 HP	575V/3PH	60	5-10146	2BK36H	5-40503601	1-3/8"
4-30024G	LT5030	5-1728	2BK80H	5-40508001	25mm	5-512025	8 HP	208V/1PH	60	5-1080	2BK34H	5-40503401	1-3/8"
4-30024H	LT5030	5-1728	2BK80H	5-40508001	25mm	5-512025	8 HP	208V/3PH	60	5-1081	2BK34H	5-40503401	1-3/8"
6-30024B	LT6035/L	5-1733	3BK70H	5-41007001	25mm	5-512025	15 HP	230V/3PH	60	5-1025	3TB56	5-407056	P1x1-5/8
6-30024C	LT6035/L	5-1733	3BK70H	5-41007001	25mm	5-512025	15 HP	460V/3PH	60	5-1025	3TB56	5-407056	P1x1-5/8
6-30024F	LT6035/L	5-1733	3BK70H	5-41007001	25mm	5-512025	15 HP	575V/3PH	60	5-1024	3TB56	5-407056	P1x1-5/8
6-30024H	LT6035/L	5-1733	3BK70H	5-41007001	25mm	5-512025	15 HP	208V/3PH	60	5-10251	3TB56	5-407056	P1x1-5/8
8-30024B	LX8030	5-1743	3BK80	5-41008001	25mm	5-512025	20HP	230V/3PH	60	5-1030	3TB60	5-407060	P1x1-5/8
8-30024C	LX8030	5-1743	3BK80	5-41008001	25mm	5-512025	20HP	230V/3PH	60	5-1030	3TB60	5-407060	P1x1-5/8
8-30024F	LX8030	5-1743	3BK80	5-41008001	25mm	5-512025	20HP	230V/3PH	60	5-1031	3TB60	5-407060	P1x1-5/8
8-30024H	LX8030	5-1743	3BK80	5-41008001	25mm	5-512025	20HP	230V/3PH	60	5-10311	3TB60	5-407060	P1x1-5/8

PARTS SPECIFICATIONS: LANDA PUMP (CONT.)

MOTOR (CON'T)							CONTROLS					
Model # (Con't)	Bushing Part #	Belt Size/Qty	Belt Part #	Motor Contactor	Motor Overload	Stepdown Transformer	Primary Fuse	Primary Fuse Part #	Secondary Fuse	Secondary Fuse Part #	Stepdown Transformer	
4-2A	5-511113	AX37 (2)	5-602037	6-4018	N/A	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-2B	5-511113	AX37 (2)	5-602037	6-4010	6-5011	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-2C	5-511113	AX37 (2)	5-602037	6-4000	6-5009	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-2F	5-511113	AX35 (2)	5-602035	6-4000	6-5007	6-60131/120v	1/2 Amp	6-02295 (2)	1/2 Amp	6-022970	6-60121/24V	
4-2G	5-511113	AX37 (2)	5-602037	6-4018	N/A	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-2H	5-511113	AX37 (2)	5-602037	6-4013	6-5011	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-3A	5-511138	BX34 (2)	5-604034	6-4021	6-5015	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-3B	5-511138	BX34 (2)	5-604034	6-4013	6-5013	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-3C	5-511138	BX34 (2)	5-604034	6-4007	6-5010	6-60111/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-3F	5-511138	BX36 (2)	5-604036	6-4000	6-5010	6-60131/120V	1/2 Amp	6-02295 (2)	1/2 Amp	6-022970	6-60121/24V	
4-3G	5-511138	BX34 (2)	5-604034	6-4021	6-5015	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
4-3H	5-511138	BX34 (2)	5-604034	6-4018	6-5014	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
6-3B	5-522158	BX50 (3)	5-604050	6-4018	6-5018	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
6-3C	5-522158	BX50 (3)	5-604050	6-4010	6-5012	6-60111/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V	
6-3F	5-522158	BX50 (3)	5-604050	6-4021	6-5018	6-60151/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V	
6-3H	5-522158	BX50 (3)	5-604050	6-4021	6-5018	6-60151/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V	
8-3B	5-522158	BX54 (3)	5-604054	6-4021	6-5016	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
8-3C	5-522158	BX54 (3)	5-604054	6-4013	6-5013	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V	
8-3F	5-522158	BX54 (3)	5-604054	6-4010	6-5012	6-60111/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V	
8-3H	5-522158	BX54 (3)	5-604054	6-4021	5-5018	6-60131/120V	1/2 Amp	6-02295 (2)	1/2 Amp	6-022970	6-60121/24V	

PARTS SPECIFICATIONS: GENERAL PUMP

Machine Model	PUMP						MOTOR						
	Pump Model	Part#	Pulley Part#	Bushing Part#	Bushing Size	Bushing	Part#	Pulley Part#	Pulley	Part#	Bushing	Bushing	
4-20021A	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	6 HP	230V/1PH	60	5-10401	2AK51H	5-40205101	1-1/8"
4-20021B	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	6 HP	230V/3PH	60	5-1011	2AK51H	5-40205101	1-1/8"
4-20021C	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	6 HP	460V/3PH	60	5-1011	2AK51H	5-40205101	1-1/8"
4-20021F	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	5 HP	575V/3PH	60	5-1027	2AK51H	5-40205101	1-1/8"
4-20021G	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	5 HP	208V/1PH	60	5-10402	2AK51H	5-40205101	1-1/8"
4-20021H	T-1011	5-2304	2AK84H	5-40208401	24mm	5-512024	6 HP	208V/3PH	60	5-10111	2AK51H	5-40205101	1-1/8"
4-30021A	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	8 HP	230V/1PH	60	5-1082	2BK50H	5-40505001	1-3/8"
4-30021B	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	8 HP	230V/3PH	60	5-1083	2BK50H	5-40505001	1-3/8"
4-30021C	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	8 HP	460V/3PH	60	5-1083	2BK50H	5-40505001	1-3/8"
4-30021F	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	7.5 HP	575V/3PH	60	5-10146	2BK45H	5-40504501	1-3/8"
4-30021G	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	8 HP	208V/1PH	60	5-1080	2BK50H	5-40505001	1-3/8"
4-30021H	TS-2021	5-2307	2BK80H	5-40508001	24mm	5-512024	8 HP	208V/3PH	60	5-1081	2BK50H	5-40505001	1-3/8"
6-30021B	TS-2021/L	5-2306	3BK80	5-41008001	24mm	5-512024	15 HP	230V/3PH	60	5-1025	3TB62	5-407062	P1x1-5/8
6-30021C	TS-2021/L	5-2306	3BK80	5-41008001	24mm	5-512024	15 HP	460V/3PH	60	5-1025	3TB62	5-407062	P1x1-5/8
6-30021F	TS-2021/L	5-2306	3BK80	5-41008001	24mm	5-512024	15 HP	575V/3PH	60	5-1024	3TB62	5-407062	P1x1-5/8
6-30021H	TS-2021/L	5-2306	3BK80	5-41008001	24mm	5-512024	15 HP	208V/3PH	60	5-10251	3TB62	5-407062	P1x1-5/8

PARTS SPECIFICATIONS: GENERAL PUMP (CONT.)

MOTOR (CONT.)						CONTROLS					
Model (Cont)	Bushing Part#	Belt Size/Qty	Belt Part#	Motor Contactor	Motor Overload	Stepdown Transformer	Primary Fuse	Primary Fuse Part#	Secondary Fuse	Secondary Fuse Part#	Stepdown Transformer
4-2A	5-511113	AX37 (2)	5-602037	6-4018	N/A	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-2B	5-511113	AX37 (2)	5-602037	6-4010	6-5011	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-2C	5-511113	AX37 (2)	5-602037	6-4000	6-5009	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-2F	5-511113	AX37 (2)	5-602037	6-4000	6-5007	6-60131/120V	1/2 Amp	6-02295 (2)	1/2 Amp	6-0229810	6-60121/24V
4-2G	5-511113	AX37 (2)	5-602037	6-4018	N/A	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-2H	5-511113	AX37 (2)	5-602037	6-4013	6-5011	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-3A	5-511138	BX36 (2)	5-604036	6-4021	6-5015	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-3B	5-511138	BX36 (2)	5-604036	6-4013	6-5013	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-3C	5-511138	BX36 (2)	5-604036	6-4007	6-5010	6-60111/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V
4-3F	5-511138	BX36 (2)	5-604036	6-4000	6-5010	6-60131/120V	1/2 Amp	6-02295 (2)	1/2 Amp	6-022970	6-60121/24V
4-3G	5-511138	BX36 (2)	5-604036	6-4021	6-5015	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
4-3H	5-511138	BX36 (2)	5-604036	6-4018	6-5014	6-60151/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
6-3B	5-522158	BX54 (3)	5-604054	6-4018	6-5018	6-60111/120V	1 Amp	6-02294 (2)	8/10 Amp	6-0229810	6-60121/24V
6-3C	5-522158	BX54 (3)	5-604054	6-4010	6-5012	6-60111/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V
6-3F	5-522158	BX54 (3)	5-604054	6-4007	6-5011	6-60131/120V	1/2 Amp	6-02295 (2)	1/2 Amp	6-022970	6-60121/24V
6-3H	5-522158	BX54 (3)	5-604054	6-4021	6-5018	6-60151/120V	1/2 Amp	6-02295 (2)	8/10 Amp	6-0229810	6-60121/24V

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
NO SPARK - NO PILOT GAS	No main power	Restore power.
	Faulty limit switch	Test/replace.
	Faulty wiring	Test wiring.
SPARK - BUT NO PILOT LIGHT	No gas supplied to pilot valve	Check for availability of gas.
	Manual valves in "OFF" position	Turn manual valve and gas cock to full "ON". Check pilot key adjustment.
	Faulty pilot valve	Test gas valve.
	Faulty wiring	Test wiring.
	Restricted pilot line or clogged pilot orifice	Clean pilot tubing and orifices.
PILOT GAS - BUT NO SPARK	Broken or shorted electrode assembly	Test/replace.
PILOT LIT - BUT MAIN BURNER WON'T COME ON	Faulty wiring	Test wiring.
	Low pilot flame	Check inlet pressure, pilot orifice.
	Improper alignment of sensor in pilot flame	Adjust alignment - see figure 6, page 14.
	Faulty main gas operator in gas control	Test gas valve - repair/replace.
	Faulty flame sensor	Test sensor, wiring - repair/replace.
PILOT CYCLES OFF AND ON BY ITSELF	Faulty pilot valve	Test gas valve.
	Faulty wiring	Test wiring.
MAIN BURNER SHUTS DOWN	Low pilot flame	Check inlet pressure, pilot orifice.
	Improper alignment of sensor in pilot flame	Adjust alignment - see figure 6, page 14.
	Faulty main gas operator in gas control	Test gas valve - repair/replace.
	Faulty flame sensor	Test sensor, wiring - repair/replace.
LOW OPERATING PRESSURE	Faulty pressure gauge	Install new gauge.
	Insufficient water supply	Use larger garden hose. Clean filter washer at water inlet.
	Old, worn or incorrect spray nozzle	Match nozzle number to machine and/or replace with new nozzle.
	Belt slippage	Tighten or replace. Use correct belt.
	Plumbing or hose leak	Check plumbing system for leaks. Retape leaks with teflon tape.
	Faulty or misadjusted unloader valve (where applicable)	Adjust unloader for proper pressure. Install repair kit when needed.
	Worn packing in pump	Install new packing kit.
	Fouled or dirty inlet or discharge valves in pump	Clean inlet and discharge valve.
	Worn inlet or discharge valves	Replace with valve kit.
	Obstruction in spray nozzle	Remove obstruction.
	Leaking pressure control valve (where applicable)	Rebuild or replace as needed.
	Detergent metering valve left open sucking air or faulty metering valve	Close and/or replace metering valve.
	Slow motor RPM	Check incoming voltage.
LOW WATER TEMPERATURE	Improper size of gas lines	See page 7 for sizing of gas lines.
	Low gas pressure	Increase gas pressure to machine.
	Improper pressure regulator	Specify BTU, building gas pressure 11 w.c.i. to machine for correct sizing of regulator.
	Low gas pressure	Increase gas pressure as described on page 9.
	Soot buildup on coils not allowing heat transfer	Clean coils.
	Improper burner nozzle	See serial plate.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
WATER TEMPERATURE TOO HOT	Incoming water to machine warm or hot	Lower incoming water temperature.
	Gas pressure too high	See page 15 for specifications for proper gas pressure.
	Detergent line sucking air	Tighten all clamps. Check detergent lines for holes.
	Defective high limit switch	Replace.
	Incorrect burner nozzle size	See serial plate.
	Insufficient water supplied	Check water GPM to machine.
	Restricted water flow	Check nozzle for obstruction, proper size.
PRESENCE OF WATER IN OIL	Oil seal worn	Check and replace if necessary.
	High humidity in air	Check and change oil twice as often.
WATER DRIPPING FROM UNDER PUMP	Piston packing worn	Check and replace if necessary.
	O-Ring plunger retainer worn	Check and replace if necessary.
DETERGENT NOT DRAWING	Air leak	Tighten all clamps. Check detergent lines for holes.
	Detergent metering valve packing not tight or packing worn	Tighten nut. Replace valve or packing.
	Filter screen on detergent suction hose plugged	Clean or replace.
	Dried up detergent plugging metering valve	Disassemble and clean thoroughly.
	High viscosity of detergent	Dilute detergent to specifications.
	Restriction behind float tank screen removed	Install restriction.
	Hole in detergent line(s)	Repair hole.
	Strainer basket plugged	Remove and clean.
	Connections on selector valve loose	Put teflon tape on all pipe connections.
	Detergent solenoid not opening (where applicable)	Check flow switch, replace detergent solenoid.
PUMP RUNNING NORMALLY BUT PRESSURE LOW ON INSTALLATION	Pump sucking air	Check water supply and possibility of air seepage.
	Valves sticking	Check and clean or replace if necessary.
	Unloader valve seat faulty	Check and replace if necessary.
	Nozzle incorrectly sized	Check and replace if necessary (See serial plate for proper size).
	Worn piston packing	Check and replace if necessary.
FLUCTUATING PRESSURE	Valves worn	Check and replace if necessary.
	Blockage in valve	Check and replace if necessary.
	Pump sucking air	Check water supply and air seepage at joints in suction line.
	Worn piston packing	Check and replace if necessary.
PUMP NOISY	Air in suction line	Check water supply and connections on suction line.
	Broken or weak inlet or discharge valve springs	Check and replace if necessary.
	Excessive matter in valves	Check and clean if necessary.
	Worn bearings	Check and replace if necessary.
OIL DRIPPING	Oil seal worn	Check and replace if necessary.
EXCESSIVE VIBRATION IN DELIVERY LINE RELIEF VALVE LEAKS WATER	Irregular functioning of the valves	Check and replace if necessary.
	Relief valve defective	Replace or repair.

BURNER SPECIFICATIONS

MODEL	BURNER ASSEMBLY	JET SIZE	GAS VALVE	PILOT ORIFICE CONVERSION
ENG4-2000	X - 46	#54	7000 MVRHC 3/4" x 3/4"	No
ENG4-3000	X - 46	#54	7000 MVRHC 3/4" x 3/4"	No
ENG6-3000	X - 98	#54	7000 MVRHC 3/4" x 3/4"	No
ENG8-3000	X - 98	#54	7000 MVRHC 3/4" x 3/4"	No
ELP4-2000	X - 46	#65	7000 MVRHC 3/4" x 3/4"	Yes
ELP4-3000	X - 46	#65	7000 MVRHC 3/4" x 3/4"	Yes
ELP6-3000	X - 98	#65	7000 MVRHC 3/4" x 3/4"	Yes
ELP8-3000	X - 98	#65	7000 MVRHC 3/4" x 3/4"	Yes

BASIC FACTS

Based on 60°	Propane	Butane
1 Cu. Ft. NG Approx 1,000 BTU		
Formula	C3H8	C4H10
Vaporization Point (°F)	-43.7	31.1
Specific Gravity (Vapor)	1.522	2.006
Specific Gravity (Liquid)	0.508	0.584
Lbs. per Gal. (Liquid)	4.23	4.87
BTU per Cu. Ft. (Vapor)	2.563	3.39
BTU per Gal. (Liquid)	91.547	102.032
BTU per Lb. (Liquid)	21.591	21.221
Cu. Ft. per Lb. (Liquid)	8.607	6.53
Cu. Ft. per Gal. (Liquid)	36.45	31.8
Octane Number	125	91
Molecular Weight	44.09	58.12
To Calculate Running Cost:	1,000 BTU = 1 Cu. Ft.	
	100 Cu. Ft. = 1 Therm	
	1 Therm = 1 Hour	
	Cost of Gas per Therm = Cost to Run	
Example Using Natural Gas at 50¢ Therm:	400,000 BTU Machine	
	400 Cu. Ft. $(400,000 / 1,000)$	
	4 x 50¢ = \$2.00 / Hour to Run $((400 / 100) \times \text{cost of gas})$	

PRESSURE EQUIVALENTS

Simply stated, pressure is the force exerted by a gas or liquid attempting to escape from a container. It is useful to know how strong this "attempt to escape" is. Pressure can be measured with a manometer or with a pressure gauge. At the lower levels, it is expressed in "inches of water column" i.e. 11" W.C. Higher pressures are expressed in terms of the force exerted against a square inch of area, for example, 125 lbs. per square inch (125 psi).

1 water column inch	=	50 oz./sq. in.	11 water column inches	=	6.35 oz./sq. in.
11 water column inches	=	4 lb./sq. in.	1 lb./sq. in.	=	27.71 water column inches
1 lb./sq. in.	=	2.04" Mercury	1" Mercury	=	.39 lb./sq. in
1 Std. Atmosphere	=	14.73 lbs./sq. in.			

PREVENTATIVE MAINTENANCE

This pressure washer was produced with the best available materials and quality craftsmanship. However, you as the owner have certain responsibilities for the correct care of the equipment. Attention to regular preventative maintenance procedures will assist in preserving the performance of your equipment. Contact your Landa, Inc. dealer for maintenance. Regular preventative maintenance will add many hours to the life of your pressure washer. Perform maintenance more often under severe conditions.

MAINTENANCE SCHEDULE		
Replace Fuel Lines		Annually
Pump Oil	Inspect	Daily inspect the oil level
	Change	After first 50 hours, then every 500 hours or annually
Clean Burner Filter		Annually
Remove Burner Soot From Heating Coil		Annually
Check Belt Tension		Monthly
Descale Coil		Annually - (more often if required)
Replace High Pressure Nozzle		Every 6 months
Replace Quick Connects		Annually
Clean Water and Detergent Screen/Filter		Weekly
Clean Float/Supply Tank		Every 6 months
Replace HP Hose		If there is any sign of wear
Grease Motor		Every 10,000 hours
Check Burner Pilot Jets		Annually
Pressure Relief Valve		Annually

OIL CHANGE RECORD

Date Oil Changed Month/Day/Year	Estimated Operating Hours Since Last Oil Change



LANDA LIMITED NEW PRODUCT WARRANTY PRESSURE WASHERS

WHAT THIS WARRANTY COVERS

All LANDA pressure washers are warranted by LANDA, INC. to the original purchaser to be free from defects in materials and workmanship under normal use, for the periods specified below. This Limited Warranty is subject to the exclusions shown below, is calculated from the date of the original purchase, and applies to the original components only. Any parts replaced under this warranty will assume the remainder of the part's warranty period.

FIVE YEAR PARTS AND ONE YEAR LABOR WARRANTY:

Components manufactured by LANDA, such as frames, handles, top and bottom wraps, float tanks, fuel tanks, belt guards, and heating coils. Internal components on the oil-end of all branded pumps have a 5 year warranty.

ONE YEAR MINIMUM ON PARTS AND ONE YEAR LABOR WARRANTY:

All other components, excluding normal wear items as described below, will be warranted for one year on parts and labor. Parts and labor warranty on these parts will be for one year regardless of the duration of the original component manufacturer's part warranty.

WARRANTY PROVIDED BY OTHER MANUFACTURERS:

Motors, generators, and engines, which are warranted by their respective manufacturers, are serviced through these manufacturers' local authorized service centers. LANDA cannot provide warranty on these items.

WHAT THIS WARRANTY DOES NOT COVER

This warranty does not cover the following items:

1. Normal wear items, such as nozzles, guns, discharge hoses, wands, quick couplers, seals, filters, gaskets, O-rings, packings, pistons, pump valve assemblies, strainers, belts, brushes, rupture disks, fuses, pump protectors.
2. Damage or malfunctions resulting from accidents, abuse, modifications, alterations, incorrect installation, improper servicing, failure to follow manufacturer's maintenance instructions, or use of the equipment beyond its stated usage specifications as contained in the operator's manual.
3. Damage due to freezing, chemical deterioration, scale build up, rust, corrosion, or thermal expansion.
4. Damage to components from fluctuations in electrical or water supply.
5. Normal maintenance service, including adjustments, fuel system cleaning, and clearing of obstructions.
6. Transportation to service center, field labor charges, or freight damage.

WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE

While not required for warranty service, we request that you register your LANDA pressure washer by returning the completed registration card. In order to obtain warranty service on items warranted by LANDA, you must return the product to your Authorized LANDA Dealer, freight prepaid, with proof of purchase, within the applicable warranty period. If the product is permanently installed, you must notify your Authorized LANDA Dealer of the defect. Your Authorized LANDA Dealer will file a claim with Landa, who must subsequently verify the defect. In most cases, the part must be returned to LANDA freight prepaid with the claim. For warranty service on components warranted by other manufacturer's, your Authorized LANDA Dealer can help you obtain warranty service through these manufacturers' local authorized service centers.

LIMITATION OF LIABILITY

LANDA'S liability for special, incidental, or consequential damages is expressly disclaimed. In no event shall LANDA'S liability exceed the purchase price of the product in question. LANDA 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 and specifications. **THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.** LANDA does not authorize any other party, including authorized LANDA Dealers, to make any representation or promise on behalf of LANDA, 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 LANDA products conforms to local codes. While LANDA attempts to assure that its products meet national codes, it cannot be responsible for how the customer chooses to use or install the product.



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