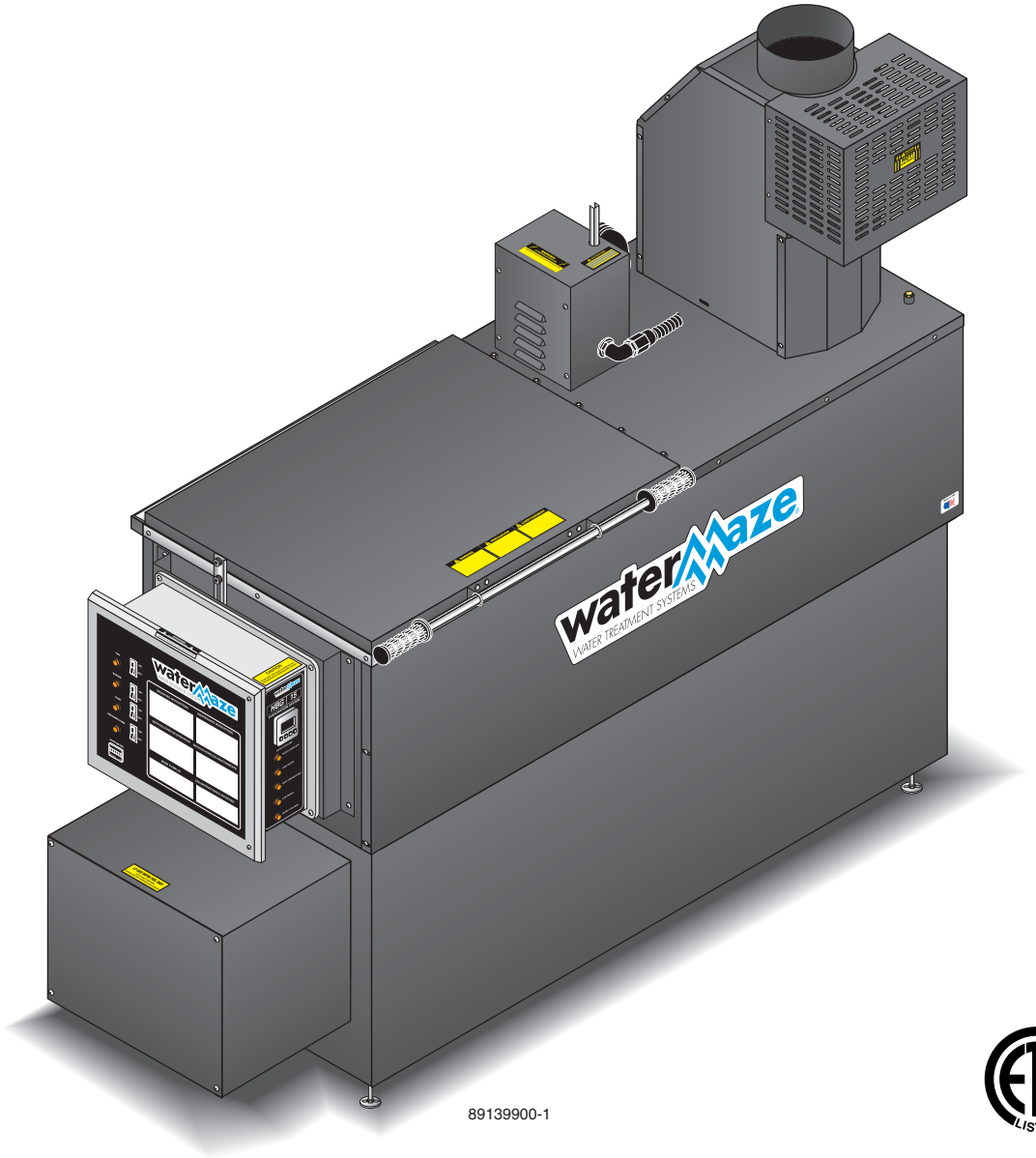
waterMaze
WATER TREATMENT SYSTEMS

HBG

OPERATOR'S MANUAL

■ HBG-15 ■ HBG-30



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ETL LISTED

For technical assistance or the Water Maze Dealer nearest you
visit our web page at **www.wmaze.com**

CONTENTS

Model Number _____

Serial Number _____

Date of Purchase _____

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

CONTENTS

INTRODUCTION

Thank you for purchasing a *WATER MAZE* HBG.

This manual covers the operation and maintenance of HBG evaporators. All information in this manual is based on the latest product information available at time of printing.

WATER MAZE reserves the right to make changes at any time without incurring any obligation.

Owner/User Responsibility:

The owner and/or user must have an understanding of the manufacturer's operating instructions and warnings before using this *WATER MAZE* machine. 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.

SAVE THESE INSTRUCTIONS

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

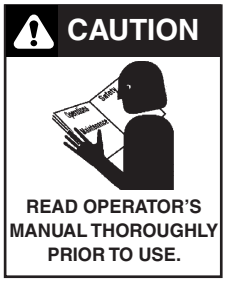
When ordering parts, please specify model and serial number. Use only identical replacement parts.

This machine is to be used only by trained operators.

PLEASE NOTE: *WATER MAZE* is not responsible for procurement of regulatory and/or operating permits that may be required by city, county, state or federal agencies. It is the customer who is responsible for procurement of any hazardous or non-hazardous regulatory and/or operating permits, compliance with codes or other governmental requirements associated with the installation, use, or disposal of waste associated with this equipment. Submerged combustion can be classified as incineration in specific jurisdictions. It is the customer's responsibility for procurement of appropriate local and state permits as needed.

The guidelines listed in the evaporator feasibility report are specific only to the waste stream submitted for the evaluation and estimated emissions. Moreover, *WATER MAZE* is not responsible for the operation or maintenance of the evaporator unit. If the unit is subjected to any waste stream other than that which has been tested by the named laboratory, operation may cause adverse effects on the equipment and will negate any warranty of parts or equipment.

IMPORTANT SAFETY INFORMATION



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 a malfunction of the evaporator and result in death, serious bodily injury and/or property damage.

CAUTION: Read the information on the serial plate and burner labels to verify proper fuel connection.

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

3. 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 touch machine with wet hands or while standing in water. Always disconnect power before servicing.
4. Never make adjustments on the machine while it is in operation except those prescribed in this manual.

   CAUTION: Use extreme caution when opening the lid of the evaporator. Hot and possibly corrosive steam will be emitted.
5. DO NOT use concentrated flammable liquids that could pose an explosion hazard.

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

6. **WARNING: DO NOT attempt to evaporate flammable wastes of any kind, i.e.**, DO NOT process solvents, pure oils, etc.
7. DO NOT locate machine in the vicinity of any flammable vapors, liquids or solids.
8. Before servicing the machine, refer to all Safety Data Sheet's on the material identified in the waste stream. You must comply with all warnings and wear all protective clothing stated on the Safety Data Sheet's.

9. When the machine is working, do not cover or place in a closed space where ventilation is insufficient. Avoid installing machines in small confined areas. Adequate oxygen is needed for the evaporation process. Standard minimum clearances for this type of appliance is 18" from floor, sides and rear and 48" from electrical control box. The minimum clearance from the vent stack is 18". This appliance must be installed on non-combustible floors.
10. The HBG and components will freeze if not in operation. In cold climates locate HBG in heated enclosure.
11. Running the system without water damages the tank floor and voids the warranty.

    NOTE: Allow tank to cool before adding wastewater or damage will occur to tank floor due to thermal shock.
12. The HBG must be installed and training provided by an authorized dealer.
13 Do not operate the equipment in an unvented, enclosed area. Carbon monoxide may accumulate.

14. If you smell gas, shut off the gas supply valve, extinguish any open flame and test all joints with a soap solution. If the odor persists, call your gas supplier immediately.
15. Only those liquid wastes that have been approved by *WATER MAZE*, and the proper regulatory agencies, should be placed in the HBG machine. Test methods as outlined in *WATER MAZE* Profile 3518 must be obtained. **NOTE:** *WATER MAZE* is not liable for the performance and the warranty will be void when waste liquids that are not tested and approved are introduced into the HBG.
16. Chemistry limitations include:

    Maximum 1,000 mg/L chlorides for 316L stainless steel.

    Maximum 40,000 mg/L chlorides for AL-6XN stainless steel pH between 7.0 and 9.0.

    Initial oil concentration between 500 and 5,000 mg/L or a corrosion inhibitor for carbon steel.

Deviations from these parameters must be approved by Engineering.

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 electrically ignited. 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 the building. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you cannot reach your gas 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. Attempted repair or use of force 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.

ELECTRICAL SAFETY

Ground equipment before connecting to the electrical power supply.

Failure to ground the equipment can cause a severe or fatal electrical shock hazard.

Do not ground to a gas supply line.

To avoid dangerous or fatal electrical shock, disconnect the power to the equipment before working on any electrical connection or making any repairs.

Supply voltage must be within ± 10% of the nameplate voltage. Incorrect voltage can cause a fire or seriously damage the equipment and void the warranty. If in doubt, consult a licensed electrician.

Connect the equipment to a dedicated circuit breaker.

DANGER: This machine is equipped with an electronic ignition system. Lighting of the pilot is accomplished through electronic spark ignition. Do not attempt to light the appliance manually as a burn injury or electrical shock may result.

STANDARD SAFETY FEATURES

The HBG uses gas and electricity to operate. This can be a fatal combination if not handled properly. For this reason, the HBG has been designed with safety in mind. You will find these standard safety features on all HBG equipment:

1. **Batch Cycle Controller**

   This controller counts how many times the machine has evaporated and refilled. At a predetermined number of batch cycles, the controller will shut down the evaporator. Maintenance must be performed before the batch cycle controller is reset.

2. **Low Water Float Switch**

   This float switch insures that there is water covering the floor of the evaporator. When the water level drops to a certain level, the low water float switch turns off the burner.

3. **High Water Float Switch**

   This float will turn off the HBG when the water level becomes too high.

4. **On-Off Switch**

   The burner on-off switch disconnects power to the burner.

5. **High Temperature Switch with Manual Reset**

   If the underneath floor temperature below the tank exceeds 500° for the HBG-15 & HBG-30, the manual reset temperature switch will trip, turning off the burner. To reset, push the black button on the side of the electrical box.

6. **High Temperature Alarm**

   Included with your HBG is a combination strobe light and horn alarm that will warn of a high temperature condition within the HBG tank. This alarm is automatically actuated on high temperature by two thermal switches mounted on the outside wall of the tank. These thermal switches are factory set at 300° F and are designed to set off the strobe/horn alarm as well to shut down the machine. This alarm unit must be field mounted (see page 26) and wired (see wiring diagram) to the HBG control panel. The strobe light has a flash rate of 75 flashes/minute. The audio alarm has a sound level of 81 dBA @ 10ft.

INSTALLATION

1. **LOCATION**-Locate the HBG evaporator on a concrete surface and level with leveling feet supplied with the machine.

   NOTE: Leveling feet must be screwed into the bottom of the flame box when it is removed from pallet. HBG-30's must have fifth leveling foot screwed into the burner support bracket located below the burner. Burner support bracket is to keep the burner level at all times. Protect machine from damaging environments such as wind, rain, sun and freezing temperatures.

   CAUTION: For natural gas, air ventilation should be located near the ceiling. For liquid propane, air ventilation should be located near the floor. Air ventilation openings and evaporator stack should be located a safe distance from building climate control air intake ducts.

2. **ELECTRICAL**-The standard HBG requires 120 volts. Refer to the serial plate for proper voltage and amp requirements for your machine. All electrical lines must be tested with a voltage meter for proper voltage and polarity before connecting to the HBG.

   CAUTION: All electrical lines must be installed by qualified personnel only. All installations must be electrically grounded and conform to all local and National Electrical codes.

   NOTE: The serial plate lists multiple AMP ratings. Use the one that matches your purchased unit and options. The first Amp rating on the serial plate is the standard unit with no air or electrical-powered options. The AIR Option Amp rating is for the unit with any air-powered auto-fill and/or chemical defoamer injection options. The ELEC Option Amp Rating is for the unit with any electric motor or solenoid-powered auto-fill and/or chemical de-foamer injection options. Refer to the Amp rating that applies to your unit when installing.

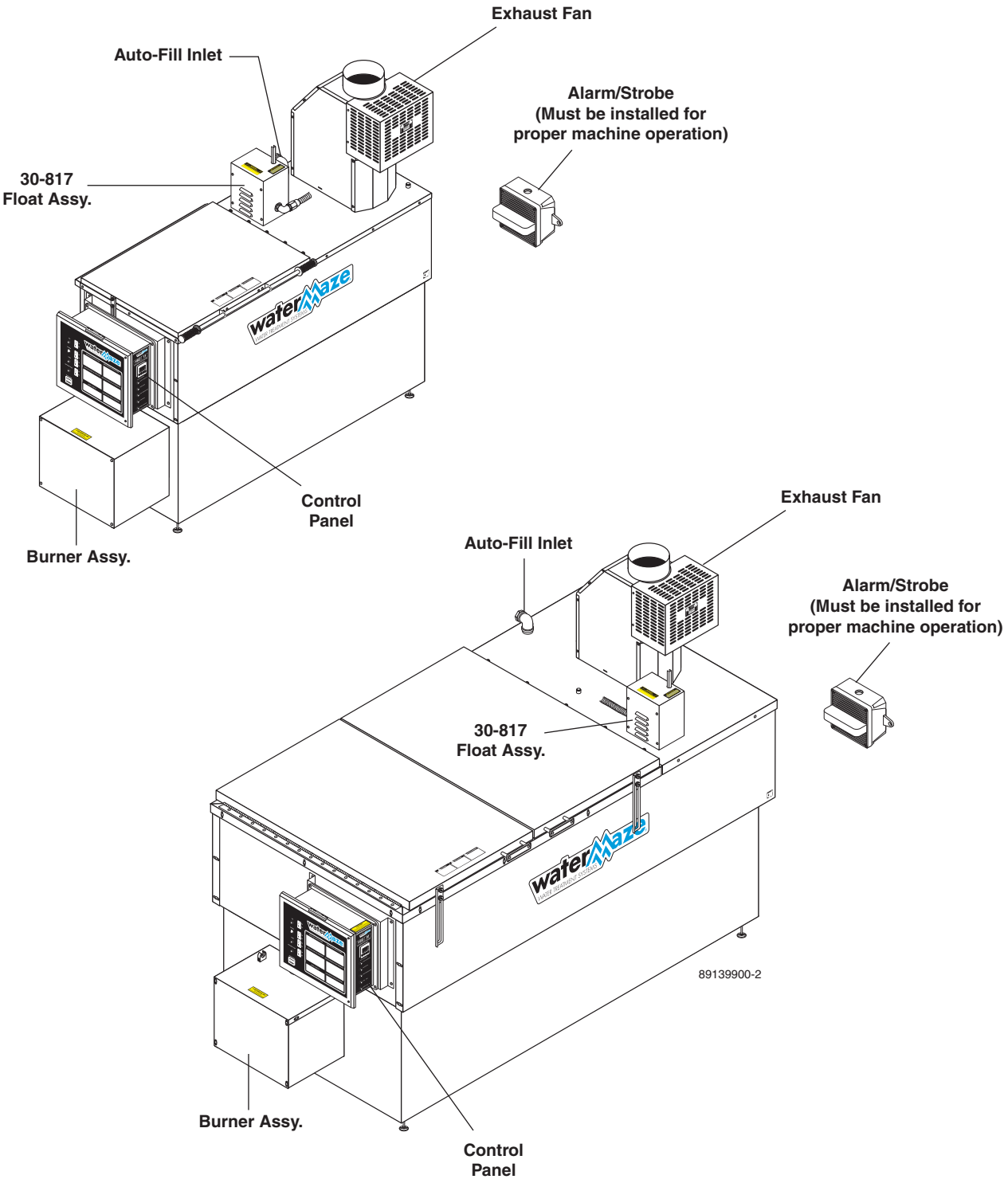
   Use a strain relief at the rear of the control panel for connecting to the main power supply. Electrical conduit must be run all the way to the connection point in accordance with local codes. To connect the power wires inside the electrical box, locate the wiring terminal strip and follow wiring diagram to make sure black wire is connected to the proper terminal. Connect the white neutral wire to terminal #N. Then connect the ground wire to the grounding stud on the back of the electrical box. Confirm that voltage is going to the correct terminals.

3. **AUTO FILL FLOAT** - Remove float wires from pump switch (black and white wires). With strain relief supplied, attach to wastewater tank near bottom and thread float wires through strain relief and tighten. **Note:** Leave at least a 3 inch tether from the strain relief for float to work correctly. Rewire float wires into pump switch.

4. **GAS PIPING** - All piping must comply with local codes and ordinances or the National Fuel Gas Code ANSI Z223. 1-1984 and NFPA No. 54. A sediment trap or drip leg must be installed in the supply line to the burner.

COMPONENT IDENTIFICATION

HBG-15 TOP
HBG-30 BOTTOM



A union shall be installed in the gas line adjacent to and upstream from the control manifold and downstream from the manual main shut off valve.

A 1/8" N.P.T. plugged tap accessible for test gauge connection shall be installed immediately upstream of the gas supply connection for the purpose of determining the gas supply pressure to the burner.

A manual shut off valve shall be installed in the gas supply line external to the appliance.

The gas line should be a separate supply direct from the meter to the burner. It is recommended that new pipe be used and located so that a minimum amount of work is required in future servicing. Piping should be durable, substantial and gas tight. It should be clear and free from cutting burrs and defects in structure or threading. Cast iron fittings or aluminum tubing should not be used for the main gas supply. Joint compounds (pipe dope) should be used sparingly on male threads only and be approved for all gases.

The building structure should not be weakened by installation of the gas piping. The piping should not be supported by other piping, but should be firmly supported with pipe hooks, straps, bands or hangers. Butt or tap welded pipe should not be bent.

The gas piping should be so installed as to prevent an accumulation of condensation and it must be protected against freezing. A horizontal pipe should be pitched so that it grades toward the meter and is free from sags. The pipe should not be run through or in an air duct or clothes chute.

The HBG and its individual gas valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures in excess of 1/2 psig.

TESTING PIPING FOR LEAKS - Before allowing gas under pressure into the 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. Be sure to relight all the gas pilots on other appliances.

PURGING - After the piping has been checked, all piping and appliances receiving gas through the meter shall be fully purged. A suggested method for purging the gas line to the burner is to disconnect the pilot line at the outlet of the pilot valve. Under no circumstances shall the line be purged into the combustion chamber.

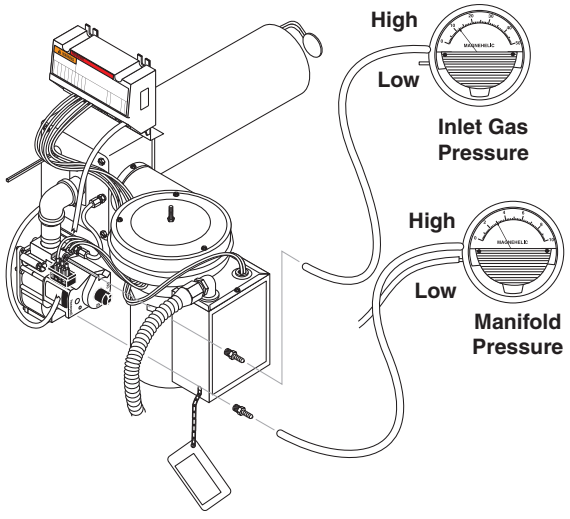
After the gas line to the burner has been fully purged and the pilot line reconnected, the gas supply at other pilot burners, located on other gas appliances which were extinguished as the result of interrupted service, shall be reignited.

GAS SUPPLY PIPE & PRESSURE - The burner gas valve will accept a 3/4" (HBG-30) and 1/2" (HBG-15) gas line.

The minimum inlet gas supply pressure is 6" W.C. for natural gas and 11.0" W.C. for L.P. gas; the maximum gas supply pressure is 14" W.C. for natural gas and L.P. gas (vapor). A regulator may be needed to obtain the required pressure. Refer to chart on page 12 for settings.

5. **WASTEWATER** - Wastewater is introduced into the evaporator using a bucket or the optional autofill pump. A 20 mesh stainless steel strainer protects the pump from debris. The connection between the above ground wastewater tank and the HBG machine is made by using a 3/4" I.D. or larger supply hose with common connectors supplied by the customer. The connection is located on the rear of the machine where the 20 mesh strainer is connected to the pump. *WATER MAZE* recommends the installation of a ball valve next to the strainer that will allow stoppage of the waste stream during maintenance. A 3" sludge valve 8.707-229.0 is recommended (not supplied) to allow easy removal of sludge and concentrated wastewater.

GAS PRESSURE TEST



HBG- 15 Burner

NOTE: The HBG optional autofill air diaphragm pump is automatically controlled by floats and will supply wastewater as needed after startup.

CAUTION: Foaming chemicals will affect the evaporation process in the HBG. An anti-foaming agent may need to be added to counteract the foam.

An automatic anti-foam dispenser can be used to automatically add anti-foam (8.906-074.0). Contact your *WATER MAZE* representative to purchase the defoamer best suited to your application. (Defoamer sold separately.)

6. **VENTING** - Each evaporator must have its own vent stack — A 6" vent pipe (HBG-15) and 10" vent pipe (HBG-30). The stack temperature will reach 650°F.

   Recommended Materials:

   1.Type L Vent Pipe

   2. Stainless Steel Pipe

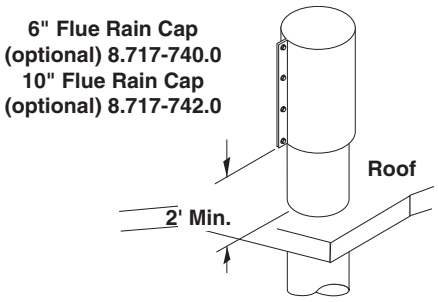
   3. Boiler Stacking

   NOTE: If possible, the stack should be a single piece. However, if the stack has seams, the seams must be sealed with duct sealant to prevent moisture leaks; since the exhaust is water saturated. A tube of RTV silicone will be supplied with each machine shipped for this purpose. Moisture leakage may result in damage to the HBG electrical systems. All stack installations must be performed only by qualified personnel.

   The top of the exhaust stack should be sufficiently high above the roof for proper dispersion of the exhaust. The stack should be unobstructed and in compliance with all local and federal codes. Avoid 90° bends in the stack. A straight stack is always best.

   A vertical discharge design should be used, together with a vertical rain diverter. A conventional rain cap is not recommended for the HBG because of induced back pressure. A vertical rain diverter is an oversized piece of stack material that is concentric with the stack. The diverter extends 6" down over the top of the stack to allow flexibility in positioning fasteners. Both rain protection and back pressure reduction is achieved with this design. This type of rain diverter can be purchased from your local dealer.

7. **Air Requirements** - An air compressor capable of delivering a minimum of 4 cubic feet per minute (CFM) of air at 60-100 psi to work the optional auto fill air diaphragm pump and air assisted defoamer system. **NOTE:** Air supply must be on at all times for machine to operate



PRE-START CHECK LIST

	YES	NO
Has gas supply been inspected by an authorized contractor to meet local codes?		
Has air supply hose been connected and adjusted?		
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 wastewater supply?		
Have all flammable liquids or gases been removed from the installation location?		
Is there adequate gas supply for the BTU rating of the burner?		
Is incoming gas supply pressure to the machine between 6-14 w.c.i. or 1/2 psig?		
Has the proper gas regulator been installed for pressure and volume?		
Is the machine properly vented to allow adequate flow?		
Are the propane tanks large enough, according to the rating of the machine, to prevent freezing?		
Have gas lines been checked for gas leaks?		
Have all operators using this machine been instructed properly and have they read the manual?		
Has the machine been installed according to the operator's manual instructions?		
Has wastewater pH been adjusted between 8 - 10?		

CAUTION: If "NO" has been checked on any of the above questions, do not operate the machine.

INSTALLING THE ALARM STROBE LIGHT ON THE HBG

ALARM STROBE INSTALLATION - Locate a position in which to install the strobe light assembly that will be visible to alert someone of this alarm.

CAUTION: Disconnect Power Before **Servicing.** From the terminal strip inside the machine's electrical box, connect a black and white 18 gauge wire (figure 1), then run them through conduit to the Alarm Strobe Light with Horn Assembly. These wires will be 120 volt!

Inside the strobe light assembly you will find 4 screw terminals. Install the 2 jumper wires included and wire per instructions provided with the strobe light assembly.

Connect the black wire to terminal #4 and the white wire to terminal #2 in the HBG electrical box per figure 1.

ATTENTION! The alarm/strobe supplied with this machine is specially designed to draw attention to abnormal conditions and alert employees. This device must be installed on the wall near the machine in clear view of the operator. See pages 6, 10 & 26 for instructions.

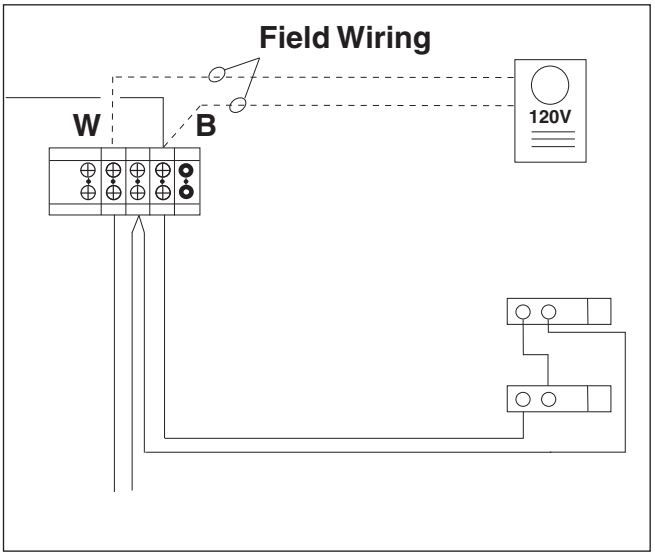


Figure 1

OPERATING INSTRUCTIONS

NOTE: If the waste stream being evaporated does not contain between 500-5000 mg/L of oil and you are using a mild steel tank, it is extremely important to add 1 quart of 20 to 40 weight chemical oil to the HBG-15 tank (2 quarts to the HBG-30 tank) each time maintenance is performed. This amount of oil will equal approx. 1/8" of oil on the top surface of the HBG liquid. This additive will impede corrosion. If this operation is not performed, the tank warranty will be void.

1. Supply the HBG-15/30 with 120 volts on a 15 amp service. **NOTE:** All supply voltage wires must be wired into the electrical box and connected to their respective terminal bar strip positions or grounding lugs. Refer to wiring diagram supplied with the machine. **Important to check wire polarity.**
2. Fill the evaporator tank with wastewater to the bottom of the top safety float. **WARNING:** If the HBG liquid level is too high, the high level safety float will not allow the machine to operate.
3. Turn the fan switch to the ON position.

   NOTE: The fan switch must be on for any other components to operate.
4. If equipped with the optional auto fill air diaphragm pump, confirm the wastewater inlet line is connected to the inlet filter garden hose swivel connector.
5. Confirm that the external normally open float with the auto fill option in the wastewater holding tank is in the up position. If the float is in the down position when the pump switch is in the auto position, the pump will not operate. If the pump switch is in the manual position the external float will be bypassed.
6. Push the pump switch to the "auto" position (auto fill option). The pump will turn on, filling the tank with wastewater. The top float inside the tank turns the pump "off."
7. Turn gas control valve knob to "ON".
8. Push the burner switch to the "ON" position. If the low water float is in the up position the burner begins the ignition process.

   NOTE: The low water float is controlled by a timer to alleviate the burner from being turned on and off due to boiling water agitation. When the low water float is moved from the down to the up position, the timer will initiate timing for 10 seconds before the burner is initiated.

The ignition process is as follows:

A. **Trial for pilot ignition:** The flame module checks that a safe start flame simulating condition exists. A fan proving switch proves the burner fan is operating. If it is not operating, the burner will not ignite.

B. **Pilot ignition:** The flame module opens the gas pilot valve. Simultaneously, the electronic spark generator ignites the pilot. Once the pilot has ignition, the electronic spark generator turns off. The pilot ignitor/sensor rod proves there is flame at the pilot. If there is no flame at the pilot the burner goes into a safety lockout period.

C. **Main flame ignition:** Once the burner pilot sensor is proven the main gas solenoid valve opens allowing full burner operation. If the flame goes out, the pilot electronic spark generator attempts to reignite the pilot.

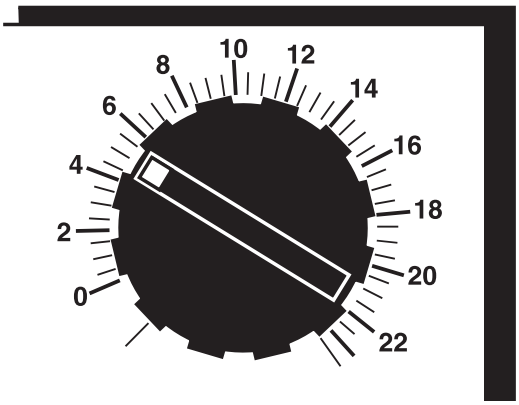
   NOTE: If the burner does not ignite, confirm the gas solenoid valve on/off switch is in the "ON" position and that the manual reset high temperature switch has not tripped due to low water or high solids build up inside the HBG tank. The reset button is on the back of the control box.

9. Remove the plug at the gas solenoid valve manifold and install a hosebarb fitting. Attach a 0-10" W.C. manometer. With the burner operating, adjust the regulator valve to the proper setting according to the chart below.
10. When the predetermined batch cycle count has been reached and after maintenance has been performed, restart the machine by pushing the reset button on the batch cycle counter labeled F1/RST.
11. To operate the optional oil skimmer, turn the burner to the "OFF" position allowing oil to float to the top of the tank. Lift the tank lid and attach the oil skimmer to the outer wall of the tank. Allow the stainless belt to pick up all the floating oil in the wastewater tank. Place a bucket under the downspout of the oil skimmer to collect the oil.

    The evaporator will operate continuously until 1) the batch controller hits its predetermined number of batch cycles. 2) the water gets too low in the wastewater holding tank (auto fill option). 3) the water level in the wastewater tank causes the bottom float to trip off the burner. Once the liquid level float has risen, the burner will automatically restart.

SETTING LIMIT CONTROL

Adjust the high limit control temperature accordiningly.



500° for HBG-15 & HGB-30

MAINTENANCE

CAUTION: Use protective gloves, goggles and any other protective clothing required by law for chemicals mixed with the waste stream.

The HBG does not require a lot of maintenance, but it does require consistent maintenance. The frequency of maintenance varies depending on what is in the water that is being evaporated.

General maintenance consists of removal of sludge from the bottom and removal of any floating oil at the top of the evaporation tank.

WARNING - Shut down the HBG and allow it to cool before performing any maintenance. Do not allow pump to run longer than 5 minutes without water. Disconnect all hoses to allow water to drain.

OIL REMOVAL - If you have excess floating oil in the evaporation tank liquid that needs to be removed, shut down the HBG and let the oil float to the top. Attach oil skimmer to side of tank and plug into own power source. Turn on the oil skimmer and collect oil in a bucket.

SLUDGE REMOVAL - Remove the lower 3" sludge drain cap on the side of the evaporator allowing sludge and water to escape. Use a small shovel to remove the residual sludge from the bottom of the tank. Removing the sludge and cleaning the floor of the evaporator will greatly improve the evaporation rate.

NOTE: Allowing sludge to accumulate on the floor of the HBG can cause warpage, corrosion and or heat stress to the floor. A build-up of solids will cause the manual reset high temperature switch to trip not allowing the burner or pump to operate. Remove the sludge, refill the tank and restart the machine.

WARNING: Allowing sludge to build up on the inside floor of the HBG can cause warpage to the floor of the tank and will void the warranty.

DRAFT INDUCER: On a monthly maintenance schedule, cleaning of the fan blade fins and exhaust stacking must be done to remove any sludge build-up that can reduce the evaporation efficiency. To clean the fan blade fins, start with the water cool and the fan switch on the control panel in the off position. Next, remove the six tek screws that attach the fan to the stack. Pull the inducer fan away from stack and scrape debris from blade fins. On reassembly, place a small bead of high heat silicone around the outer edge of the inducer housing on each tek screw to seal out any possible air leaks.

WEEKLY MAINTENANCE

1. Turn all power switches to the "OFF" position.
2. Allow the wastewater to cool.
3. Position a sludge container under the sludge valve. Open the sludge valve and remove the remaining waste liquid.
4. After every batch is complete, scrape the floor and interior walls of the HBG tank, transferring the sludge into the sludge container.
5. Remove any buildup that has accumulated on the exterior of the tank and exhaust pipe.
6. Clean the liquid level floats, remove any accumulation that may coat the floats and not allow them to move freely.
7. Clean all three wastewater filter screens if auto fill option is installed. (i.e. both inlet strainers and one underneath the Parker solenoid brass cap)
8. If the evaporator is not in use at least twice per week, then clean out and rinse with fresh water, and let sit empty.
9. Check tank and lid for corrosion after each complete batch.

SEMI ANNUAL MAINTENANCE

1. Check auto fill pump for proper pressure, flows and electrical capacities.
2. Check auto fill floats for proper operation.
3. Oil the draft inducer motor bearings. Oil holes are provided at front and rear faces of motor. ***CAUTION:*** Not more than 3 drops of S.A.E. 20 oil should be used.
4. Check tank and lids for corrosion.
5. Check burner for proper operation and gas pressure.

AUTO FILL OPERATING CHARACTERISTICS

The auto fill option consists of two level control switches which control the fill pump. The lower level switch turns the pump on. As the water level raises, the upper level switch turns the pump off. The evaporator then evaporates the water, which in turn lowers the water level past the lower level switch, which turns the pump on and starts the fill process.

NOTE: To engage the auto fill feature, push the pump switch to auto. This will allow the pump to be controlled by the auto fill float level switches. Pushing the pump switch to manual will bypass the external N/O tethered float in the wastewater holding tank.

AIR ASSISTED DEFOAMER OPERATING CHARACTERISTICS

The air assisted defoamer option consists of a metering pump drawing up defoamer and a solenoid controlling the air injecting the defoamer through a fan nozzle located inside the wastewater tank. Set the three position switch to "auto" and defoamer will then be injected every time the machine refills. If more defoamer is needed, turn adjustment screw, located under cover plate in front of pump, clockwise to increase pump speed. Injecting manually is also available. **NOTE:** The air pressure needed to operate the defoamer must not exceed 2 psi.

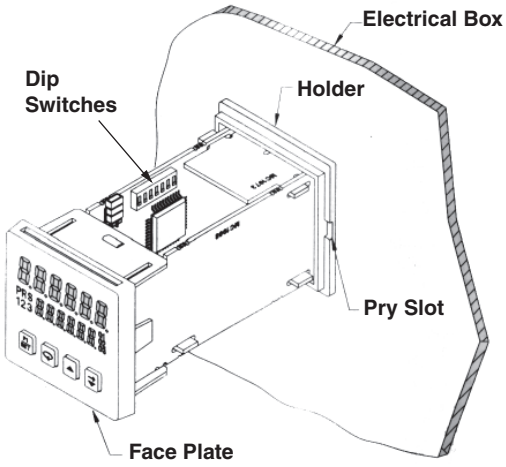
HBG FUEL AND AIR SETTINGS

Natural Gas	GPH	Gas Orifice	Inlet Gas Supply Pressure	Man. Pressure	Air Setting
HBG-15D	10 - 15	G (.261)	4.5 - 14 WCI	3 WCI	Open Draft Wheel 6 Full Turns
HBG-30D	25 - 30	T (.468)	5.5 - 14 WCI	3 WCI	Draft Open to 4
Liquid Propane	**GPH**	**Gas Orifice**	**Inlet Gas Supply Pressure**	**Man. Pressure**	**Air Setting**
HBG-15D	10 - 15	#22 (.157)	11 - 14 WCI	5 WCI	Open Draft Wheel 6 Full Turns
HBG-30D	25 - 30	Q - (.332)	5.5 - 14 WCI	5 WCI	Draft Open to 8

Batch Cycle Counter Quick Reprogramming Instructions

1. Pull face plate of batch cycle counter out of its holder in electrical box with your fingers . Dip switch #7, located along left side (wall) of circuit board, needs to be switched to the down (OFF) position. This will allow for reprogramming. Slide batch counter back into its holder.
2. Press ⬭ button until LED screen in green shows (PRS 1 #02). Push the ▲ or ⩢ button until the new batch cycle count appears in green. Then press the ⬭ button once to save the setting for preset 1.
3. Press ⬭ button once more. The LED screen in green will show (PRS 2 #02). Push the ▲ or ⩢ until the value in green is the same value in preset 1. Press ⬭ button to save setting for preset 2.
4. Remove batch cycle counter once again from its holder in the electrical box. Change the setting on dip switch #7 to the up (ON) position. Slide the batch counter back into its holder in the electrical box.

NOTE: # stands for batch count value



Function Settings

F1 RST **Reset Button.** Push to restart machine after batch cycle completed.

⬭ **Scroll Button.** Push to select the different programming modes. Also saves program values.

▲ **Vertical Scroll** changes programming values.

⩢ **Horizontal Scroll** for multiple values. Also changes programming values.

INITIAL PROGRAMMING OF BATCH CYCLE COUNTER

Function Settings

F1 RST **Reset Button**. Push to restart machine after batch cycle completed.

Scroll Button. Push to select the different programming modes. Also saves program values.

▲ **Vertical Scroll** changes programming values.

▼ **Horizontal Scroll** for multiple values. Also changes programming values.

NOTE: Original batch counter has been preset at factory.

Programming

1. Press and hold button for 2 seconds. **(Entry)** will appear in red. **(Auto Sc)** will appear in green. No change is necessary.

2. Press button once, **(Ac PSc)** will appear in red. **(-L)** will appear in green and does not need to be changed.

3. Press button, **(PSc ALr)** will appear in red. **(1.00000)** will appear in green and does not need to be changed.

4. Press button, **(dEc Pt)** will appear in red. **(------)** will appear in green. This value can't be changed.

5. Press button, **(Cnt In)** will appear in red. **(Cl-ud)** will appear in green. No change is necessary.

6. Press button, **(OPEr 1)** will appear in red. **(11)** will appear in green. Press ▼ button until **(1)** is showing.

7. Press button, **(C2 ASn)** will appear in red. **(bAtch)** will appear in green. No change is necessary.

8. Press button, (**OPEr 2)** will appear in red. **(1)** will appear in green. No change is necessary.

9. Press button, **(Ac PrS)** will appear in red. **(-y-y-y)** will appear in green. Press ▼ button until the far left **(-y)** value is blinking. To change, press ▲ button until **(-L)** is showing. Press ▼ once, the middle **(-y)** value will blink. Press ▲ button until (-n) is showing. Press ▼ button once more and the far right **(-y)** will blink. Press s button until **(-n)** is showing.

10. Press button, (**PrESEt)** will appear in red. The value to set is predetermined from the wastewater analysis. This value is known as PRS1 (Preset 1). Press the ▲ or ▼ buttons to set the batch cycle value.

11. Press button, (**PrESEt)** will appear in red. This value, PRS2 (preset 2), must be set with the same value as (preset 1). Press the s or ▼ buttons to set value.

12. Press button, (**PrESEt)** will appear in red. This is (preset 3) and must be set with the value **999999.** Press and hold the ▲ button until achieved.

13. Press button, **(P1tr Ac)** will appear in red. Value **(no)** will appear in green. No change is necessary.

14. Press button, **(Ac Out)** will appear in red. **(-L-L-L)** will appear in green. No change is necessary.

15. Press button, **(OutrES)** will appear in red. **(0.01SEC)** will appear in green. No change is necessary.

16. Press button, **(OutPut**) will appear in red. **(1t 0.10)** will appear in green. No change is necessary.

17. Press button, **(OutPut)** will appear in red. **(2t 0.10)** will appear in green. No change is necessary.

18. Press button, **(OutPut)** will appear in red. **(3t 0.10)** will appear in green. No change is necessary.

19. Press button, **(rEUOut)** will appear in red. **(-n-n-n)** will appear in green. Press ▼ button until middle **(-n)** value is blinking. Press ▲ button until **(-y)** value is showing.

20. Press button, **(rEUAnu)** will appear in red. **(-n-n-n)** will appear in green. No change is necessary.

21. Press button, **(OutP.uP)** will appear in red. **(PPP)** will appear in green. Press ▼ button until left **(P)** value is blinking. Press ▲ button until **(P)** value appears. Do the same for center and right, all values should read (-P)

22. Press button, **(USr In 1)** will appear in red. **(rSt. -L)** will appear in green. Press ▲ button until **(Pro.dis)** appears.

23. Press button, **(USr Fl)** will appear in red. **(rst-L)** will appear in green. No change is necessary.

24. Press button, **(CodE)** will appear in red. Value **(0)** will appear in green. No change is necessary.

25. Press button, **(ScroLL)** will appear in red. **(no)** will appear in green. No change is necessary.

26. Press button, **(FAcSEt)** will appear in red. **(no)** will appear in green. No change is necessary.

27. Press and hold button for 2 seconds. **(Prog)** will appear in red and **(SAVE)** will appear in green.

To complete setting the batch counter, first pull the face plate of the batch counter out of its holder with your fingers. This will expose the internal circuit boards. Along the left side (wall) circuit board are the dip switches. These switches are numbered 1 through 7. Switches 2, 5, and 7 need to be in the up (ON) position.

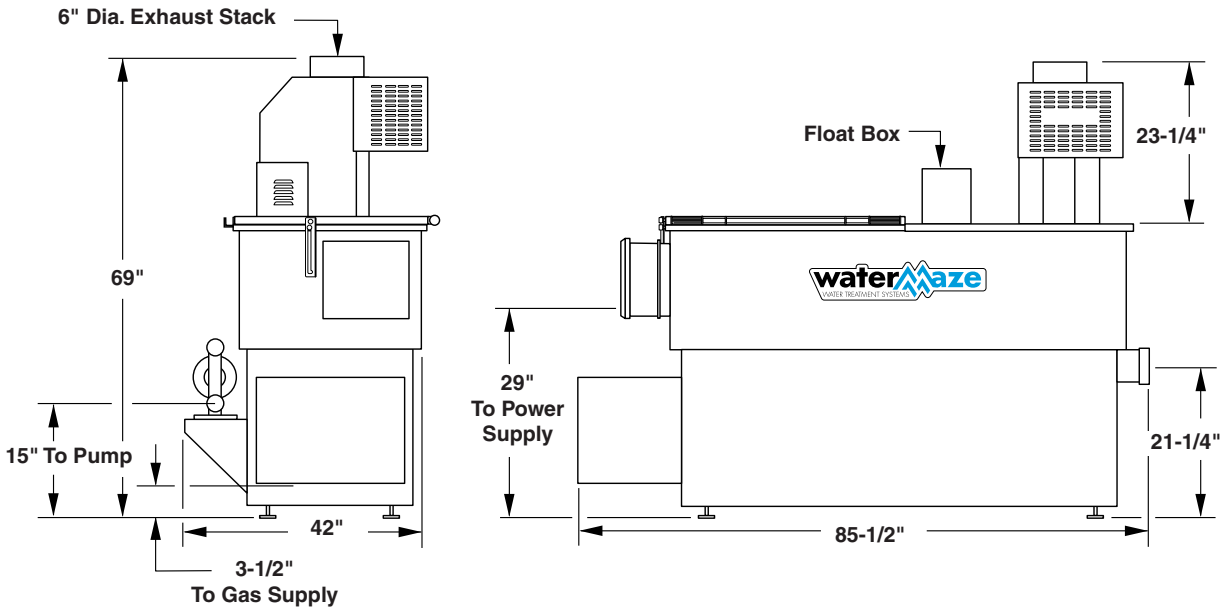
Slide the batch counter back into its holder. Initial programming of the batch cycle controller is now complete.

(**NOTE**: Programming cannot be performed if dip switch #7 in the up (ON) position). If adjustment to the batch cycle count value is to be reprogrammed, dip switch #7 needs to be in the down (OFF) position. When reprogramming is complete, set dip switch #7 back to the up (ON) position).

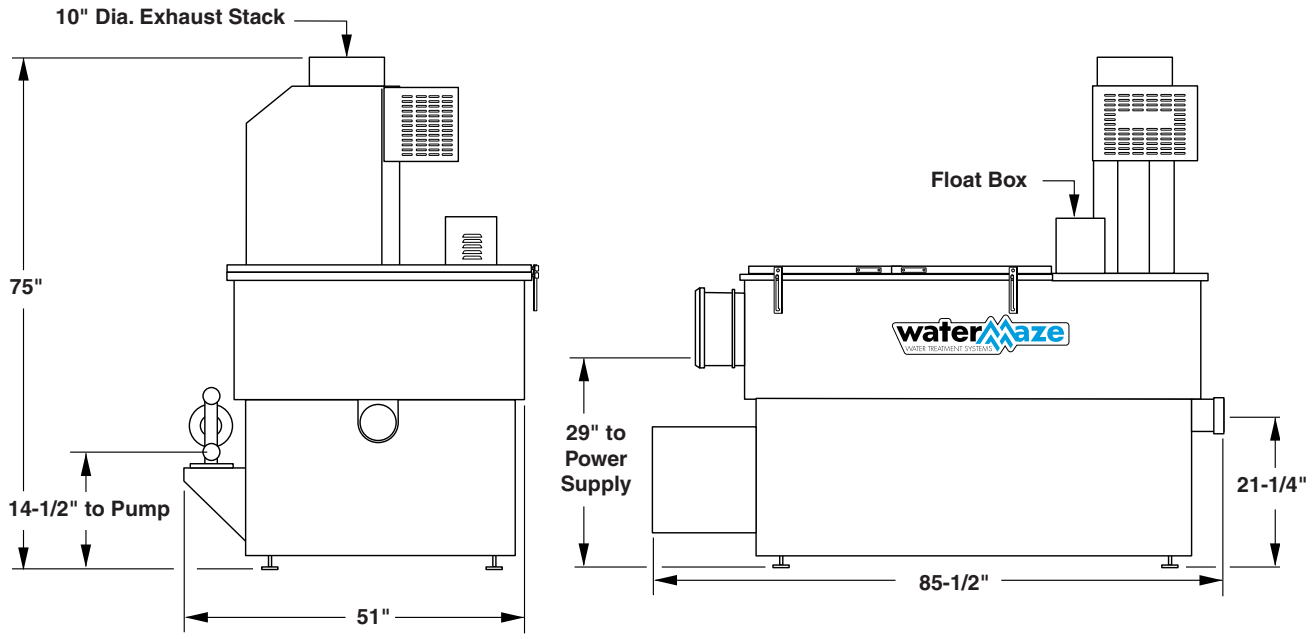
SETTINGS CHART	
MODE	VALUE SETTING
Entry	Auto Sc
Ac PSc	-L
PSc ALr	1
dEc In	------
Cnt Pt	CI-ud
OPEr I	1
C2 ASn	bAtch
OPEr 2	1
Ac PrS	-L-n-n
PrESEt	Customer batch cycle value
PrESEt	Customer batch cycle value
PrESEt	999999
PltrAc	no
Ac Out	-L-L-L
OutrES	0.01SEC
OutPut	1t 0.10
OutPut	2t 0.10
OutPut	3t 0.10
rEUOut	-n-y-n
rEUAnu	-n-n-n
OutP.uP	-P-P-P
USr InI	Pro.dis
USr FI	rst-L
codE	0
Scroll	no
FacSEt	no
Dip switches 2, 5, 7 are set in up (ON) position	

INSTALLATION DIMENSIONS

HBG-15 HBG-30

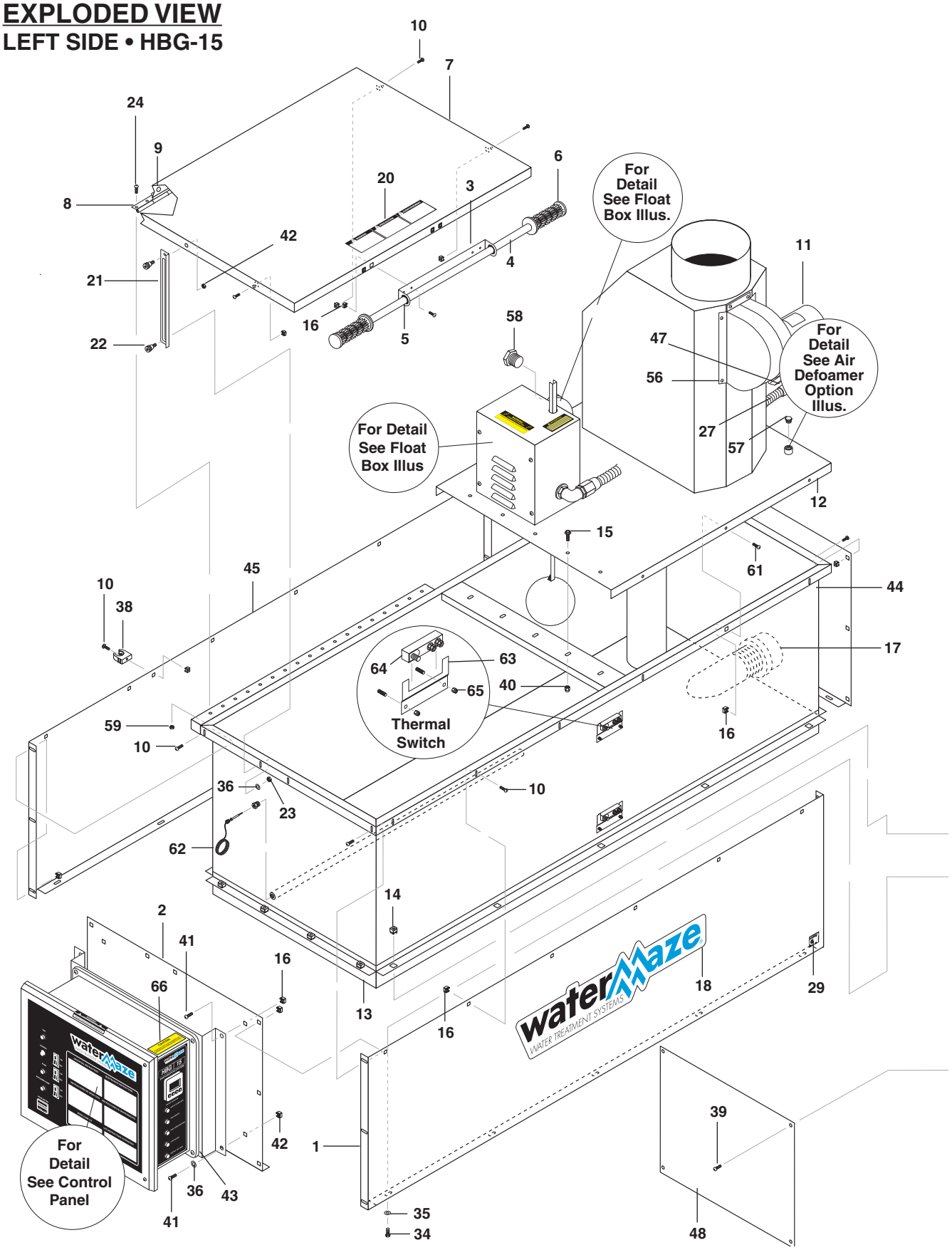


HBG-15

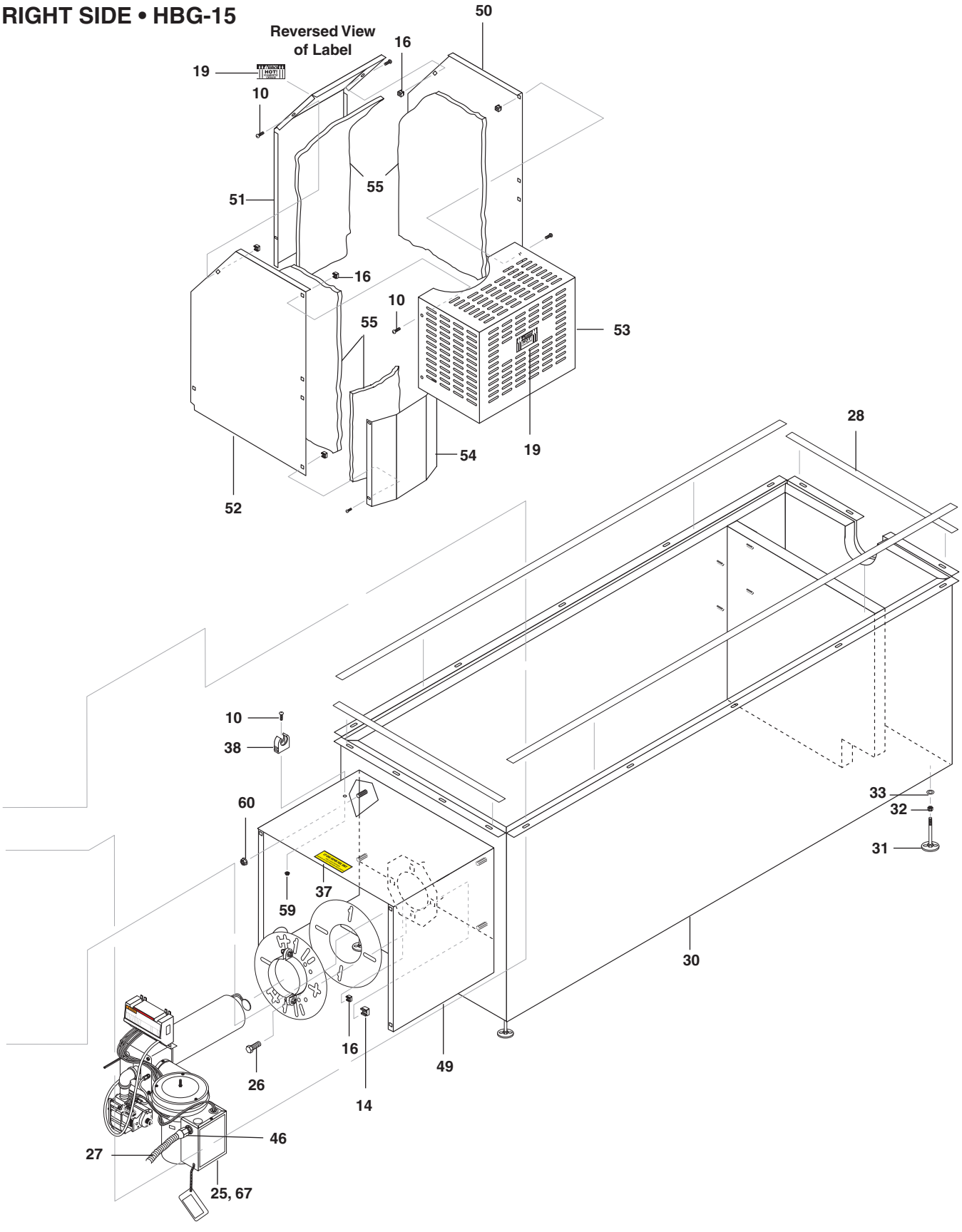


HBG-30

EXPLODED VIEW
LEFT SIDE • HBG-15



EXPLODED VIEW
RIGHT SIDE • HBG-15



HBG-15 EXPLODED VIEW
PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.913-200.0	Panel, Front	1
2	8.913-201.0	Panel, Right Side	1
3	8.913-042.0	Bracket, Handle	1
4	8.913-041.0	Handle, Lid	1
5	9.803-049.0	Snap Bushing, 7/8"	2
6	8.706-572.0	Grip, 7/8" Handle	2
7	8.913-043.0	▲ Lid, Top Inside Shell, 316L SS	1
	8.913-045.0	Lid, Hinged Outside Shell	1
	8.717-383.0	▲ Insulation, Rigid Foam, /Sq Ft, 1/2" x 24" x 33"	6 sf
	8.707-404.0	▲ Pad, HBG Lid, 1/4"	2
8	8.919-841.0	Hinge, 29.5", Door, SS	1
9	8.719-053.0	Rivet, 1/4" x 3/8" Grip, Blind SS	15
10	8.718-812.0	Screw, Cap 10/32" x 3/4" BH, HF, SS, Soc	52
11	8.715-192.0	Fan, Draft Inducer, D-3	1
12	8.913-199.0	Panel, Top, 316L SS	1
	8.717-738.0	▲ Flue Adapter, 6"	1
13	8.913-195.0	Tank Assembly, Carbon Steel	1
	8.913-196.0	Tank Assembly, 316L SS	1
	8.913-197.0	Tank Assembly, AL-6XN SS	1
	8.913-178.0	▲ Shovel, Clean Out	1
14	9.802-792.0	Nut, Cage, 3/8" x 12 Gauge	22
15	8.718-753.0	Screw, 1/4"-20 x 3/4" Phil PH SS M/S	5
16	9.802-791.0	Nut, Cage, 10/32" x 16 Ga.	55
17	8.706-258.0	Pipe, Cap, 3" Black Pipe	1
	8.706-261.0	Pipe, Cap, 3", 316LSS	1
	8.707-229.0	▲Valve, 3" Brass, Ball (Optional)	1
18	8.900-841.0	Label, Water Maze Logo	1
19	9.800-006.0	Label, Hot/Caliente	2
20	8.900-584.0	Label, Steam Warning	1
21	8.913-176.0	Support, Lid Lock, HBG	1

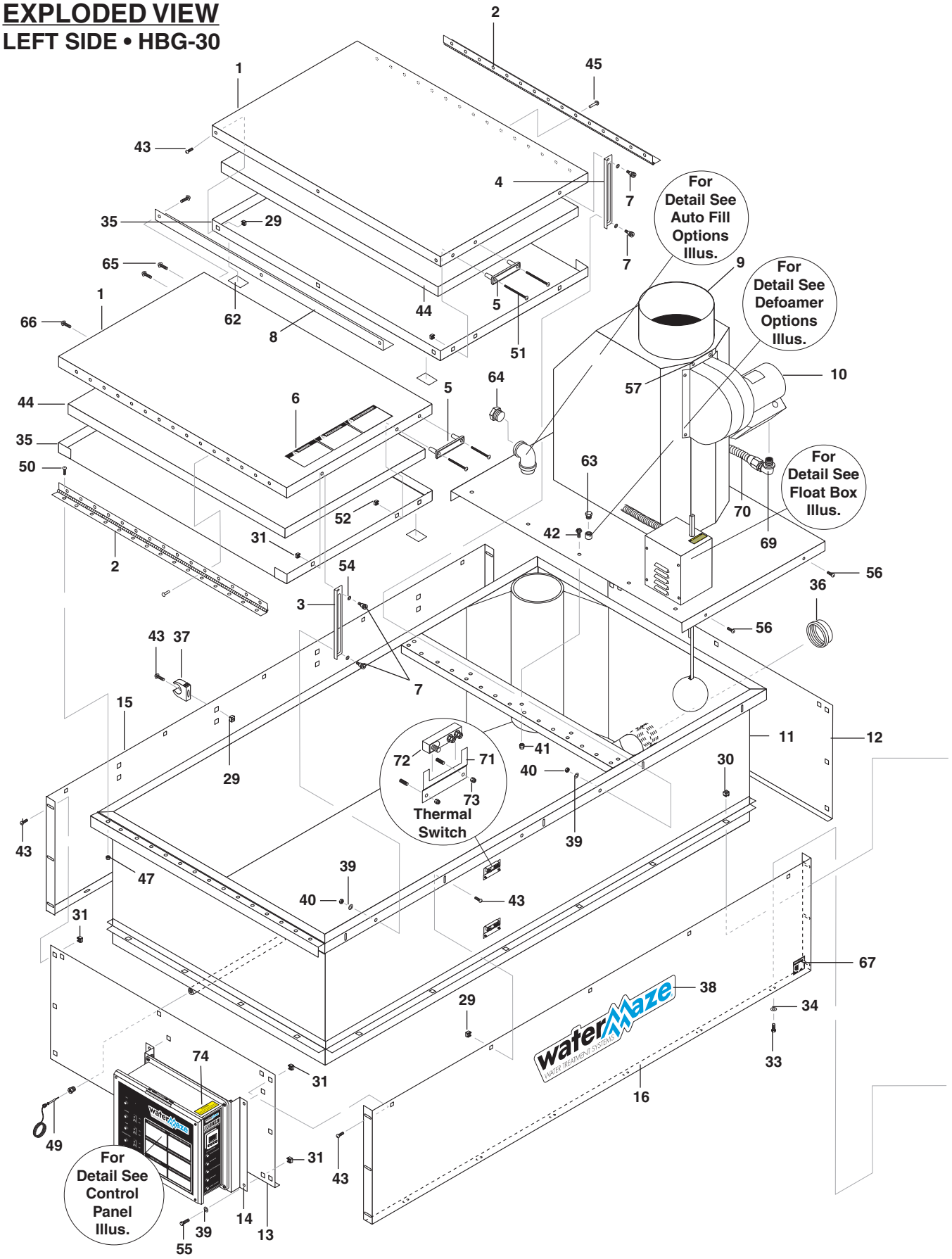
ITEM	PART NO.	DESCRIPTION	QTY
22	8.718-785.0	Bolt, 3/8" x 3/8" x 3/8" SCKT	2
23	9.802-776.0	Nut, 5/16" ESNA	1
24	8.718-813.0	Screw, 10/32" x 1/2" BH SOC, SS	15
25	8.717-099.0	Burner, P-250 AFEP, NG	1
	8.717-101.0	Burner, P-250 AFEP, LPG	1
26	9.802-767.0	Screw, 3/8" x 3/4" HH, NC Whiz	4
27	9.802-448.0	Conduit, Wtr Tight, Flex 1/2"	12.5 ft
28	8.717-434.0	Insulation, 1" x 2"	2.39 sf
29	8.900-313.0	Label, Assembled in USA	1
30	8.913-198.0	Fire Box W/Insulation	1
31	9.803-138.0	Leveling, Foot Assembly	4
32	9.802-790.0	Nut, 1/2" Hex	4
33	9.803-517.0	Washer, 1/2" Lock	4
34	9.802-721.0	Bolt, 3/8" x 1", NC HH SS	18
35	9.802-808.0	Washer, 3/8" SS Flat	18
36	8.718-980.0	Washer, 5/16"	5
37	8.932-963.0	Label, Liquid Propane	1
	8.932-964.0	Label, Natural Gas	1
38	9.802-203.0	Clamp, 1/2" RO, Clip	10
39	9.802-759.0	Screw, 10/32" x 1/2", BHSOC	4
40	9.802-774.0	Nut, 1/4" ESNA, SS	5
41	8.718-618.0	Bolt, 5/16" x 3/4"	4
42	8.718-903.0	Nut, 5/16" x 12 Gauge, Black	5
43	8.913-204.0	Bracket, Electric Box	1
44	8.913-171.0	Panel, Left Side	1
45	8.913-202.0	Panel, Rear	1
46	8.716-547.0	Connector, 1/2" L/T St	1
47	9.802-517.0	Connector, 1/2 L/T 90°	1
48	8.913-205.0	Lid, Burner Cover	1
49	8.913-203.0	Cover, Burner Assembly	1
50	8.913-253.0	Side Panel, Left, Plenum Heat Shield	1

HBG-15 EXPLODED VIEW
PARTS LIST (CONTINUED)

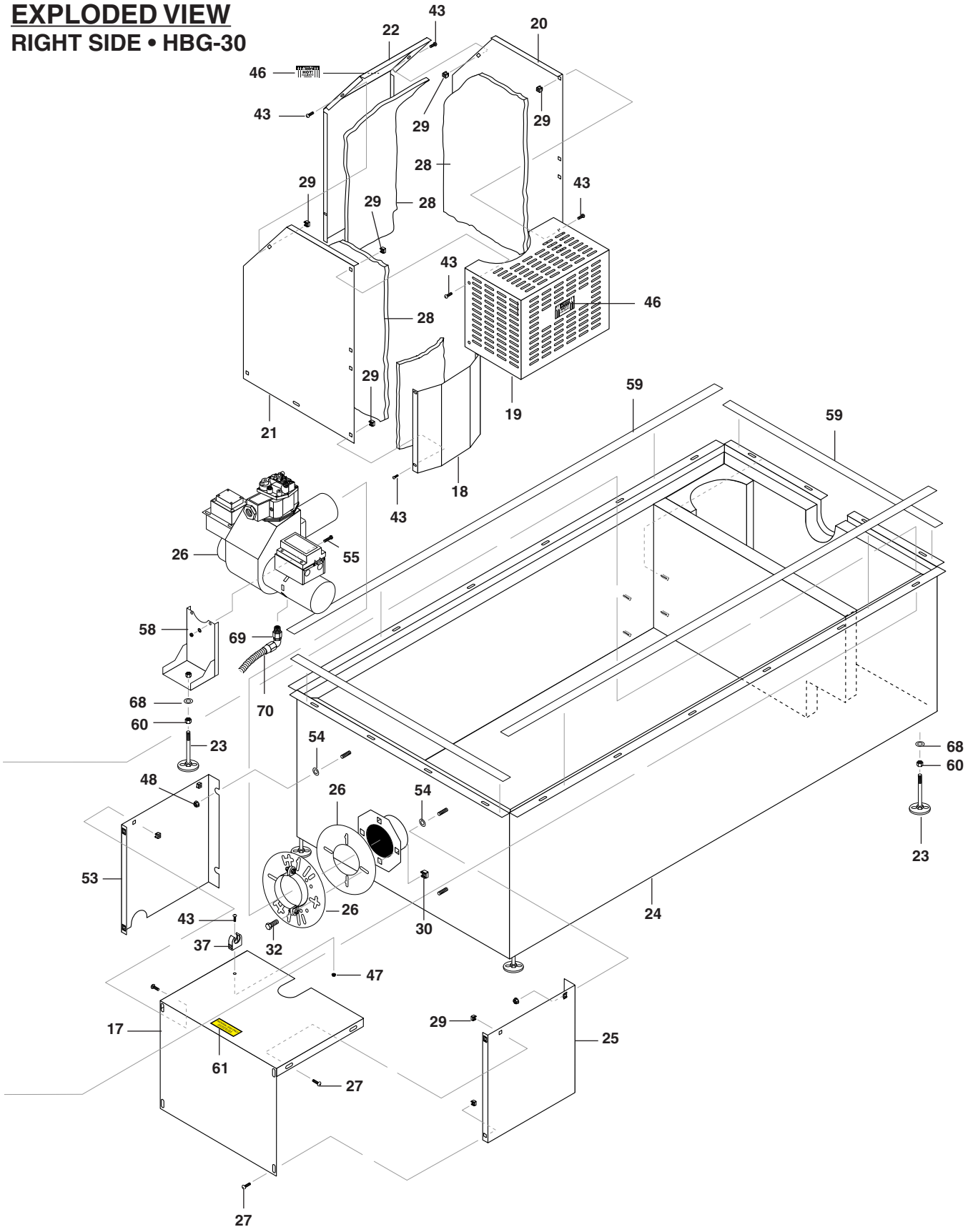
ITEM	PART NO.	DESCRIPTION	QTY
51	8.913-256.0	Cover, Plenum, Heat Shield	1
52	8.913-254.0	Side Panel, Right, Plenum Heat Shield	1
53	8.913-257.0	Cover, Fan Shield	1
54	8.913-255.0	Lower Cover, Plenum Heat Shield	1
55	8.717-415.0	Insulation, Blanket - No Foil, 1/2" x 24" /sq ft	6
56	8.718-942.0	Screw, #12 x 3/4", TEK	6
57	8.706-246.0	Plug, 1/4" Allen Countersunk	1
58	8.706-254.0	Plug, 1" Black Hex Head	1
59	9.802-696.0	Nut, 10/32" NF ST ST KEPS	16
60	9.802-781.0	Nut, 3/8" Whiz Loc	4
61	8.718-814.0	Screw, 10/32" x 1-1/4" BH NC SS	9
62	8.712-175.0	Thermocouple SS Sheath, 34"	1
63	8.913-271.0	Tab, Pinch	2
64	8.712-177.0	Switch, Thermal	2
65	8.718-817.0	Nut, 1/4"-20 Whiz-Loc	4
66	8.900-853.0	Label, Batch Warning	1
67	8.718-197.0	ORIFICE, #22 (.156), LPG, P-250 Wayne (LP Option Only)	1

▲ Not Shown

EXPLODED VIEW
LEFT SIDE • HBG-30



EXPLODED VIEW
RIGHT SIDE • HBG-30



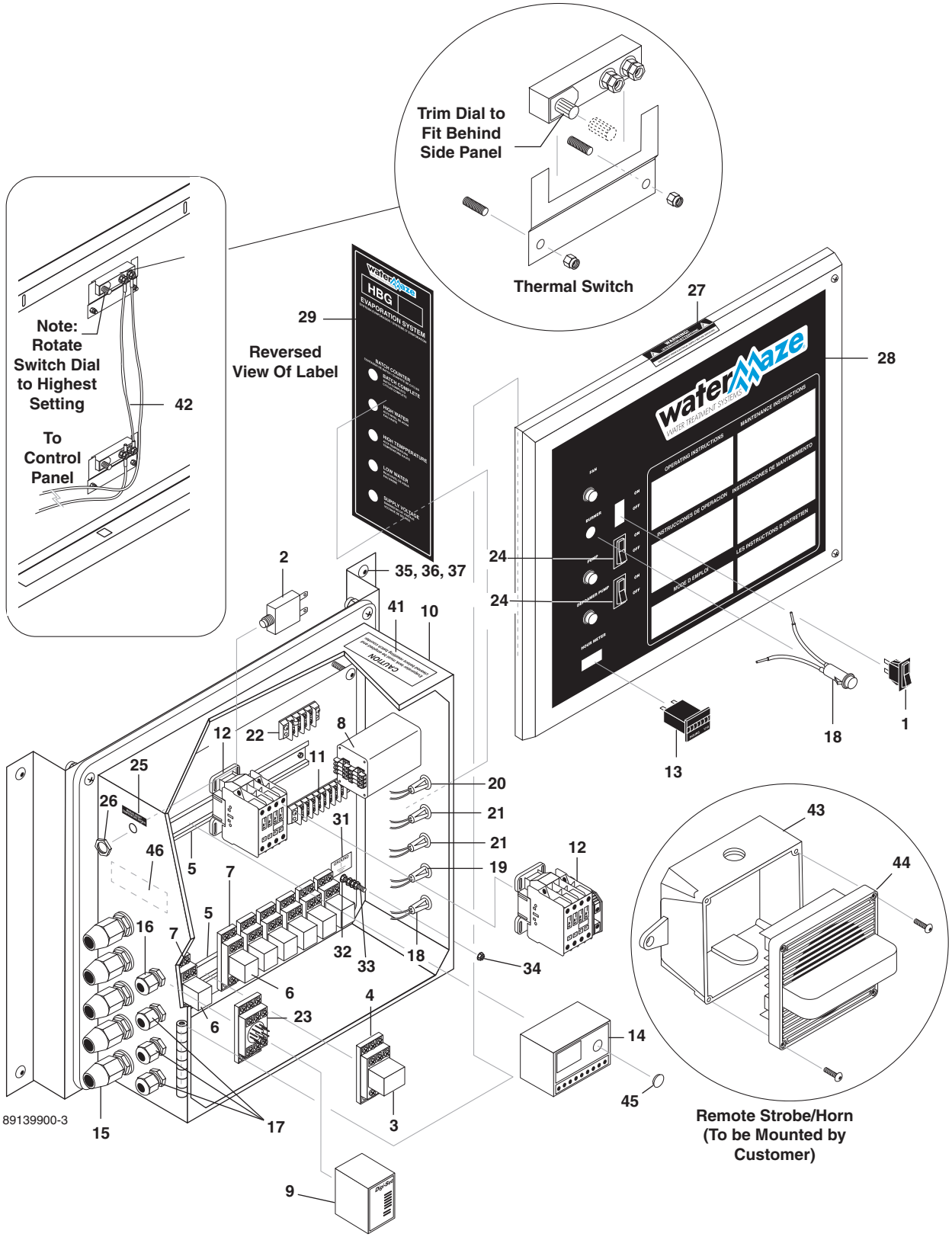
HBG-30 EXPLODED VIEW
PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.913-231.0	Lid, Top	2
2	8.919-841.0	Hinge, 29.5", Door, SS	2
3	8.913-176.0	Support, Lid, HBG	1
4	8.913-240.0	Support, Lid, HBG	1
5	8.706-684.0	Handle, Lid SJ	2
6	8.900-584.0	Label, Steam Warning, Hot Box	1
7	8.718-785.0	Screw, 3/8" x 3/8", SCKT, SHDR	4
8	8.913-235.0	Guard, Splash	1
9	8.913-242.0	Assy, Top Panel, 316L SS	1
	8.753-494.0	▲ Start Collar, 12"	1
10	8.715-192.0	Fan, Draft Inducer D-3,	1
11	8.913-223.0	Assy, Tank, Carbon Steel	1
	8.913-224.0	Assy, Tank 316L SS	1
	8.913-225.0	Assy, Tank, AL-6XN	1
	8.913-178.0	▲ Shovel, Clean-Out	1
12	8.913-265.0	Panel, Drain End	1
13	8.913-264.0	Panel, Burner End	1
14	8.913-204.0	Bracket, Electrical Box	1
15	8.913-263.0	Panel, Rear	1
16	8.913-266.0	Panel, Front	1
17	8.913-270.0	Top, Burner Cover	1
18	8.913-250.0	Lower Cover, Plenum Heat Shield	1
19	8.913-252.0	Cover, Fan Shield	1
20	8.913-249.0	Panel, Right Side	1
21	8.913-248.0	Panel, Left Side	1
22	8.913-267.0	Cover, Plenum	1
23	9.803-138.0	Foot, Leveling	5
24	8.912-120.0	Assy, Fire Box	1
25	8.913-268.0	Wall, Burner Cover, Left	1
26	8.717-100.0	Burner, Wayne, HSG-400	1
27	9.802-759.0	Screw, 10/32" x 1/2" BHSOC	8
28	8.717-415.0	Insulation, Blanket, No-Foil, 1/2" x 24" /sq. ft.	10
29	9.802-791.0	Nut, Cage, 10/32" x 16 Gauge	66
30	9.802-792.0	Nut, Cage, 3/8" x 12 Gauge	24
31	8.718-903.0	Nut, Cage, 5/16" x 12 Gauge	8
32	9.802-767.0	Screw, 3/8" x 3/4" HH NC Whiz Loc	4
33	9.802-721.0	Bolt, 3/8" x 1" HH/NC, 316 SS	20
34	9.802-808.0	Washer, 3/8" S/S Flat	20
35	8.913-226.0	Lid, Bottom, 16 Gauge 316L	2
36	8.706-258.0	Cap, Pipe, 3" Black Pipe	1
	8.706-261.0	Cap, Pipe, 3" 316L SS	1
	8.707-229.0	▲ Valve, 3" Brass (Optional)	1
37	9.802-203.0	Clip, Conduit	12
38	8.900-841.0	Label, Water Maze Logo	1
39	8.718-980.0	Washer, 5/16" Flat	10
40	9.802-776.0	Nut, 5/16" ESNA	2
41	9.802-774.0	Nut, 1/4" ESNA, SS	5
42	8.718-753.0	Screw, 1/4"-20 x 3/4" Phil, PH, SS, M/S	5
43	8.718-812.0	Screw, Cap, 10-32 x 3/4"	50
44	8.717-383.0	Insulation, Rigid Foam, /Sq Ft 1/2" x 23.5" x 35" (Note: 6 Sq Ft/ Lid)	12 sf
45	8.719-053.0	Rivet, 1/4" x 3/8" Grip, Blind SS	30
46	9.800-006.0	Label, Hot/Caliente	2
47	9.802-696.0	Nut, 10-32, SS	31
48	9.802-781.0	Nut, 3/8" Whiz Loc	4
49	8.712-175.0	Thermocouple, SS Sheath, 34"	1
50	8.718-813.0	Screw, 10-23 x 1/2" BH, SOC SS	30
51	8.718-729.0	Screw, 1/4"-20 x 2" SHCS, Zinc	4
52	9.802-793.0	Nut, Cage, 1/4" x 16 Gauge	8
53	8.913-269.0	Wall, Burner Cover, Right	1
54	9.802-807.0	Washer 3/4" Flat	6
55	8.718-618.0	Bolt, 5/16" x 3/4" NC	6
56	8.718-814.0	Screw, 10/32" x 1-1/4" BH SOC SS	8
57	8.718-942.0	Screw #12 x 3/4" TEK	6
58	8.913-258.0	Assy Bracket, Burner Support	1
59	8.717-434.0	Insulation, 2" x 1",	3.1 sf
60	9.802-790.0	Nut, 1/2" Hex NC	5
61	8.932-964.0	Label, Natural Gas	1

HBG-30 EXPLODED VIEW
PARTS LIST (CONT)

ITEM	PART NO.	DESCRIPTION	QTY
62	8.707-404.0	Pad, Hot Box Lid, 1/4 Neoprene	4
63	8.706-246.0	Plug, 1/4" Allen Countersunk	1
64	8.706-254.0	Plug, 1" Black Hex Head	1
65	9.802-760.0	Screw, 1/4" x 1/2" BH SOC	4
66	9.802-708.0	Screw 5/16" -18 x 3/4"	2
67	8.900-313.0	Label, Assembled in USA	1
68	9.803-517.0	Washer	5
69	9.802-517.0	Connector, 1/2" L/T 90°	2
70	9.802-448.0	Conduit WTR Tight Flex 1/2	15 ft.
71	8.913-271.0	Tab, Pinch	2
72	8.712-177.0	Switch, Thermal	2
73	8.718-817.0	Nut, 1/4"-20 Whiz Loc	4
74	8.900-853.0	Label, Batch Warning	1

▲ Not Shown


Trim Dial to Fit Behind Side Panel
Thermal Switch
Note: Rotate Switch Dial to Highest Setting
42
To Control Panel
29
Reversed View Of Label
27
28
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24
2
35, 36, 37
41
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89139900-3
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45
Remote Strobe/Horn (To be Mounted by Customer)

CONTROL PANEL

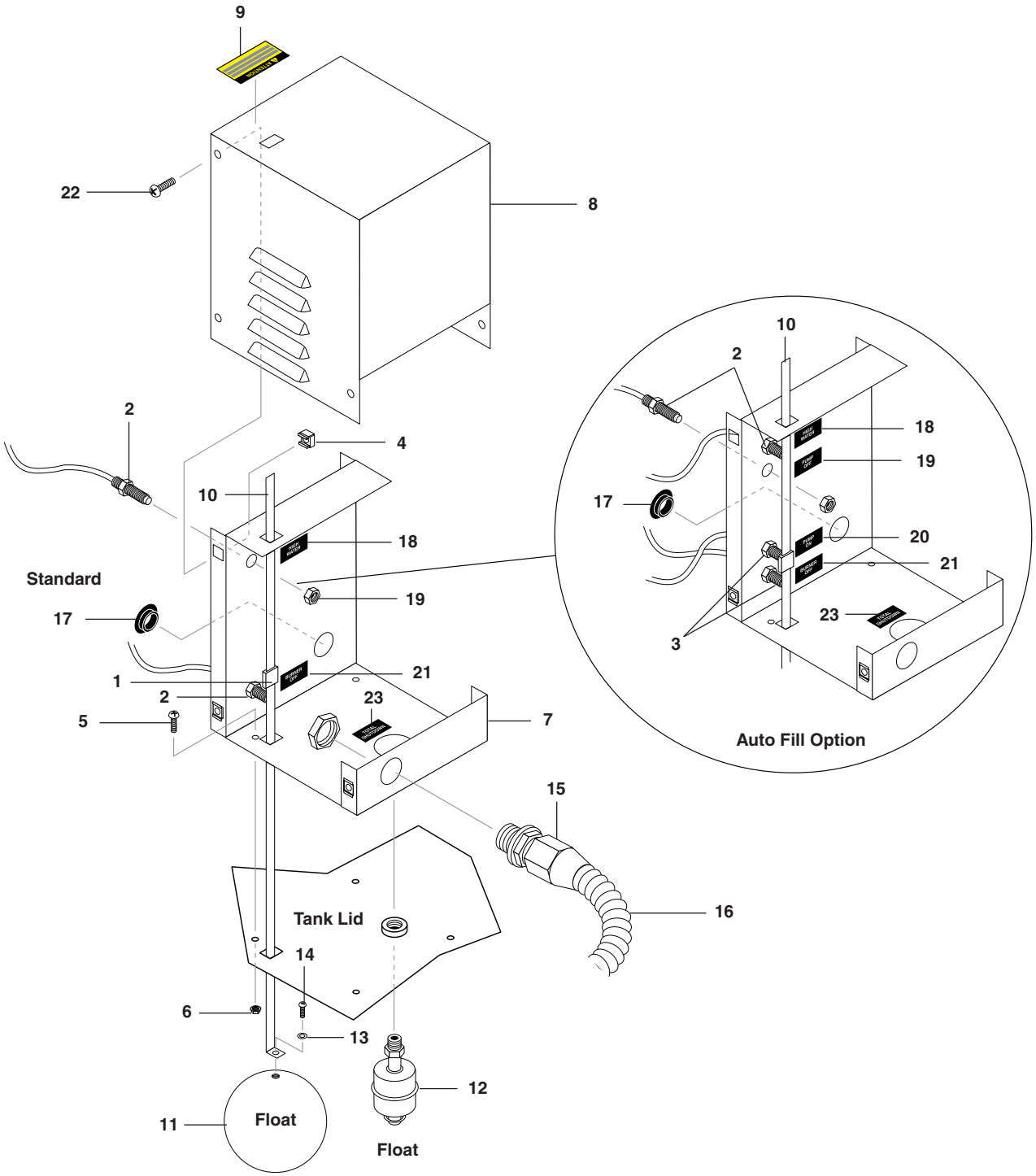
HBG-15, HBG-30 Parts List

ITEM	PART NO.	DESCRIPTION	QTY
1	9.802-453.0	Switch, Curvette	1
2	8.716-091.0	Switch, Momentary Push	1
3	8.716-211.0	Relay, 120V, 4PDT	1
4	8.716-212.0	Base, Relay, 120V, 4PDT	1
5	9.802-457.0	Din Rail, 35MM	23"
	8.718-936.0	▲ Screw #8 x 1/2" Tek, Sq Head SS	4
	8.718-959.0	▲ Washer #10 Flat SS	4
6	9.802-468.0	Relay, 120V, 2PDT (Auto Fill Option)	5 2
7	9.802-467.0	Base, Relay, 2PDT (Auto Fill Option)	5 2
8	8.716-237.0	Counter, Red Lion	1
9	8.716-251.0	Timer, Variable Time	1
10	8.716-281.0	Box, Plastic, 14" x 16" x 6-3/4" w/Hinged Lid	1
11	9.802-492.0	Block, Terminal, 8 Pole	1
	8.718-898.0	▲ Nut Cage, 8/32" x 16 ga	2
	9.802-749.0	▲ Screw 8/32" x 3/4"	2
12	8.724-264.0	Contactor, 15 Amp Contactor (Auto Fill Option)	1 1
13	9.802-283.0	Hour Meter	1
14	8.754-117.0	Hi Limit Control 500°F	1
15	8.716-547.0	Connector, 1/2" LT (Options)	3 2
16	9.802-515.0	Strain Relief, STRT, LQ Tite	1
17	9.802-514.0	Strain Relief, STRT, LQ Tite Sm (Options)	3
18	9.802-455.0	Light, Indicator, Green, 125V (Auto Fill Option) (Air Defoamer Option)	2 1 1
19	8.716-408.0	Light, Amber, 125V (Auto Fill Option)	1
	8.716-409.0	Light, Blue 125V	1
20	9.803-540.0	Light, Blue, 14V	1
21	8.716-409.0	Light, Blue, 125V	2

ITEM	PART NO.	DESCRIPTION	QTY
22	9.802-491.0	Block, Terminal, 8 Pole	1
23	8.716-252.0	Base Timer, IDEC Socket	1
24	8.716-052.0	Switch Curvette ON-OFF-ON (Auto Fill Option) (Air Defoamer Option)	 1 1
25	8.913-206.0	Standoff Electrical Box	1
	9.802-759.0	▲ Screw 10/32" x1/2"	4
	9.802-695.0	▲ Nut, 10/32" Keps	4
26	8.900-536.0	Label, Manual Reset Temp Switch	1
27	9.800-016.0	Label, Disconnect Power Supply	1
28	8.900-585.0	Label, Control Box Front	1
29	8.900-586.0	Label, Control Box, Side	1
30	8.670-187.0	▲ Switch, Float N/O (Auto Fill Option)	1
31	9.800-040.0	Label, Ground	1
32	8.716-460.0	Terminal, Gounding Lug	1
33	8.718-730.0	Screw, 10/22" x 2-1/2" Rnd Hd	1
34	9.802-695.0	Nut, 10/32" Keps	5
35	8.718-817.0	Nut, 1/4"-20 Hex Whiz Loc SS	4
36	8.718-603.0	Bolt, 1/4" x 3/4" NC, HH,SS	4
37	8.718-965.0	Washer, 1/4" SS Flat	4
38	8.900-234.0	▲ Label, HBG	1
39	8.940-157.0 8.900-401.0	▲ Label 15 (HBG-15) ▲ Label 30 (HBG-30)	1 1
40	8.753-351.0	▲ Channel 1" Gray, w/Cover	1.25 ft
41	8.900-853.0	Label, Caution Empty Tank	1
42	8.716-004.0	Wire, Nickel Hinge, 12 Ga.	20 ft.
43	8.752-970.0	Black Box	1
44	8.752-143.0	Strobe Light w/Horn	1
45	8.706-738.0	Plug, 3/4" Hole	1
46	8.923-972.0	Label, Caution Thermostat HBG	1

▲ Not Shown

FLOAT ASSEMBLY
EXPLODED VIEW



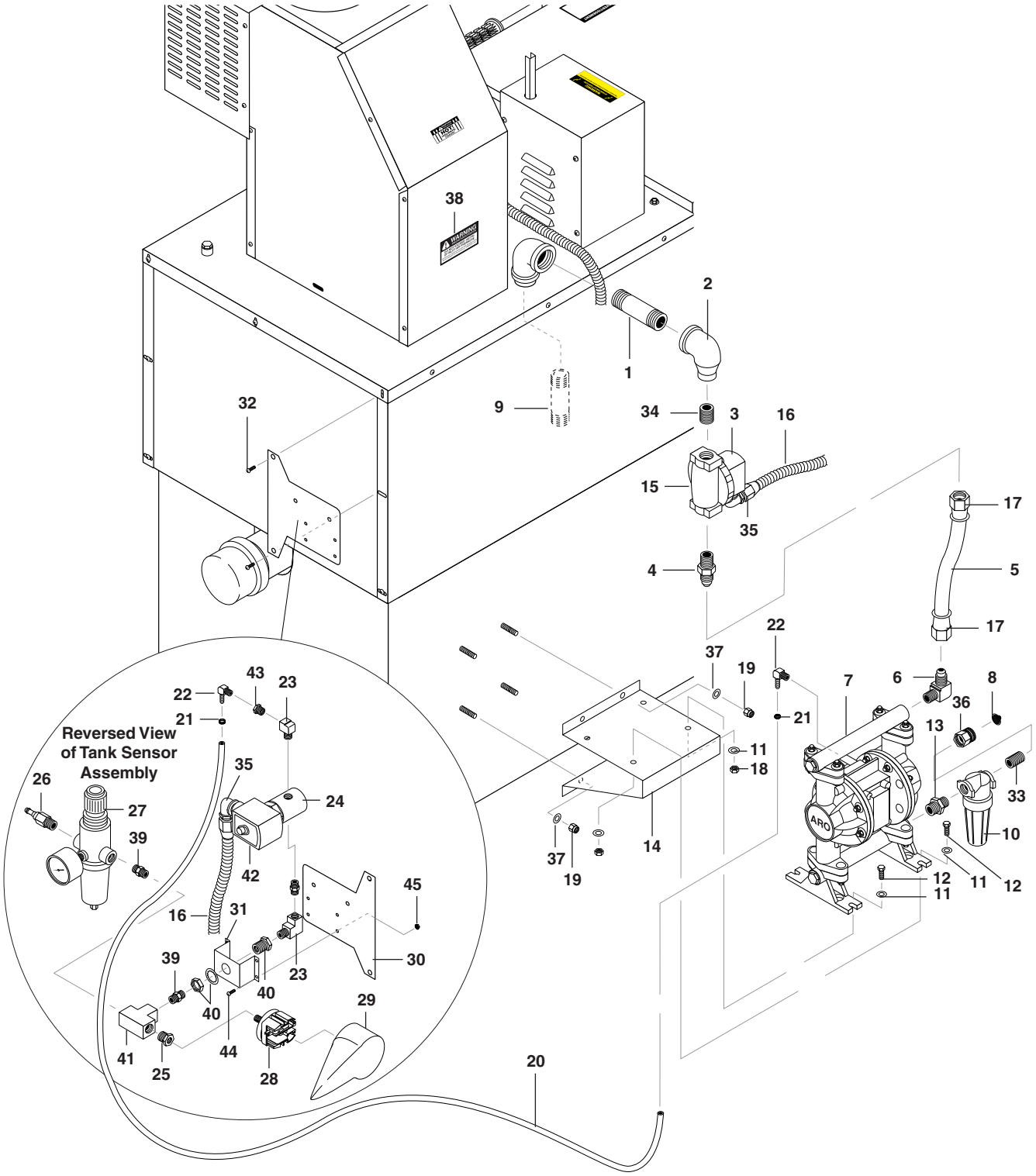
FLOAT ASSEMBLY
PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	9.804-120.0	Magnet	1
	8.731-134.0	▲ Screw, 4 x 40	1
	8.718-847.0	▲ Nut, 4 x 40	1
2	9.804-119.0	Switch, Magnetic N/C	2
3	9.804-118.0	Switch, Magnetic N/O (Auto Fill Option)	2
4	9.802-791.0	Nut, Cage, 10/32"	6
5	8.718-813.0	Screw, 10/32" SS	4
6	9.802-696.0	Nut, 10/32" Keps, SS	4
7	8.913-262.0	Box, Float	1
8	8.913-243.0	Lid, Float Box	1
9	8.900-582.0	Label, Keep Float Free	1
10	8.913-259.0	Float Rod, Long	1
11	8.712-132.0	Float, 3-1/2" Ball, Steel 316SS	1
12	8.716-294.0	Switch, Liquid Level, M-500	1
13	8.718-978.0	Washer, 1/4" Split Ring Lock SS	1
14	9.802-760.0	Screw, 1/4" x 1/2" BH SOC	1
15	9.802-517.0 8.716-547.0	Connector, 1/2" L/T 90° (15D) Connector, 1/2" L/T St (30D)	1 1
16	9.802-448.0	Conduit, WTR Tight Flex (15D) (30D)	 6 ft. 8.5 ft.
17	9.802-103.0	Bushing, Snap 5/8"	1
18	8.900-328.0	Label, High Water	1
19	8.900-327.0	Label, Pump Off (Auto Fill Option)	1
20	8.900-326.0	Label, Pump On (Auto Fill Option)	1
21	8.900-330.0	Label, Burner Off	1
22	9.802-759.0	Screw, 10/32" x 1/2 Black	6
23	8.900-329.0	Label, Total Shutdown	1

▲ Not Shown

HBG OPTIONS

AIR AUTO FILL EXPLODED VIEW



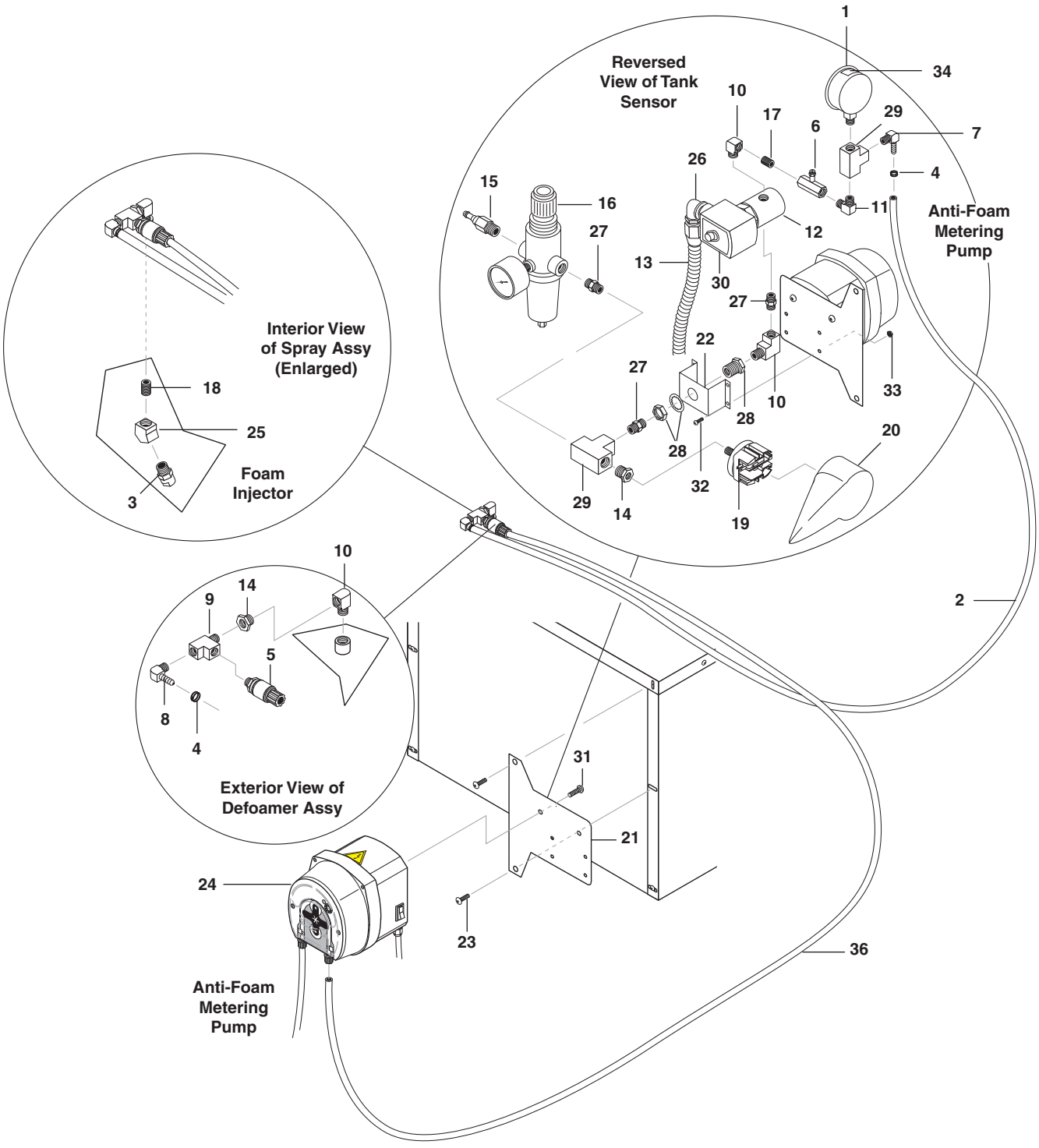
HBG OPTIONS
AIR AUTO FILL PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.706-024.0	Nipple, 1" x 4", Black Pipe	1
2	9.802-028.0	Elbow, 1" x 3/4", Reducing Blk	1
3	8.716-689.0	Solenoid Coil, 120V	1
4	8.706-899.0	Nipple, 3/4" JIC x 3/4" Pipe	1
5	9.802-261.0	Hose, 3/4" Push-On	1.66 ft.
6	9.802-132.0	Elbow, 3/4" JIC x 1/2", 90°	1
7	8.715-278.0	Pump, Air Diaphragm, 1/2" Poly	1
8	9.804-016.0	Filter Screen Washer, Garden Hose / 30Mesh	1
9	8.706-023.0	Nipple, 1" x 4", 316L SS	1
10	8.709-179.0	Filter, Inlet	1
11	8.718-980.0	Washer, 5/16" Flat, SAE	8
12	9.802-710.0	Bolt, 5/16" x 1", NC HH	4
13	8.706-881.0	Nipple, 3/4" Pipe x 1/2" Pipe	1
14	8.913-040.0	Bracket, Pump Support, Black	1
15	8.716-690.0	Valve, Solenoid, Parker	1
16	9.802-448.0	Conduit, Flex, Water Tight	16 ft.
17	9.802-152.0	Swivel, 3/4" SAE Female, Push-On	2
18	9.802-776.0	Nut, 5/16" ESNA, NC	4
19	9.802-779.0	Nut, 3/8" ESNA	4
20	9.802-254.0	Hose, 1/4" Push-on	2.66 ft
21	6.390-126.0	Clamp, Hose, .46-, .54 ST	2
22	8.706-958.0	Barb, Hose, 1/4" Barb x 1/4" Pipe	2
23	8.706-827.0	Elbow 1/4" Street	2
24	8.716-691.0	Valve, Solenoid Parker	1
25	8.706-910.0	Bushing, 1/4" x 1/8" Pipe	1
26	8.707-177.0	Nipple, 1/4" Male, Air	1
27	8.707-331.0	Regulator, Air w/Filter 1/4" Ga	1
28	8.716-413.0	Pressure Switch Barksdale	1
29	8.716-427.0	Boot, Red Tri Delta Switches	1
30	8.913-177.0	Bracket, Defoamer Pump	1
31	8.912-531.0	Support, Metering Valve	1
32	8.718-812.0	Screw 10/32" x 3/4" BH SOC	2
33	8.706-799.0	Nipple 3/4" Close	1
34	9.802-017.0	Nipple, 3/4" Close Black	1
35	9.802-517.0	Connector 1/2-L/T 90° Black	1
36	8.706-970.0	Swivel, 3/4" Fem HS x 3/4" Fem	1
37	9.802-807.0	Washer, 3/8 SAE Flat	4
ITEM	**PART NO.**	**DESCRIPTION**	**QTY**
38	8.900-210.0	Label, Warning 100 PSI Air Pressure	1
39	8.706-780.0	Nipple, 1/4 Hex	3
40	8.706-999.0	Connector, 1/4" Anchor	1
41	8.706-841.0	Tee 1/4" Female Pipe	1
42	9.802-533.0	Solenoid Coil 120V	1
43	8.706-996.0	Adapter 1/4" x 1/4"	1
44	9.802-759.0	Screw 10/32" x 1/2" Blk	4
45	9.802-696.0	Nut 10/32" Keps SS	4
46	9.802-422.0	▲ Cord Service SEO16-2	11 ft.

▲ Not Shown

HBG OPTIONS

AIR DEFOAMER ASSEMBLY EXPLODED VIEW



HBG OPTIONS

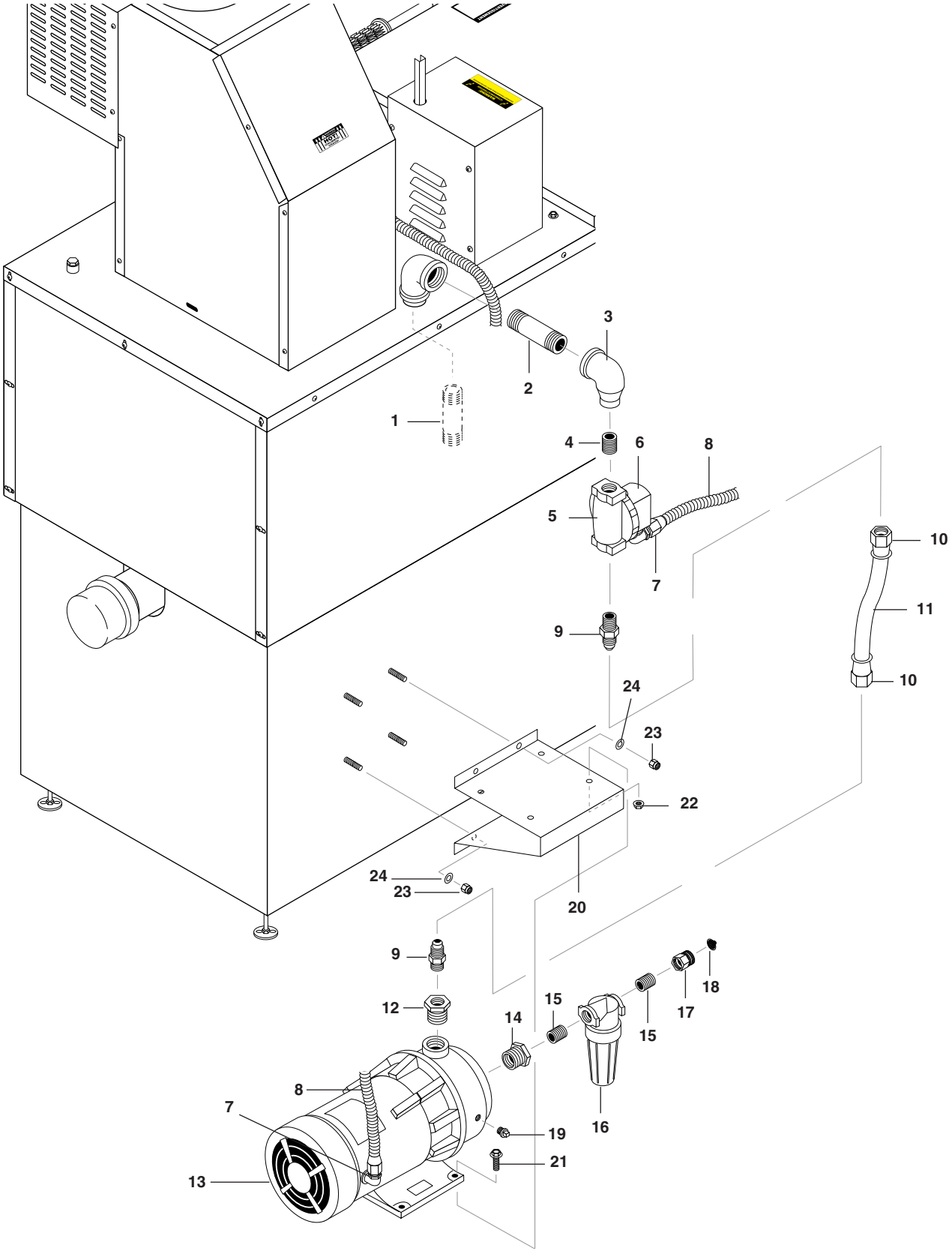
AIR DEFOAMER ASSEMBLY PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.712-155.0	Gauge, Pressure, 0-10 PSI	1
2	9.802-254.0	Hose, 1/4" Push-On	3
3	8.711-453.0	Nozzle Only, 1/4" Meg	1
4	6.390-126.0	Clamp, Hose, .46-, .54 ST	2
5	8.749-860.0	Check Valve, PVC,1/8" MP,	1
6	8.707-341.0	Valve, Inline Metering	1
7	8.706-958.0	Hose Barb, 1/4" Barb x 1/4" Pipe, 90°	1
8	8.706-955.0	Hose Barb, 1/4" Barb x 1/8" MP, 90°	1
9	8.706-857.0	Tee, 1/8" Street	1
10	8.706-827.0	Elbow, 1/4" Street	3
11	8.706-163.0	Elbow, 1/4" Male, Pipe	1
12	8.716-691.0	Valve, Solenoid, Parker	1
13	9.802-448.0	Conduit, Flex Water Tight	10 ft.
14	8.706-910.0	Bushing, 1/4" x 1/8" Pipe	2
15	8.707-177.0	Nipple, 1/4" Mal Air	1
16	8.707-331.0	Regulator, Air w/ Filter, 1/4" Ga	1
17	8.706-777.0	Nipple, 1/4" Close	1
18	8.705-971.0	Nipple, 1/4 " Close, 304 Stainless	1
19	8.716-413.0	Pressure Switch, Barksdale	1
20	8.716-427.0	Boot, Red, Tri Delta Switches	1
21	8.913-177.0	Bracket, Defoamer Pump Mount	1
22	8.912-531.0	Support, Metering Valve	1
23	8.718-812.0	Screw, 10/32" x 3/4" BH SOC	2
24	8.919-139.0	Pump, Peristaltic, 8-45 gpd, Sekokem	1
25	8.706-165.0	Elbow, 1/4", 45°, 316L SS	1
26	9.802-517.0	Connector 1/2" L/T 90° Black	1
27	8.706-780.0	Nipple 1/4" Hex	3
28	8.706-999.0	Connector 1/4" Anchor	1
29	8.706-841.0	Tee 1/4" Female Pipe	2
30	9.802-533.0	Solenoid Coil, 120V	1
31	8.718-941.0	Screw, #10 x 5/8", Tek	2
32	9.802-759.0	Screw 10/32" x 1/2"	4
33	9.802-696.0	Nut, 10/32 Keps SS	4
34	8.900-229.0	Label, 2 PSI	1
35	9.802-422.0	▲ Cord Service SEO 16-2	11 ft.
36	8.711-737.0	Tubing, 1/8" ID, Norprene	2.5 ft.
37	9.802-525.0	▲ Locknut, 1/2"	1
38	8.900-210.0	▲ Label, Warning 100 PSI Air Pressure	1

▲ Not Shown

HBG ELECTRIC AUTO FILL

EXPLODED VIEW

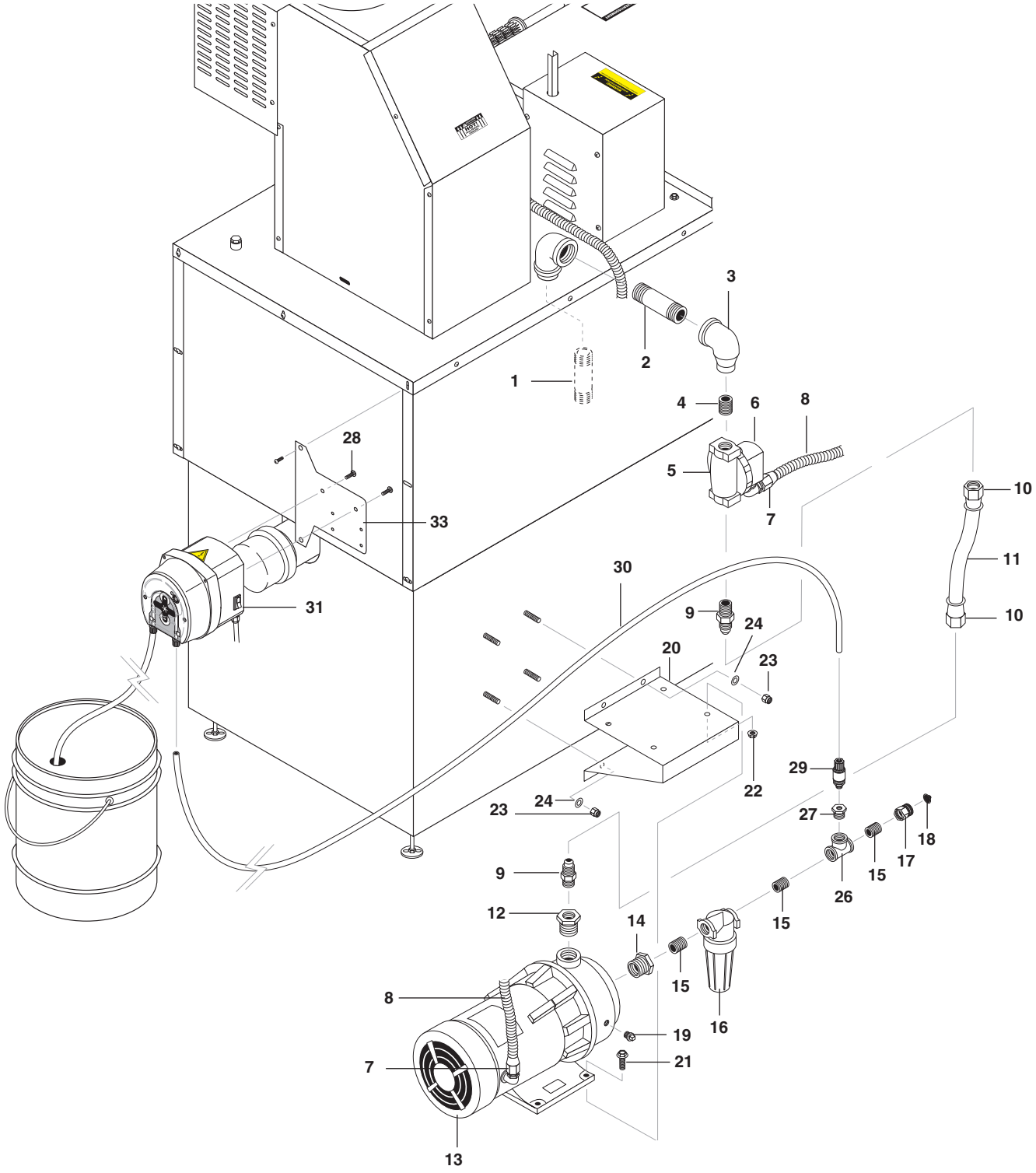


HBG ELECTRIC AUTO FILL
EXPLODED VIEW PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.706-023.0	Nipple, 1" x 4" 316L SS	1
2	8.706-024.0	Nipple, 1" x 4" Black Pipe	1
3	9.802-028.0	Elbow, 1" x 3/4 Reducing Black	1
4	9.802-017.0	Nipple, 3/4" x Close Black	1
5	8.716-690.0	Valve, Solenoid Parker	1
6	8.716-689.0	Solenoid Coil, 120V	1
7	9.802-517.0	Connector, 1/2" L/T 90°	2
8	9.802-448.0	Conduit, WTR Tight Flex	16 ft.
9	8.706-899.0	Nipple, 3/4" JIC x 3/4 Pipe	2
10	9.802-152.0	Swivel, 3/4" SAE Fem, Push-on	2
11	9.802-261.0	Hose, 3/4" Push-on	1.33 ft.
12	8.706-929.0	Bushing, 1" x 3/4" Barstock	1
13	8.715-382.0	Pump, 1/2 HP 115/230V, 5 Cyclone	1
14	8.706-930.0	Bushing, 1-1/4 x 3/4" Brass	1
15	8.706-799.0	Nipple, 3/4" Close	2
16	8.709-179.0	Strainer, 3/4" x 20 Mesh	1
17	8.706-970.0	Swivel, 3/4" Fem HS x 3/4" Fem	1
18	9.804-016.0	Filter Screen Washer, Garden Hose / 30Mesh	1
19	8.706-865.0	Plug, 1/4" Countersunk	1
20	8.913-040.0	Bracket, Pump Support	1
21	9.802-767.0	Screw, 3/8" x 3/4" HH NC Whiz	4
22	9.802-781.0	Nut, 3/8" Flange Whiz	4
23	8.725-395.0	Nut, 3/8 ESNA NC	4
24	9.802-807.0	Washer, 3/8" Flat	4
25	9.802-203.0	▲ Clamp, 1/2" Ro-Clip	4

▲ Not Shown

HBG ELECTRIC AUTO FILL ANTI FOAM KIT
EXPLODED VIEW



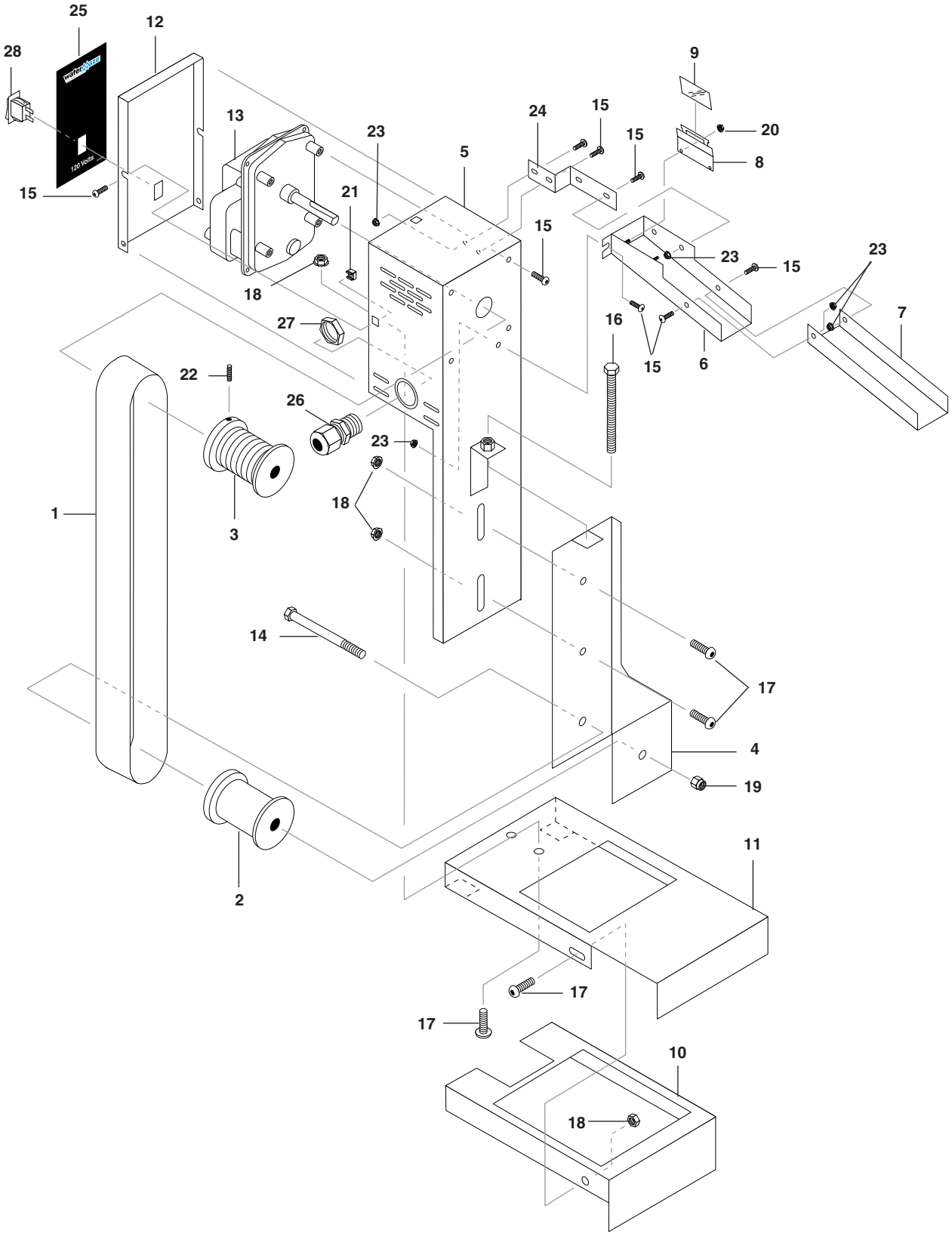
HBG ELECTRIC AUTO FILL ANTI FOAM KIT
EXPLODED VIEW PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.706-023.0	Nipple, 1" x 4" 316L SS	1
2	8.706-024.0	Nipple, 1" x 4" Black Pipe	1
3	9.802-028.0	Elbow, 1" x 3/4" Reducing Black	1
4	9.802-017.0	Nipple, 3/4" x Close, Black	1
5	8.716-690.0	Valve, Solenoid Parker	1
6	8.716-689.0	Solenoid, Coil 120V	1
7	9.802-517.0	Connector, 1/2" L/T 90°	2
8	9.802-448.0	Conduit, WTR Tight, Flex	16 ft.
9	8.706-899.0	Nipple, 3/4" JIC x 3/4" Pipe	2
10	9.802-152.0	Swivel, 3/4" SAE Fem, Push-On	2
11	9.802-261.0	Hose, 3/4" Push-on	1.33 ft
12	8.706-929.0	Bushing, 1" x 3/4" Barstock	1
13	8.715-382.0	Pump, 1/2 HP, 115/230V, 5 Cyclone	1
14	8.706-930.0	Bushing, 1-1/4" x 3/4" Brass	1
15	8.706-799.0	Nipple, 3/4" Close	3
16	8.709-179.0	Strainer, 3/4" x 20 Mesh	1
17	8.706-970.0	Swivel, 3/4" Fem HS x 3/4" Fem	1
18	9.804-016.0	Filter Screen Washer, Garden Hose / 30Mesh	1
19	8.706-865.0	Plug, 1/4" Countersunk	1
20	8.913-040.0	Bracket, Pump Support	1
21	9.802-767.0	Screw, 3/8" x 3/4" HH, NC Whiz	4
22	9.802-781.0	Nut, Flange Whiz	4
23	8.725-395.0	Nut, 3/8 ESNA NC	4
24	9.802-807.0	Washer, 3/8" Flat	4
25	9.802-203.0	▲ Clamp, 1/2" Ro-Clip	4
26	8.706-846.0	Tee 3/4" Female Pipe, Brass	1
27	8.706-921.0	Bushing, 3/4" x 1/8" Pipe	1
28	8.718-941.0	Screw, #10 x 5/8" Tek	2
29	8.749-860.0	Check Valve ,PVC 1/8" MP	1
30	8.711-737.0	Tubing, 1/8" ID, Norprene	3 ft.
31	8.919-139.0	Pump, Peristaltic 8-45 gpd, Sekokem	1
32	9.802-525.0	▲ Locknut, 1/2"	1
33	8.913-177.0	Bracket, Defoamer Pump Mount	1

▲ Not Shown

HBG OPTIONS

OIL SKIMMER ASSEMBLY (8.903-741.0) EXPLODED VIEW



HBG OPTIONS
OIL SKIMMER PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	8.706-750.0	Belt, Oil Skimmer, Urethane	1
2	8.719-982.0	Spool, Lower (316SS)	1
3	8.719-983.0	Spool, Upper (316SS)	1
4	8.913-290.0	Frame, Idler Pulley (316SS)	1
5	8.913-288.0	Assy, Frame/Elec Box (316SS)	1
6	8.931-138.0	Assy, Oil Ramp (316SS)	1
7	8.913-283.0	Extension, Oil Ramp, (316SS)	1
8	8.719-980.0	Holder, Plastic Blade	1
9	8.706-751.0	Blade, Oil Skimmer, Plastic	1
10	8.913-190.0	Bracket, Lower	1
11	8.913-188.0	Assy, Oil Skimmer Bracket (316SS)	1
12	8.913-277.0	Lid, Motor Cover (316SS)	1
13	8.715-159.0	Motor, Belt Skimmer	1
14	8.718-638.0	Bolt, 5/16" x 3-1/2" NC	1
15	8.718-813.0	Screw, 10/32" x 1/2" BHSOC (316SS)	13
16	8.731-131.0	Bolt, 1/4"-20 x 1-3/4", NC Tap SS	1
17	8.718-753.0	Screw, 1/4"-20 x 3/4" PHIL BH SS M/S (316SS)	6
18	8.718-882.0	Nut, 1/4" -20, NC Keps, SS	6
19	9.802-777.0	Nut, 5/16" Esna NC SS	1
20	9.802-785.0	Nut, 8/32" KEPS	2
21	9.802-791.0	Nut, Cage, 10/32" x 16 Gauge	2
22	8.731-137.0	Screw, 1/4" x 3/8" SOC, Set, Blk	1
23	9.802-696.0	Nut, 10/32" Keps, SS	7
24	8.913-293.0	Bracket, Ramp Support Oil Skimmer (316 SS)	1
25	8.940-241.0	Label, Oil Skimmer	1
26	9.802-514.0	Strain Relief, 1/2" Small	1
27	9.802-525.0	Locknut 1/2"	1
28	9.802-453.0	Switch, Curvette	1
29	9.802-423.0	▲ Cord Service 16-3	15 ft.
30	8.716-307.0	▲ Plug, Male 120/15A	1
31	8.932-969.0	▲ Label, Warning Service Cord	1

▲ Not Shown

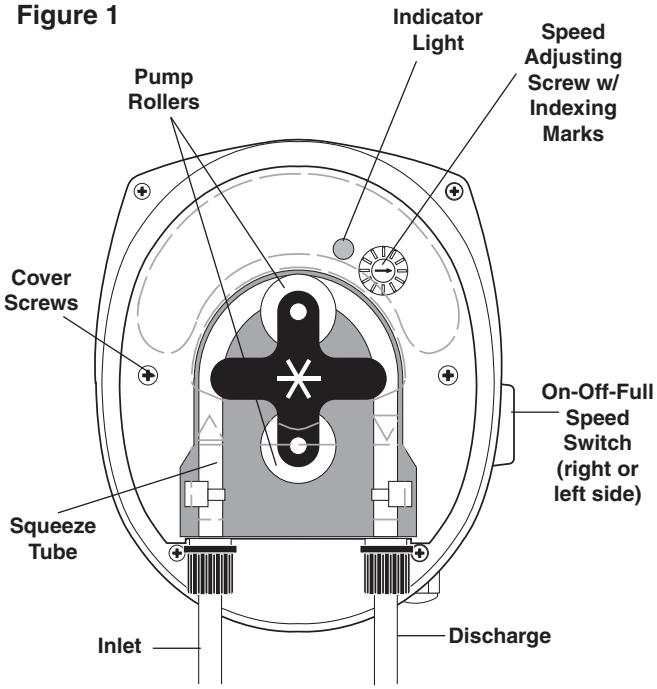
REPLACING PUMP HEAD TUBING:

WARNING: Wear protective gloves, goggles, and other adequate protection for the chemical hazard. Before replacing the pump head, remove chemical from tubing as follows. Remove strainer from chemical tank then run pump until all chemical is removed from the tubing.

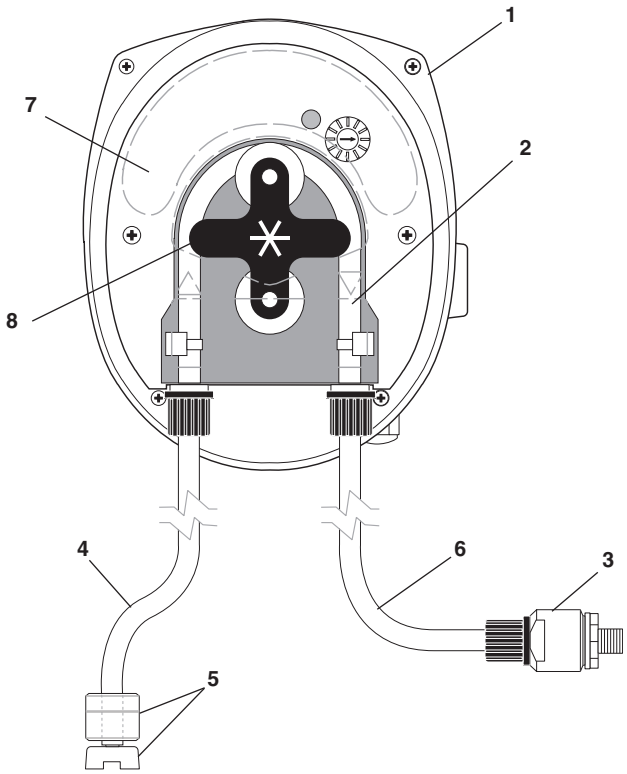
1. Remove the compression fittings from the tubing at the pump head.
2. Pull the suction and discharge tubing from the pump head.
3. Remove the front cover.
4. Rotate the pump rollers to a vertical position.
5. Lift the inlet fitting out of the housing.
6. Pull the tube out while rotating the pump rollers clockwise.
7. Remove the outlet fitting.
8. Install the inlet fitting for the new tube assembly.
9. Press the tube into place in front of a roller while rotating the roller assembly clockwise.
10. Install the outlet fitting.
11. Reconnect the suction and discharge lines.
12. Install the front cover.

CAUTION: DO NOT LOSE THE BEARING FROM THE CENTER HOLE IN THE COVER PLATE.

Figure 1



METERING PUMP AND PARTS LIST

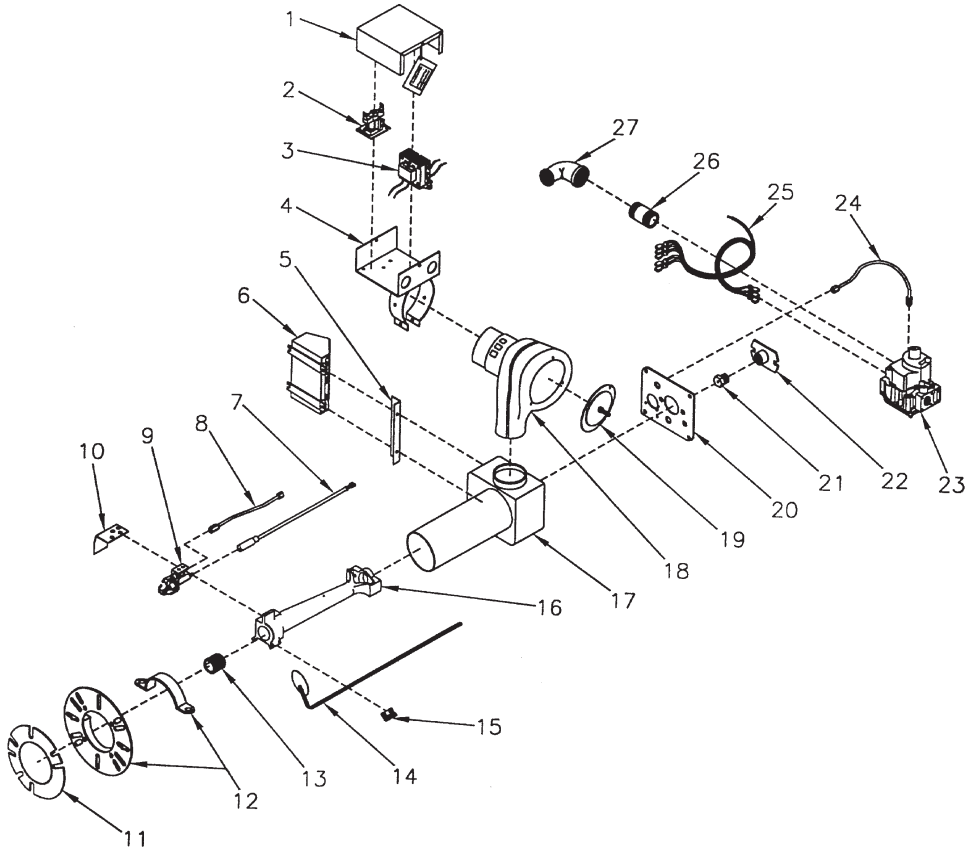


ITEM	PART NO.	DESCRIPTION	QTY
1	8.919-139.0	Pump, Peristaltic, PR-7, 8-45 gpd, Sekokem	1
2	8.750-963.0	Tube, Squeeze, Sekokem, PR-7,* 8-45 gpd	1
3	8.749-860.0	Check Valve, PVC	1
4	8.749-857.0	Tubing, 1/4", PE, Black	AR
5	8.749-863.0	Strainer, w/welght	1
6	8.711-737.0	Tubing, 1/8", ID, Norprene	AR
7	8.751-801.0	Faceplate, PRS-1/PR-7	1
8	8.751-375.0	Roller Assembly, PR-7	1

* Alternative tubing materials are available

Burner Assembly, HBG-15 Model # P250AFEP

PART # 8.717-099.0 NATUAL GAS
PART # 8.717-101.0 LIQUID PROPANE

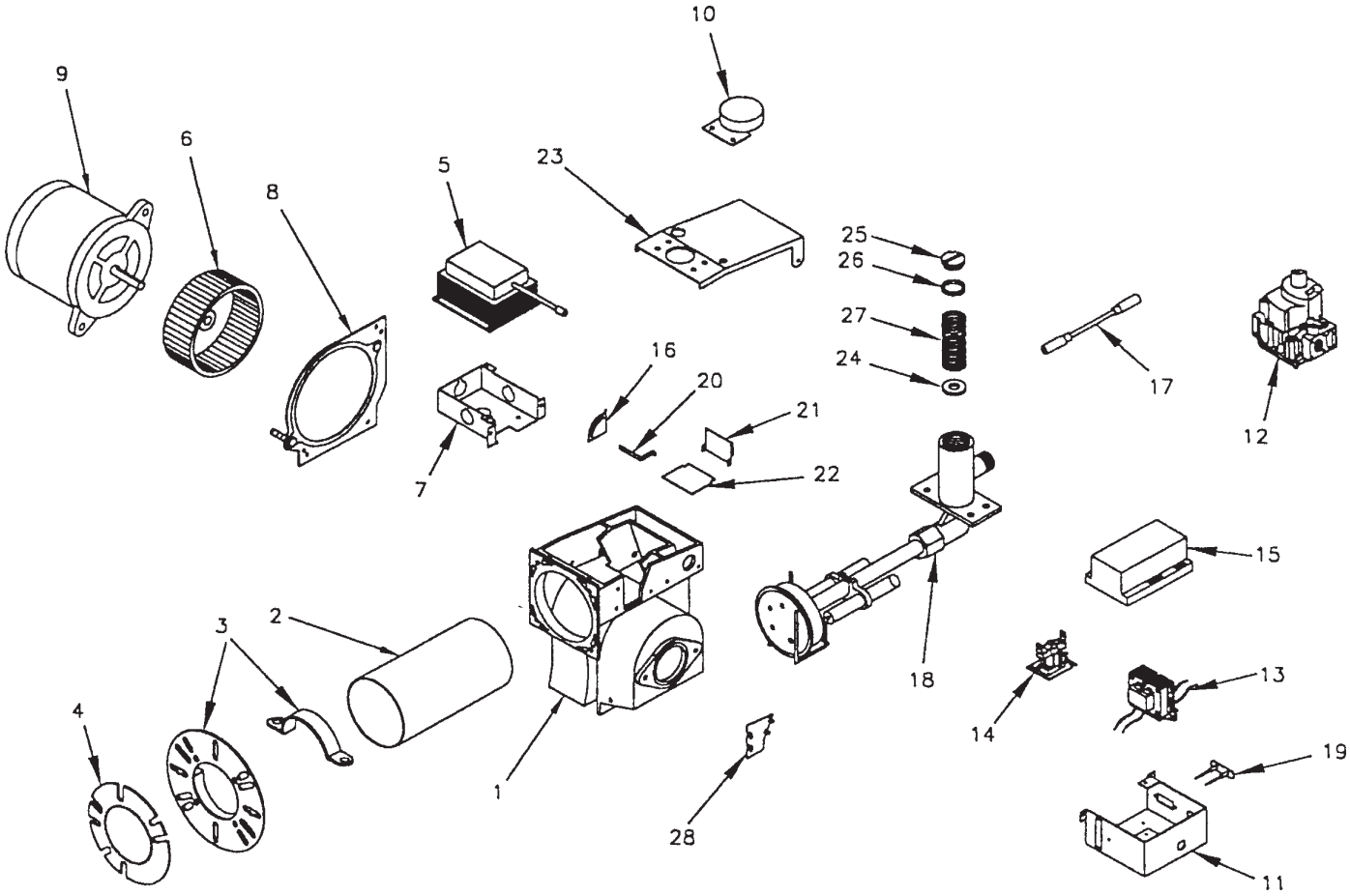


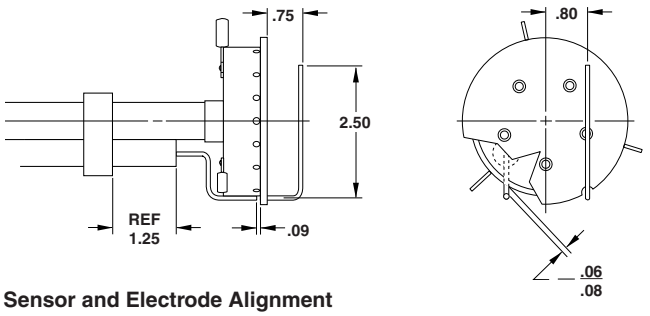
ITEM	PART NO.	DESCRIPTION
1	61823-003	Control Box Cover Assembly
	62998-001	Control Box Cover Assembly (LP)
2	61444-002	Relay, Time Delay Assembly
3	8.717-985.0	Transformer, 34v/30va
4	62301-001	Control Box/Strap Assembly
5	62700-001	Bracket
6	8.717-990.0	Ignition Module (S8600H-1006)
7	8.718-009.0	Ignition Wire Assembly
8	8.717-986.0	Tube 1/4" x 5.25"
	62320-001	Tube 1/4" x 7.5" (LP)
9	8.718-012.0	Burner Pilot
10	8.717-897.0	Pilot Shield
11	100428	Gasket
	8.717-736.0	Gasket (LP)
12	21756-011	Flange, Adjustable
13	600748	Flame Retention Assembly
14	8.717-989.0	Flame Spreader Assembly
15	61840	Flame Spreader Bracket

ITEM	PART NO.	DESCRIPTION
16	61817	Venturi-P250AF
17	8.718-004.0	Air Tube Housing
18	8.717-984.0	Motor Blower Assembly
19	8.718-003.0	Air Shutter Assembly
20	62049-0902	Housing Coverplate Assembly
21	8.724-854.0	Orifice (.242")
	8.718-197.0	Orifice (.157") (LP)
22	62898-001	Orifice Holder
23	8.717-991.0	Gas Valve, Honeywell
24	62320-012	Tube 1/4" x 10.00"
	15407	▲ Compression Nut
	15408	▲ Compression Sleeve
25	62245-001	Wiring Harness
26	60017	Nipple 3/4" x 2-1/2"
27	60016	Elbow 1/2" NPT x 3/4" NPT
		▲ Not Shown
	8.906-076.0	**Factory Conversion, NG to LP**

Burner Assembly, HBG-30

MODEL #HSG-400 PART # 8.717-100.0





Sensor and Electrode Alignment

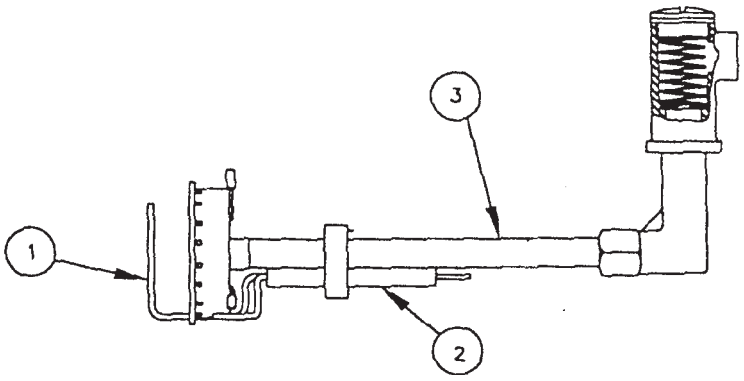
Burner Assembly
PARTS LIST MODEL #HSG-400

ITEM	PART NO.	DESCRIPTION
1	100935-001	Burner Housing
2	8.718-015.0	Air Tube , 6"
3	8.717-843.0	Adjustable Flange Assembly
4	8.717-736.0	Gasket
5	8.718-001.0	Transformer
6	8.717-842.0	Blower Wheel
7	21319	J-Box
8	21658	Side Plate
9	20627	Motor, 1/5-3450/115/60
10	8.718-013.0	Pressure Switch
11	62408-001	Control Box
12	8.717-992.0	Gas Valve
13	8.717-985.0	Transformer
14	8.718-000.0	Relay
15	8.718-006.0	Primary Control

ITEM	PART NO.	DESCRIPTION
16	100377-002	Off Cycle Indicator
17	8.718-008.0	Ignition Wire
18	62473-009	Gas Train Asm
19	60178	Terminal Strip
20	100372	Damper Arm
21	100378	Off Cycle Bracket
22	100371	Off Cycle Damper
23	62404-002	Housing Cover
24	8.718-198.0	Orifice, 15/32" NG1
	8.718-199.0	Orifice Q (.332) LP1
25	62385-001	Cap
26	62401-001	Gasket
27	62410-001	Spring
28	62399-002	Shield

HSG Gas Train Assembly

ITEM	PART NO.	DESCRIPTION
1	8.717-996.0	Probe
2	8.717-997.0	Electrode
3	62575-001	Chamber/Manifold Asm



TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
MACHINE WON'T POWER UP	Breaker tripped	Reset breaker and reset batch cycle controller by pushing the F1/RST button.
	Batch cycle complete	Reset batch cycle controller by pushing the F1/RST button.
PILOT DOES NOT LIGHT (HBG-15)	Air in gas line	Bleed gas line.
	High or low gas pressure	Adjust air regulator.
	Blocked pilot orifice	Replace or clean orifice.
PILOT GOES OUT FREQUENTLY DURING STANDBY (HBG-15)	Restriction in pilot gas line	Clean line.
	Low gas pressure	Adjust pressure regulator.
	Blocked pilot orifice	Replace or clean orifice.
PILOT GOES OUT WHEN GAS VALVE OPENS (HBG-15)	Restriction in pilot gas line	Clean pilot orifice.
	High or low gas pressure	Test and adjust pressure.
	Excessive pressure drop when main gas valve opens	Increase size of inlet gas piping.
BURNER MOTOR DOES NOT RUN	Burned out fuse or current is off	Check fuse and replace.
	Thermostat or limit defective or improperly set	Test and reset thermostat.
	Relay or transformer defective	Test and replace.
	Motor burned out	Replace.
	Improper wiring	Check all connections.
	Manual reset high temperature switch is tripped	Scrape and clean floor of tank. Reset swtich on back of control box.
	Liquid level is too high. High float is in up position	Remove enough water from tank to lower level float then restart burner.
BURNER MOTOR RUNNING BUT NO FLAME	Pilot out (HBG-15)	Restart burner.
	Very low or no gas pressure	Adjust pressure regulator.
	Motor running too slow	Check voltage.
SHORT NOISY BURNER FLAME	Pressure regulator set too low	Increase pressure.
	Air shutter open too wide	Close shutter.
	Too much pressure drop in gas line	Increase gas pipe size.
	Defective regulator	Replace.
LONG YELLOW FLAME	Air shutter not open enough	Open air shutter (see Air Setting).
	Air openings or blower wheel clogged	Clean.
	Too much input gas	Turn gas pressure down.
MAIN GAS VALVE DOES NOT CLOSE WHEN BLOWER STOPS	Defective valve	Replace gas valve.
	Obstruction on valve seat	Replace gas valve.
REGULATOR VENT LEAKING GAS	Hole in diaphragm	Replace regulator
BURNER IGNITES FOR 2-4 SECONDS (HBG-30)	Check main voltage polarity	Switch black & white incoming power wires.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
BURNER WON'T SHUT DOWN AT LOW WATER	Low water float does not work	Check switch for continuity, then adjust or replace.
WATER WON'T HEAT UP OR HEATS UP TOO SLOWLY	Sludge buildup on floor or tank	Scrape sludge from bottom of tank.
	Incorrect gas supply for burner	Recheck manifold. Reset if needed.
AIR PUMP WON'T START	Long float, top micro switch not energized. Water too high	Keep evaporating or manually lower the water level.
	Air regulator setting adjusted too low	Readjust air regulator to between 50 and 100 psi.
	Air pump solenoid plugged	Clean out.
	No voltage to air pump solenoid coil	Check wiring in electrical box. Replace parts as needed.
	Bad air pump solenoid coil	Replace solenoid coil.
WASTEWATER DISCHARGING FROM AIR PUMP EXHAUST	Check for diaphragm rupture	If ruptured, replace.
	Check for diaphragm nut	Tighten nut.
AIR BUBBLES IN DISCHARGE HOSE	Check connections of suction plumbing	If loose, retighten.
	Check band clamps on intake manifold	If loose, retighten.
	Check o-rings between intake manifold and fluid caps	Replace o-rings if worn.
	Check tightness of diaphragm nut	Tighten nut.
AIR PUMP BLOWS AIR OUT MAIN EXHAUST WHENSTALLED ON EITHER STROKE	Check U cups on spool in major valve	Replace if needed.
	Check valve plate and insert for wear	Replace if needed.
	Check sleeve and o-ring on diaphragm connecting rod	Replace if needed.
	Check o-rings on piston for wear	Replace if needed.
LOW DISCHARGE G.P.M.	Check air supply	Adjust to between 50 and 100 psi.
	Check for plugged discharge hose	Unplug discharge hose.
	For the pump to prime itself it must be mounted in a vertical position so that the balls will check by gravity	Level machine.
	"Check for pump cavitation - suction pipe should be 1/2"" minimum or larger if high viscosity fluids are being pumped. Suction hose must be non-collapsible type, capable of pulling a high vacuum"	Replace hoses if undersized.
	Check all joints on intake manifolds and suction connections. These must be air tight	Tighten all joints and connections.
	Check for sticking or improperly seating check valves	Clean check valves.
	If pump cycles at a high rate or runs erratically, check piston o-rings for wear	Replace o-rings if needed

HBG COST FORMULAS

Propane conversion from gallons of propane to therms for use in chart below: 1 Therm = 1.0929 gallons of propane. Multiply the cost of 1 gallon of propane by 1.0929 to determine the propane cost per therm.
Example: Propane = $1.50 gallon. Multiply 1.0929 (gallons of propane per therm) x $1.50 (cost of gallon of propane)= $1.6393 per therm.

MODEL	FUEL USAGE	EVAPORATION RATE
HBG-15	180,000 BTU / HR	13 gallons per hour
HBG-30	311,000 BTU / HR	28 gallons per hour

Note: NG calculations

Constants:

1 cubic foot of natural gas = 1,000 BTU's
1 gallon of propane = 91,500 BTU's
1 gallon of propane = 0.915 therms
1 therm = 100 standard cubic feet of natural gas
1 therm = 100,000 BTU's

Operating Cost for Natural Gas:

Gas Cost (Cost per Gallon) **=** HBG Rating BTU's per Hour **x** Local Cost of Fuel per Therm
BTU's per Therm **x** HBG Evaporation Rate

Operating Cost for Electricity:

Electricity Cost (Cost per Gal) **=** Volts **x** Amps **x** Cost of Kilowatt Hour
1000 **x** HBG Evaporation Rate

Example for HBG-15: 180,000 BTU/Hr, 40¢/Therm, 120 Volts, 3 Amps, 6¢/KWH

Gas Cost (¢/Gal) = $\frac{180{,}000 \times 40}{100{,}000 \times 13}$ = 5.5 ¢/Gal

Electricity Cost (¢/Gal) = $\frac{120 \times 3 \times 6}{1000 \times 13}$ = .1¢/Gal

Total Cost = 6.2¢ (gas) **+ .1¢** (elec) **= 6.3¢/Gal**

SPECIFICATIONS

MODEL	HBG-15	HBG-30
EVAPORATION RATE	10-15 GPH (38 - 57 Liter/Hr)	25-30 GPH (95 - 114 Liter/Hr)
ENERGY SOURCE	Natural Gas or LPG	
ENERGY USAGE	180,000 BTU/HR	311,000 BTU/HR
TANK CAPACITY	70 Gallons (265 Liters)	120 Gallons (379 Liters)
TANK MATERIAL MILD STEEL	"3/8"" Plate Floor, 3/16"" Gauge Walls"	
STAINLESS STEEL	"1/4"" Plate Floor, 12 Gauge Walls"	
INSULATION	Air Insulated	
WEIGHT	1,215 Lbs. (552 Kg)	1,485 Lbs. (675 Kg)
DIMENSIONS W x L x H	33" x 78.5" x 65" (84 x 199 x 165 Cm)	90" x 44" x 70" (229 x 112 x 178 Cm)
POWER REQUIREMENTS	120V, 1 PH, 3 Amps (13 amps for electric autofill)	
WARRANTY	1 Year Parts	1 Year Parts

ETL Certified

PREVENTATIVE MAINTENANCE

This evaporator 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 dealer for maintenance. Regular preventative maintenance will add many hours to the life of your machine. Perform maintenance more often under severe conditions.

MAINTENANCE SCHEDULE		
Sludge	Inspect	Daily
	Remove	After each complete batch
Liquid Level Switches	Inspect	Daily
	Clean	Weekly
Inspect and Clean Tank(s)		After each complete batch
Lubricate Draft Inducer Motor		Semi-annually
Clean Draft Inducer Fins		Monthly
Wastewater pH between 8-10		Daily
Clean Water Screen/Filter		Weekly

WATER TREATMENT SYSTEMS

LIMITED NEW PRODUCT WARRANTY
WASH WATER / WATER TREATMENT SYSTEMS

WHAT THIS WARRANTY COVERS

All *WATER MAZE* water treatment systems are warranted by to the original purchaser to be free from defects in materials and workmanship under normal use, for the periods specified below. This Limited Warranty, 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. A 60 day grace period will be given for installation.

ONE YEAR PARTS AND 30 DAY LABOR WARRANTY:

All components excluding normal wear items as described below.

WARRANTY PROVIDED BY OTHER MANUFACTURERS:

Motors, which are warranted by their respective manufacturers, are serviced through these manufacturers' local authorized service centers. *WATER MAZE* 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 seals, filters, gaskets, O-rings, packings, pistons, brushes, filtering media, ozone bulbs, sensors, UV scanners, oil-skimmer belt, impedance sensor. Minor leaks covered first time on original start-up only.
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, sludge build-up, chemical deterioration (oxidation, chloride or fluoride corrosion), and rust.
4. Damage to components from fluctuations in electrical or water supply.
5. Normal maintenance service, including adjustments.
6. Transportation to service center, field labor charges, or freight damage.
7. Consumables and water quality.

WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE

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

LIMITATION OF LIABILITY

WATER MAZE'S liability for special, incidental, or consequential damages is expressly disclaimed. In no event shall *WATER MAZE'S* liability exceed the purchase price of the product in question. *WATER MAZE* 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. Our obligation under this warranty is expressly limited at our option to the replacement or repair at a service facility or factory designated by us, of such part or parts as inspection shall disclose to have been defective. **THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY WATER QUALITY, MERCHANTABLIITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY.** This warranty gives you specific legal rights and you may also have other rights which vary from state to state. *WATER MAZE* does not authorize any other party, including authorized *WATER MAZE* Distributors, to make any representation or promise on behalf of *WATER MAZE*, 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 *WATER MAZE* products conforms to local codes. While *WATER MAZE* attempts to assure that its products meet national codes, it cannot be responsible for how the customer chooses to use or install the product. Some states do not allow limitations or exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

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