

INSTALLATION & OPERATING INSTRUCTIONS

For All A2000 Series Water Heaters & Water Boilers



WARNING: If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

FOR YOUR SAFETY: Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.

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 gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Note: Place a copy of these instructions adjacent to the boiler/heater; notify the owner to keep for future reference.
If Shipping Damage is noted, receiver must make damage claim on Bill of Lading (see page 6).



GREEN BOILER TECHNOLOGIES

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SAFETY

Safety messages and instructions located in this manual and on the heater/boiler provide warnings to you and others of potential hazards. Before installing, operating or servicing this heater/boiler, it is important to read and understand these safety instructions and messages.



The safety alert symbol alerts you to potential hazards. The message that follows this symbol must be obeyed to avoid possible injury or death.



DANGER indicates the presence of immediate hazards which, if not avoided, could result in severe personal injury, death, or substantial property damage.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in severe personal injury, death or substantial property damage.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Qualified Installer: Must have the ability of a licensed tradesman in the fields of gas supply, plumbing and venting, including a thorough understanding of the National Fuel Gas Code as it relates to gas fired water heaters and boilers. The installer must thoroughly review and understand this manual.

Service Agency: Must have the ability of a licensed tradesman in the fields of gas supply, plumbing and venting, including a thorough understanding of the National Fuel Gas Code as it relates to gas fired water heaters and boilers. The servicer must thoroughly review and understand this manual and perform service and repairs strictly in accordance with the manufacturer's service instructions.

Gas Supplier: A natural gas or propane Utility or service company that supplies gas for water heater and boiler appliances, typically having responsibility for the inspection and code approval of the gas piping up and including the meter or Propane storage tank. Many gas suppliers meet the requirements of a Qualified Installer or Service Agency.



Verify that the gas hooked up to the appliance is the same type specified on the Name Plate label, located on the heater/boiler.



Should overheating occur, or the gas valve fails to shut, do not turn off the electrical supply to the heater/boiler. Shut off the gas supply at a location away from the heater/boiler.



Do not use this heater if any part has been under water. Have the heater/boiler inspected by a qualified service technician. Replace any electrical or gas control system which has been under water.



This unit requires an inlet water temperature of at least 120 °F (49 °C) to avoid flue gas condensation. Condensation may cause pre-mature heat exchanger failure. Prolonged operation of this heater/boiler with return temperatures below 120 °F will void the warranty.



Maintain the area surrounding the heater/boiler clean and free of combustible materials, gasoline, and other flammable liquids or vapors. The heater/boiler should never be covered.



This heater/boiler requires a constant supply of fresh air for proper combustion. Failure to provide an adequate flow of fresh air may result in series injury or death.

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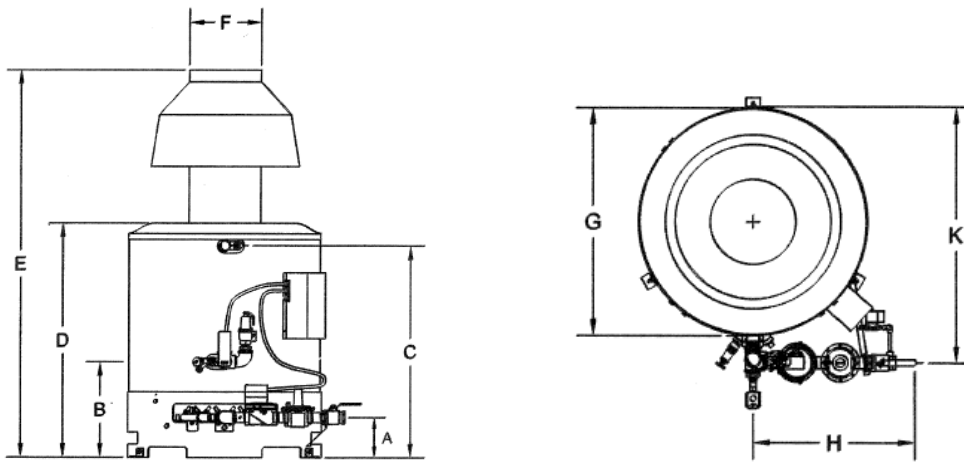
INTRODUCTION

Thank you for purchasing an A2000 Series water heater/boiler from Green Boiler Technologies. Your model was proudly built in the United States with high quality components and craftsmanship. With the proper installation and maintenance, your A2000 heater/boiler will provide years of outstanding performance.

The A2000 series water heaters and water boilers utilize efficient copper fin-tube heat exchangers and are certified as Category I Appliances. Category I equipment utilizes natural draft to remove flue gases without need of a fan or draft inducer, and has flue gas temperatures more than 140° F above the dew point.

The unique design of the appliance provides excellent heat transfer and a small footprint. The heat exchanger resists build-up of lime scale and allows de-liming without disassembly of the unit.

DIMENSIONS & SPECIFICATIONS



Model	A	B	C	D	E	F	G	H	K
A2-035	7	17 ½	34 ½	38	58	9	24	10	29
A2-050	8	16 ½	33	42	69	10	28	18 ½	33
A2-070	10 ¼	13 ¼	33	38 ¾	66	12	32	25	36 ¼
A2-097	6 ¾	17 ¾	38	41 ¼	77 ¼	16	35	20	43
A2-120	7	17 ½	44 ½	48 ½	84 ½	16	35	22	43
A2-140	7	17 ½	44 ½	48 ½	100 ½	18	35	22	43

Dimensions in Inches; Dimensions For Units With Standard Gas Train

Model	BTU Input **	GPH @ 100° Rise	Gas Connection	Water Connection	Vent Diameter	Shipping Weight *
A2-035	350,000	336	1	1 ½	9	460
A2-050	500,000	480	1	1 ½	10	600
A2-070	700,000	672	1 ¼	1 ½	12	650
A2-097	970,000	932	1 ¼	1 ½	16	700
A2-120	1,200,000	1152	1 ½	1 ½	16	804
A2-140	1,400,000	1345	1 ½	1 ½	18	944

Dimensions In Inches; GPH = Gallons Per Hour; * Approximate

** Propane Model Input Is 10% Less

MODEL IDENTIFICATION

The model number can be found on the Name Plate label, located on the heater/boiler.

A2 - (H,X,B,T,C) - (###) - (NG,LP,NH,LH)

A2 =	A2000 Series Water Heater or Boiler
H =	Water Heater
X =	Water Heater with 2-Stage burner controls
B =	Boiler
T =	Boiler with 2-Stage burner controls
C =	Boiler with ASME CSD-1 controls
### =	Nominal Rated Input
NG =	Natural Gas
LP =	Propane
NH =	Natural Gas, High Altitude
LH =	Propane, High Altitude

RATINGS AND CERTIFICATIONS

The A2000 models are certified to the following standards:

- ANSI Z21.13 – CSA 4.9 Gas-Fired Hot Water Boilers, Latest Edition
- ANSI Z21.10.3 – CSA 4.3 Gas Water Heaters, Latest Edition

All A2000 models are ASME National Board Approved and are constructed in accordance with Section IV of the ASME Heater Pressure Vessel Code (160 psi working pressure) and bears the ASME “H” stamp.



Do not alter or replace the heat exchanger without the approval of Green Boiler Technologies. To do so will void the warranty and the ASME certification.

Ensure the fuel that the appliance will burn is the same as that specified on the boiler rating plate. Conversions must be completed by a Qualified Service Agency or Gas Provider. Call your Green Boiler Technologies Representative or Customer Service for instructions and the proper conversion kit.

INSTALLATION

This manual must be thoroughly reviewed and understood before installing your A2000 heater/boiler. Installation and Service must be completed by a Qualified Installer, Service Agency or Qualified Gas Supplier. If you have any questions which are not covered in the manual, please contact Green Boiler Technologies or your local representative.

✓ PRODUCT RECEIPT

On receipt of your heater/boiler, visually check for external damage to the appliance or shipping crate. If the crate is damaged, make a note to that effect on the Bill of Lading before signing for the shipment. After removing the appliance from the shipping crate, report any damage to the carrier immediately. If any items were shipped loose, make sure they were received. All carrier claims are your responsibility.

All claims for damage or shortages must be filed with the carrier. Before product is returned, permission and an Authorized Return Goods Number (RMA) must be acquired from the manufacturer. Product returned to the factory without an authorized RMA will not be accepted. All returned product is subject to a restocking charge.

✓ HIGH ELEVATION

For units installed at elevations above 2,000 feet over sea level, consult the factory for the proper burner orifices.



Units installed at elevations above 2,000 feet must be de-rated to account for the lower percentage of oxygen present in the air. Personal injury due to the inhalation of Carbon Monoxide may result if the unit input is not properly de-rated.

✓ INSTALLATION CODE REQUIREMENTS

1. The installation of the unit must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI, Z223.1 / NFPA 54, Latest Edition and the National Electric Code (NEC) ANSI/NFPA 70.
2. Where required by authority having jurisdiction, the installation of water boilers must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1.
3. For Canada only, the installation must conform to CAN/CGA B149 and CSA C22.1 Part 1.



It is important to wear eye protection and gloves while installing, servicing or repairing the unit. A dust respirator is recommended while servicing or repairing the burner assembly or combustion chamber area. Use caution when working on roofs and/or scaffolding. Proper and safe scaffolding and/or ladders must be used and all ladders should be secured when in use. Check overhead for antennas, power lines and other obstacles before erecting ladders or scaffolding and while working on any roof structure.

✓ LOCATION & PLACEMENT

When installing the boiler or heater, consideration must be given to proper location. In addition to the following requirements, the installation must adhere to all local or state code requirements.

1. The unit should be leveled.
2. Minimum clearance for hot water pipes and venting from combustible material is 6 inches.
3. The boiler/heater must not be installed on carpeting or other combustible flooring.
4. The unit is for alcove installation on non-combustible floors only. The minimum clearance for combustible material:

Minimum Clearance	A-035	A-050	A-070	A-097	A-120	A-140
Back & Side Walls	24	24	24	24	24	24
Top of Jacket to Ceiling	51	51	56	56	56	56
Dimensions in Inches						

5. The heater/boiler must be installed so that it can be serviced without removing the heater/boiler or any surrounding structure. The minimum space required in front of the boiler to allow removal of the burner is:

Minimum Clearance	A-035	A-050	A-070	A-097	A-120	A-140
Burner Removal	23	28	32	35	35	35
Dimensions in Inches						

6. A hot water boiler installed above radiation level must be provided with a low water cutoff device either as a part of the boiler or at the time of boiler installation.
7. The boiler/heater shall be protected from freezing. Heat exchangers damaged by freezing shall not be considered for warranty.
8. The unit must be located where condensation or leakage from the heat exchanger or connections can be drained and will not result in damage to the adjacent area or to lower floors of the structure. If this cannot be avoidable, use of an adequately drained catch pan is recommended. The pan must not restrict combustion air flow to the burner.
9. The boiler/heater must be installed such that the gas ignition system and other electrical components are protected from water (dripping, spraying, rain, etc.) during operation and service.



Maintain the area surrounding the heater/boiler clean and free of combustible materials, gasoline, and other flammable liquids or vapors. The heater/boiler should never be covered.

✓ COMBUSTION AIR REQUIREMENTS

The boiler/heater room must be provided with **TWO** openings to assure adequate combustion air and proper ventilation. One opening should be 6 to 12 inches above the floor and the other 6 to 12 inches below the ceiling, preferably on opposite walls. The size of each opening will vary based on whether the air is taken from inside or outside the building, and with the input rating of the boiler/heater.



The make-up air must be sized for the total BTU per hour demand of ALL gas fired or air using appliances served by these openings.

When air is taken directly from the outdoors or through a vertical duct, each opening must have a minimum of 1 square inch (6.5 cm²) per 4,000 Btu/hour. If a horizontal duct is used, each opening must have a minimum of 1 square inch per 2,000 Btu/hour is required.

When air is taken from another interior space, **each** opening should have a minimum free area of 1 square inch for each 1,000 Btu/hour of gas input, but not less than 100 square inches. The area of the room the boiler is located in, plus the area it is communicating with for combustion air, must meet the large room criteria described in the National Fuel Gas Code.

Example 1: One 500,000 btu/hr input boiler with air taken from the outdoors through two horizontal ducts. The open area of each duct must be at least 250 square inches (161 cm²). [500,000 / 2,000] = 250]

Example 2: One 350,000 and one 1,400,000 btu/hr input boilers, with air taken from the outdoors through two vertical ducts. The open area of each duct must be at least 437.5 square inches (2823 cm²). [(1,400,000 + 350,000) / 4,000 = 437.5]

Provision for combustion and ventilation air must be in accordance with Section 5.3 of the National Fuel Gas Code, ANSI Z223.1 (latest edition) or applicable provisions of the local building code.



Under no circumstances should the boiler room ever be under a negative pressure. Particular care must be taken when steam boilers, exhaust fans, compressors, air handling units or other equipment may rob air from the unit.



The combustion air supply must be free of chemical fumes, which may be destructively corrosive when burned. Examples of chemicals that must be avoided are fluorocarbons and other halogenated compounds, commonly present as refrigerants or solvents, such as Freon, trichloroethylene, and chlorine. These chemicals, when burned, form acids that will attack the boiler tubes, flue collectors, and boiler stack, resulting in premature boiler failure.

Canadian Installations: All combustion air must be drawn from outside the building. The mechanical equipment room must communicate directly with the outdoors. Refer to CGA B149 Installation Code for additional information.

✓ ELECTRICAL REQUIREMENTS

Installations must follow the National Electrical Code (NEC) ANSI/NFPA No. 70, latest edition (CSA C22.1 CEC Part 1 for Canada) and any other local codes or regulations having jurisdiction. The unit must be electrically grounded in accordance with NEC. Install a separate disconnect means for the heater/boiler.

The electrical conductors shall be type MTW 105 °C wire, with black for hot, white for neutral, and green for ground. All electrical wiring must be protected from mechanical damage. The conduit and junction box shall be UL approved with the wall thickness of the steel junction box at least 0.031 inches (0.79 mm).

The A2000 water boiler/heater operates on 115V, 15 amp, 60Hz power. A transformer is provided to reduce the voltage to 24 volts for the ignition control module and gas valve operation. Consult the wiring diagram located on the heater/boiler or the Wiring Diagrams section of this manual for the specific connection points and control devices applicable for your model.

ELECTRICAL SHOCK HAZARD: Ensure electrical power to the heater/boiler is disconnected before connecting power, auxiliary controls and components or servicing.



Do not attach any electrical components to the interior or exterior of this boiler/heater unless given authority to do so by a representative of Green Boiler Technologies.



All models are furnished with a pre-wired, manual reset, water high limit temperature switch. This temperature switch must not be used as an operating aquastat. A separate operating temperature controller is required for proper operation of this appliance (see wiring diagrams for suggested location in the electrical circuit). Failure to install a separate operating temperature controller will result in short cycling. Typically, water heaters are installed along with a storage tank and the temperature controller is

mounted in the lower half of the storage tank. Boiler temperature controls are typically mounted in the primary loop. If the temperature control sensor is mounted directly on the heater/boiler water piping, the sensor must be installed on the inlet water piping to prevent short cycling of the appliance.

A water flow switch must be installed by the installer and wired to prevent the unit from firing if for any reason there is an inadequate flow of water through the boiler/heater (see wiring diagrams for suggested location in the electrical circuit). **NOTE: CSD-1 model boilers only, are equipped with a factory installed operating aquastat.**

Optional, circulation pumps can be supplied for single or three phase and 115 to 460 volts as required. The pump power must be wired independently and should be adequate for the amp rating of the pump motor. Refer to the Operating Instructions and Wiring Diagrams sections of this manual for more information regarding pumps.

✓ GAS REQUIREMENTS



Ensure the fuel the appliance will burn is the same as that specified on the boiler rating plate. Conversions must be completed by a Qualified Service Agency or Gas Provider. Call your Green Boiler Technologies Representative or Customer Service for instructions and the proper conversion kit.

The gas supply meter, regulator, and piping must have sufficient capacity to supply all gas fired appliances they feed without undue pressure loss. If the gas meter, regulator or piping is too small, request the gas company install equipment with adequate capacity.

The allowable pressure loss in gas piping between the gas meter or service regulator and each appliance is generally between 0.3 to 0.5 inches of water column. Refer to the National Fuel Gas Code, ANSI Z223.1, Latest Edition, for sizing guidelines.

Gas Pipe Sizing Chart: Cubic Feet of Gas Per Hour								
Max Length (Equivalent feet)	Size Schedule 40 Metallic Pipe (inches)							
	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4
10	273	514	1060	1580	3050	4860	8580	17500
20	188	353	726	1090	2090	3340	5900	12000
30	151	284	583	873	1680	2680	4740	9660
40	129	243	499	747	1440	2290	4050	8270
50	114	215	442	662	1280	2030	3590	7330
60	104	195	400	600	1160	1840	3260	6640
70	95	179	368	552	1060	1690	3000	6110
80	89	167	343	514	989	1580	2790	5680
90	83	157	322	482	928	1480	2610	5330
100	79	148	304	455	877	1400	2470	5040
125	70	131	269	403	777	1240	2190	4460
150	63	119	244	366	704	1120	1980	4050
175	58	109	224	336	648	1030	1820	3720
200	54	102	209	313	602	960	1700	3460
Table Values For Natural Gas, Specific Gravity 0.60								
Typical Natural Gas = 1025 Btu per cuft ; Typical Propane = 2,500 btu/cuft								

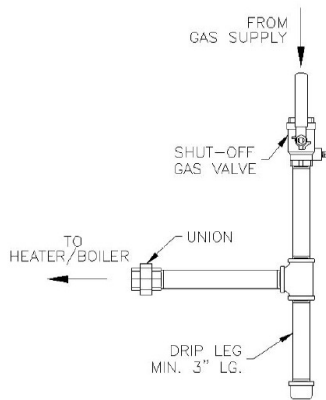
Example: For 20 equivalent feet of 1-1/2 inch piping, the maximum cuft/hr gas flow with a 0.3 inch w.c. pressure loss is 726. For natural gas at 1025 Btu/cuft, the maximum firing rate is 744,000 Btu/hr [726 x1025]. For propane at 2500 Btu/cuft, the maximum firing rate is 1,815,000 Btu/hr [726 x 2500].

Maximum and minimum gas pressure delivered to the boiler/heater is shown below. If the gas supply line pressure is greater than the maximum listed, a pressure regulator must be installed at least 10 pipe diameters upstream of the boiler/heater.

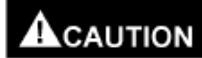
	Maximum Pressure	Minimum Pressure
Natural Gas	9	5
Propane	15	13
Units: Inches of Water		



The A2000 series water boiler/heater is not intended to operate at a gas supply pressure other than shown on the rating plate. Exposure to a higher gas supply pressure may cause damage to the gas valves, which can result in fire or explosion.



The gas supply piping must have a 3 inch (7.6 cm) minimum sediment trap (sometimes referred to as a dirt trap or drip leg) and a manual shut off valve ahead of the boiler/heater. The sediment trap should be located as close to the heater as possible, be readily accessible and not subject to freezing conditions. A union of the ground joint or flanged joint type must be installed in the gas supply piping adjacent to the boiler/heater for ease of service.



It is important to guard against gas valve fouling from contaminants in the gas piping. Fouling may cause improper operation, fire or explosion. Clean the inside of all supply pipe and fittings prior to insulation. Do not use Teflon tape. Use only a joint compound suitable for natural gas and propane. Apply the joint compound sparingly, only on the male threads and do not apply to the first two threads.



To prevent damage, do not apply excessive torque when attaching the gas supply line to the boiler/heater gas valve.

The gas supply piping must be adequately supported by using hangers or other suitable types of support. Do not use the boiler/heater gas train to support the gas supply piping.

The boiler/heater and its gas connections must be leak tested prior to placing the unit in operation. Use soap and water solutions or other material acceptable for the purpose of locating gas leaks. Do not use matches, candles, flame, or other sources of ignition for this purpose.

During pressure testing, disconnect the heater/boiler from the gas supply if the test pressure is equal to or greater than ½ psig (3.5 kPa). The gas supply line must be capped when not connected to the boiler during this process. Relieve the gas pressure in the gas supply line prior to re-connecting to the boiler/heater. Failure to follow this process may damage the gas valves and voids the warranty on the gas valves.



Do not subject the boiler/heater gas train components to pressures equal to or greater than ½ psig. Damage to the gas valves may result.

Local codes may require the vents on the supply regulators and safety vent valves be piped to the outside. When required, this piping is part of the gas supply piping and not part of the boiler/heater. It is important to insure these vents are protected against blockage, with special care given to prevent blockage from rain, condensation, ice, or snow.

When multiple appliances are fed gas from the same supply line, individual point of use regulators are recommended to minimize variations in supply pressure.

✓ WATER CONNECTIONS

The type of system in which the boiler/heater is to be used will determine the type of water connections to be made. Consult the piping schematics provided in the DIAGRAMS section before beginning the installation. Be sure to install the unit in accordance with the installation instructions to insure proper operation and safety.

The heater/boiler should be located so that any water leaks will not cause damage to the adjacent area or structures. If this cannot be avoided, use of a properly sized, drained catch pan is recommended. The catch pan must not impair combustion air flow to the burner. Union connections and shut off valves must be provided at the unit to facilitate future service which may be required.

The ASME pressure relief valve supplied on the unit must be piped to a drain or to a safe location to prevent accidental burns should the valve discharge hot water. DO NOT install a valve between the relief valve and the heater. DO NOT install reducing coupling, restriction, or valve in the relief valve discharge line. DO NOT pipe to an area where freezing could occur. Local code requirements concerning size, type and placement of other safety valves must be followed. The relief valve should be checked at least once yearly by manually operating the release lever to insure proper operation.

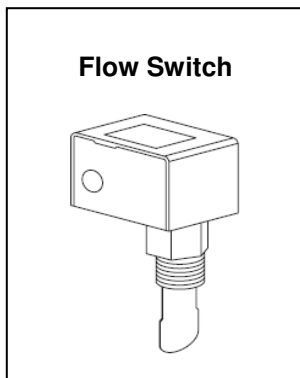


A discharge line must be connected to the pressure relief valve and piped to a safe location. Do Not Install a valve or other restriction between the relief valve and heater, or the relief valve and the end of the discharge line. Water discharging from the relief valve will be very hot and may cause serious injury.

If the heater/boiler is connected to a water storage tank, a temperature and pressure relief valve must be installed on the tank. The temperature/pressure relief valve serves as a safety device to prevent excessive pressure and temperature. Excessive pressure may be caused by the expansion of water when it is heated in a closed system. A closed system is one that has a check valve, back-flow-preventer, or a pressure-reducing valve in the cold water supply line. In this type of system it is normal for the relief valve to relieve small quantities of water from the closed system when the boiler is firing and no water is being used. An expansion tank or other suitable means must be provided to control thermal expansion.

Insulating or dielectric unions or bushings should be used in connections between dissimilar metal fittings (such as between copper and galvanized). These fittings are required to minimize electrolytic corrosion, which can result from direct connection of dissimilar metals in a water system.

A flow switch must be installed and wired to prevent the unit from firing if there is an inadequate flow of water through the boiler/heater. A flow switch on this unit meets CSD-1 safety requirements as a low water cut-off device. **Note: A factory-wired flow switch is provided on all CSD-1 models.** The flow switch should be set so that the heater/boiler will not fire when the flow rate is less than that which will provide greater than a 80° F (44 °C) temperature rise through the heater/boiler.



Flow Rate (gpm) Vs. Water Temperature Rise							
Temp Rise		A2000 Model					
deg F	deg C	A2-035	A2-050	A2-070	A2-097	A2-120	A2-140
80	44	7.0	10.0	14	19	24	28
70	39	8.0	11	16	22	28	32
60	33	9.4	13	19	26	32	37
50	28	11	16	22	31	39	45
40	22	14	20	28	39	48	56
30	17	19	27	37	52		
20	11	28	40	56			
Recommended Temperature Rise: 20 - 45 °F							

When used for both potable water heating and space heating, all piping and components connected to the system for space heating must also be suitable for use with potable water. Do not introduce toxic chemicals, such as those used for boiler treatment, into the system. Any components previously used with non-potable water must not be connected to the potable water system.

When the system requires water for space heating at temperatures higher than 140° F (60° C), use a mixing valve or similar means to reduce the potable water supply temperature to avoid scald injuries. The operating thermostat should be set at the lowest possible temperature that provides useful service for the application. For potable water uses, 120 – 125 °F (49 – 51 °C) is recommended (use a tank mounted Operating Aquastat).

This heater/boiler requires forced water circulation when the burner is operating. Pump selection and sizing depends upon the type of system in which the heater/boiler will be used. Pressure loss through the A2000 heat exchanger is provided below. **The maximum flow rate through the A2000 heat exchanger is 56 gpm due to velocity induced tube erosion.**

Head Loss (ft hd) Vs. Water Flow Rate Through Heat Exchanger (Approximate)						
Flow (gpm)	A2000 Model					
	A2-035	A2-050	A2-070	A2-097	A2-120	A2-140
10	1.5	2.0	2.5	4.5	4.5	4.5
20	4	6	8	12	12	12
30	9	13	15	21	21	21
40	17	22.5	26	35	35	35
50		36	46	52	52	52
56			57	64	64	64
psi = (ft hd) x 0.434						

The A2000 models are designed to operate with a return water temperature of 120° F (49 °C) or greater. Condensation of the flue gasses may result if the inlet water temperature is under 120° F. This appliance and the venting connected to it are not designed to withstand repeated condensation. Low operating temperatures and frequent cold start-ups must be prevented. Frequent operation below 120°F return water temperature will damage the heat exchanger and **void the warranty**. If low operating temperatures cannot be avoided, a feedback loop (by-pass) must be installed as shown in the DIAGRAMS section.



Do not operate your A2000 heater/boiler with inlet water temperatures lower than 120°F (49°C). Consistent operation below these temperatures will cause heat exchanger corrosion and void the warranty. A By-Pass piping arrangement is required when inlet water temperatures are consistently below 120 °F.

Water temperature thermometers should be obtained and field installed as shown in the DIAGRAMS section.

Water Chemistry: Water that is very soft, very hard, having a high total dissolved solids (TDS), or an acidic or alkaline pH will shorten the life of the heat exchanger. The water should be between 5 and 15 grains per gallon hardness. Water with a hardness exceeding 15 grains or a TDS exceeding 2500 ppm should be softened or treated to prevent scaling of the heat exchanger, which reduces efficiency and ultimately may cause premature failure of the heat exchanger due to overheating. Water softer than 5 grains may be corrosive, causing premature heat exchanger failure, and must be treated with a suitable buffer. The ideal pH for water used in a storage tank or copper heating system is 7.2 to 7.8. Corrosion of the heat exchanger may result when the pH is lower than 6 or higher than 8.

Scaling of the heat exchanger is aggravated with low water flow rates and high water temperatures. To minimize scaling, use the highest water flow rate and lowest water temperature set-point suitable for the application.



FAILURE TO PROPERLY OBSERVE THE ABOVE WATER CHEMISTRY RECOMMENDATIONS WILL VOID THE WARRANTY AND MAY RESULT IN A VERY SHORT LIFE OF YOUR BOILER/HEATER.

Leak Testing: The A2000 heater/boiler does not require hydrostatic pressure testing, as the heat exchanger was factory tested for 160 psig operating pressure. However, the water piping connections to the heater, and the balance of the water system should be leak tested prior to putting the system into operation. Leaks must be immediately repaired to prevent damage to the heater or property.



When a boiler is used in connection with refrigeration systems, it must be installed so the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the boiler. When a boiler is connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation, it must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cycle.

IMPORTANT: Before attempting to start the unit, be sure the system is full and the water is free to flow through the unit. All air must be relieved from the unit and piping and the pump must be working before the unit is fired.

✓ VENTING SYSTEM



Proper installation of the flue venting is critical for the safe and efficient operation of your heater/boiler. Failure to conform with any of these requirements may violate local, state or federal codes as well as create conditions that may cause catastrophic property damage or personal injury.

The venting system must comply with the National Fuel Gas Code, ANSI, Z223.1 / NFPA 54, Latest Edition, or for Canada, CAN/CGA B149.1, and all local codes. Venting must be provided to completely remove all gases and products of combustion to the outside, without condensation in the stack or spillage at the draft hood.

The A2000 heater/boilers are negative vent, non-condensing Category I appliances and can utilize un-insulated single wall "B" vent connectors. Vent material must be listed by a nationally recognized test agency. Insulated metal vent pipe must be used for outdoor vent sections in cold climates to reduce condensation. Observe clearances in accordance with applicable codes from all combustible materials. Use insulated venting or vent pipe spacers where the vent passes through combustible roofs, floors, and walls.

Natural draft vent systems utilize natural buoyancy of the hot flue products to create the pressure difference that allows the flue products to exhaust from the flue. The negative pressure draft should be -0.1 to -0.8 inches of water column when measured 12 inches (30 cm) above the draft hood to ensure proper operation.

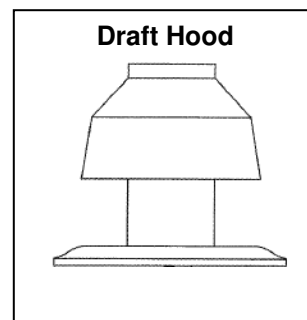
Do not reduce the vent diameter and avoid sharp turns in the vent piping. Use the same size stack and draft diverter as the discharge from the unit. The vent sizes for A-2000 models are:

Model:	A2-035	A2-050	A2-070	A2-097	A2-120	A2-140
Vent Diameter	9"	10"	12"	16"	16"	18"

The draft hood that was supplied with your A-2000 model must be installed directly on top of the unit. The draft hood slips over the flue outlet flange.

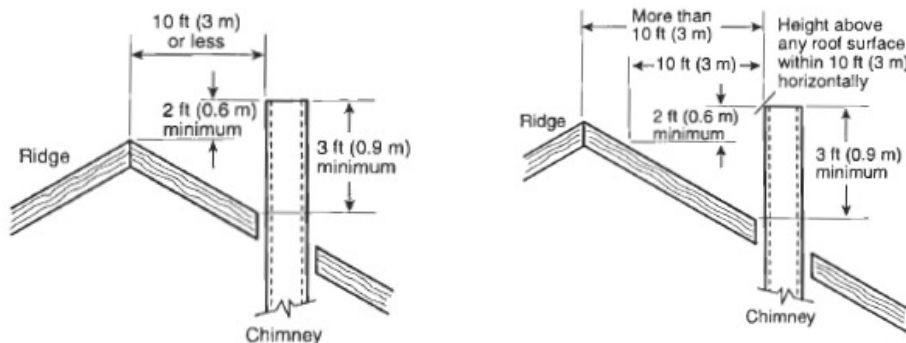
General Venting Requirements:

- The maximum and minimum vent length for Category I systems is determined by the National Fuel Gas Code, or for Canada, B149.
- Avoid long horizontal runs of vent pipe, reductions, restrictions, and 90° elbows. The length of the horizontal run should be as short as possible, but must not exceed 75% of chimney height.
- All horizontal runs must slope upward toward the termination at least ¼ inch per foot (2 cm per meter) and be adequately supported.
- A2000 models are designed to operate with a negative pressure in the exhaust venting. This appliance is NOT approved for side-wall venting. Consult your GBT representative or Customer Service if side-wall venting is required.
- When any horizontal vent extends for more than 6 feet (1.8 meter), vent supports must be installed with



subsequent supports after every additional 6 feet. The support must be secured using at least #10 fasteners to a solid material (solid masonry or wood framing or blocking). Do not fasten to drywall sheathing using hollow wall anchors. As an alternative, a threaded rod and trapeze support in accordance with SMACNA HVAC Construction Standards – Metal and Flexible, latest edition, shall be installed every 6 feet of continuous horizontal vent and after any offset elbows.

- Install an approved cap for the stack outlet. The bottom of the cap must be one stack diameter above the top of the stack and so designed to prevent snow or any debris from blocking the vent. The top of the stack must be carried to a minimum of two feet above the highest point of the roof or any other obstructions within 8 feet (2.4 meter) of the termination. The vent must not terminate near an air supply inlet to any building.
- The venting system must be planned so as to avoid possible contact with concealed plumbing or electrical wiring inside the walls.
- Venting in a multi-family structure must be enclosed when passing through occupied or unoccupied spaces above the connected boiler. The enclosure is to be of materials no less fire resistant than surrounding floors and walls. It is recommended that the system be enclosed whenever passing through occupied spaces. Be sure to check your local building codes for additional requirements.
- Minimum clearance of 4 feet (1.2 meter) (6 feet or 1.8 meter in Canada) horizontally must be maintained between the unit and vent stack from electric meters, gas meters, regulators and relief equipment (no part of the unit or venting may be directly above or below electric meters, gas meters, or regulators).
- A vertical support must be installed at least twice in any continuous vertical run, or every 10 feet. Install a Vent Roof Jack Assembly or Fire stop Plate at every penetration of a floor or ceiling.
- Roof Line: The vent system must terminate at least 3 feet (0.9 meter) and no more than 6 feet (1.8 meter) above the roof line, and no closer than 8 feet (2.4 meter) from any wall or vertical structure. Vents extending above the roof more than 5 feet (1.5 meter) should be secured using guy wires or braces to withstand wind or snow loads.



WARNING These units are engineered for natural draft and may not be connected into any portion of a mechanical or other draft system operating under positive pressure. Verify that the venting is under negative pressure when all boiler room doors are closed, the heater/boiler is firing, and all other air using appliances in the room are operating. If the venting is under positive pressure during operation a draft inducer must be installed, vent material suitable for positive pressure must be installed and all joints must be sealed.

Common Vent System: Manifolds that connect more than one heater/boiler to a common chimney must be sized to handle the combined load. At no time should the area of the common vent be less than the area of the largest heater/boiler exhaust outlet.



CAUTION Common vent systems may be too large if an existing unit is removed. When an existing appliance is removed, the vent system design must be carefully evaluated for proper sizing (Refer to MAINTENANCE Section of this manual).

START-UP & OPERATION



Follow these instructions exactly. A fire or explosion may result, potentially causing personal injury, loss of life and property damage.



Do not use this appliance if any part has been flooded or heavily sprayed with water. Immediately call a qualified service technician to inspect the controls and replace any part that has been damaged by water.

✓ PRE-START CHECKLIST

Before starting the boiler, review the following:

- Is the unit properly sized for the application?
- Is the gas supply properly sized and installed?
- Is the vent system properly installed?
- Is the combustion and ventilation air adequate?
- Is the water system properly installed and filled with water?
- Is the proper operation understood and all instructions followed?



This appliance is equipped with an ignition device, which automatically lights the burner. **DO NOT TRY TO LIGHT THE BURNER BY HAND.**

✓ FILL THE SYSTEM WITH WATER.

Fill the system with water and purge all air. Trapped air can prevent proper water circulation. Check the water piping system for leaks and if found, repair immediately.

✓ PURGE AIR FROM GAS LINES

For a new installation, or if the gas lines feeding the heater/boiler were opened to the atmosphere during installation or service, air in the gas lines must be purged before operating the unit.

Before purging gas lines, ensure electrical power is turned off to the heater/boiler AND ALL OTHER APPLIANCES IN THE VICINITY OR ROOM. TURN OFF GAS TO ALL APPLIANCES IN THE VICINITY OR ROOM.



Provide ventilation from the area around the heater/boiler to the outdoors, preferably using a fan or blower.

Loosen the pipe union or fitting upstream and adjacent to the heater/boiler. Slowly, partially open the manual gas valve installed upstream of the loosened union or connection. Allow the trapped air to exit the gas piping until the smell of gas is noticed. Close the manual gas valve and reconnect the pipe union or fitting. Wait at least 15 minutes before turning electrical power back and/or gas back on to the other appliances, and only after you are sure purged gases have dissipated.

✓ PREPARATION

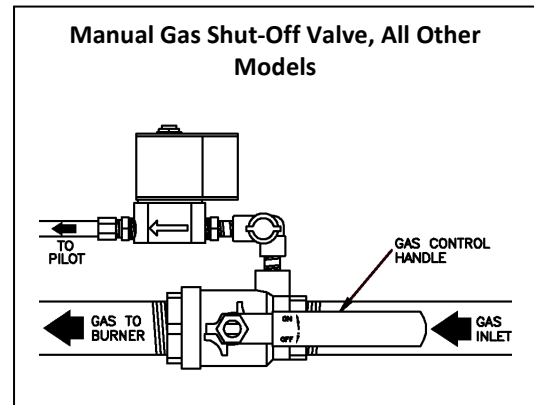
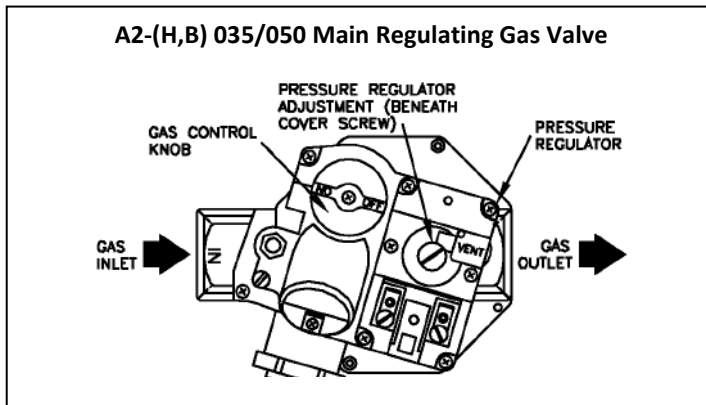
1. Ensure the manual gas valve upstream of the heater/boiler is **CLOSED**.
2. For A2-035 and A2-050 models, ensure the main regulating gas valve is closed.

Before turning on the power to this appliance smell all around the appliance for gas. Be sure to smell next to the floor because some gas is heavier than air and will collect near the floor.



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 gas supplier, call the fire department.



3. Turn on electrical power to the heater/boiler. Using a multi-meter, check voltage between the HOT and COMMON (should be about 120 Volts).
4. Check voltage between the HOT and Ground (should be about 120 Volts).
5. Check voltage between the COMMON and Ground (should be less than 1 Volt).



If the COMMON – Ground is more than 1 Volt, STOP! Contact a licensed electrician to correct the ground fault.

6. Turn OFF electrical power to the heater/boiler.
7. Attach 24 inch manometers to the gas line so that the gas pressure can be measured upstream of the first heater/boiler automatic gas valve, downstream of the last automatic gas valve, and between automatic gas valves. **NOTE: Depending upon the model, your heater/boiler may be equipped with one or two automatic gas valves.**
8. Install water temperature measurement thermometers in the water inlet and outlet piping.
9. Slowly turn on the manual gas shut off valve upstream of the heater/boiler.
10. Read the gas supply pressure using the manometer. Verify that the supply gas supply pressure is between the minimum and maximum per the table below. If the pressure is not within these limits, check to see if a service gas regulator is installed and adjust accordingly.

	Maximum Pressure	Minimum Pressure
Natural Gas	9	5
Propane	15	13
Units: Inches of Water		



Do not operate heater/boiler if the gas supply pressure is not within the limits shown in the table above.

11. Turn OFF the manual gas shut off valve upstream of the heater/boiler.
12. Turn ON electrical power to the heater/boiler ON.
13. Turn the operating thermostat to a setting high enough to turn on the water pump. Verify water is flowing through the heater/boiler by verifying the flow switch has closed.

14. Turn the operating thermostat to its lowest setting so that water pump stops.

✓ START-UP

1. Slowly turn on the manual gas valve upstream of the heater/boiler. For A2-035 and 050 models only, turn on the manual valve located on top of the Robertshaw automatic gas valve.
2. Turn the operating thermostat to a setting high enough to turn on the water pump.
3. The ignition control module will turn on the spark ignition system and pilot operating valve to light the pilot burner. If the pilot does not light the first time, it will retry, up to three times. This is normal during the initial start-up due to air in the pilot line. If, after trying three times, the pilot burner does not light, remove power to the ignition module to reset, by either turning the operating thermostat down to its lowest setting or turning off electrical power to the heater/boiler.

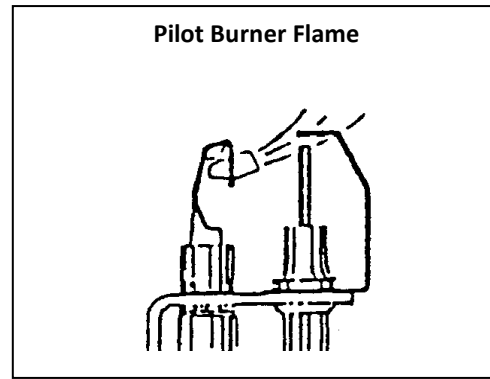
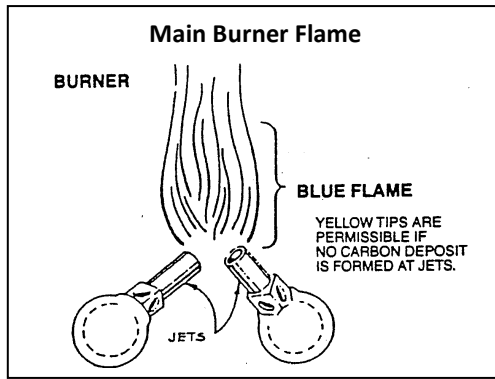
NOTE: CSD-1 models only utilize an ignition module that waits 5 minutes before attempting to re-light the pilot.

4. After the pilot burner is lit and pilot flame is proven, the Ignition Module will open the automatic main gas valve(s) and the main burner will light.



If the pilot or main burner fails to light after repeated attempts, shut off the manual gas valve upstream of the heater/boiler, remove electrical power from the heater/boiler, and call your qualified service technician or gas supplier.

5. Check for gas leaks in the gas train assembly using soap and water or an appropriate leak check fluid. **DO NOT use an open flame to check for gas leaks.**
6. Using the manometers with the heater/boiler operating, check to make sure the gas supply pressure is within the limits shown above.
7. Check the manifold gas pressure downstream of the automatic gas valves using the outlet pressure tap provided on the gas valve (A2-035 and 050 models only) or the pressure tap provided in the gas piping.
 - For Natural Gas models, the manifold pressure should be set to 4.0" water column.
 - For Propane Gas models, the manifold pressure should be set to 10.5" water column.
 - For 2-Stage models, see the Operating Section for setting the gas manifold pressure.
 - a. For A2-035 and A2-050 models, adjust the manifold pressure using the adjustment screw located on top of the Robertshaw gas valve (remove the dust cover cap to expose the adjustment screw).
 - b. For A2-070, 970, 120 and 140 models, adjust the manifold pressure using the Maxitrol gas pressure regulator located upstream of the automatic gas valve (remove the dust cover cap to expose the adjustment screw).
 - c. Replace the manifold pressure adjustment screw caps
8. With the manifold gas pressure set per step 6 above, observe the main burner flame characteristics. The burner flame should be blue at the base, with yellow at the tips permissible. An excessive amount of yellow flame suggests a lack of combustion air or inadequate vent draw.



9. Verify the water flow switch opens at the minimum water flow rate by slowly closing a manual ball valve installed in the water outlet piping, until the difference between the water inlet and outlet reaches 95 – 100 °F (53 – 55 °C). Note: The operating thermostat may have to be turned to its highest setting in order to conduct this test. If the main burner does not shut down when this temperature difference is achieved, adjust the flow switch set point until the flow switch opens (refer to Operating Section for instructions concerning setting the flow switch).
10. Fully open the manual ball valve in the water outlet piping.
11. After the main burner has been in operation for at least five (5) minutes, inspect the venting for spillage. Draft tests must be done with the appliance firing. Proper draft or airflow in the venting may be determined by either of the following means:
 - Smoke Test – Place a source of smoke or other visible fumes under the opening of the draft hood. If the fumes are all drawn up the draft hood opening, the appliance is drafting properly. If any fumes roll outside of the vent hood there is a problem with the drafting or make-up air.
 - Draft Gauge – A draft pressure gauge can be inserted into the vent pipe directly above the draft hood. The draft gauge must show a constant negative pressure.
12. Turn the operating thermostat down to its lowest setting. The pilot and main burner will shut off. Close the manual gas valve immediately upstream of the heater/boiler.
13. Remove the gas pressure manometers and replace all plugs. Use an appropriate pipe thread sealant (do not use Teflon tape).
14. Open the manual gas valve immediately upstream of the heater/boiler and set the operating thermostat at the desired temperature.

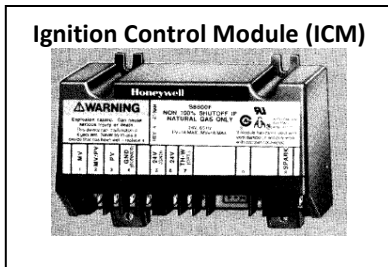
NOTE: Low inlet water temperatures on start-up may create flue gas condensation which may gather on the floor under the heater. THIS IS NOT A LEAK. The unit will stop condensating when it reaches standard operating temperatures.

✓ SHUT DOWN PROCEDURE

1. Set the operating thermostat to lowest setting and turn the gas valve to “OFF.”
 - For A2-(H,B)-035/050 models, rotating the control knob on top of the combination regulating gas valve to the “OFF” position turns off the gas.
 - For all other models, the gas is turned off by rotating the handle on the separate manual gas valve to a position perpendicular to the gas piping.
2. Switch off all electrical power to the system.

✓ OPERATION

The A2000 models are simple ON/OFF water heater/boilers. The units are turned ON and OFF by the application or removal of 120 VAC power to the control panel. Normally, this 120 VAC power is provided through an operating thermostat. Safety controls (such as a flow switch and manual reset water high limit temperature switch) installed between the operating thermostat and the heater/boiler prevent power from reaching the control panel if water flow is not present, or the outlet water temperature has been exceeded. When 120 VAC power is applied to the heater/boiler control panel on a call for heat from the operating thermostat, 24 VAC is applied to the Ignition Control Module via a transformer. The ICM provides spark to the igniter, opens the pilot burner operating valve providing gas flow to the pilot burner, and looks for flame verification through the spark igniter electronics. Once pilot flame is verified, the ICM opens the automatic main burner valve(s), which provides gas flow to the main burner, which is ignited by the pilot burner.



If the pilot flame is not verified, the ICM will try to light the pilot burner two more times (see CSD-1 Section below for control differences specific to CSD-1 models). After the third try, the ICM will go into lock-out. The ICM can be reset by removing power to the heater/boiler. The pilot burner remains ON the entire time the main burner is ON. If pilot flame verification is lost while the main burner valves are ON, the ICM will close the main burner valves and try to re-establish pilot burner flame.

When the operating thermostat is satisfied, the 120 VAC is removed, and the normally closed pilot valve and main burner valves close.

Operating Thermostat Setting: A separate operating temperature controller is required for proper operation of this appliance. Failure to install a separate operating temperature controller will result in short cycling. Water heaters are expected to operate at temperatures between 120 °F and 155 °F (49 to 68 °C) Water boilers can operate with return water temperature up to 190 °F (88 °C) and a supply temperature up to 240 °F (115 °C). Return water temperatures must be kept above 120 °F to prevent condensation. Refer to the DIAGRAMS section for recommended piping for lower operating water temperatures. Frequent operation below 120°F (49 °C) return water temperature will damage the heat exchanger and **void the warranty**.



Do not operate your A2000 heater/boiler with return water temperatures lower than 120 °F (49 °C). Consistent operation below these temperatures will cause heat exchanger corrosion and void the warranty.

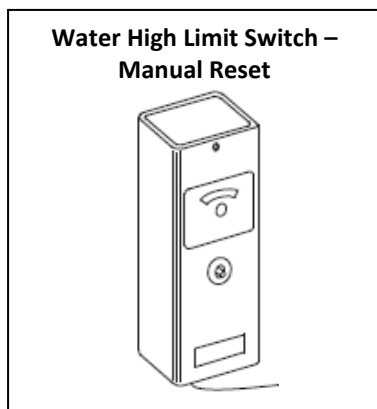
Water Temperature - Scald Relationship		
Water Temperature		Time to Produce 2nd & 3rd Degree Burns on Adult Skin
deg F	deg C	
> 170	> 77	Nearly Instantaneous
160	71	About 1/2 Second
150	65	About 1-1/2 Second
140	60	Less Than 5 Seconds
130	54	About 30 Seconds
120	49	More Than 5 Minutes

When the heater/boiler is used for potable water heating, use a mixing valve or similar means to reduce the potable water supply temperature to avoid scald injuries. The mixing valve should be set at the lowest possible temperature that provides useful service for the application. For potable water uses, 120 – 125° F (49 – 51° C) is recommended.



Water temperatures higher than 125 °F (51 °C) can cause severe burns, personal injury or loss of life. The temperature at which injury occurs varies with a persons age and the time of exposure. Never allow small children to use a hot water tap or draw their own bath water.

Water High Limit Switch: Every A2000 model is equipped with a manual reset, High Limit Switch on the hot water outlet. For water heater models, the high limit has a factory stop of 200 °F (93 °C). For boiler models, the factory stop is set at 240 °F (115 °C). The high limit switch must always be present and must never be bypassed. If the High Limit Switch trips, it must be manually reset by pressing the red button, located on the front cover of the High Limit Switch.

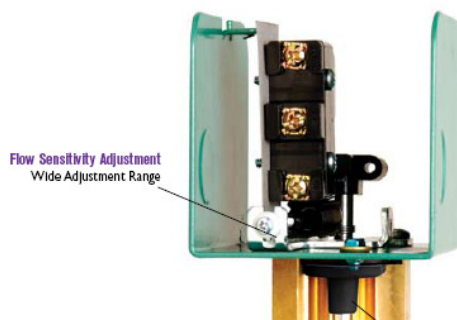


Gas Pressure Regulator: A gas pressure regulator is provided on all A2000 water heater/boilers. This regulator is preset at 4 inches water column for natural gas or 10.5 inches water column for Propane gas. For A2(H,B)035/050 models, the pressure may be adjusted using the adjustment screw located on the combination gas valve (see Figure on page 16). For all other models, except 2-Stage, a Maxitrol gas pressure regulator is provided. If a pressure adjustment is required, remove plug and turn screw clockwise to increase pressure, counterclockwise to decrease pressure. One complete turn will change the pressure approximately ¼ inch of water column. For 2-Stage models, see the Items Specific to 2-Stage Models below.



Operation of the A2000 heater/boiler at gas manifold pressures greater than 4.0” w.c. for Natural Gas, and 10.5” w.c. for Propane Gas, will cause the unit to be over-fired, which may cause premature heat exchanger failure, serious injury, or loss of life.

Flow Switch: A flow switch is required to be installed in the outlet water line, wired so that the heater/boiler will not fire unless the minimum water flow through the heat exchanger is present. The minimum flow rate for each model the flow that will provide a 100 °F (55 °C) temperature rise through the heat exchanger (see table in INSTALLATION Section).



The set point for the flow switch can be changed using the adjustment screw located under the electrical house cover of the switch. Rotate the screw clockwise to increase the flow set point, counter-clockwise to decrease the flow set point. With the heater/boiler firing (make sure 2-Stage models are firing on HIGH), slowly close the manual valve in the water outlet piping, until the temperature rise through the heat exchanger approaches 100 °F (or lower based on specific installation or requirements). Adjust the switch set point so that the switch opens at this flow rate. Slowly open the water valve so that the switch closes, then repeat the process to ensure the switch is set correctly.



Risk of electrical shock. Be careful not to touch live electrical parts or bare wires inside the flow switch housing. The voltage to the flow switch is 120 VAC.

Water Pump: All A2000 models require forced circulation of the water through the heat exchanger. Selection and installation method of the pump depends upon the design of the system and intended use (see DIAGRAMS section for water pump location suggestions). The pump electrical power must be wired independently and should be adequate for the amp rating of the pump motor. Refer to the INSTALLATION section for pressure losses through the A2000 heat exchangers. **The maximum flow rate through the A2000 heat exchanger is 56 gpm due to velocity induced tube erosion. A list of acceptable water pumps and manufacturers for the A2000 models is listed on the following page.**

A2000 Pump Selection Chart						
MODEL:	A2*035*	A2*050*	A2*070*	A2*097*	A2*120*	A2*140*
Flow Rate & Head Loss	23GPM @ 11.3 FT.	23GPM @ 11.3 FT.	40GPM @ 34.6 FT.	49GPM @ 54.8 FT.	54GPM @ 70.7 FT.	40GPM @ 70.7 FT.
<u>Pump Vendor</u>						
GOULDS :	1ST2C1D4	1ST2C1D4	1ST1C1E4	2ST1E1E4	2ST1F1D4	2ST1F1D4
Horsepower	1/2	1/2	1/2	1	1-1/2	1-1/2
RPM	1750	1750	3450	3450	3450	3450
Electric	115/230 VAC	115/230 VAC	115/230 VAC	115/230 VAC	115/230 VAC	115/230 VAC
Impeller	4-3/4"	4-3/4"	4-7/16"	4-1/4"	4-5/8"	4-5/8"
B & G :	3530 1-1/4x1-1/2x6	3530 1-1/4x1-1/2x6	3530 1-1/4x1-1/2x6	3530 1-1/4x1-1/2x6	3530 1-1/2x2x6	3530 1-1/2x2x6
Horsepower	1/2	1/2	1	2	3	3
RPM	1750	1750	3500	3500	3500	3500
Electric	115 VAC	115 VAC	115 VAC	115 VAC	115 VAC	115 VAC
Impeller	3-7/8"	3-7/8"	3-7/8"	4-5/8"	4-3/4"	4-3/4"
GRUNDFOS :	UP26-96BF	UP43-75BF	Not Available	Not Available	Not Available	Not Available
Horsepower	1/12	1/6				
RPM	3450	3450				
Electric	115 VAC	115 VAC				
Impeller	One Size Only	One Size Only				
TACO :	0012BF4	0012BF4	Not Available	Not Available	Not Available	Not Available
Horsepower	1/8	1/8				
RPM	3250	3250				
Electric	115 VAC	115 VAC				
Impeller	One Size Only	One Size Only				
BURKS :	Not Available	Not Available	3GA5-1 1/4AB	10GA5-1 1/4AB	10GA5-1 1/4AB	10GA5-1 1/4AB
Horsepower			1/3	1	1	1
RPM			3500	3500	3500	3500
Electric			115/230 VAC	115/230 VAC	115/230 VAC	115/230 VAC
Impeller			3-1/8"	4-1/8"	4-1/8"	4-1/8"
MEPCO :	Not Available	Not Available	RC05-10 -005-34-1	RC05-10 -010-34-1	RC05-10 -015-34-1	RC05-10 -015-34-1
Horsepower			1/2	1	1-1/2	1-1/2
RPM			3450	3450	3450	3450
Electric			115/230 VAC	115/230 VAC	115/230 VAC	115/230 VAC
Impeller			3-1/2"	4-1/2"	5"	5"

Relief Valve Operation: Each boiler/water heater is equipped with an ASME approved pressure relief valve, with a standard setting of 125 psi (862 kPa). The outlet of the relief valve must be piped to a drain or other suitable safe place in accordance with local codes. When the heater/boiler is connected to a storage tank, a separate temperature/pressure relief valve must be provided on the tank.

Items Specific To CSD-1 Models: A2000 models equipped with ASME CSD-1 gas train and controls (model numbers start with "A2C") include a factory installed water flow switch in the water hot water outlet, and an operating thermostat (240 °F (115 °C) maximum setting) in the cold water inlet. CSD-1 models are also equipped with an Ignition Control Module (ICM) that waits five minutes before trying to re-light the pilot burner. The CSD-1 ICM will not lock out on flame failure; it will continually try to re-light the pilot burner every five minutes.

Items Specific to 2-Stage Models: Natural Gas A2000 models equipped with a 2-Stage gas valve (model numbers starting with "A2T" or "A2X") include an electronic temperature controller with its temperature sensor installed in the inlet water line. 24 VAC power for the automatic gas control valve, from the ICM, passes through electronic temperature controller, to either the LOW or HIGH terminal of the 2-Stage gas valve. The 2-Stage gas valve is factory set to provide 4 inches w.c. gas pressure in HIGH fire mode, and 2.0 inches w.c. in the LOW fire mode (approximately 70% of nameplate input).

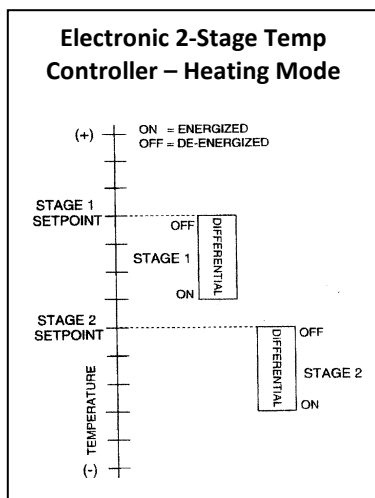
The electronic controller is factory set with both stages in Heating Mode, with Stage 2 set for HIGH fire, and Stage 1 set for LOW fire. The factory temperature and differential settings are provided in the table below.



2-Stage Controller - Factory Set Points	
Stage 1 (Low Fire OFF) Set Point	180 °F
Stage 1 Differential	45 °F
Stage 2 (High Fire OFF) Set Point	135 °F
Stage 2 Differential	95 °F
Low Fire Range: 135 °F to 180 °F	
High Fire Range: 40 °F to 135 °F	

When the control is in heating mode, the differential is below the set point. The relay will de-energize as the temperature rises to the set point.

To change the settings, press the SET button. The screen will display °F or °C, press the ▲ or ▼ key to change the mode. Press the SET button again to display the Stage 1 (S1) set point. Press the ▲ or ▼ key to change the set point, then press SET. The S1 differential will not be displayed. Press the ▲ or ▼ key to change the differential, then press SET. The heating (H1) or cooling mode (C1) will be displayed. Press SET to keep the control in heating mode. Press SET again to display the Stage 2 (S2) set point. After setting the desired temperature, press SET again to display the S2 differential. Press set again to display heating (H2) or cooling (C2) mode. Press SET to keep control in heating mode.



Programming is now complete. Programming mode will end if no keys are pressed for 30 seconds. Any changes will be saved. Settings are stored in non-volatile memory and will not be lost with power failure.

MAINTENANCE & INSPECTION

This manual must be thoroughly reviewed and understood before servicing your A2000 heater/boiler. Installation and Service must be completed by a Qualified Installer, Service Agency or Qualified Gas Supplier. If you have any questions which are not covered in the manual, please contact Green Boiler Technologies or your local Representative.



Keep the area clear and free from combustible materials, flammable liquids and vapors. Do not block the flow of combustion air by blocking air vents or by storing boxes or other items near the appliance.



Label all wires before disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.



Verify proper operation of the heater/boiler after any inspection or servicing the appliance.

Heat Exchanger: The heat exchanger should be visually checked at least once a year, or whenever necessary. The heat exchanger can be viewed from the top of the unit by removing the draft hood. The fins on the heat exchanger tubing should extend about 27/64 of an inch. Excessive burn off of fin height indicates poor heat transfer, commonly caused by scaling (deposits of lime and other minerals) inside the tube. Look for corrosion (usually a rusty-brown coating) commonly caused by cleaning solvent vapors or fumes in the combustion air supply), or sooting (a fine black-gray powder caused by improper combustion, usually due to a partially blocked stack or insufficient combustion air), or the affect of excessive condensation (usually evidenced by a greenish-black cupro oxide caused by the acid formed by the mixing of combustion gases with the condensate).



Before removing draft hood, ensure that the gas and electrical power to the heater/boiler is shut off.

Burner & Pilot Flame: The burner and pilot flame should be checked frequently (it is recommended that the unit be checked at least annually by a professional service technician). A yellow flame commonly indicates poor combustion, and may cause soot deposits on the heat exchanger or inside the venting. When an excessively yellow flame is present, inspect the burner orifices and heat exchanger for carbon deposits and foreign particles. Yellow flame and sooting may be caused by inadequate combustion air, venting, or incorrect gas manifold pressure. Refer to the burner and pilot flame Figure in the START-UP Section of this manual.

Gas Manifold Pressure: Check the gas manifold pressure at least once per year to make sure it matches that specified on the Name Plate, using a manometer (refer to START-UP Section for checking manifold pressure).

Vent System: Inspect the venting system for proper size, horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or any other deficiencies which could cause an unsafe condition. Check the inside of the vent system for excessive sooting.

In so far as practical, close all building doors between the space in which the appliances are connected to a common venting system and any area where any appliance which is not connected to the common venting system is located. Test the system by turning on clothes dryers and any other appliance not connected to the common venting system. Turn on all exhaust fans, including those used in range hoods and bathroom exhausts, so they will operate at their maximum speed. Close fireplace dampers.

Place the appliance being tested into operation by following the proper lighting instructions. Adjust the aquastat so the appliance will remain in operation for the duration of the test. After the main burner has been in operation for at least five (5) minutes, inspect the venting for spillage. When it is determined the unit is working without exhaust gasses spilling into the room, return doors, windows, fans, fireplace dampers and any other gas-burning device to their normal condition of use.

Draft tests must be done with the appliance firing. Proper draft or airflow in the venting may be determined by either of the following means:

- Smoke Test – Place a source of smoke or other visible fumes below the opening of the draft hood. If the fumes are all drawn up the draft hood opening, the appliance is drafting properly. If any fumes roll outside of the vent hood there is a problem with the drafting or make-up air.
- Draft Gauge – A draft pressure gauge can be inserted into the vent pipe directly above the draft hood. The draft gauge must show a constant negative pressure.

Any improper operation of common venting systems should be corrected so the installation conforms to the National Fuel Gas Code, ANSI-Z223.1, Latest Edition. When any portion of the venting system is changed it must conform to the National Fuel Gas Code, ANSI-Z223.1, Latest Edition.

Burner & Flue Passageway: Do not allow the burner, burner orifices, or the floor shield to accumulate foreign matter. Clean periodically by brushing or blowing any dust or debris from the area. Orifices should be checked for size and reamed as required. The flue gas passageway can be cleaned by simply sliding the burner out and flushing the finned tubing with water.



Before disconnecting the burner, be sure to shut off all gas valves and electrical switches then let cool for 30 minutes. After cleaning, reinstall the burner. Water must be circulating before turning on the gas valve to prevent heat exchanger damage.

Pressure Relief Valve: A pressure relief valve is supplied on the outlet of the heat exchanger. The relief valve should be tested at least annually by lifting the test handle.



When testing the valve extremely hot water and/or steam may be released.

High Temperature Switch: The manual reset High Temperature switch, located in the water outlet piping, should be checked annually for proper function. To test the switch, slowly close the valve in the water outlet piping until the water temperature exceeds the set point of the switch. The temperature switch should open before the water temperature reaches 210 °F (99 °C) for a water heater, and 250 °F (121 °C) for a boiler. Note: The operating thermostat and/or flow switch may have to be temporarily by-passed in order to conduct this test.



Ensure all operating and safety controls are put back into proper operation before putting the heater/boiler back into service.

Flow Switch: The water Flow Switch should be checked annually for proper function. To test the Flow Switch, slowly close the valve in the water outlet piping until the temperature rise through the heat exchanger approaches 100 °F (55 °C). The Flow Switch should open before the temperature rise exceeds 105 °F (58 °C). Refer to the OPERATION Section of this manual for more information regarding the water Flow Switch.

Heat Exchanger Protection: Either very soft or very hard water will shorten the life of the heat exchanger. The water to be heated should be between 5 and 15 grains per gallon. Harder water should be softened to prevent scaling, reduced efficiency and ultimately melting the heat exchanger. Softer water must have buffers added to prevent erosion of the heat exchanger. **NOTE: FAILURE TO PROPERLY OBSERVE THE ABOVE WILL VOID THE WARRANTY AND MAY RESULT IN A VERY SHORT LIFE OF THIS BOILER/HEATER.**

Condensation: Condensation of the flue gas may result if the inlet water temperature is under 120° F. Condensation will form on the outside of the heat exchanger and drip down onto the burner and possibly the floor below the heater/boiler, often mistaken for a leaking coil. After the boiler has been in operation long enough for the temperature of the water in the system to reach 120° F, the condensation will stop dripping from the heat exchanger. The A2000 and the venting connected to it are not designed to withstand repeated condensation. Low operating temperatures and frequent cold start-ups must be prevented. Frequent operation below 120°F return water temperature will damage the heat exchanger and void the warranty. If low operating temperatures cannot be avoided, a feedback loop (by-pass) must be installed as shown in the DIAGRAMS section.

Noise During Operation: Knocking sounds produced by the heater/boiler may indicate scale build-up in the heat exchanger waterway. De-liming is recommended. Scale thickness as thin as 1/16 inch can increase fuel consumption by 15%. Refer to procedure provided with de-liming kit part number W3700001. Extended operation with a scaled heat exchanger may cause early heat exchanger failure and will void warranty.

Removal of Existing Appliance: If an existing appliance is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it.

At the time of removal, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

- (a) Seal any unused openings in the common venting system.
- (b) Visually inspect the venting system for proper size and horizontal pitch, and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- (c) Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
- (d) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
- (e) Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
- (f) After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.
- (g) Any improper operation of the common venting system should be corrected so the installation conforms with the *National fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code*. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the *National fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code*.

TROUBLESHOOTING

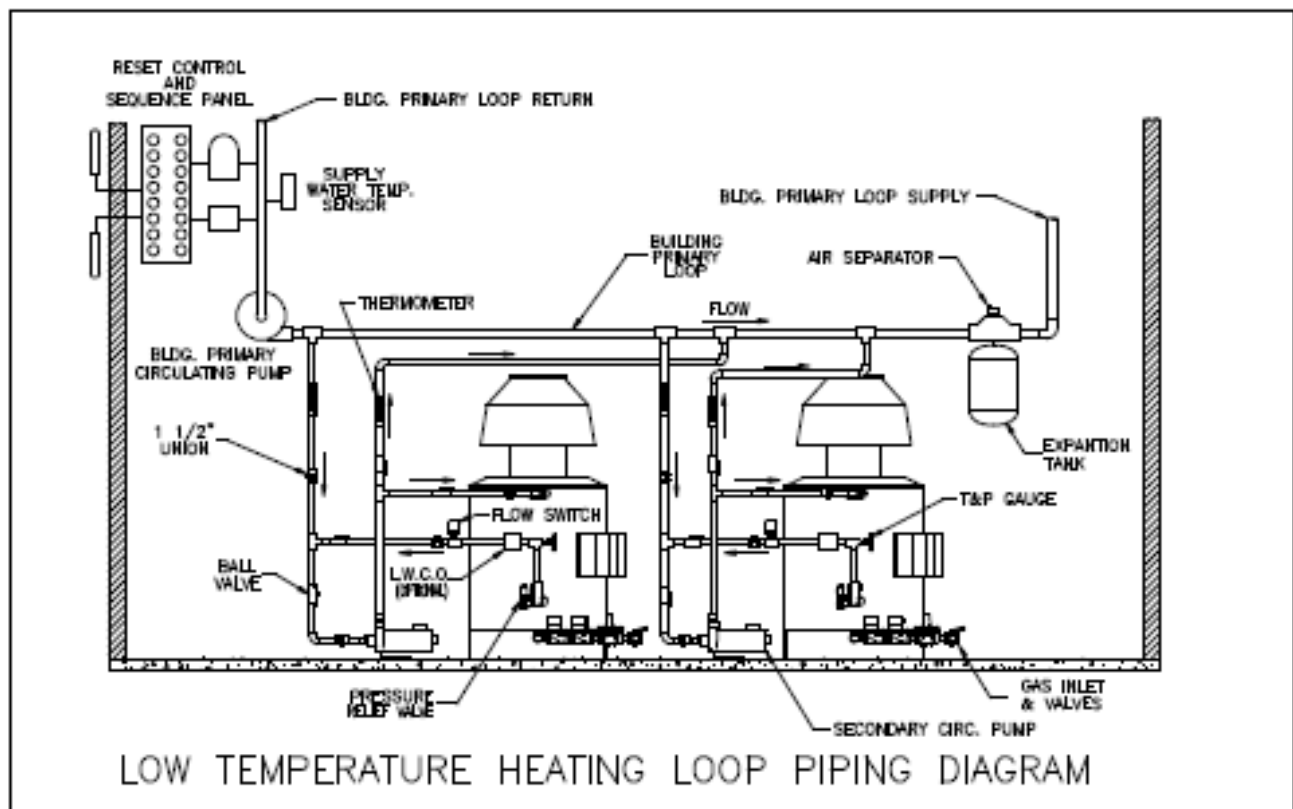
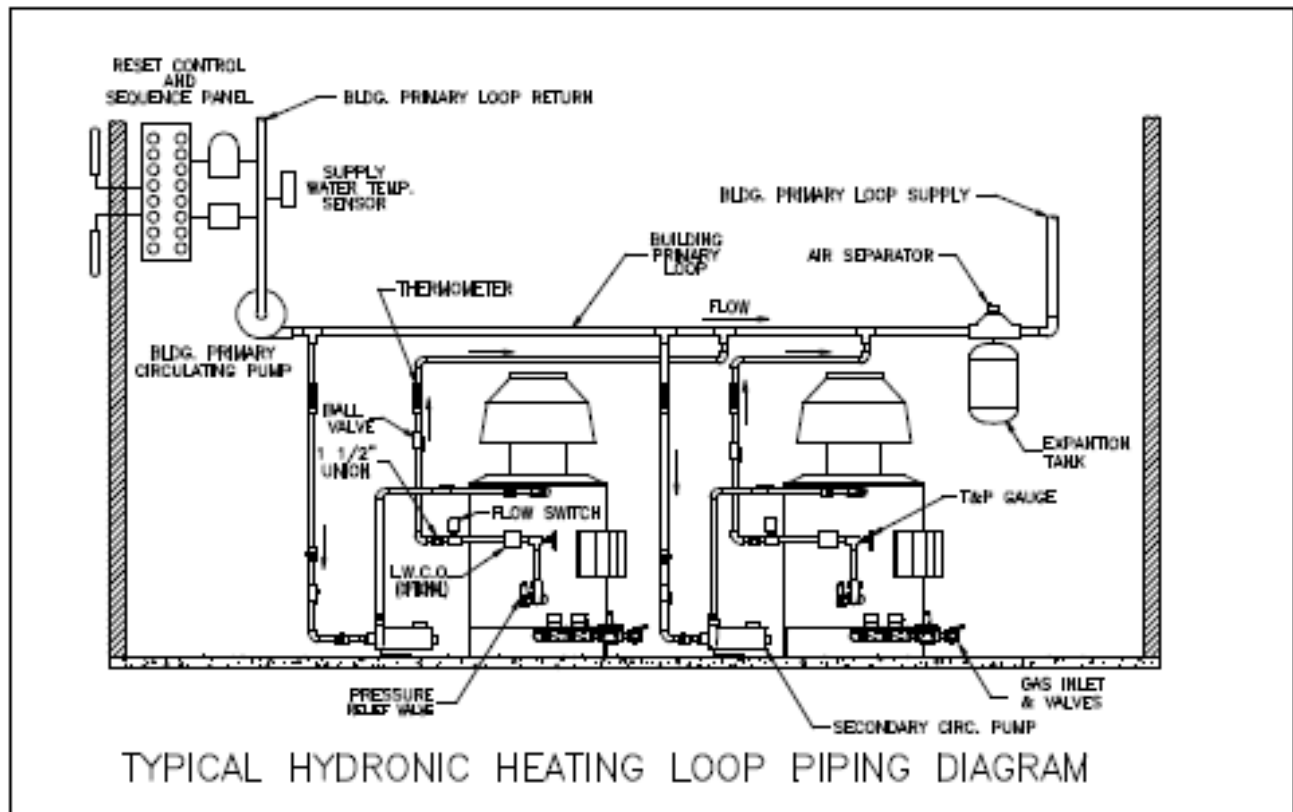
SYMPTOM	POSSIBLE CAUSE	CHECKS & REMEDIES
<p>Short Cycling (Unit Turns ON And OFF Every 30 seconds Or So).</p>	<p>Operating Aquastat Not Installed</p>	<p>Install An Operating Aquastat Or Boiler Sequencer To Control The Water Temperature</p>
	<p>Operating Aquastat Installed In The Wrong Location</p>	<p>For a Storage Tank Installation, Install the Operating Aquastat in the Tank. Otherwise, the Operating Aquastat Must Be Installed Upstream of the A2000 In A Place That Will Have Constant Water Flow Across The Sensor</p>
	<p>System Mis-Wired Or Operating Aquastat Has Failed</p>	<p>When The Desired Operating Temperature has Been Reached, The 120 VAC Electrical Power Supplied To the Appliance Should Be Interrupted. If The Power Is Not Stopped At The Desired Operating Temperature, Correct The Wiring Or Replace The Defective Temperature Switch.</p>
<p>The Unit Will Not Operate</p>	<p>Pilot Burner Is Not Being Lit</p>	<p>Refer to "Pilot Burner Not Lighting" In The Symptoms Listed Below.</p>
	<p>Pilot Lights But Main Burner Will Not Come On</p>	<p>Refer To "Main Burner Not Lighting" In the Symptoms Listed Below.</p>
	<p>No Power To The Unit</p>	<p>Use A Multimeter To Check For 120 VAC Power To The Unit When It is Supposed To Be Turned ON. Trace The Interruption Of Power Back To the Source.</p>
	<p>No Power To The Transformer</p>	<p>Check The Manual Reset High Temperature Switch. Reset Or Replace As Necessary</p>
	<p>No Power To The Ignition Module</p>	<p>Verify 120 VAC Power To The Transformer. Replace Transformer If Needed.</p>

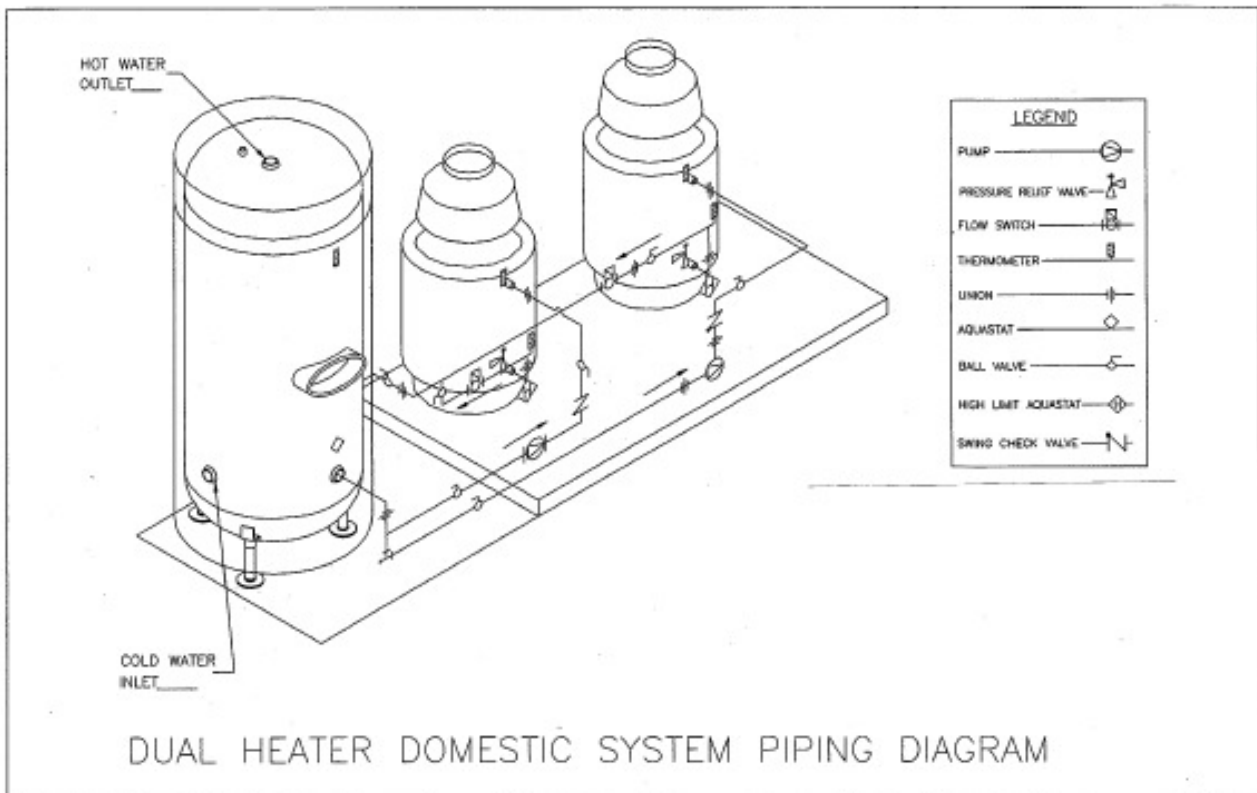
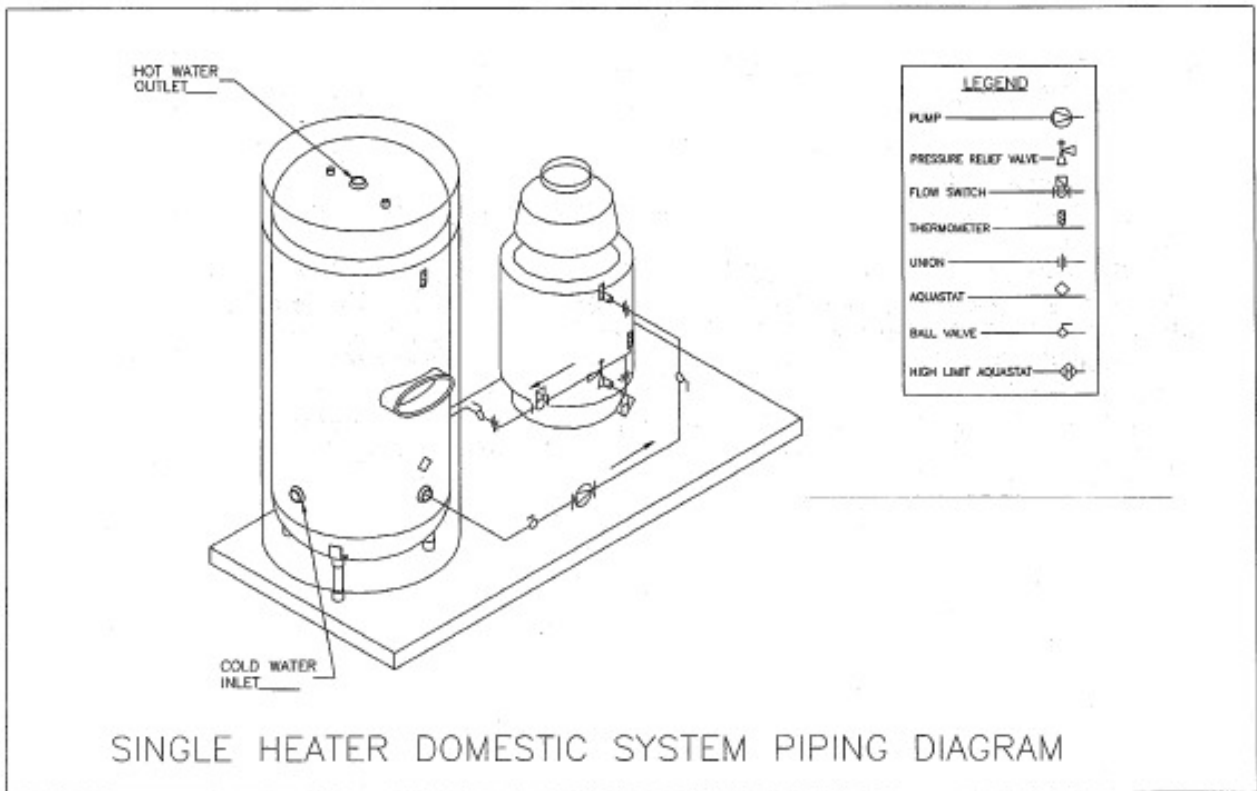
SYMPTOM	POSSIBLE CAUSE	CHECKS & REMEDIES
Pilot Burner Not Lighting	The Ignition Module Is Not Generating A Spark	Verify That The Red Spark Cable Is Securely Attached To The Ignition Module And The Pilot Burner.
		Verify The Red Spark Cable Is Not Cracked Or Broken. Replace If Necessary.
		Verify that the Ignition Module Is Receiving 24 VAC Power Across The Blue and Yellow Wires, And Listen For Sparks For 15 Seconds After Being Powered. If The Module Does Not Generate A Spark When Powered, Replace The Ignition Module.
	The Spark Is Not Arcing In The Proper Location	Verify That The Unit Is Properly Grounded. Remove The Burner Assembly And Inspect The Pilot Burner Assembly. Clean Any Residue From The Spark Rod and Striking Plate With a Scotch Brite Pad. Use A 1/8" Drill Bit to Make Sure The Gap Between The Spark Rod and Striking Plate Is Exactly 1/8". If any Cocks Are Observed In The Ceramic, Or If Cleaning And Gapping fail To Correct The Problem, Replace The Pilot Burner Assembly.
The Pilot Is Lit, But Goes Out After 15 Seconds Or Less. The Main Burner Never Comes On	Poor Ground	Make Sure The Appliance Is Properly Grounded
	The Ignition Cable Is Broken	Replace Ignition Cable
	A Crack In The Pilot Burner Assembly Is Preventing Flame Sensing	Replace The Pilot Burner Assembly
	Gas Valve Mis-Wired	Check The Unit Wiring Against The Appropriate Wiring Schematic And Correct Any Problems

SYMPTOM	POSSIBLE CAUSE	CHECKS & REMEDIES
<p>The Pilot Is Lit And Stays ON, But The Main Burner Never Comes ON</p>	<p>The Bleed Line On One Of The Gas Valves Is Plugged</p>	<p>(Only For Honeywell V88 Gas Valves) Temporarily Disconnect The 1/8" Bleed Line From Each Gas Valve. If The Appliance Operates Properly, Clear Or Replace The Bleed Lines.</p>
	<p>The Ignition Module Is Defective</p>	<p>Check The Wires To The Gas Valves For 24 VAC When The Pilot Is Lit. If No Power Found, Replace The Ignition Module</p>
	<p>The Gas Valve Is Defective</p>	<p>Check The Wires To The Gas Valves For 24 VAC When The Pilot Is Lit. If The Valves Are Receiving Power But Not Operating, Replace The Defective Valve</p>
	<p>Gas Valve(s) Mis-Wired</p>	<p>Check The Unit Wiring Against The Appropriate Wiring Schematic And Correct Any Problems</p>
<p>Hot Spots On The Jacket Or Flames Rolling Out From The Base Of The Unit</p>	<p>Heat Exchanger Fins Clogged</p>	<p>Cover The Burner And Controls And Clean The Heat Exchanger With A Wire Brush Or High Pressure Water. Prevent Future Fouling Of The Heat Exchanger By Preventing Condensation Or Removing Contaminants From The Air Supply. Refer To MAINTENANCE & INSPECTION Section Of This Manual. Replace Jacket & Insulation As Required.</p>
	<p>Inadequate Make-Up (Combustion) Air</p>	<p>Make Sure The Combustion Make-Up Air Openings Meet The Requirements Discussed In The INSTALLATION Section Of This Manual.</p>
	<p>Improper Vent Installation</p>	<p>Make Sure The Exhaust Vent System Meets The Requirements Discussed In The INSTALLATION Section Of This Manual.</p>
	<p>Clogged Vent</p>	<p>Inspect Vent System For Flow Blockages. Clean & Remove Blockages As Required</p>
<p>Manual Reset High Temperature Switch Keeps Tripping Off</p>	<p>Operating Aquastat Is Not Set More Than 35°F Below The High Temperature Limit Switch Set Point (200°F For Water Heaters) (240 °F For Boilers)</p>	<p>Make Sure The High Limit Switch Is Set To The Highest Setting. Ensure The Operating Thermostat Is Set At Least 35 °F Below The High Temperature Switch Set Point.</p>

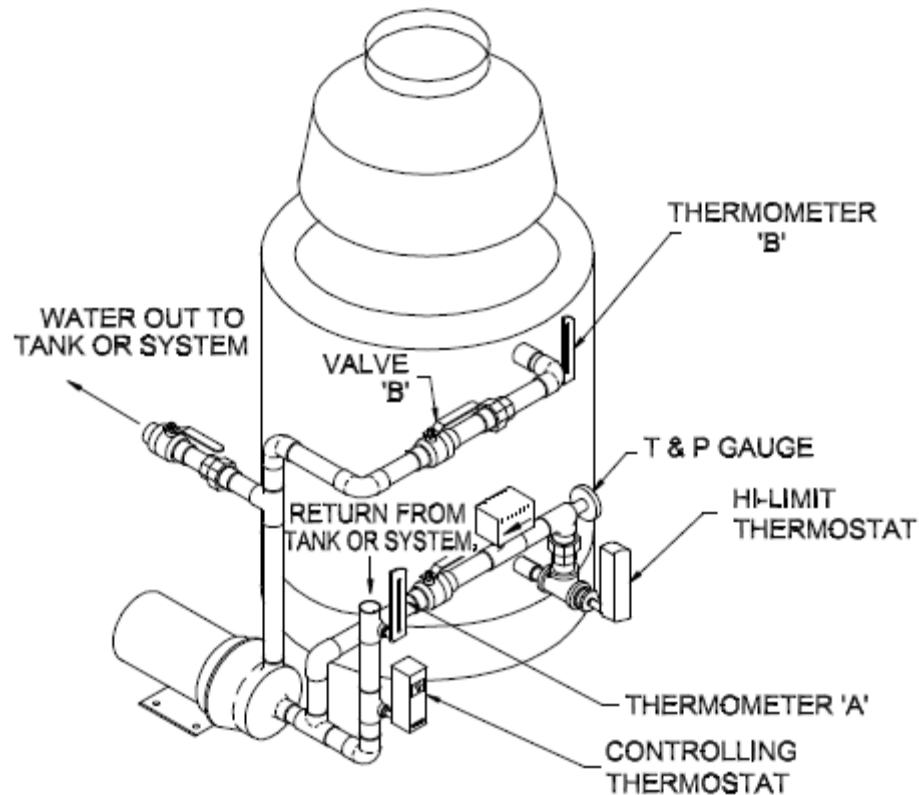
SYMPTOM	POSSIBLE CAUSE	CHECKS & REMEDIES
<p>The Flow Switch Keeps Tripping Or Will Not Close</p>	<p>Water Flow Rate Too Low</p>	<p>Ensure Valves In The Water Lines Are Open</p>
		<p>Ensure The Pump Is Operating Correctly. Replace Or Upgrade Pump If Required.</p>
	<p>Excessive Scaling Inside The Heat Exchanger.</p>	<p>The Heat Exchanger Should Be De-limed. Contact Your Local Green Boiler Representative For Assistance. Refer To The INSTALLATION And MAINTENANCE Sections Of This Manual For Information To Prevent Future Heat Exchanger Scaling.</p>
	<p>Flow Switch Set Incorrectly</p>	<p>Adjust Flow Switch Set Point. Refer To OPERATION Section Of This Manual</p>
<p>An Appliance That Has Been In Operation For Over A Year Starts To Have Any Of The Following Symptoms: Stack Temperature Over 450 °F, A Water Temperature Rise Through The Heat Exchanger More Than 5 °F (3 °C) Rise Higher Than Originally Set, Or Trouble Proving Water Flow</p>	<p>Excessive Scaling Inside The Heat Exchanger</p>	<p>If One Of The Symptoms Occurs, Check For The Other Symptoms. If Two Or More Happen At The Same Time, The Heat Exchanger Should Be De-limed. Contact Your Local Green Boiler Representative For Assistance. Refer To The INSTALLATION And MAINTENANCE Sections Of This Manual For Information To Prevent Future Heat Exchanger Scaling.</p>
<p>Knocking Sounds From The Heat Exchanger</p>	<p>Excessive Scaling Inside The Heat Exchanger</p>	<p>The Heat Exchanger Should Be De-limed. Contact Your Local Green Boiler Representative For Assistance. Refer To The INSTALLATION And MAINTENANCE Sections Of This Manual For Information To Prevent Future Heat Exchanger Scaling.</p> <p>Refer to De-Liming Procedure Included With Kit Number W3700001</p>

DIAGRAMS





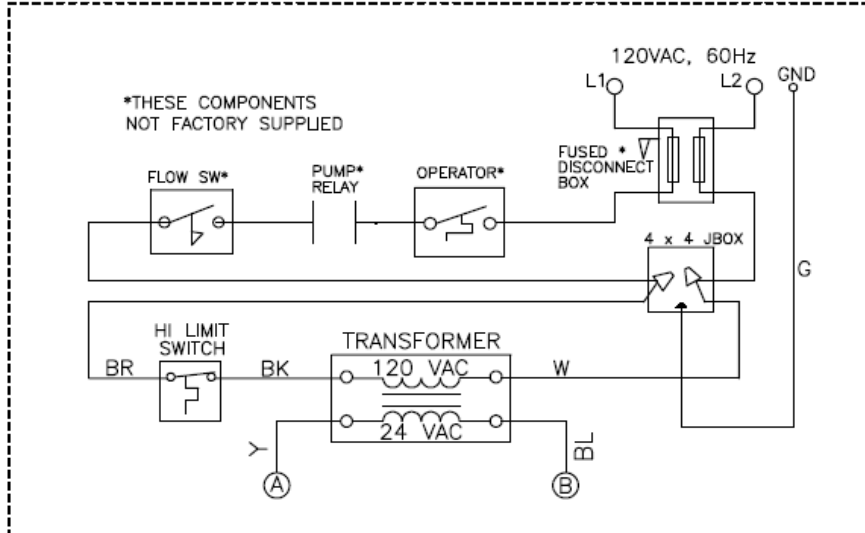
FEEDBACK LOOP (BY-PASS) PLUMBING FOR LOW TEMPERATURE SYSTEMS



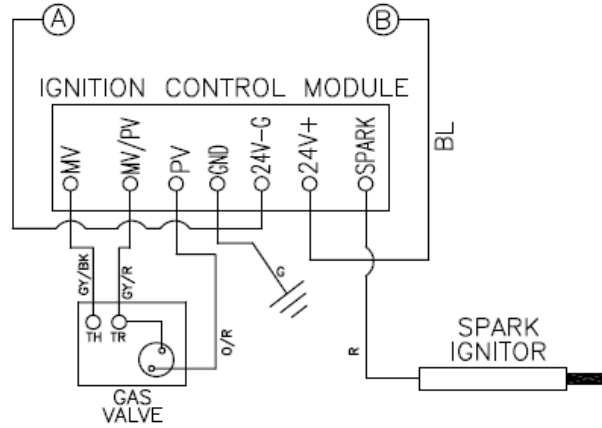
1. Set Operating (Controlling) Thermostat to the desired return temperature.
2. Open all water valves.
3. Watch the temperatures at Thermometer 'A' and the T&P Gauge on the Heater/Boiler Outlet.
4. Adjust valve 'B' in small increments until the temperature reading at the T&P Gauge is about 80 °F higher than the temperature measured at Thermometer 'A'. (The Heater/Boiler must be firing continuously during this adjustment. Thermometer readings may be inaccurate if the Heater/Boiler cycles frequently).
5. Monitor Operation of the Heater/Boiler and the water temperature until the system reaches the desired operating temperature.
6. If the Heater/Boiler cycles ON and OFF more than once every few minutes, contact the Customer Service for further assistance.

WIRING DIAGRAM

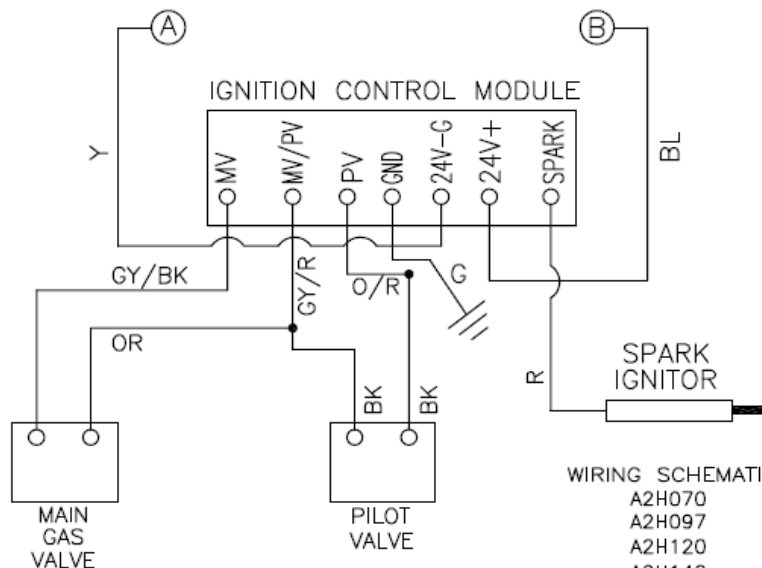
A2000 Water Heater Models



WIRING SCHEMATIC
A2H035
A2H050
WATER HEATER
MODELS



W3250016

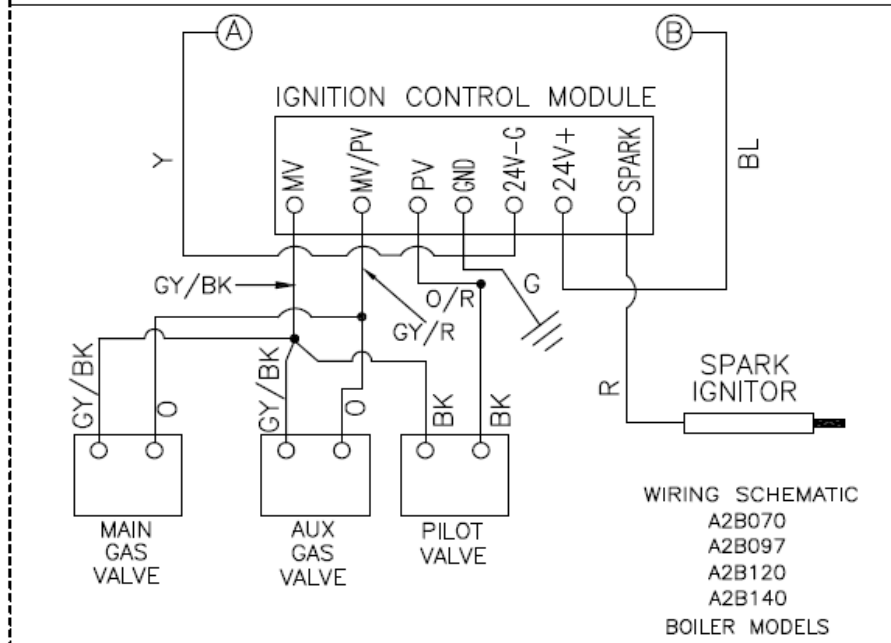
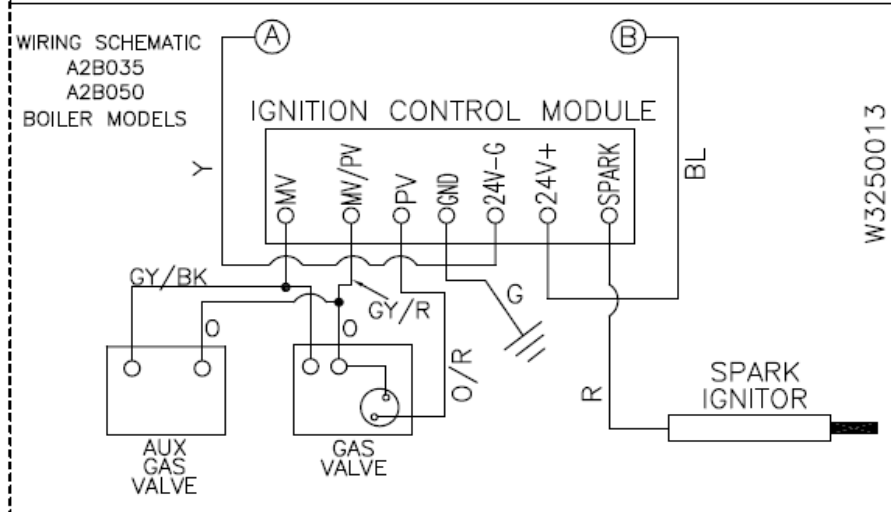
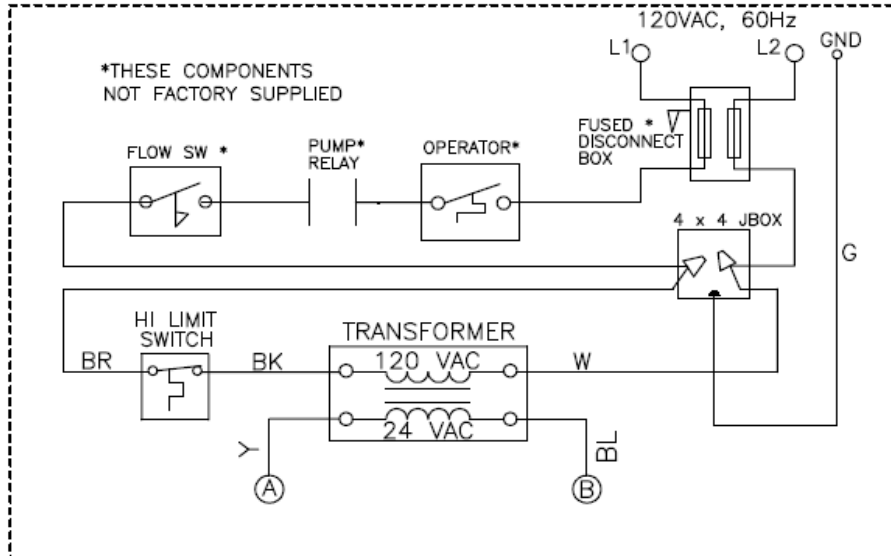


WIRING SCHEMATIC
A2H070
A2H097
A2H120
A2H140
WATER HEATER
MODELS

IMPORTANT: REPLACE WIRE WITH TYPE MTW 105°C AWG #16 ONLY

WIRING DIAGRAM

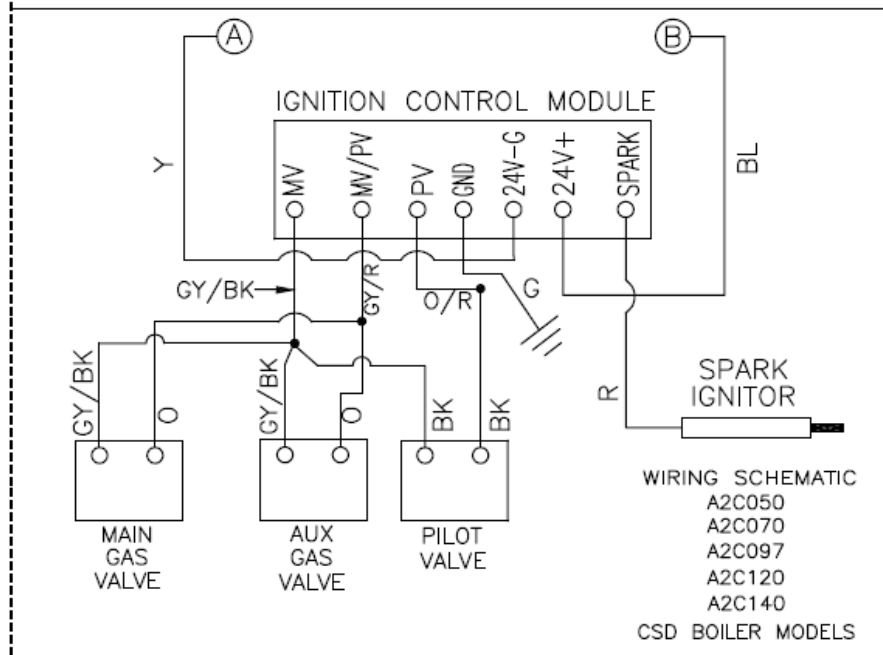
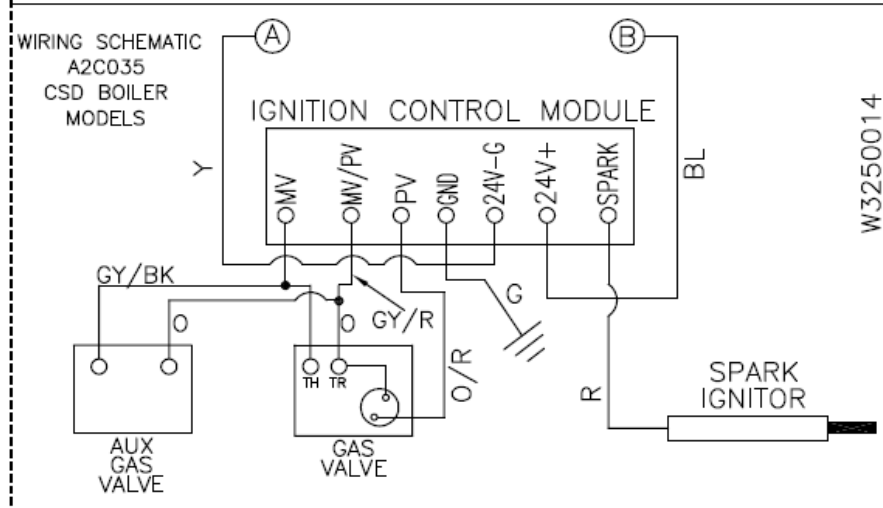
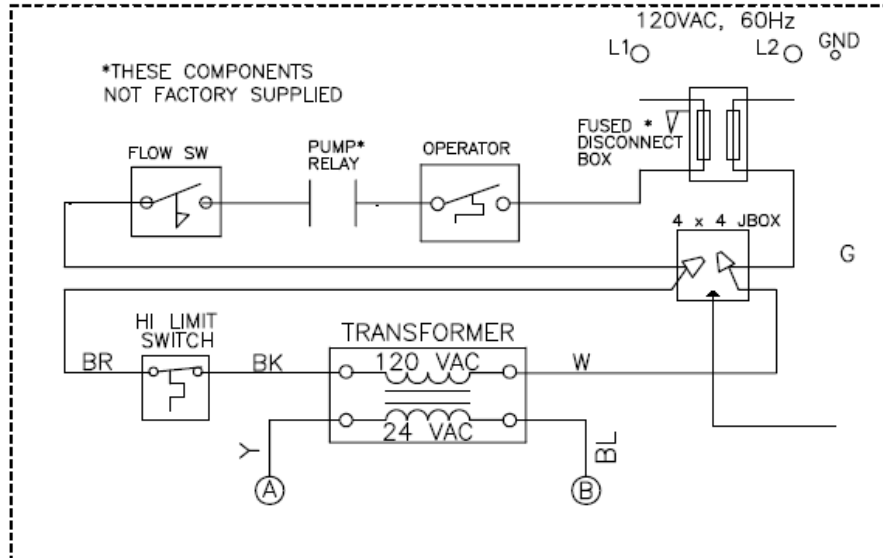
A2000 Boiler Models



IMPORTANT: REPLACE WIRE WITH TYPE MYW 105° AWG #16 ONLY

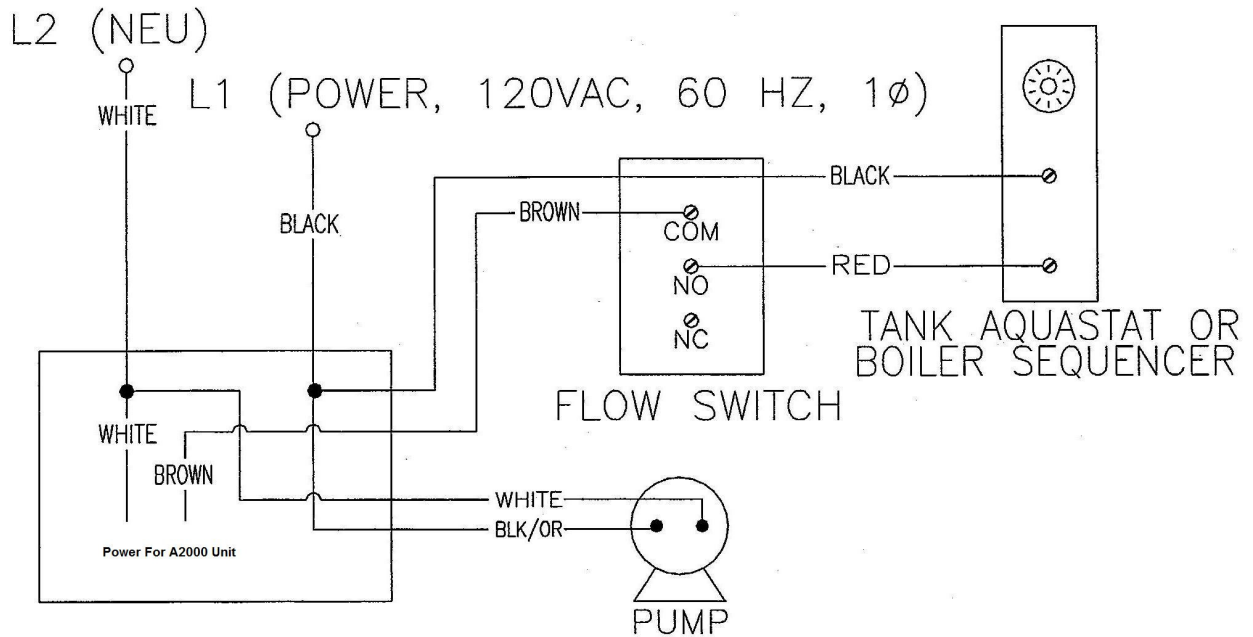
WIRING DIAGRAM

A2000 CSD-1 Boiler Models

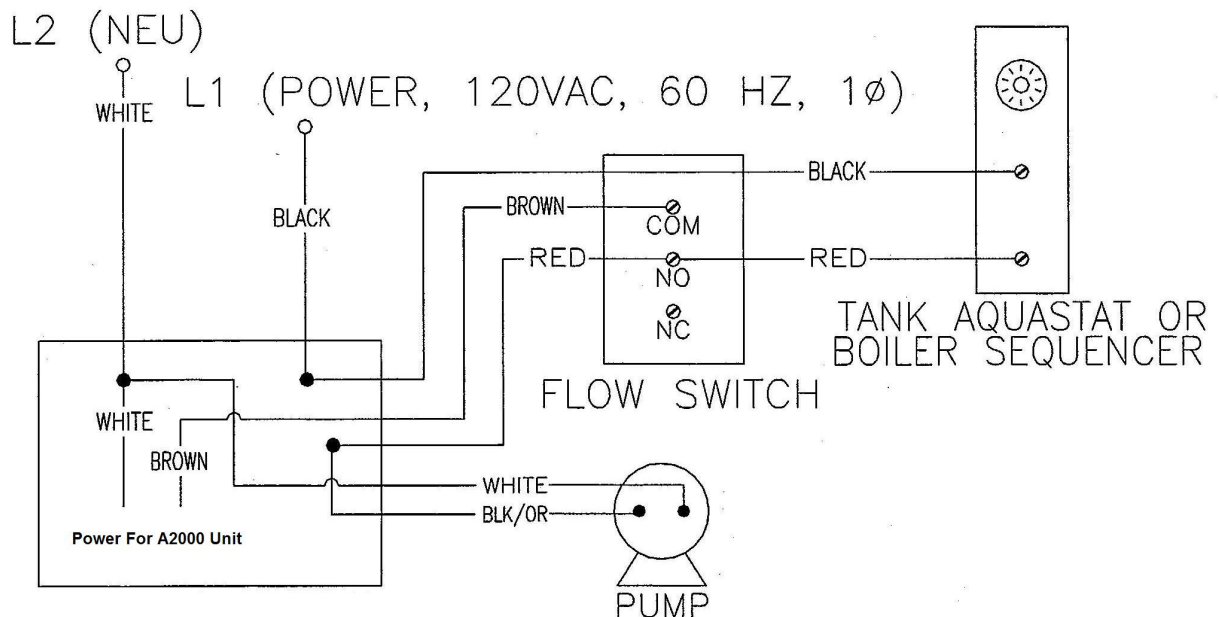


IMPORTANT: REPLACE WIRE WITH TYPE MYW 105* AWG #16 ONLY

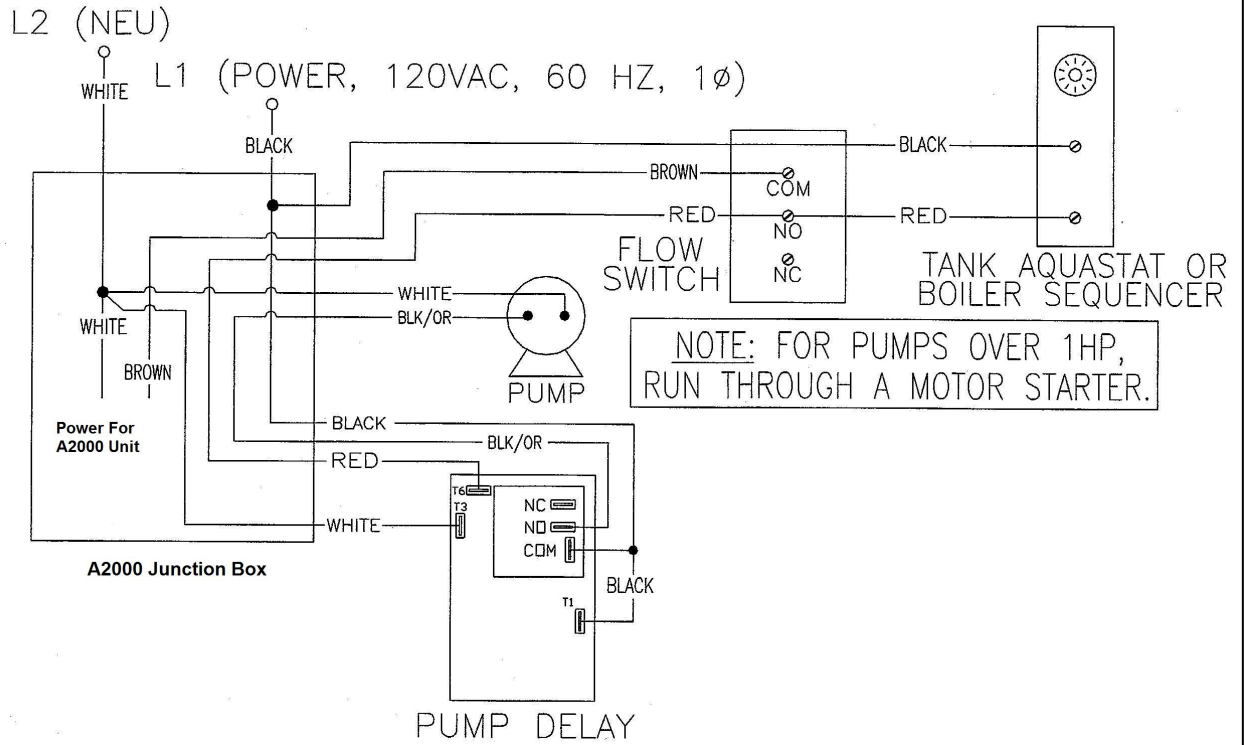
A2000 WITH CONSTANT PUMP OPERATION



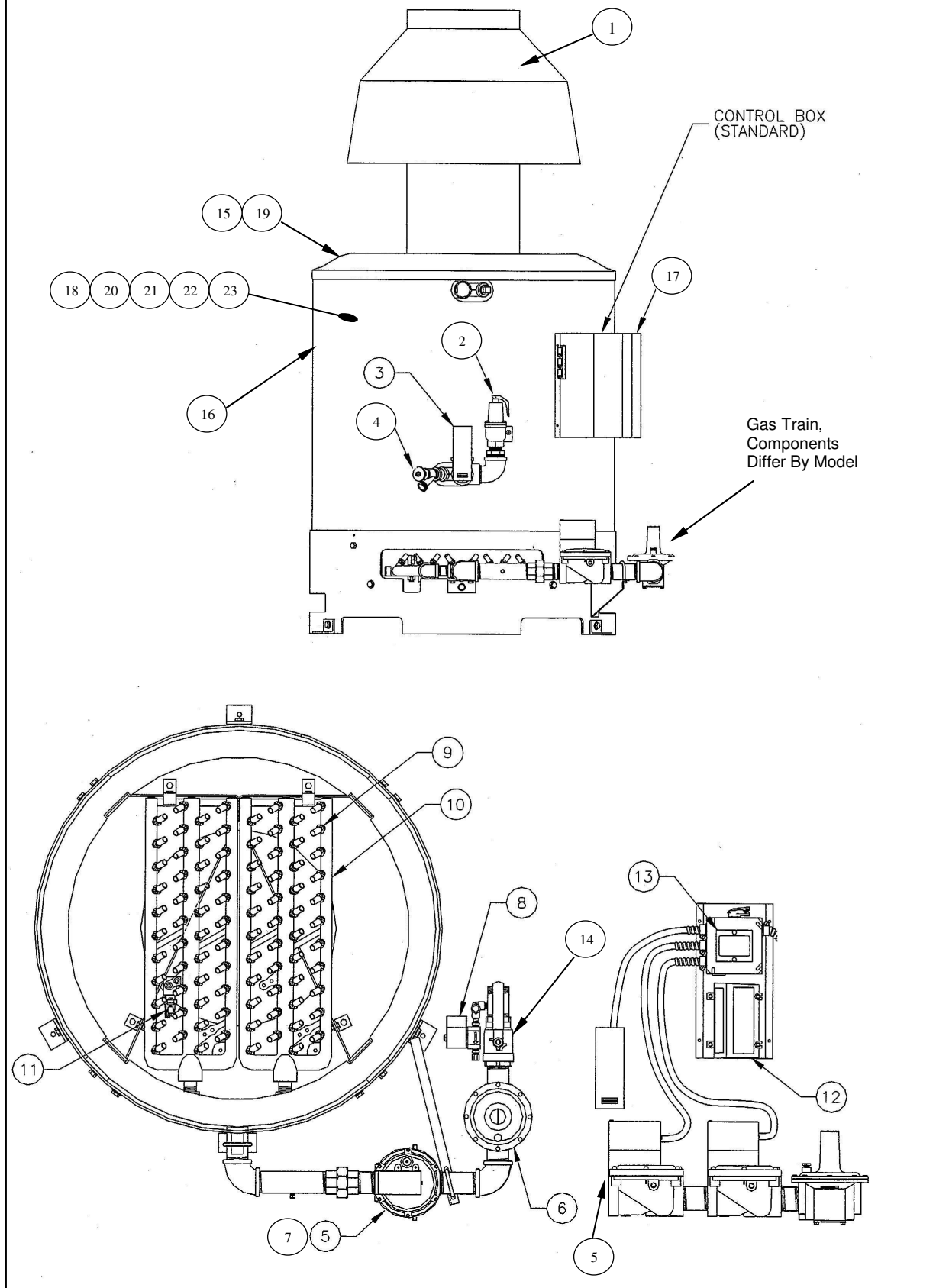
A2000 WITH ON-OFF PUMP OPERATION



A2000 WITH INFITEC PUMP DELAY



A2000 PARTS LIST



A2000 PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	USE ON MODEL
1	W5501005	Draft Hood, 9"	A2-035
	W5501006	Draft Hood, 10"	A2-050
	W5501000	Draft Hood, 12"	A2-070
	W5501001	Draft Hood, 16"	A2-097
	W5501001	Draft Hood, 16"	A2-120
	W5501002	Draft Hood, 18"	A2-140
2	W1653010	125 PSI Pressure Relief Valve, 3/4"	A2-(035-070)
	W1653014	125 PSI Pressure Relief Valve, 1"	A2-(097-140)
3	W2102025	Manual Reset High Limit Switch, 200 °F	A2-(H,T)(035/140)
	W2102003	Manual Reset High Limit Switch, 240 °F	A2-(B,C,X)(035/140)
4	W1651000	Boiler Drain Valve, 3/4"	All Models
5	W1751026	Automatic Gas Valve, 1"	A2C035, A2(B,C,X)050
	W1751013	Automatic Gas Valve, 1-1/4"	A2(H,B,C,X)(070,097)
	W1751024	Automatic Gas Valve, 1-1/2"	A2(H,B,C,X)(120,140)
	W1751022	2-Stage Gas Valve, 1" NG	A2(T,X)(035,050)NG
	W1751023	2-Stage Gas Valve, 1-1/4" NG	A2(T,X)(070,097)NG
	W1751025	2-Stage Gas Valve, 1-1/2" NG	A2(T,X)(120,140)NG
6	W5501102	NG Gas Pressure Regulator, 1" RV61	A2C-(035,050)-NG
	W5501106	LP Gas Pressure Regulator, 1" RV61	A2C(035,050)-LP
	W5501103	NG Gas Pressure Regulator, 1-1/4" RV61	A2-070-NG
	W5501107	LP Gas Pressure Regulator, 1-1/4" RV61	A2-070-LP
	W5501104	NG Gas Pressure Regulator, 1-1/4" RV81	A2-097-NG
	W5501108	LP Gas Pressure Regulator, 1-1/4" RV81	A2-097-LP
	W5501105	NG Gas Pressure Regulator, 1-1/2" RV81	A2-(120,140)-NG
	W5501109	LP Gas Pressure Regulator, 1-1/2" RV81	A2-(120,140)-LP
7	W1751014	Combination Gas Valve, Main & Pilot, NG	A2(H,B)-(035,050)-NG
	W5501111	Combination Gas Valve, Main & Pilot, LP	A2(H,B)-(035,050)-LP
8	W1751021	Pilot Valve	All Except A2(H,B)-(035,050)
	W1751038	Manual Gas Valve, 1/8"	Most Models
9	W2500005	Burner Orifice, NG #53	NG Models Except High Altitude
	W2500004	Burner Orifice, LP #66	LP Models Except High Altitude
	W2500007	Burner Orifice, Blank	High Altitude Models, Drill To Order
	W2500006	Burner Orifice, Special Stainless Steel	All Models, Drill To Order
10	W1800002	Burner With Orifices, A2-035-NG	A2-035-NG
	W1800011	Burner With Orifices, A2-035-LP	A2-035-LP
	W1800003	Burner With Orifices, A2-050-NG (2 Req)	A2-050-NG
	W1800012	Burner With Orifices, A2-050-LP (2 Req)	A2-050-LP
	W1800004	Burner With Orifices, A2-070-NG (2 Req)	A2-070-NG
	W1800013	Burner With Orifices, A2-070-LP (2 Req)	A2-070-LP
	W1800005	Burner With Orifices, A2-097-NG (2 Req)	A2-097-NG
	W1800020	Burner With Orifices, A2-120-NG (2 Req)	A2-120-NG
	W1800021	Burner With Orifices, A2-140-NG (2 Req)	A2-140-NG
	W1800016	Burner With Orifices, A2-140-LP (2 Req)	A2-140-LP

A2000 PARTS LIST - Continued

ITEM	PART NUMBER	DESCRIPTION	USE ON MODEL
11	W1950023	Pilot Burner Assembly, NG	All NG Models
	W5501112	Pilot Burner Assembly, LP	All LP Models
	W4501050	Pilot Mounting Bracket, A2-035	A2-035
	W4501051	Pilot Mounting Bracket, A2-050	A2-050
	W4501052	Pilot Mounting Bracket, A2-070	A2-070
	W4501053	Pilot Mounting Bracket, A2-(097-140)	A2-(097-140)
12	W1950081	Ignition Control Module S8600H	All Models Except CSD-1
	W1950082	Ignition Control Module S8600M	A2C(035-140)
	W1950028	Ignition Cable, 30"	All Models
13	W2250003	Transformer, 120/24 VAC, 40VA	All Models
14	W1751051	1" Gas Valve, Manual w/Pressure Tap	A2-(035,050)
	W1751052	1-1/4" Gas Valve, Manual w/Pressure Tap	A2-(070,097)
	W1751053	1-1/2" Gas Valve, Manual w/Pressure Tap	A2-(120,140)
15	W4501018	Top Outer Lid - Stainless	A2-035
	W4501019	Top Outer Lid - Stainless	A2-050
	W4501020	Top Outer Lid - Stainless	A2-070
	W4501021	Top Outer Lid - Stainless	A2-097
	W4501023	Top Outer Lid - Stainless	A2-120
	W4501024	Top Outer Lid - Stainless	A2-140
16	W4501306	Outer Jacket - Stainless	A2-035
	W4501307	Outer Jacket - Stainless	A2-050
	W4501308	Outer Jacket - Stainless	A2-070
	W4501309	Outer Jacket - Stainless	A2-097
	W4501310	Outer Jacket - Stainless	A2-(120,140)
17	W4501080	Cover Control Box	All Models
	W4501031	Bracket, Control Box Mounting	All Models
18	W4501164	Insulation, Shell 24 x 78"	A2-035
	W4501166	Insulation, Shell 30 x 90"	A2-050
	W4501168	Insulation, Shell 27.5 x 112"	A2-070
	W4501170	Insulation, Shell 27.5 x 112"	A2-097
	W4501172	Insulation, Shell 34 x 112"	A2-(120,140)
	W4501165	Insulation, Top 24 x 24"	A2-035
	W4501167	Insulation, Top 28 x 28"	A2-050
	W4501169	Insulation, Top 32 x 32"	A2-070
	W4501171	Insulation, Top 34 x 34"	A2-097
	W4501173	Insulation, Top 36 x 36"	A2-(120,140)
19	W4501010	Top, Inner Lid	A2-035
	W4501011	Top, Inner Lid	A2-050
	W4501012	Top, Inner Lid	A2-070
	W4501013	Top, Inner Lid	A2-097
	W4501015	Top, Inner Lid	A2-120
	W4501016	Top, Inner Lid	A2-140

A2000 PARTS LIST - Continued

ITEM	PART NUMBER	DESCRIPTION	USE ON MODEL
20	W5501066	Heat Exchanger Assy A2-035 *	A2-035
	W5501067	Heat Exchanger Assy A2-050 *	A2-050
	W5501068	Heat Exchanger Assy A2-070 *	A2-070
	W5501069	Heat Exchanger Assy A2-097 *	A2-097
	W5501071	Heat Exchanger Assy A2-(120,140) *	A2-(120,140)
* Heat Exchanger Assemblies Include Inner Front Panel, Inner Jacket and Flue Baffles			
21	W4501182	Inner Front Panel	A2-035
	W4501064	Inner Front Panel	A2-050
	W4501062	Inner Front Panel	A2-070
	W4501183	Inner Front Panel	A2-097
	W4501296	Inner Front Panel	A2-(120,140)
22	W4501085	Inner Jacket	A2-035
	W4501086	Inner Jacket	A2-050
	W4501087	Inner Jacket	A2-070
	W4501089	Inner Jacket	A2-097
	W4501088	Inner Jacket	A2-(120,140)
23	W5501088	Flue Baffle (Cone)	A2-035
	W5501041	Flue Baffle (Cone)	A2-050
	W5501040	Flue Baffle (Cone)	A2-070
	W5501035	Flue Baffle (Cone)	A2-(097-140)
	W4501072	Flue Baffle (Stainless Strip, 96" Section)	All Models

Accessories

	W3700001	Delimiting Kit	All Models
	W2000002	Module, Pump Delay	All Models
	W2101001	Water Flow Switch	All Models
	W2103031	Combination Temp & Pressure Gauge	All Models
	W2102002	Operating Aquastat, 240 °F	All Models
	W2102018	Electronic Temp Controller, 2-Stage	2-Stage Models

For NG to LP or LP to NG Conversion Kits, Call Your Green Boiler Technologies Representative or the Customer Service Number

Fuel Conversions Must Be Completed By A Qualified Service Agency or Gas Supplier

GREEN BOILER TECHNOLOGIES, INC. COIL TYPE WATER HEATERS 10 YEAR LIMITED WARRANTY

This is our only heater warranty and applies only to water heaters installed within the United States. This warranty applies to the original purchaser at the original installation address only. The manufacturer warrants the water heater of its manufacture to be free from defects in material and workmanship and failure due to thermal shock when not misused or neglected. Should the heat exchanger fail and subsequent examination reveal that the unit has failed under the terms of this warranty, at the manufacturers option, the heat exchanger will be either repaired or replaced in accordance with the following schedule:

TYPE OF WATER HEATER	*WARRANTY PERIOD AND UNIT COST TO OWNER					
	<u>1st-5th Year</u>	<u>6th Year</u>	<u>7th Year</u>	<u>8th Year</u>	<u>9th Year</u>	<u>10th Year</u>
A2000	No Charge	50% list	55% list	60% list	65% list	70% list

*Includes only the unit cost using list price at time of failure. Freight, labor and installation costs are paid by the owner. Should any replacement be made under the terms of this warranty, all replaced items shall be shipped FOB Danville, Kentucky and the defective unit shall be returned to the manufacturer for inspection prepaid upon request.

The cabinet, controls, fans, pumps and safety devices on this water heater are warranted to be free from defects for a period of one year from startup or 18 months after date of shipment, whichever comes first. Should a defect in any of these parts develop during the warranty period, that part will be replaced free of charge, FOB Danville, Kentucky. Freight, labor and installation costs are paid by the owner. Damage to the water heater or surroundings or personal injury resulting from the failure of any control or safety device is not covered under this warranty, nor is the liability for such assumed by the manufacturer.

This warranty covers only water heaters installed, adjusted or maintained in accordance with the installation and operating instructions and all applicable state and local plumbing, electrical and building codes, ordinances and regulations.

This warranty is void if at any time the water pressure exceeds the maximum allowable working pressure stamped on the water heater, nor is it applicable where the temperatures entering the water heater are frequently below the allowable level. The minimum allowable temperature is 120°F for the A2000 units.

This warranty is void if used with aggressive water. Aggressive water is 5-grains of hardness or less, or any water that is corrosive to copper, brass or bronze and/or may be caused by some method of water softening, water treatment, or highly oxygenated water.

This warranty does not cover leakage resulting from loose or damaged fittings installed by others. This warranty is void where any failure is determined to be due to a halogen in the combustion air or due to electrolytic action.

This warranty does not cover any freight, labor, installation or removal costs, either for its original purchase or its replacement.

GBT does not assume liability for any permits, loss of time, consequential damages or contingent liability of any kind resulting from the manufacture, sale, installation or use of this water heater.

No other warranty or agreement, expressed or implied, is authorized by GBT.

GBT makes no warranty of merchantability or warranty of fitness for a particular purchase including implied warranty arising from course of usage or trade.

**GREEN BOILER TECHNOLOGIES, INC.
918 WEST WALNUT STREET
DANVILLE, KY 40422**

WE-02

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GREEN BOILER TECHNOLOGIES, INC. COIL TYPE BOILERS
10 YEAR LIMITED WARRANTY

This is our only boiler warranty and applies only to boilers installed within the United States. This warranty applies to the original purchaser at the original installation address only. The manufacturer warrants the boiler of its manufacture to be free from defects in material and workmanship and failure due to thermal shock when not misused or neglected. Should the heat exchanger fail and subsequent examination reveal that the unit has failed under the terms of this warranty, at the manufacturers option, the heat exchanger will be either repaired or replaced in accordance with the following schedule:

TYPE OF BOILER	WARRANTY PERIOD
A2000 Series	1st to 10th Year No Charge

Should any replacement be made under the terms of this warranty, all replaced items shall be shipped FOB Danville, Kentucky, and the defective unit shall be returned to the manufacturer for inspection prepaid upon request. Freight, labor and installation cost are paid by the owner.

The cabinet, controls, fans, pumps and safety devices on this water heater are warranted to be free from defects for a period of one year from startup or 18 months after date of shipment, whichever comes first. Should a defect in any of these parts develop during the warranty period, that part will be replaced free of charge, FOB Danville, Kentucky. Freight, labor and installation costs are paid by the owner. Damage to the boiler or surroundings or personal injury resulting from the failure of any control or safety device is not covered under this warranty, nor does the manufacturer assume the liability for such.

This warranty covers only water boilers installed, adjusted or maintained in accordance with the installation and operating instructions and all applicable state and local plumbing, electrical and building codes, ordinances and regulations.

This warranty is void if at any time the water pressure exceeds the maximum allowable working pressure stamped on the boiler, nor is it applicable where the temperatures entering the boiler are frequently below the allowable level. The minimum allowable temperature is 120°F for the A2000 units.

This warranty is void if used with aggressive water. Aggressive water is 5-grains of hardness or less, or any water that is corrosive to copper, brass or bronze and/or may be caused by some method of water softening, water treatment, or highly oxygenated water.

This warranty does not cover leakage resulting from loose or damaged fittings installed by others. This warranty is void where any failure is determined to be due to a halogen in the combustion air or due to electrolytic action. This warranty is void if the boiler is used in an open loop system.

This warranty does not cover any freight, labor, installation or removal costs, either for its original purchase or its replacement.

GBT does not assume liability for any permits, loss of time, consequential damages or contingent liability of any kind resulting from the manufacture, sale, installation or use of this water boiler.

No other warranty or agreement, expressed or implied, is authorized by GBT.

GBT makes no warranty of merchantability or warranty of fitness for a particular purchase including implied warranty arising from course of usage or trade.

GREEN BOILER TECHNOLOGIES, INC.
918 WEST WALNUT STREET
DANVILLE KY 40422

WE-03

10-08

Please read the entire manual before installation or operation of this appliance, for safe and satisfactory operation.

Place a copy of these instructions adjacent to the boiler/heater and notify the owner to keep for future reference.

HANDLING, INSPECTION & STORAGE

All **Green Boiler Technologies A-2000** series appliances are factory tested and inspected before shipment. On receipt, **carefully inspect** the unit for **shipping damage**. Pay particular attention to the controls and the various gas and electrical connections. Make sure the **packing slip matches** the total **number of pieces received**. If the unit is not to be installed immediately, it must be protected from the weather. It is also recommended that the boiler remain in its original shipping container until installed. The failure of components due to weather exposure is not covered by warranty.

SHIPPING DAMAGE

On receipt, note any damage or shortages on the freight bill, and immediately notify the carrier. All claims for damage or shortage must be filed with the carrier by the customer.



918 West Walnut St. Danville, Kentucky 40422

Visit Us On The Web: www.gbt-inc.com

For Customer Service Please Call: 859-236-3181