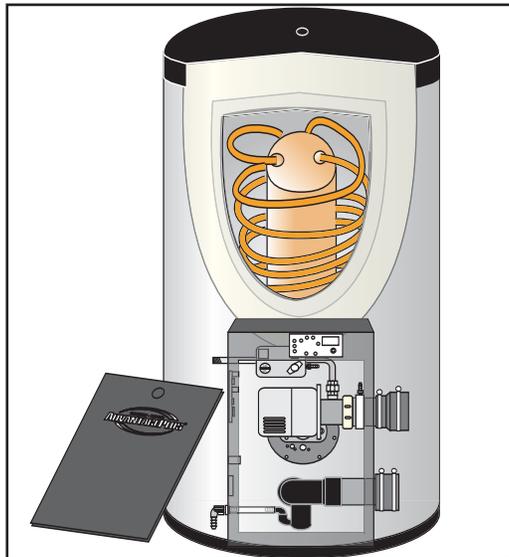


# High Efficiency Commercial Gas Water Heater

## USE & CARE MANUAL

WITH INSTALLATION INSTRUCTIONS FOR THE CONTRACTOR



This Use & Care Manual covers the following model numbers:

HE45-100N	HE119-130N	HE45-199LP
HE45-130N	HE119-160N	HE80-130LP
HE45-160N	HE119-199N	HE80-160LP
HE45-199N	_____	HE80-199LP
HE80-130N	HE45-100LP	HE119-130LP
HE80-160N	HE45-130LP	HE119-160LP
HE80-199N	HE45-160LP	HE119-199LP



Recognize this symbol as an Indication of Important Safety Information!



Do Not Destroy this Manual. Please read carefully and keep in a safe place for Future Reference.



**NOTICE:** This water heater is designed for use in a commercial application. The installation and maintenance of it should be performed by qualified, licensed service personnel.



**WARNING:** Read and review this entire manual with special emphasis on the Venting and Operation Sections prior to any installation work.



**CALIFORNIA PROPOSITION 65 WARNING:** This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.



**WARNING:** If the information in 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 or 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.
- Do not return to your building until authorized by the gas supplier or fire department.
- Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

# SPECIFICATIONS

## RECOVERY CAPACITIES

Recovery in U.S. Gallons/Hr. (GPH) and Liters/Hr. (LPH) at Various Temperature Rises

MODEL NUMBER	INPUT (BTU/HR) NAT. & LP	THERMAL EFFICIENCY	UNITS	40°F (22.2°C)	50°F (27.8°C)	60°F (33.3°C)	70°F (38.9°C)	80°F (44.4°C)	90°F (50.0°C)	100°F (55.6°C)	110°F (61.1°C)	120°F (66.7°C)
HE45-100	100,000	95%	GPH	288	230	192	165	144	128	115	105	96
			LPH	1090	872	726	623	545	484	436	396	363
HE45-130 HE80-130 HE119-130	130,000	95%	GPH	374	299	249	214	187	166	150	136	125
			LPH	1417	1133	944	809	708	630	567	515	472
HE80-160 HE119-160	160,000	95%	GPH	461	368	307	263	230	205	184	167	154
			LPH	1744	1395	1162	996	872	775	697	634	581
HE80-199 HE119-199	199,000	95%	GPH	573	458	382	327	286	255	229	208	191
			LPH	2169	1735	1446	1239	1084	964	867	789	723

Recovery rating is based on thermal efficiencies obtained in an AGA certified laboratory.

## BOOSTER MODELS Recovery in U.S. Gallons/Hr. (GPH) and Liters/Hr. (LPH)

MODEL NUMBER	INPUT (BTU/HR) NAT. & LP	THERMAL EFFICIENCY	UNITS	40°F (22.2°C)	50°F (27.8°C)	60°F (33.3°C)	70°F (38.9°C)	80°F (44.4°C)	90°F (50.0°C)	100°F (55.6°C)	110°F (61.1°C)	120°F (66.7°C)	130°F (72.2°C)	140°F (77.8°C)
HE45-160	160,000	95%	GPH	461	368	307	263	230	205	184	167	154	142	132
			LPH	1744	1395	1162	996	872	775	697	634	581	536	498
HE45-199	199,000	95%	GPH	573	458	382	327	286	255	229	208	191	176	164
			LPH	2169	1735	1446	1239	1084	964	867	789	723	667	620

All models exceed the minimum NAECA energy efficiency requirements of ASHRAE 90.1b-1989, 1992 requirements.

## MAXIMUM DELIVERY

In U.S. Gallons and Liters (Includes useable storage and recovery for indicated times)

MODEL NUMBER	GALLONS/ LITERS	MAX. SETPOINT	INPUT (BTU/HR) NAT. & LP	TEMP. RISE	UNITS	5 MIN.	10 MIN.	15 MIN.	20 MIN.	30 MIN.	45 MIN.	1 HR.	2 HR.	3 HR.	MIN. TO RECOVER CONTENTS
HE45-100	45 170	160°	100,000	100°F	GAL.	41	51	60	70	89	118	147	262	377	23
				55.6°C	LTR.	156	192	228	265	337	446	555	991	1427	
HE45-130	45 170	160°	130,000	100°F	GAL.	44	56	69	81	106	144	181	331	481	18
				55.6°C	LTR.	166	214	261	308	403	544	686	1253	1819	
HE80-130	80 303	160°	130,000	100°F	GAL.	68	81	93	106	131	168	206	355	505	32
				55.6°C	LTR.	259	306	354	401	495	637	779	1345	1912	
HE119-130	119 450	160°	130,000	100°F	GAL.	96	108	121	133	158	196	233	383	532	48
				55.6°C	LTR.	363	410	457	504	599	750	882	1449	2015	
HE45-160	45 170	180**	160,000	100°F	GAL.	47	62	78	93	124	170	216	400	584	15
				55.6°C	LTR.	177	235	294	352	468	642	817	1514	2211	
HE80-160	80 303	160°	160,000	100°F	GAL.	71	87	102	117	148	194	240	424	609	26
				55.6°C	LTR.	270	328	386	444	561	735	909	1607	2304	
HE119-160	119 450	160°	160,000	100°F	GAL.	99	114	129	145	175	221	268	452	636	39
				55.6°C	LTR.	373	432	490	548	664	838	1013	1710	2408	
HE45-199	45 170	180**	199,000	100°F	GAL.	51	70	89	108	146	203	261	490	719	12
				55.6°C	LTR.	192	264	336	408	553	770	987	1854	2721	
HE80-199	80 303	160°	199,000	100°F	GAL.	75	94	113	132	171	228	285	514	743	21
				55.6°C	LTR.	284	357	429	501	646	863	1079	1947	2814	
HE119-199	119 450	160°	199,000	100°F	GAL.	102	121	141	160	198	255	312	542	771	31
				55.6°C	LTR.	338	460	532	604	749	966	1183	2050	2918	

All models have a maximum setpoint of 160°F with the exception of the HE45-160 and HE45-199 booster models. The HE45-160 and HE45-199 have a maximum setpoint of 180°F.

\* NOTE: The 180° F models are shipped with all necessary components for an approved installation (see Booster Installation Kit for component list.)

## DIMENSIONAL INFORMATION

All dimensions shown in English and Metric

MODEL NUMBER	UNITS	HEIGHT	WIDTH	DEPTH	VENT	WATER CONNECTIONS		APPROX SHIPPING WT.
						INLET	OUTLET	
HE45-100 HE45-130	inches mm	42 1067	23 1/2 597	32 813	2 51	1 25	1 25	175 lbs. 79 kgs
HE45-160 HE45-199	inches mm	42 1067	23 1/2 597	32 813	3 76	1 25	1 25	175 lbs. 79 kgs
HE80-130 HE80-160 HE80-199	inches mm	72 1854	23 1/2 597	32 813	3* 76	1-1/2 38	1-1/2 38	235 lbs. 106 kgs
HE119-130 HE119-160 HE119-199	inches mm	73 1854	27 686	36 914	3* 76	1-1/2 38	1-1/2 38	405 lbs. 184 kgs

**0" CLEARANCE TO COMBUSTIBLES ON ALL ADVANTAGE PLUS UNITS, HOWEVER, A 24" CONTROL PANEL SERVICE CLEARANCE IS RECOMMENDED.**

All models require a 120V power source.

\* 130,000 Btu models are certified to be installed with 2" venting.



## General Safety Precautions

Be sure to read and understand the entire Use & Care Manual before attempting to install or operate this water heater. Pay particular attention to the following General Safety Precautions. Failure to follow these warnings could result in a fire or explosion, causing property damage, bodily injury or death. Should you have any problems understanding the instructions in this manual, STOP, and get help from a qualified installer or service technician or the gas supplier.

### **! WARNING**

Gasoline, as well as other flammable materials and liquids (adhesives, solvents, etc.), and the vapors they produce, are extremely dangerous. DO NOT handle, use or store gasoline or other flammable or combustible materials anywhere near or in the vicinity of a water heater. Be sure to read and follow the warning label pictured below and other labels on the water heater, as well as the warnings printed in this manual. Failure to do so can result in property damage, bodily injury, or death.

### **! DANGER**

Failure to install and properly vent the water heater to the outdoors as outlined in the Venting Section of this manual can result in unsafe operation of the water heater. To avoid the risk of fire, explosion, or asphyxiation from carbon monoxide, never operate this water heater unless it is properly vented and has an adequate air supply for proper operation. Be sure to inspect the vent system for proper installation at initial start-up and at least annually thereafter. Refer to maintenance section of this manual for more information regarding vent system inspections.

### **! DANGER**

#### LIQUEFIED PETROLEUM MODELS

- Propane, or LP gas, must be used with great caution.
- It is heavier than air and will collect first in lower areas making it hard to detect at nose level.
- Make sure to look and smell for LP leaks before attempting to light appliance. Use a soapy solution to check all gas fittings and connections. Bubbling at a connection indicates a leak that must be corrected. When smelling to detect an LP leak, be sure to sniff near the floor.
- Gas detectors are recommended in LP applications and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations or customs.
- It is recommended that more than one method be used to detect leaks in LP applications.

#### IF LP GAS IS PRESENT OR SUSPECTED:

- DO NOT attempt to find the cause yourself;
- DO NOT try to light any appliance;
- DO NOT touch any electrical switch;
- DO NOT use any phone in your building.
- Leave the house immediately and make sure your family and pets leave also.
- Leave the doors open for ventilation and contact the gas supplier, a qualified service agency or the fire department.
- Keep the area clear until the service call has been made, the leak is corrected, and a qualified agency has determined the area to be safe.

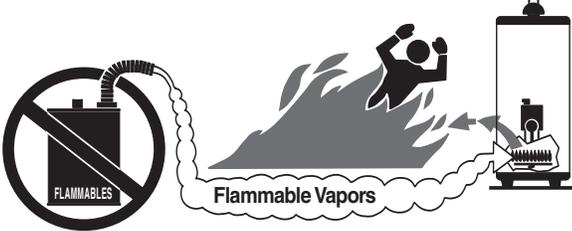
### **! WARNING**

Both LP and natural gas have an odorant added to help detection. Some people may not physically be able to smell or recognize this odorant. If unsure or unfamiliar about the smell associated with LP or natural gas, ask the gas supplier. Other conditions, such as "Odorant Fade", which causes the odorant to "fade", or diminish in intensity can also hide or camouflage a gas leak.

### **! DANGER**

Water heaters utilizing Liquefied Petroleum gas (LP) are different from natural gas models. A natural gas heater will not function safely on LP gas and vice versa. No attempt should ever be made to convert a heater from natural gas to LP gas. To avoid possible equipment dam-

**! DANGER**



**! Vapors from flammable liquids will explode and catch fire causing death or severe burns.**  
Do not use or store flammable products such as gasoline, solvents or adhesives in the same room or area near the water heater.

Keep flammable products:

1. far away from heater,
2. in approved containers,
3. tightly closed and
4. out of children's reach.

Water heater has a main burner and pilot flame. The pilot flame:

1. which can come on at any time and
2. will ignite flammable vapors.

Vapors:

1. cannot be seen,
2. are heavier than air,
3. go a long way on the floor and
4. can be carried from other rooms to the pilot flame by air currents.

**Installation:**  
Do not install water heater where flammable products will be stored or used unless the main burner and pilot flames

are at least 18" above the floor. This will reduce, but not eliminate, the risk of vapors being ignited by the main burner or pilot flame.

Read and follow water heater warnings and instructions. If owners manual is missing, contact the retailer or manufacturer.



## General Safety Precautions

age, personal injury or fire: DO NOT connect this water heater to a fuel type not in accordance with unit rating plate. Propane gas for propane units. Natural gas for natural gas units. These units are not certified for any other type fuel.

### WARNING

LP appliances should not be installed below-grade (for example, in a basement) if such installation is prohibited by federal, state and/or local laws, rules, regulations, or customs.

To meet commercial water use needs, the thermostat on this water heater is adjustable up to 160° F (Booster models have a maximum setpoint of 180°F). However, water temperatures over 125° F can cause severe burns instantly or death from scalds. This is the preferred starting point for setting the controls for supplying general purpose hot water.

Safety and energy conservation are factors to be considered when setting the water temperature on the thermostat. The most energy efficient operation will result when the temperature setting is the lowest that satisfies the needs consistent with the application.

Maximum water temperatures occur just after burner has shut off. To find temperature of the water being delivered, turn on a hot water faucet and place a thermometer in the hot water stream and read the thermometer.

The following chart details the relationship of water temperature and time with regard to scald injury and may be used as a guide in determining the safest water temperature for your applications.

**TIME / TEMPERATURE RELATIONSHIPS IN SCALDS**

Temperature	Time to Produce Serious Burn
120°F	More than 5 minutes
125°F	1½ to 2 minutes
130°F	About 30 seconds
135°F	About 10 seconds
140°F	Less than 5 seconds
145°F	Less than 3 seconds
150°F	About 1½ seconds
155°F	About 1 second

Table courtesy of Shriners Burn Institute

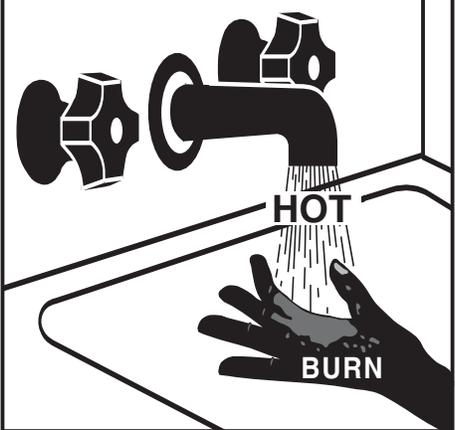
The temperature of the water in the heater can be regulated by setting the temperature on the electronic thermostat. To comply with safety regulations, the thermostat was set at its lowest setting before the water heater was shipped from the factory. See the section titled SET POINT ADJUSTMENT PROCEDURE to set the electronic thermostat.

### DANGER

**There is a Hot Water SCALD Potential if the thermostat is set too high.**

NOTE: When this water heater is supplying general purpose hot water requirements for use by individuals, a thermostatically controlled mixing valve for reducing point of use water temperatures is recommended to reduce the risk of scald injury. Contact a licensed plumber or the local plumbing authority for further information.

**DANGER**



**Water temperature over 125°F can cause severe burns instantly or death from scalds.**

**Children, disabled and elderly are at highest risk of being scalded.**

**See instruction manual before setting temperature at water heater.**

**Feel water before bathing or showering.**

**Temperature limiting valves are available, see manual.**

## INSTALLATION

### WARNING

Read and review this entire manual with special emphasis on the Venting Sections and Operation Sections prior to any installation work.

#### LOCAL INSTALLATION REGULATIONS

This water heater must be installed in accordance with these instructions, local codes, utility company requirements, and/or in the absence of local codes, the latest edition of the American National Standard / National Fuel Gas Code, a copy of which can be purchased from either American Gas Association, 1515 Wilson Blvd., Arlington, VA 22209 as booklet Z223.1 or National Fire Prevention Association, 1 Batterymarch Park, Quincy, MA 02269 as booklet NFPA 54.

The water heater must be located or protected so it is not subject to physical damage, for example, by moving objects, area flooding, etc.

### CAUTION

The water heater should not be located in an area where leakage of the tank or connections will result in damage to the area adjacent to it or to lower floors of the structure. When such areas cannot be avoided, it is recommended that a suitable catch pan, adequately drained, be installed under the water heater. The pan MUST NOT restrict the flow of combustion air flow.

**NOTE: Auxiliary catch pan installation MUST conform to the applicable local codes**

#### LOCATION

Choose a location for your water heater centralized to the piping system, along with consideration to vent pipe length. As the length of vent pipe increases, the firing rate of the appliance decreases. You must also locate the Advantage Plus where it will not be exposed to below freezing temperatures. Additionally, you will need to place the water heater so that the controls, drain, inlet/outlet, and gas valve are easily accessed. This appliance must not be installed outdoors, as it is certified as an indoor appliance, and must be kept vertical and on a level surface. Also, care must be exercised when choosing the location of this appliance where leakage from the relief valve, leakage from related piping, or leakage from the tank or connections, will not result in damage to the surrounding areas or to the lower floors of the building. **A water heater should always be located in an area with a floor drain or installed in an adequately drained catch pan suitable for water heaters.** Proper clearance must be provided around the AdvantagePlus as follows: Sides, bottom, top, and back are 0" (zero clearance). Front of the appliance needs 24"

service clearance minimum. This front service may be achieved by a non-rated or combustible door or access panel; providing the 24" service clearance is achieved when the door is opened or panel is removed. **This water heater must not be located near flammable liquids such as gasoline, adhesives, solvents, paint thinners, butane, liquefied propane, etc. as the controls of this appliance could ignite those vapors, causing an explosion.**

#### TEMPERATURE AND PRESSURE RELIEF VALVE

A new combination temperature and pressure relief valve, complying with the Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22, must be installed in the opening provided on the water heater at the time of installation. No valve is to be placed between the relief valve and the water heater. For circulating tank installation, the separate storage tank(s) must have similar protection. The pressure rating of the relief valve must not exceed the maximum working pressure as marked on the front of the water heater. The Btu/h rating of the relief valve must equal or exceed the Btu/h input of the water heater as noted on its rating plate. Connect the outlet of the relief valve to a suitable open drain. The discharge line must pitch downward from the valve to allow complete draining (by gravity) of the relief valve and discharge line, and must be no smaller than the outlet of the relief valve. The end of the discharge line should not be threaded or concealed and should be protected from freezing. No valve of any type, restriction or reducer coupling should be installed in the discharge line. Local codes shall govern the installation of the relief valves.

#### EXPANSION TANK

A potable hot water expansion tank may be required to offset the water expansion as the water is heated. In most city plumbing systems, the water meter has a no return or back flow device built into the system to prevent back flowing of water back into city mains. Back flow preventers may be found on all incoming water supplies. Under these circumstances, you will need a hot water expansion tank listed for potable water use. The expansion tank should be located on the cold inlet piping close to the water heater. **The expansion tank must be suitable for hot potable water.**

### WARNING

The manufacturer's warranty does not cover any damage or defect caused by installation or attachment or use of any special attachments such as energy saving devices (other than those authorized by the manufacturer) into, onto, or in conjunction with the water heater. The use of such unauthorized

devices may shorten the life of the water heater and may endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized devices.

**DOMESTIC WATER CONNECTIONS**

The water connections must be installed in accordance with all national and local plumbing codes, or any prevailing standard. **NEVER USE DIELECTRIC UNIONS OR GALVANIZED STEEL FITTINGS ON ADVANTAGE PLUS CONNECTIONS.** The inlet and outlet connections are 1" on the 45 gallon models and 1-1/2" on the 80 and 119 gallon models. On the cold inlet, install a 1" brass tee on the 45 gallon models, or a 1-1/2" brass tee on the 80 and 119 gallon models. On the run of the 1" brass tee install, with pipe sealant, compound a 1" brass drain cock or it's equivalent (*not supplied*). Into the branch of the 1" or 1-1/2" brass tee install a copper male adapter to match with the copper plumbing system. For convenience, you may install a shut off valve and a union in the cold inlet piping to ease servicing in the future. If there is a back flow preventer, or any type of a no return valve in the system, then you must install an additional tee for a suitable potable thermal expansion tank. (See section on Expansion Tank.) In the hot outlet connection, (top left), install a suitable adapter to match the copper tubing of the plumbing system. A thermal trap or heat trap loop may be installed here to provide additional energy savings and prevent thermal siphoning of domestic hot water. A domestic hot water tempering/ anti-scald valve should be installed into the hot water line to prevent the

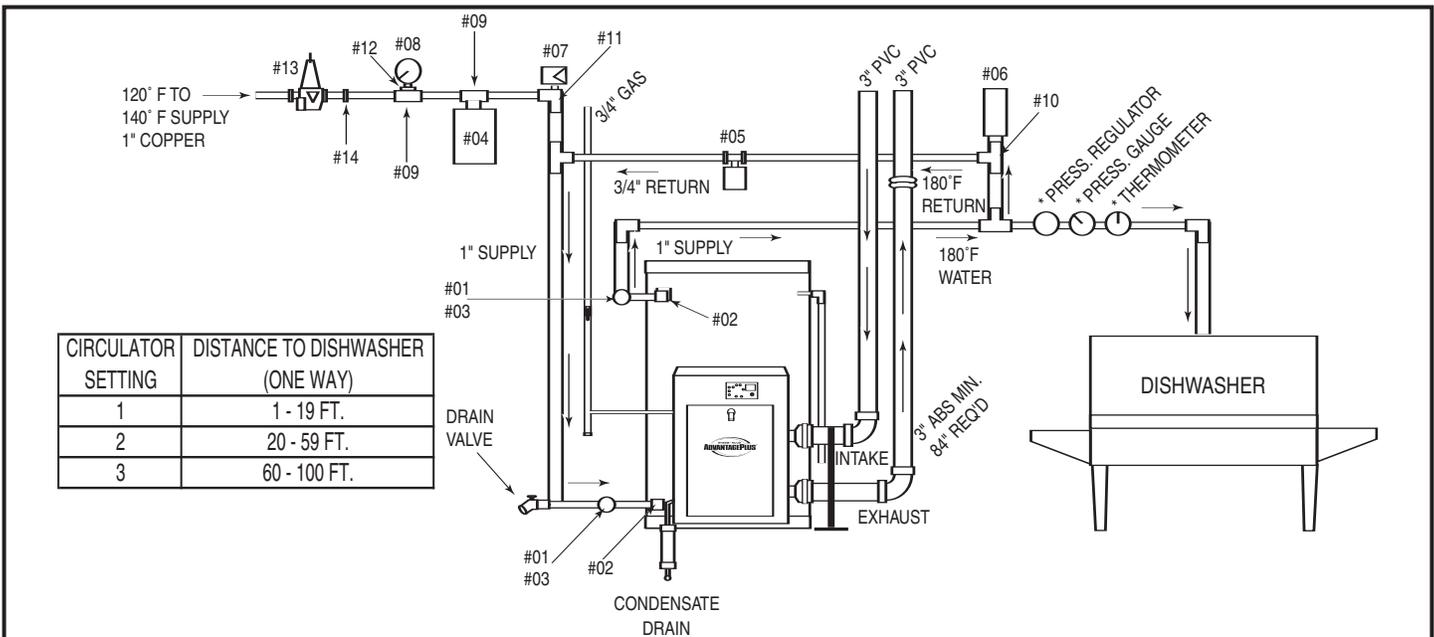
maximum outlet water temperature from exceeding 125° Fahrenheit to prevent scald injury.

**SPECIAL INSTRUCTIONS FOR BOOSTER INSTALLATIONS**

All booster heaters are supplied with the "Booster Installation" kit. In order to maintain proper temperature, this kit must be correctly installed. The Booster kit contains the following list of parts:

- #01 - Nibco Tee - 1"x 1"x 1/2" (2 pcs.)
- #02 - Female Adapter - 1" (2 pcs.)
- #03 - Dial Thermometer (2 pcs.)
- #04 - Expansion Tank - 4-1/2 Gal.
- #05 - Grundfos 3 Speed Pump w/ Check Valve
- #06 - Nibco 1.2" x 12" Fitting Air Chamber
- #07 - Vacuum Relief Valve
- #08 - Pressure Gauge - 0 - 200 PSI
- #09 - Nibco Tee 712R - 1"x 1" x 3/4" (2 pcs.)
- #10 - Nibco Tee 714RR - 1"x 1/2"x 1"
- #11 - Nibco Tee - 1"x 1/2"x 1" Copper
- #12 - Reducing Coupling
- #13 - Pressure Reducing Valve
- #14 - Nibco Male Adapter - 1"

See the following drawing for a typical "Booster" installation. Please note that those items marked with an asterisk in the drawing are not included with the Booster kit, but are items that should be installed in a typical dishwasher package.



The booster heater is equipped with a circulating pump to provide the minimum water flow in the booster and maintain a uniform water temperature in the tank. Depending on the physical distance from the booster to the dishwasher, and the length of time between washes, it may be necessary to run an empty rack to purge the supply line of water that has cooled below 180°F. For this reason it is best to locate the booster as close as possible to the dishwasher. The circulator is equipped with three speeds to increase flow rate and reduce heat

loss. Reference the "Distance" chart to determine the appropriate circulator speed setting.

All piping should be installed with suitable pipe insulation to avoid temperature loss on the re-circulation line. A minimum of 1" thick pipe insulation is recommended. **Under no circumstances** should the booster be installed without a circulating pump.

## WARNING

Tank **MUST** be full of water before power is turned on. Heat exchanger coil **WILL BE DAMAGED** if energized even for a short time while the tank is dry. The water heater's warranty does not cover damage or failure resulting from operation with an empty or partially empty tank. (Reference is made to the limited warranty for complete terms and conditions)

## ELECTRICAL CONNECTION

The electrical connection for the AdvantagePlus is on the left side of the combustion shroud. There is a 1/2" knock-out location for electrical connection. All electrical wiring must be performed by a qualified licensed electrician, and in accordance with National Electrical Code, or to the applicable local codes and standards. The electrical requirements are for standard 120 volts, 60 Hz., 10 amp service. It is recommended that an electrical disconnect switch be placed near the water heater, and that the connection to the AdvantagePlus be made using 3/8" extra-flex, or 3/8" greenfield (or equivalent). **This unit must be wired with #14 AWG, and fused for no more than 15 amps. It is of extreme importance that this unit be properly grounded!** Ground the water heater by connecting the green wire in the electrical access compartment directly to the main building ground system. **It is very important that the building system ground is inspected by a qualified electrician prior to making this connection.** Once all connections have been made, the electrical access may be closed. It is very important that the electrical power is not turned on until gas and venting connections are completed and the tank is full of water.

**A green LED is provided on the main control board. This LED must be illuminated when appliance is turned on for proper operation. Failure to illuminate means bad or missing ground or reverse polarity.**

## GAS CONNECTION

Gas supply shall not exceed a maximum inlet pressure of 14" water column (350 mm), 1/2 pound pressure (3.4 kPa), and a minimum of 7" water column (natural and propane). The entire piping system, gas meter, and regulator must be sized properly to prevent a pressure drop greater than 0.5" of water column as stated in the National Fuel Gas Code. Gas pressure information is listed on the rating plate. **It is very important that you are connected only to the type of gas noted on the rating plate; "LP" or propane gas or "Nat" natural gas or city gas.** All gas connections must be approved by the local gas supplier or utility in addition to the governing authority prior to turning the gas supply on. The nipple provided for the inlet gas connection is 1/2", and it is mandatory that a 3/4" to 1/2" reducing bushing (provided) is used, threaded into the branch of a 3/4" tee, and a drip leg fabricated, as per the National Fuel Gas Code.

You must ensure that the entire gas line to the reducing bushing connection at the Advantage Plus is no smaller than 3/4".

## CAUTION

THE USE OF FLEXIBLE GAS CONNECTORS IS NOT RECOMMENDED. HOWEVER, IF USED, IT IS IMPERATIVE THAT THEY ARE SIZED CORRECTLY. FLEXIBLE GAS CONNECTORS MUST HAVE A MINIMUM ID OF 3/4". A MINIMUM 3/4" ID MUST BE MAINTAINED TO AVOID RESTRICTION OF GAS FLOW! NEVER REDUCE THE GAS SUPPLY LINE BELOW 3/4"!

Once all the inspections have been performed, the piping system must be leak tested. If the leak test pressure is higher than the maximum permissible inlet pressure, you must isolate the AdvantagePlus from the gas line before testing. In order to do this, you must disconnect the union and cap the inlet gas line. *In the event the gas valve is exposed to a pressure greater than 1/2 PSI, 14" water column, the gas valve must be replaced.*

**Failure to follow all precautions could result in fire, explosion or death!** It is recommended that a soapy solution be used to detect leaks. Bubbles will appear and indicate a leak is present. The gas piping must be sized for the proper flow and length of pipe to avoid unacceptable pressure drop. Both the gas meter and the gas regulator must be properly sized for the total gas load. If you experience a pressure drop greater than 1" W.C., the meter or regulator or gas line may be undersized or in need of service. On the inlet side of the gas valve, there is a 1/8" NPT plug. This plug can be removed to attach a manometer. You can attach a meter to the incoming gas drip leg by removing the cap and installing the meter. The gas pressure must remain between 7" and 14" of water column during stand-by and unit running heat cycle. If an in-line regulator is used, it must be a minimum of 10 feet from the AdvantagePlus. **It is very important that the gas line is properly purged by the gas supplier or utility. Failure to properly purge the lines or improper line sizing, will result in the failure of the AdvantagePlus lighting off.** The gas valve is a special gas valve which has a Pressure Augmented Regulator feature, as well as negative outlet pressure. This valve must not be replaced with a conventional valve under any circumstances. Make sure valve is in the "OFF" position prior to turning gas supply on. As an additional safety feature, this valve has a left hand thread on the outlet end, and a special tamper resistant electrical connector.

## WARNING

Never use open flame to test for gas leaks, as bodily injury or property damage could result.

## WARNING

**DO NOT** exceed input shown on water heater rating plate.

## VENTING WHEN USING 3" VENT PIPE

(ONLY MODELS WITH INPUTS OF 100,000 BTU AND 130,000 BTU ARE CERTIFIED TO USE 2" VENT PIPE, SEE SPECIAL VENTING INSTRUCTIONS SECTION)

For inlet air supply, top pipe on the right of the shroud, use 3" PVC schedule 40. It is very important that you plan the location properly to eliminate long pipe runs and excessive fittings. **Inlet pipe size must not be reduced. Do not combine the inlet air with any other inlet pipe including an inlet to an additional similar appliance.** The joints must be properly cleaned, primed, and cemented. The piping must also be properly supported as per local and national standard plumbing codes. It is important that the piping be clean and free from burs, debris, ragged ends, and particles of PVC.

For exhaust piping, lower pipe on the right of the shroud, use only ABS schedule 40 or CPVC schedule 40 or 80, **NON FOAM CORE**, in the first 84" (7 feet) of vent length. The balance of the inlet and exhaust piping may be PVC schedule 40, ABS schedule 40 or CPVC schedule 40 or 80, **NON FOAM CORE ONLY**, as required to meet local venting codes.

Exhaust piping should be sloped back to the connection on the AdvantagePlus, at least 1/4 inch per foot of pipe, to remove the condensate that forms within the pipe. The total combined length of pipe, (inlet air piping plus exhaust piping) including allowances for elbows, should not exceed 85 equivalent feet. The total combined length of pipe, including allowances for elbows, should not be less than 22 equivalent feet (minimum length of 12 feet of piping, including allowances for elbows, on the inlet and the exhaust). Choose your vent termination locations carefully. You must make certain that exhaust gas does not re-circulate back into the air inlet pipe. You must place your vent terminations in an open area, according to the following guidelines.

### Venting Guidelines

- 1) Never vent into a walkway or patio area, or an alley, or otherwise public area less than 7' from the ground.
- 2) Allow four (4) feet below or four (4) feet horizontally from any door, window or gravity air inlet to the building or other appliance.
- 3) Never install a heat saver or similar product to capture waste heat from exhaust.
- 4) Always have vent location at least 1' above maximum snow level.
- 5) Always have vent 1' above ground level, away from shrubs and bushes.
- 6) Follow local gas codes in your region or refer to National Fuel Gas Code, or Can B149.
- 7) Always have vent at least 3' from an inside corner of outside walls.
- 8) Maintain at least 4' clearance to electric meters, gas meters and exhaust fans or inlets.
- 9) Inlet air must be taken from **outside** of building next to exhaust outlet, no closer than 8".

10) Always place 1/2 inch x 1/2 inch 16 gauge galvanized steel screen in the intake and exhaust openings to prevent foreign matter from entering the AdvantagePlus.

11) The vent system must be balanced by friction loss equivalent (See table on page 10).

12) The same method must be used for both intake and exhaust termination. **DO NOT** terminate one horizontally and the other vertically.

13) Roof Venting: The vent intake and exhaust must be properly cleaned and glued, for pressure tight joints. Several methods for venting the AdvantagePlus can be found on pages 22 and 23. Use the layout as a guideline. Certain site conditions such as multiple roof lines/pitches may require venting modifications-consult factory. The air inlet must be a minimum of 1' vertically above the maximum snow level or 24" whichever is greater. The air inlet must also be a minimum of 10' horizontally from the roof and terminated with a tee. The exhaust must be a minimum of 24" above the air inlet opening and terminated with a coupling. It is very important that there are no other vents, chimneys, or air inlets in any direction for at least 4'. **All venting must be properly supported, as the AdvantagePlus is not intended to support any venting whatsoever.** All piping, glue, solvents, cleaners, fittings, and components must conform to ASTM (American Society for Testing and Materials), and ANSI (American National Standard Institute).

14) It is recommended that you use vent kits specifically designed for AdvantagePlus installations.

## PIPE / FITTINGS WHEN USING 3" VENT PIPE

The first 84" (7') of exhaust piping, must be of 3" ABS solid only (provided) or CPVC; (**NEVER use cellular foam core pipe on exhaust piping**), and conform to ASTM D-3965 for ABS or ASTM F-441 for CPVC, and fittings to ASTM D2661 & D3311 for ABS and ASTM F-439 for CPVC. The balance of exhaust piping, and all of intake piping, use standard 3" PVC schedule 40 or 3" ABS schedule 40, conforming to ASTM D2665, or ABS conforming to ASTM D-3965 & ASTM R-441 for ABS; and fittings conforming to ASTM D-2665 & D331. ABS may also be used for intake venting as long as pipe conforms to ASTM D3965 & D2661 and fittings meet ASTM D2661 & D3311.

## FOR LONGER VENT LENGTHS WHEN USING 3" VENT PIPE

All venting must be 3", both intake and exhaust. **NEVER use any piping less than 3", or different size pipe on the intake and exhaust.** You may use 4" venting on both intake and exhaust to lower the pressure drop and provide additional venting length. **It is imperative when using 4" venting to follow these instructions very carefully. For longer venting lengths, the first 10' of both the intake and exhaust piping are 3". For the intake, use 10' of 3" PVC plus one 90 degree or two 45 degree elbows. For the exhaust, use 10' of ABS solid NON FOAM CORE, or CPVC plus one 90 degree**

**or two 45 degree elbows.** Then use a 4" x 3" PVC or 4" x 3" ABS reducing coupling. Then proceed with PVC 4" NON FOAM CORE pipe and fittings for both the intake and exhaust piping. On 4" piping you may go an additional 125 equivalent feet of pipe and fittings, combined total length. The 4" fittings have a friction loss allowance as follows:

4" 90 degree = 3' and a 4" 45 degree = 1'.

The total maximum venting length can be 125', plus the first 10' of each 3", and a maximum fitting allowance of the 3", total two 90 degree or four 45 degree before increasing to 4". Total equivalent would be 30' of 3" plus 125' of 4". Never use different pipe sizes for intake and exhaust.

### **SPECIAL VENTING INSTRUCTIONS USING 2" VENT PIPE**

**(ONLY MODELS WITH INPUTS OF 100,000 BTU AND 130,000 BTU ARE CERTIFIED FOR 2" VENTING) HE45-100, HE45-130, HE80-130, HE119-130**

For inlet air supply, top pipe on the right of the shroud, use 2 inch PVC schedule 40. It is very important that you plan the location properly, to eliminate long pipe

runs and excessive fittings. Inlet pipe size must not be reduced. Do not combine the inlet air with any other inlet pipe, including an inlet to an additional similar appliance. The joints must be properly cleaned, primed and cemented. The piping must also be properly supported as per local and national standard plumbing codes. It is important that the piping be clean and free from burs, debris, ragged ends and particles of PVC.

For exhaust piping, lower pipe on the right of the shroud, use 2 inch PVC schedule 40 NON FOAM CORE. Use 2 inch ABS NON FOAM CORE or 2 inch CPVC schedule 40 or 80 only when required to meet local venting codes. Exhaust piping should be sloped back to the connection on the AdvantagePlus, at least 1/4 inch per foot of pipe, to remove the condensate that forms within the pipe. The total combined length of pipe, (inlet air piping plus exhaust piping) including allowances for elbows, should not exceed 85 equivalent feet. The total combined length of pipe, including allowances for elbows, should not be less than 22 equivalent feet (minimum length of 12 feet of piping, including allowances for elbows, on the inlet and the exhaust). Choose your vent termination locations carefully. You must make certain that exhaust gas does not re-circulate back into the air inlet pipe. You must place your vent terminations in an open area, according to the venting guidelines section on page 8.

### **PIPE / FITTINGS WHEN USING 2" VENT PIPE**

All inlet air and exhaust venting may use standard PVC

schedule 40 piping, conforming to ASTM D-1785, and fittings conforming to ASTM D-2466, or ABS pipe conforming to ASTM D-3965 and ASTM D-2661, and fittings conforming to ASTM D-3311 and ASTM D-2661. (NEVER use cellular foam core pipe on exhaust piping)

### **FOR LONGER VENT LENGTHS WHEN USING 2" VENT PIPE**

You may use 3 inch venting on both the intake and exhaust to lower the pressure drop and provide additional vent length. It is imperative when using 3 inch venting to follow these instructions carefully. For longer vent lengths, the first 10 feet of both the intake and exhaust piping must be 2 inches. For the first 10 foot use 2 inch PVC schedule 40 NON FOAM CORE, 2 inch ABS NON FOAM CORE or 2 inch CPVC schedule 40 or 80 plus one 90 degree or two 45 degree elbows. Then use a 2" x 3" reducing coupling of like material. Then proceed with 3 inch PVC schedule 40 NON FOAM CORE, 3 inch ABS NON FOAM CORE or 3 inch CPVC schedule 40 or 80 pipe and fittings for both the intake and exhaust piping. On 3 inch pipe you may go an additional 125 equivalent feet of pipe and fittings, combined total length. The total combined equivalent vent length would be 30 equivalent feet of 2-inch vent and 125 equivalent feet of 3-inch vent, for a maximum equivalent vent length of 155 feet. Never use different pipe sizes for intake and exhaust.

### **CLEANER / CEMENT**

Cement for all venting must be ALL PURPOSE Cement, and must conform to ASTM D-2235, D-2564 and F-493, and cleaner for the piping and fittings must conform to ASTM F-656.

### **NOTE:**

**THE METHODS DESCRIBED ARE SUGGESTED GENERIC METHODS ONLY. SPECIFIC JOB SITE OBSERVATIONS AND SIZING MAY REQUIRE ALTERNATE INSTALLATION METHODS. CONSULT THE FACTORY WITH SPECIFIC JOB REQUIREMENTS FOR ADDITIONAL RECOMMENDATIONS.**

### **VERY IMPORTANT SET-UP INSTRUCTIONS!**

IF YOU HAVE A COMBUSTION ANALYZER, THE FOLLOWING RATINGS WILL BE **VERY HELPFUL** IN SETTING UP YOUR ADVANTAGE PLUS:

### **FOR NATURAL GAS -**

CO<sub>2</sub> reading should be between (9 1/2% – 10%)

O<sub>2</sub> reading should be between (3 1/2% – 4 1/2%)

CO reading should be under 10 PPM

### **FOR PROPANE GAS -**

CO<sub>2</sub> reading should be between (10 1/2% – 11 1/2%)

O<sub>2</sub> reading should be between (3 1/2% – 4 1/2%)

CO reading should be under 10 PPM



## CONTROL DESCRIPTION

The fully integrated water heater control is an all electronic, fully automatic controller which will provide many years of trouble free service. The control requires no periodic maintenance and includes a built-in micro-processor which performs a number of diagnostic tests to verify proper appliance and control operation. Should an unsafe condition occur, the burner will shut down and the appropriate status indicators will illuminate indicating the need for service. Consisting of two printed circuit board assemblies, the controller's main board is attached to the inside left of the shroud while the display board is mounted to the front top of the shroud. This arrangement simplifies access for the user adjustments while enhancing the visibility of the temperature display and status indicators. A power step-down transformer and blower pressure switch are also mounted on the inside left of the shroud. The controller display functions include a high visibility three digit LED readout which is used to display the actual water temperature within the tank along with the programmed desired water temperature (set point temperature). Nine individual LED indicators are also mounted on the display board which are used to determine the operating status of the appliance and provide assistance when troubleshooting any problems which may occur. All indicators are of the solid state variety and should last for the life of the appliance. The controller has sufficient built-in memory to retain the programmed temperature set point in the event power is ever interrupted. The final component of the control system includes a temperature sensing probe which is threaded into the side of the tank. This probe is of unique construction in that both the temperature sensing/control and safety limit functions are performed by this single device. All probe components are of solid state construction to provide extended operational life.

## START UP PROCEDURE

**(NEVER APPLY POWER TO AN ADVANTAGEPLUS UNIT THAT IS NOT COMPLETELY FILLED WITH WATER)**

1. Make sure that the AdvantagePlus has been installed to these instruction procedures along with all applicable state and local codes.
2. Make sure all gas piping and connections have been verified and inspected by all applicable inspectors. Turn on gas supply. Ensure that the gas line and the LP tank, if applicable, has been properly purged. Failure to properly purge the gas lines will result in failure to operate.
3. Make sure that the cold water supply has been turned on and the AdvantagePlus is completely filled with water. Verify by opening a hot water faucet, or purging at the dishwasher, and allowing water to flow until all air is removed and a clear water flow is present.

## NEVER PURGE FROM THE T&P VALVE.

4. Turn on electrical supply.
5. The control will first display "102", then "88.8", which is the control test, and finally the actual tank temperature at the probe.

## TEMPERATURE SET POINT ADJUSTMENT PROCEDURE

### **WARNING**

**When this water heater is supplying general purpose hot water requirements for individuals, a thermostatically controlled mixing valve for reducing point of use water temperature is recommended. Contact a licensed plumber or the local plumbing authority for further instructions.**

The three digit LED display will illustrate actual water temperature within the tank under normal operating conditions. However, this display is also used to indicate the temperature set point when in the programming mode.

The controller has a temperature set point range of 70°F to 160°F (Booster models have a maximum set point of 180°F), with a factory setting of 120°F.

**NOTE: Power must be applied to the controller prior to any programming operations.**

To change or access the programmed temperature set point value, utilize the red button on the display panel. Momentarily depressing the button will briefly illustrate the existing set point value. If the button is held down for more than one second, the programming mode is entered and the set point value will begin incrementing by one degree per second. When the desired set point value is reached, simply release the button and the controller will automatically retain this value in temporary memory. After 30 seconds, this new set point will be retained in permanent memory.

**NOTE: If power is interrupted during this 30 second period, the new set point will not be retained in permanent memory. It is a good practice to re-check the set point value approximately 60 seconds after a new value has been entered.**

If the button is held down, the maximum set point will reach 160°F (180°F on Booster models) and stop. This is the maximum value. At this point, if the desired set point has not been obtained, release the button and depress it again, the set point will decrement down to 70° F and stop. The set point value will now restart at 70° F and once again increase in value for as long as the button is pressed.

## DANGER

There is a hot water SCALD POTENTIAL if the thermostat is set too high.

### THERMOSTAT DIFFERENTIAL ADJUSTMENT PROCEDURE

To allow proper water heater operation, the control has an 8°F "window" around the set point. This means that the burner will be turned on when the water temperature drops to 4°F below the set point, and it will be turned off when the water temperature reaches 4°F above the set point. Thus, if the set point is set to 120°F., the control will turn on the burner when the water temperature drops to 116°F., and will continue to heat the water until the temperature reaches 124°F. The differential is factory set to 8°F (+ or- 4°F.) If another differential is required, the value of the differential can be field adjusted by holding the set point button when power is applied to the control. Shut off power to the control. Next hold in the set point button. Now reapply power to the control. Using the set point button, the value of the differential can be incremented or decremented as above. When the proper value is reached, release the button and wait for the display to show "00". This indicates the new differential has been stored into permanent memory. Remove power and restart control by applying power for normal operation.

### OVERALL APPLIANCE AND CONTROL OPERATION

A normal operating sequence is as follows:

1. The control determines that the actual water temperature inside the tank is 4 degrees F below the programmed temperature set point.
2. The control performs selected system diagnostic checks.
3. If all checks are successfully passed, the combustion blower is energized for the 40 second pre-purge cycle.
4. After the pre-purge cycle is complete, power is applied to the ignitor element for the ignitor warm-up period (blower should continue to run).
5. The ignitor warm-up period will last for 30 seconds, then gas valve will be opened, allowing gas to enter the burner chamber.
6. The ignitor will remain on for an additional 4 seconds, then it will be turned off.
7. After an additional 2 seconds, the control will verify the presence of flame. If the flame was not established, the gas valve will be closed, power will be removed from the ignitor element, and the control will run the blower for 30 seconds. This removes excess fuel from the combustion chamber. At this point, the control will return to step 2.

8. If flame is present, the control will enter the heating mode where it will continue heating the tank water until the set point temperature plus 4°F is reached. At this point, the gas valve is closed and the control enters the post-purge cycle. The flame can be viewed through a window on the lower right of combustion blower flange.

9. The post purge cycle continues to run the combustion blower for an additional 30 seconds to purge the system of all combustion gases. After this time period, the blower is de-energized and will coast to a stop.

10. The control will now enter the idle state while continuing to monitor internal tank water temperature. If the temperature drops to 4°F below the set point value, the control will automatically return to step 1.

### STATUS INDICATORS

Pages 16-20 contain nine individual diagrams which illustrate the various operating states of the appliance and their relation to the LED status indicators found on the controller. These diagrams reflect normal water heater operation.

### MAINTENANCE

## CAUTION

**In unusually dirty or dusty conditions, care must be taken to keep appliance door in place. Failure to do so VOIDS WARRANTY!**

The control system requires no periodic maintenance under normal conditions. However, in unusually dirty or dusty conditions, periodic vacuuming of the cover to maintain visibility of the display and indicators is recommended.

### INTERNAL WIRING

For specific wiring information, please refer to the diagrams on pages 21 and 22.

### SHUTDOWN PROCEDURE

If the burner is operating, lower the set point value to 70°F and wait for the burner to shut off. Continue to wait for the combustion blower to stop so all latent combustion gases are purged from the system. This should take a maximum of 40 to 90 seconds. Disconnect the electrical supply. If the burner is not operating, disconnect the electrical supply.

### VACATION PROCEDURE

**If there is danger of freezing, change the set point to 70°F. DO NOT turn off electrical power.** If there is no danger of freezing, follow the "Shutdown Procedure".

## FAILURE TO OPERATE

Should the burner fail to light, the control will perform two more ignition trials prior to entering a lockout state (flashing "LOC"). Note that each subsequent ignition trial will not occur immediately. After a failed ignition trial, the blower must run for approximately 10 seconds to purge the system, then the ignitor element must complete a 30 second warm-up period. Therefore, a time period of approximately 40 to 90 seconds will expire between each ignition trial. If the burner lights during any one of these three ignition trials, normal operation will resume. If the burner lights, but goes off in about 4 seconds, check the polarity of the wiring. See electrical on page 6. **If the burner does not light after the third ignition trial, the control will enter a lockout state. This lockout state indicates that a problem exists with either the appliance, the controls, or the gas supply.** Under such circumstances, a qualified service technician should be contacted immediately to properly service the appliance and correct the problem. If a technician is not available, depressing the red button once will remove the lockout state so additional trials for ignition can be performed. **Any time flashing double zero's are shown, you must look for an LED out, or flashing. The LED that is out or flashing will assist you in diagnosing lock out condition.**

## FUEL CONVERSIONS

This product may be converted from L.P. gas (propane) to Natural gas or from Natural gas to L.P. gas (propane). For information and requirements about this procedure call the Technical Service Department at 1-800-432-8373.

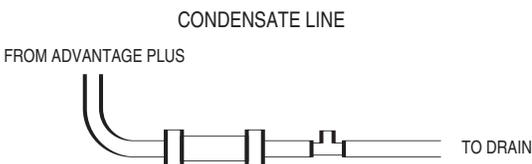
### **⚠ WARNING**

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.

### **⚠ WARNING**

DO NOT use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace the water heater if the control system or any gas control which has been under water.

## INSTALLATION OF A CONDENSATE NEUTRALIZER AND PUMP (Not Supplied)



CONDENSATE LINE MUST BE PITCHED AT LEAST 1/4" PER FOOT TO PROPERLY DRAIN. IF THIS CANNOT BE DONE OR A VERY LONG LENGTH OF CONDENSATE HOSE IS USED YOU MUST INCREASE THE CONDENSATE HOSE TO A MINIMUM OF 1" I.D. AND PLACE A TEE IN THE LINE AFTER THE CONDENSATE NEUTRALIZER TO PROPERLY REDUCE VACUUM LOCK IN THE DRAIN LINE.

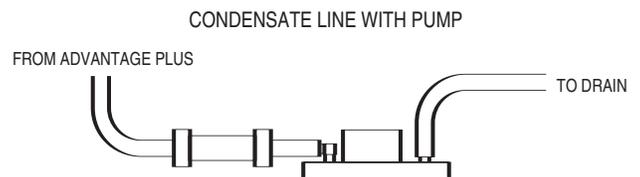
## CORROSIVE ATMOSPHERES

The heater should not be installed near an air supply containing halogenated hydrocarbons. For example, the air in beauty salons, dry cleaning establishments, photo processing labs, and storage areas for liquid and powdered bleaches or swimming pool chemicals often contain hydrocarbons. The air there may be safe to breathe, but when it passes through a gas flame, corrosive elements are released that will shorten the life of any gas burning appliance. Propellants from common spray cans or gas leaks from refrigeration equipment are highly corrosive after passing through a flame. The limited warranty is voided when failure of water heater is due to a corrosive atmosphere. (Reference is made to the limited warranty for complete terms and conditions.)

## CONDENSATE

This is a condensing high efficiency appliance, therefore this unit has a condensate removal system. Condensate is nothing more than water vapor, derived from the combustion products, similar to an automobile when it is initially started. This condensate does have a low pH and should be treated with a condensate filter. This filter contains either lime crystals or marble crystals, which will neutralize the condensate. The outlet of the filter is sized for 5/8" ID (inside diameter) plastic tubing. It is very important that the condensate line is sloped away from and down to a suitable inside drain. If the condensate outlet on the AdvantagePlus is lower than the drain, you must use a condensate removal pump. It is also very important that the condensate line is not exposed to freezing temperatures, or any other type of blockage. Plastic tubing should be the only material used for the condensate line. Steel, brass, copper, or other metals will be subject to corrosion and deterioration. A second vent may be necessary to prevent condensate line vacuum lock if a long horizontal run is used. Also an increase to 1" tubing may be necessary.

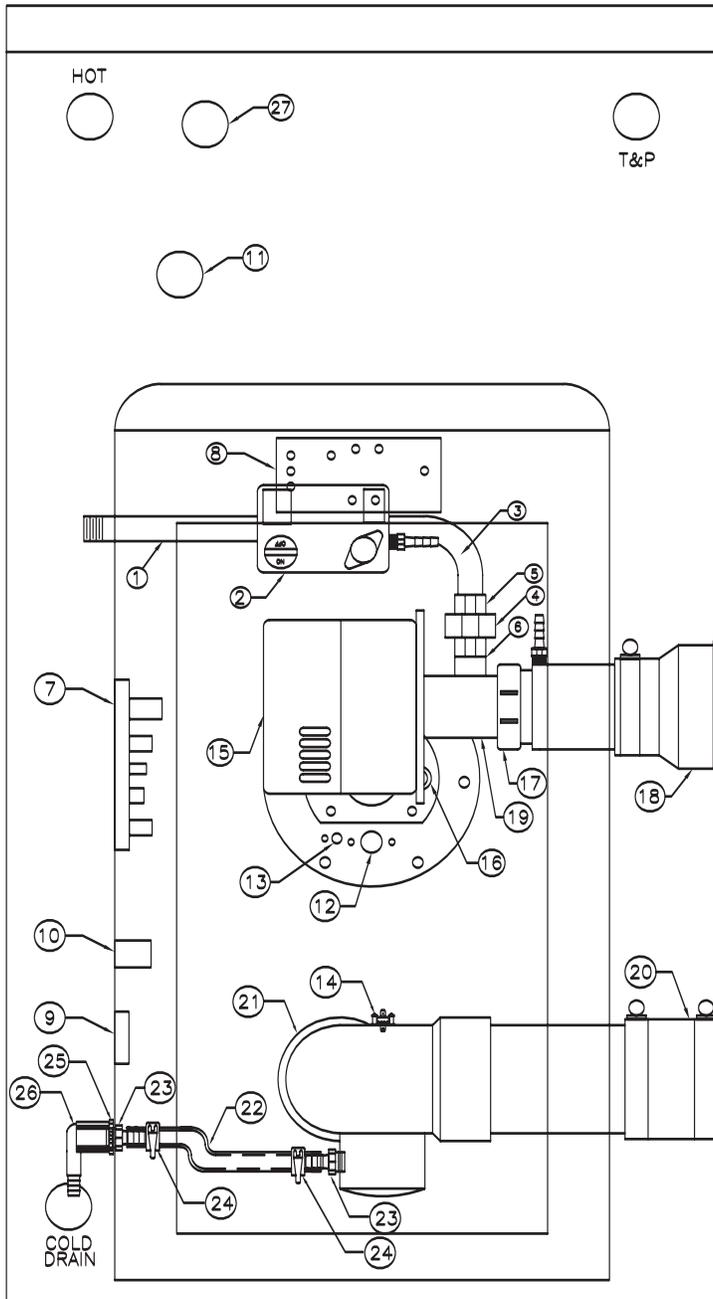
**NOTE: Always check local codes for proper evacuation of condensate.**



CONTACT YOUR LOCAL WHOLESALE PLUMBING SUPPLY STORE FOR MORE INFORMATION ON CONDENSATE NEUTRALIZERS AND PUMPS

## Components of the AdvantagePlus

# COMPONENTS DIAGRAM



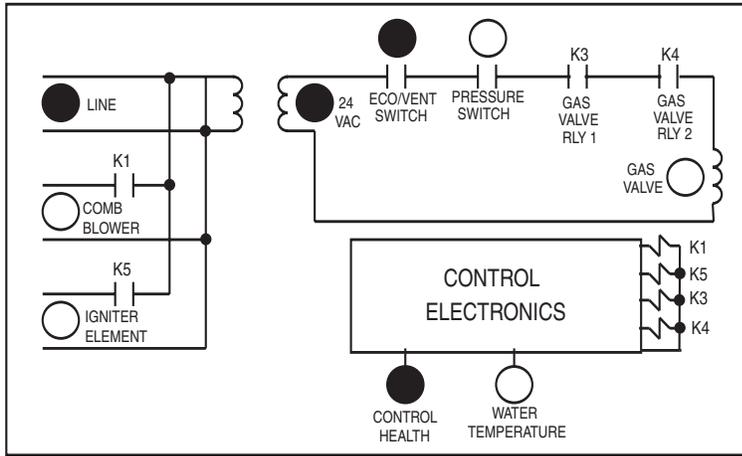
1. 1/2" NPT x 6" Gas Inlet Nipple
2. Gas Valve
3. Gas Valve Elbow
4. Gas Orifice Union
5. Gas Orifice
6. Union Connector Nipple
7. Main Control PC Board
8. Display PC Board
9. Pressure Switch
10. Transformer
11. ECO / Temperature Probe
12. Carborundum Ignitor
13. Flame Rectification Probe
14. Over Temperature Switch
15. Combustion Blower
16. Glass Sight Window
17. Air Inlet Adapter
18. Air Inlet Connector
19. Air Inlet Manifold
20. Exhaust Outlet Connector
21. Exhaust Elbow and Drain
22. Condensate Connector Hose
23. 1/2" barb x 1/2" M Adapter
24. 15/16" Hose Clamp
25. 90 degree Street Elbow
26. Combination 90 degree Elbow
27. Conduit 1/32" locknut
28. Combination 90 degree Elbow

### REPLACEMENT PARTS NOT SHOWN

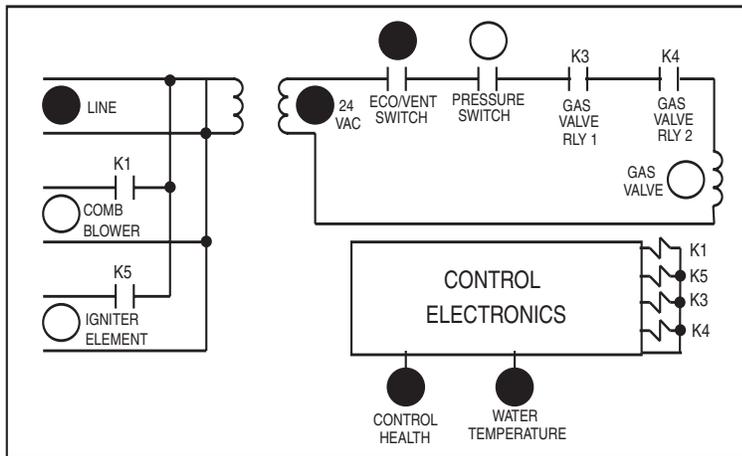
- Low Voltage Cable Assembly
- Interconnect Ribbon Cable
- Line Cable
- Blower Cable
- Gasket Burner Mounting Flange
- Gasket Blower Outlet Flange
- Gasket Air Inlet
- Gasket Burner Mounting Flange White



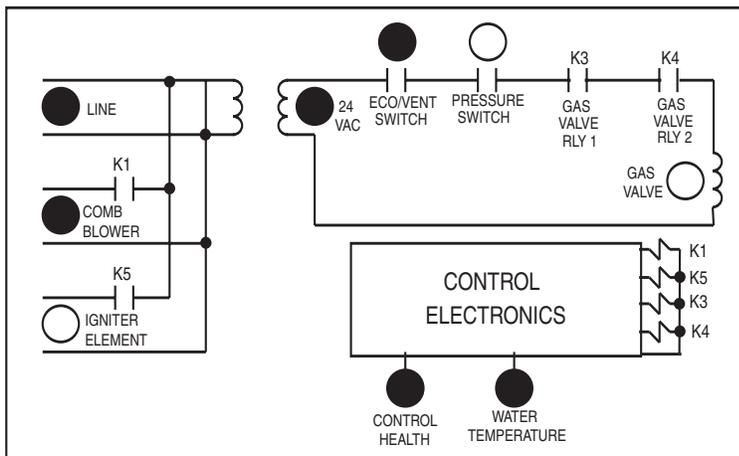
## STATUS INDICATIONS UNDER NORMAL CONDITIONS



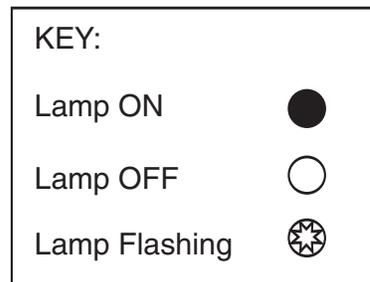
1. Idle Status



2. Call for Heat

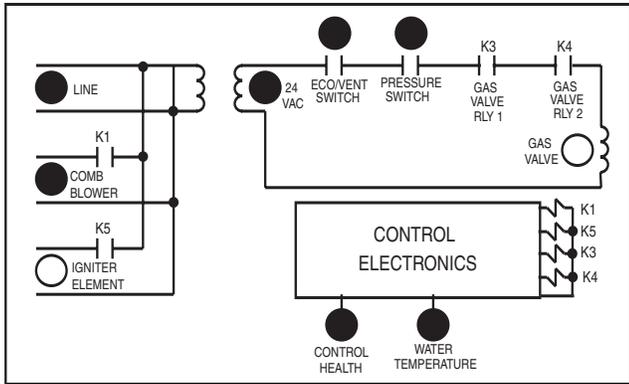


3. Combustion Blower Powered

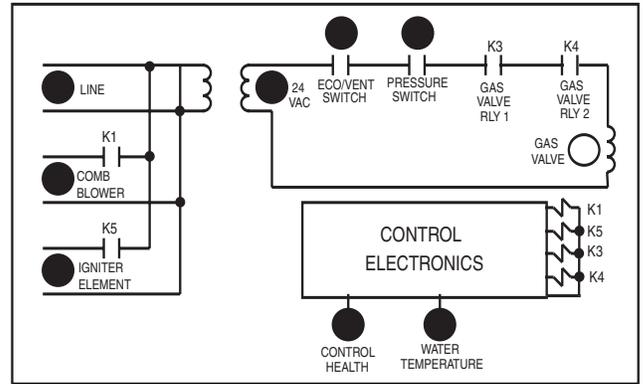


**NOTICE:**

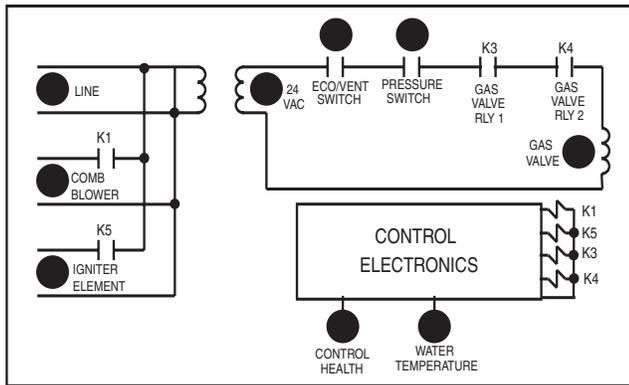
If an error message is still indicated after removal of the replaceable 3 amp fuse on the **CONTROL**, there is a problem with the transformer. The **TRANSFORMER** has an internal non-replaceable fuse. The transformer must be replaced. Please contact your local distributor or service professional.



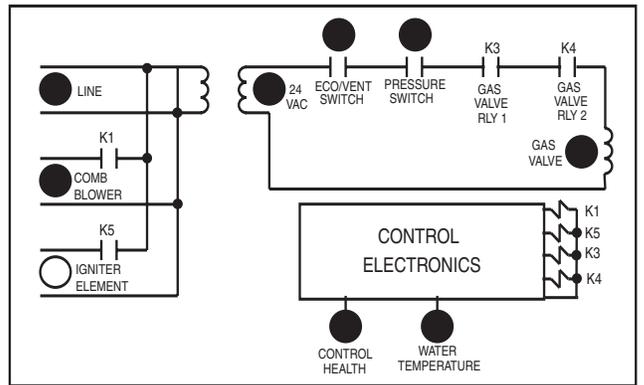
4. Pressure Switch Closes,  
Pre-purge Cycle Starts



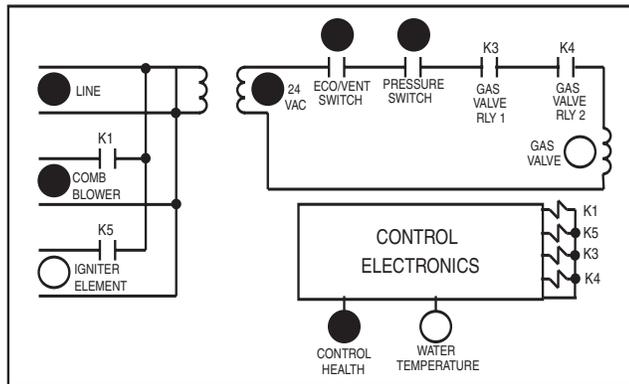
5. Igniter Element Warmup



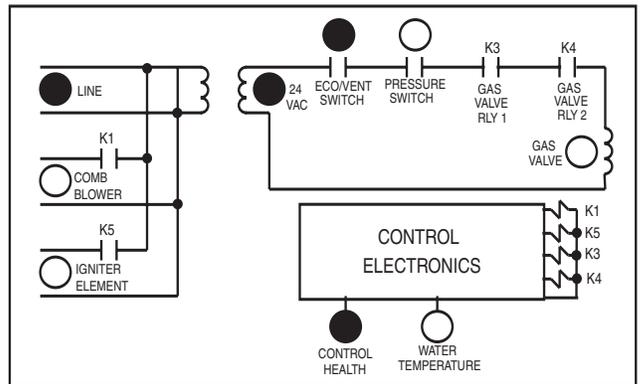
6. Burner Light-off



7. Water Heating



8. End Call for Heat  
Start Post-purge Cycle

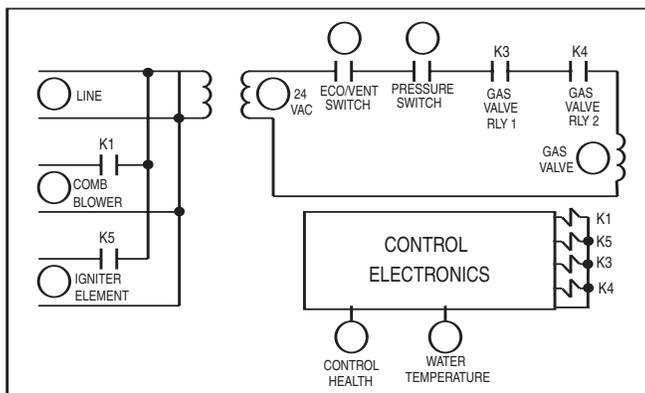


9. End of Sequence, Idle State

STATUS INDICATIONS UNDER NORMAL OPERATING CONDITIONS

## NO INCOMING LINE VOLTAGE OR 24 VOLT

Line LED & 24 VAC LED Off



### POSSIBLE CAUSE

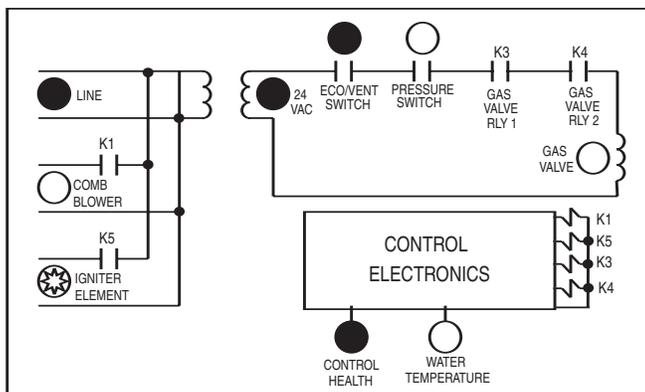
1. No Input power.
2. Wiring disconnected
3. One or more wiring receptacles disconnected from control.
4. LED burned out.
5. Defective transformer.
6. Transformer wiring problem.

### REMEDY

1. Apply Power
2. Check all wiring
3. Reconnect plugs on control. Confirm all are fully seated.
4. Replace display board.
5. Replace transformer.
6. Repair transformer wiring.

#### NOTE:

The transformer is of Class II variety and has an internal non-replaceable fuse. If blown, a problem may exist with the control which is affecting the transformer. In such cases, it is recommended the control should be replaced as well.



## IGNITOR LOCKOUT

Ignitor Element LED Flashing

### POSSIBLE CAUSE

1. Broken ignitor element.
2. Ignitor unplugged.
3. Insufficient ignitor current draw.

### REMEDY

1. Replace ignitor element.
2. Plug in ignitor.
3. Monitor ignitor current draw. See note below.

#### NOTE:

The ignitor current is monitored by pressing the blue button to the left of the LEDs during the ignitor warm-up period or when the ignitor element LED is illuminated. The 3-segment LED display will show the actual ignitor current draw. The expected ignitor current draw is from 2.5 to 4.5 amps.

## IGNITION LOCKOUT

### Gas Valve LED Flashing

This condition results from a failure to establish burner ignition after three successive trials. In such cases:

First - Investigate the possible cause and remedy any observations.

Second - Momentarily press the red button on the display panel to reset the lockout condition.

Third - Confirm the proper appliance operation.

#### POSSIBLE CAUSE

1. Burner ground wire broken or corroded.
2. Connectors unplugged.
3. Flame probe faulty.
4. Gas shut off.
5. Clogged gas valve.
6. Faulty gas valve.
7. Defective control.
8. Burner improperly adjusted.
9. Dirty burner.
10. Improper line connection.

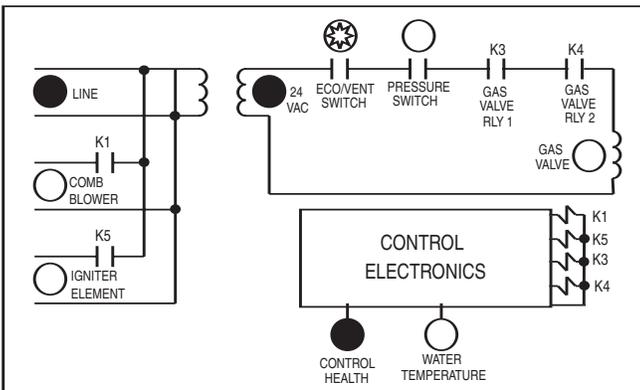
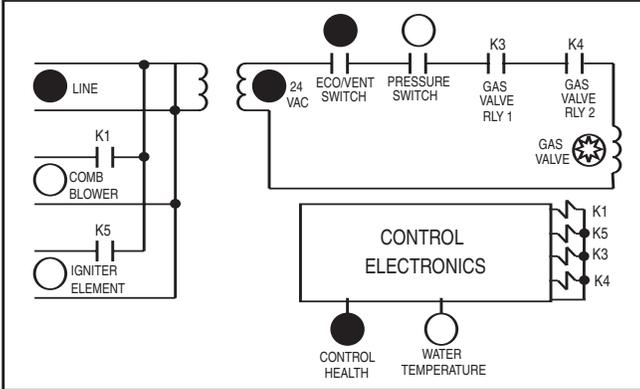
#### REMEDY

1. Check wire and connection at burner.
2. Check connectors.
3. Replace flame probe.
4. Turn on gas supply
5. Replace gas valve.
6. Replace gas valve.
7. Replace control.
8. Adjust burner.
9. Clean burner.
10. Verify green LED on the-control board is illuminated when power is applied.
11. Monitor flame current. See note below.

11. Insufficient flame current.

#### NOTE:

The flame current (flame rectification) is monitored by pressing the blue button to the left of the LEDs during the heat cycle or when the gas valve LED is illuminated. The 3-segment LED display will show the actual flame current. The expected flame current draw is 4.0 to 5.1 micro-amps.



## ECO SWITCH OPEN

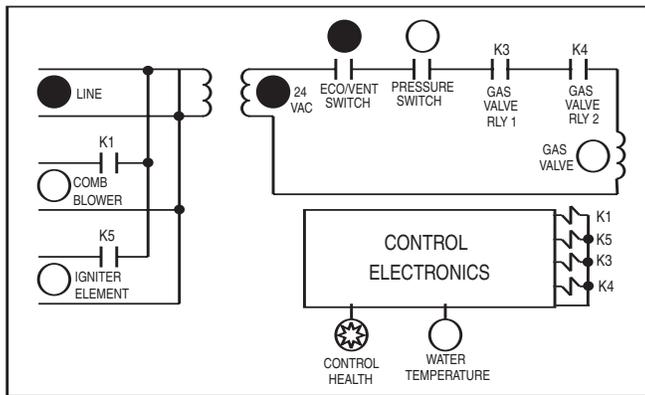
### ECO LED Flashing

#### POSSIBLE CAUSE

1. Temperature probe is unplugged.
2. Temperature probe wiring damaged.
3. Water in tank is too hot. ECO is tripped.
4. Low water cutoff device is tripped.

#### REMEDY

1. Check connectors.
2. Repair wiring.
3. Normal condition when water temperature exceeds safety limit. Allow tank to cool or admit cold water into tank. Manually reset the control. Determine cause for overtemp condition.
4. Make sure tank is full of water.



## CONTROL HEALTH

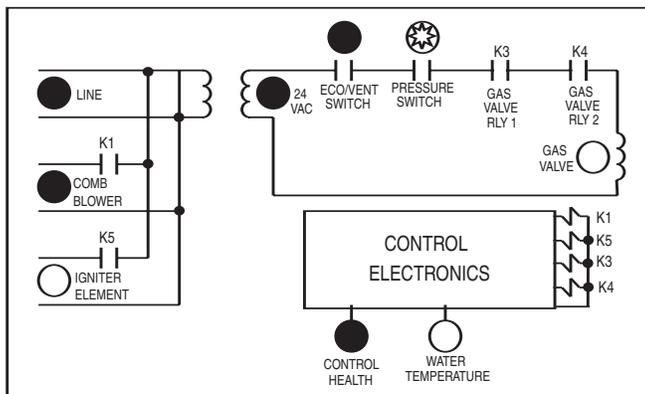
### Control Health LED Flashing

#### POSSIBLE CAUSE

This indicates that the main control board has failed one or more of its internal diagnostic self-tests.

#### REMEDY

Press red reset button on the display board to reset the control. If this error occurs repeatedly, replace the main control board.



## COMBUSTION AIR BLOCKAGE

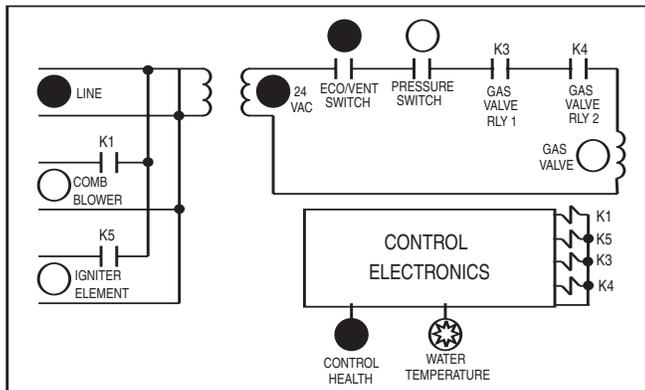
### Pressure Switch LED Flashing

#### POSSIBLE CAUSE

1. Combustion air blockage.
2. Blower not operating:
  - a. Blower wiring
  - b. Blower motor
3. Defective air switch
4. One of the gas valve wires may be disconnected during ignition sequence.
5. Poly hose between the blower and air pressure switch is blocked or disconnected.

#### REMEDY

1. Check intake and exhaust piping for obstructions.
  - 2a. Repair wiring.
  - 2b. Replace blower motor.
3. Replace air switch.
4. Check wires to Gas valve. Reseat wires into harness.
5. Remove or correct blockage connect hose to blower or air pressure switch.



## TEMPERATURE PROBE FAULT

### Water Temp LED Flashing

#### POSSIBLE CAUSE

1. Temp probe wiring open.
2. Defective probe.
3. No water in tank or tank in freezing conditions.
4. Water level in tank is too low - probe in steam.
5. Probe wiring shorted.

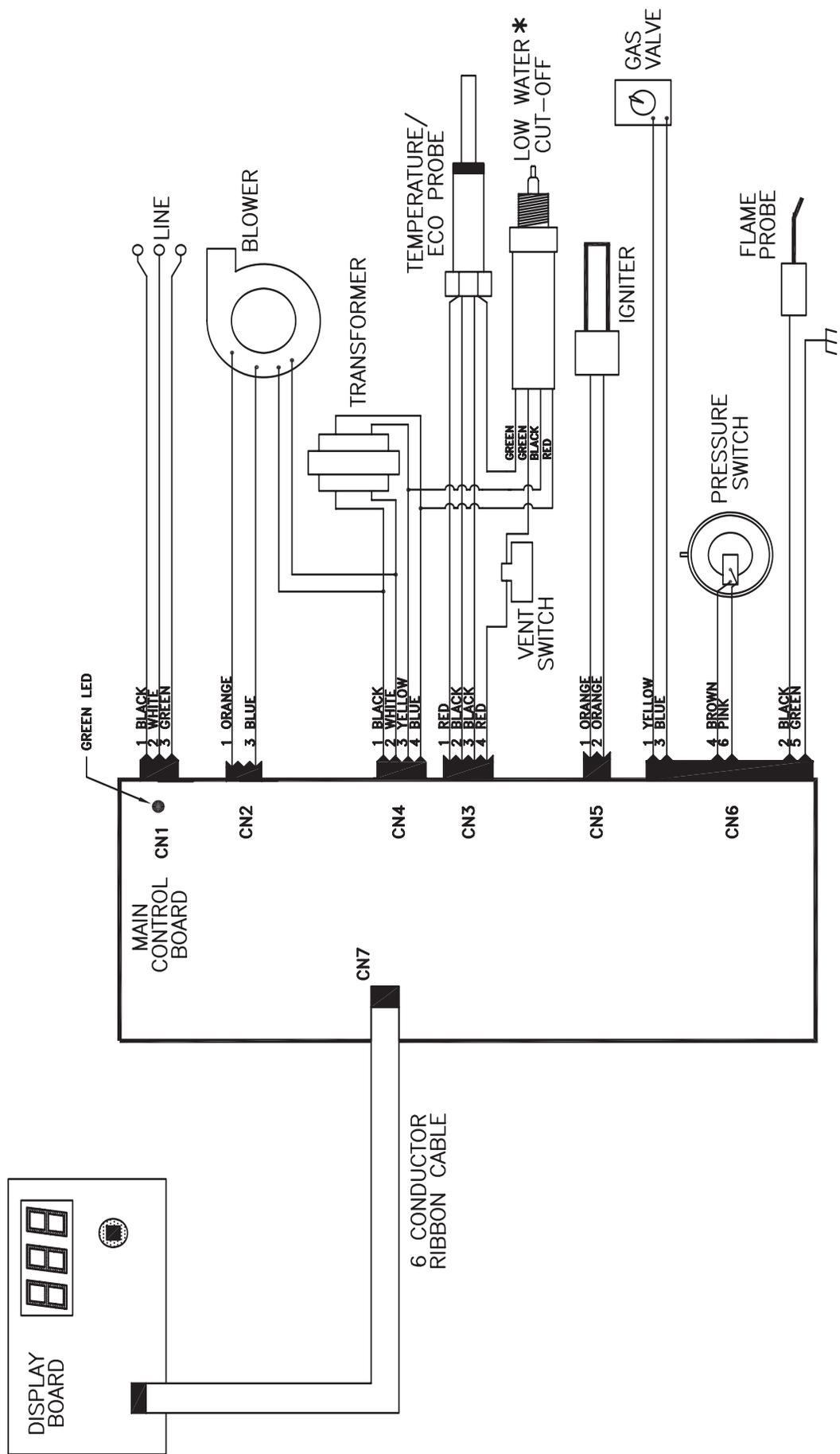
#### REMEDY

1. Repair wiring.
2. Replace probe.
3. Control is recording an "out of bounds" condition. Turn on water supply; remove tank from freezing conditions.
4. Control is recording an "out of bounds" condition. Fill tank.
5. Replace probe.

#### NOTE:

If the temperature probe housing fractures and allows water into the sensor section of the probe, this may affect the temperature display on the display panel. If the display is showing highly inconsistent temperature readings, this is an indication the temperature probe is defective due to water contamination. Replace probe.

# WHC1200 INTEGRATED WATER HEATER CONTROL CONNECTION DIAGRAM



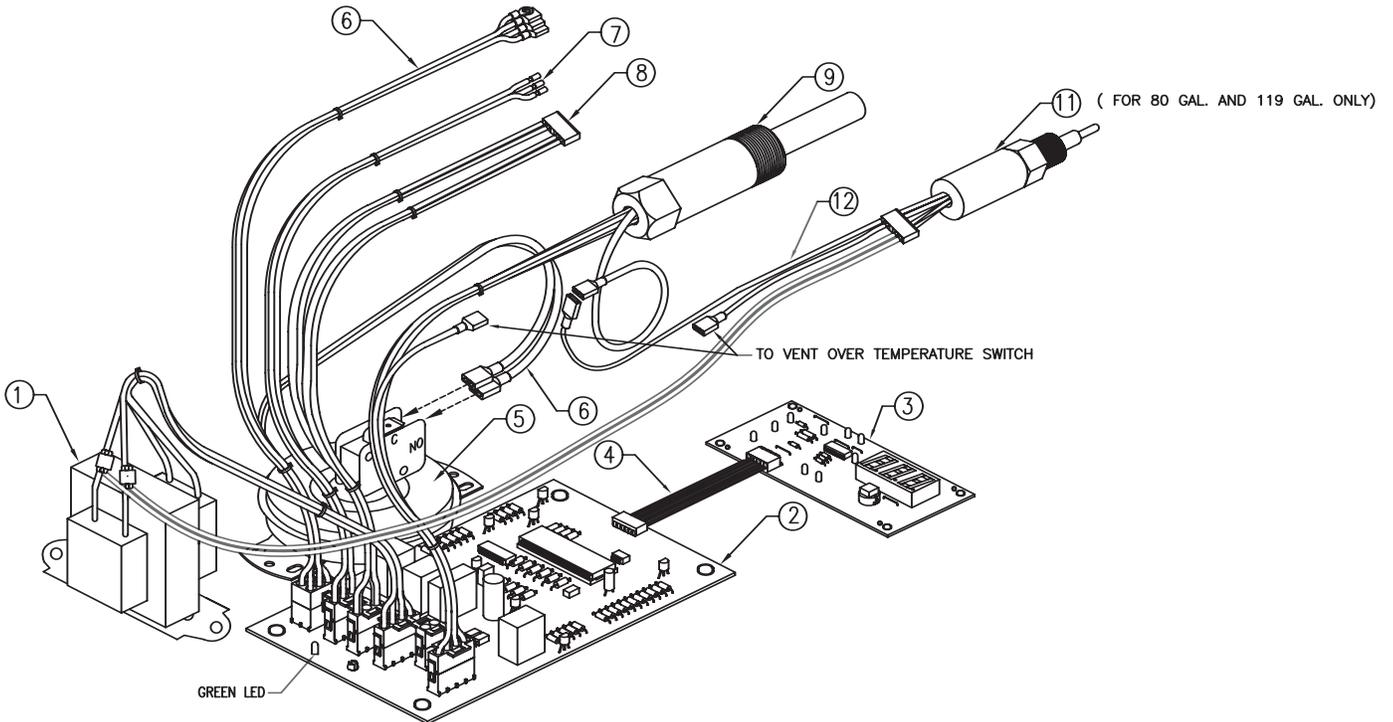
\* LOW WATER CUT-OFF FOR 80 GAL. AND 119 GAL ONLY

# Integrated Water Heater Control

## Parts Identification Drawing

PARTS IDENTIFICATION	
ITEM	DESCRIPTION
1	TRANSFORMER & BLOWER SUPPLY CABLE
2	CONTROL BOARD – MUST SPECIFY MODEL & SERIAL NUMBER WHEN ORDERING
3	DISPLAY BOARD
4	DISPLAY BOARD TO CONTROL BOARD WIRE
5	PRESSURE SWITCH
6	WIRE HARNESS FROM CN6 TO GAS VALVE, FLAME PROBE AND PRESS. SWITCH
7	WIRE HARNESS FROM CN1 TO LINE POWER
8	WIRE HARNESS FROM CN2 TO COMBUSTION BLOWER & TRANSFORMER
9	ECO/TEMPERATURE PROBE (WIRED TO CN3)
*10	PUSH BUTTON SWITCH FOR IGNITOR & FLAME CURRENT
11	LOW WATER CUT-OFF SWITCH ( FOR 80 GAL. AND 119 ONLY)
12	WIRING HARNESS – LOW WATER CUT-OFF ( FOR 80 GAL AND 119 ONLY)

\*NOT SHOWN



# VERY IMPORTANT SET-UP INSTRUCTIONS!

USING A COMBUSTION ANALYZER, THE FOLLOWING RATINGS WILL BE VERY HELPFUL IN SETTING UP

FOR NATURAL GAS - CO2 READING SHOULD BE BETWEEN 9 1/2% & 10 1/2%  
 O2 READING SHOULD BE BETWEEN 3 1/2% & 4 1/2 %  
 CO READING SHOULD BE UNDER 10 PPM

FOR PROPANE GAS - CO2 READING SHOULD BE BETWEEN 10 1/2% & 11 1/2%  
 O2 READING SHOULD BE BETWEEN 3 1/2% & 4 1/2 %  
 CO READING SHOULD BE UNDER 10 PPM

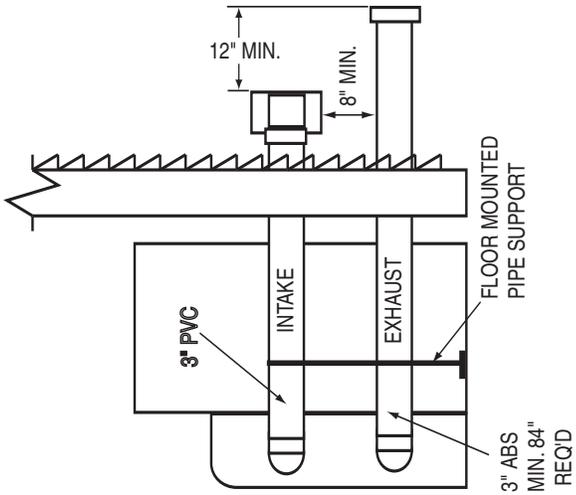


FIGURE 1 - SIDE VENTING  
SIDE VIEW

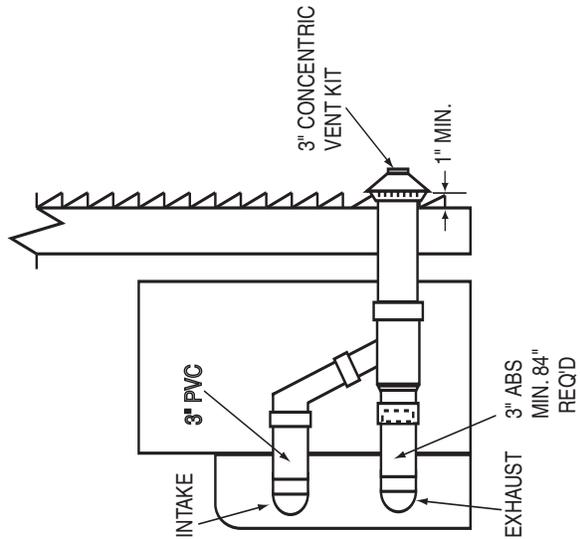


FIGURE 2 - SIDE VENTING  
SIDE VIEW

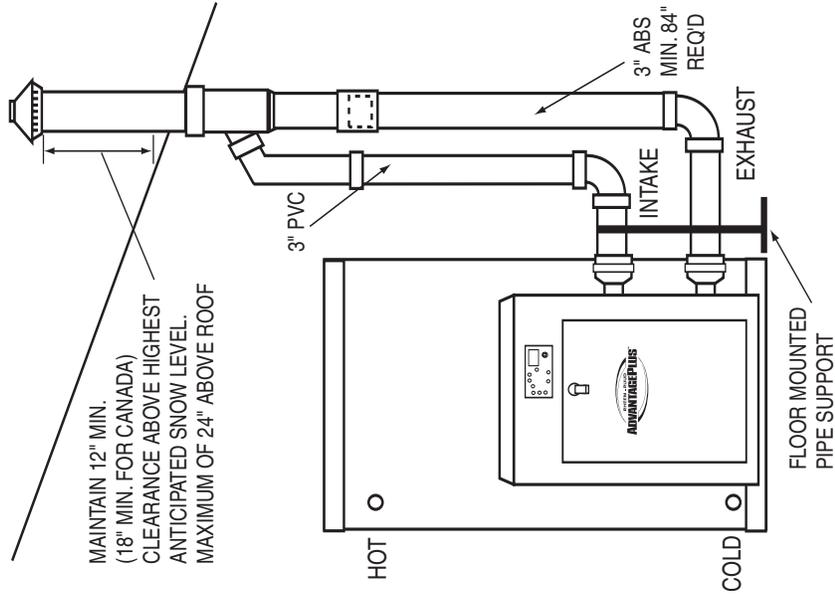


FIGURE 3 - VERTICAL ROOF VENTING  
FRONT VIEW

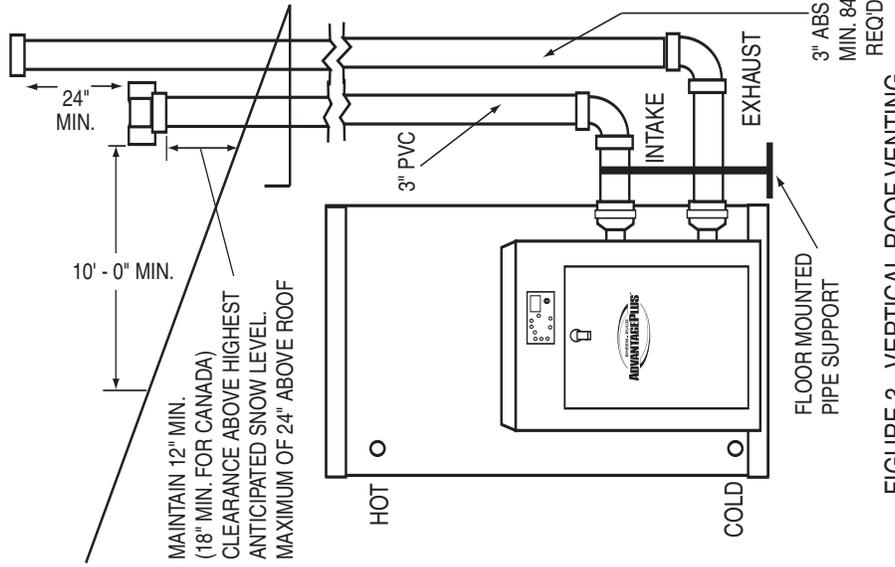


FIGURE 4  
VERTICAL ROOF VENTING W/ CONCENTRIC VENT KIT

# Venting Samples

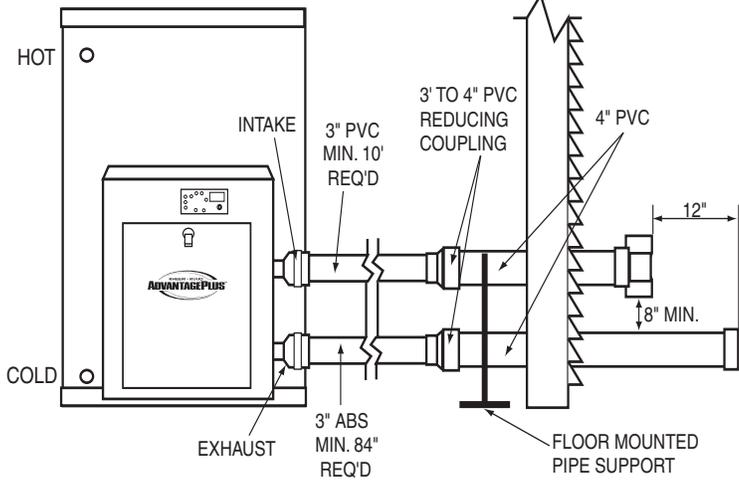


FIGURE 5 - SIDE WALL VENTING  
3" → 4" (SIDE VIEW)

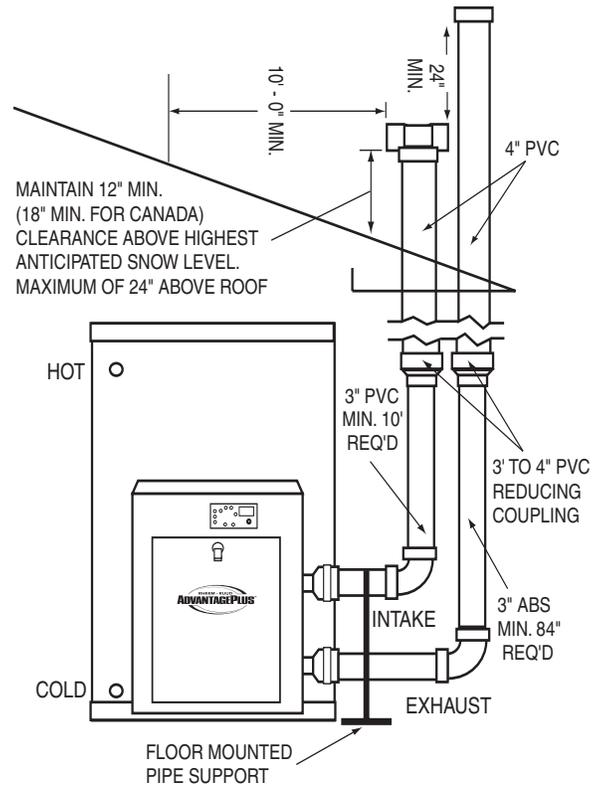


FIGURE 6 - VERTICAL ROOF VENTING  
3" → 4" (FRONT VIEW)

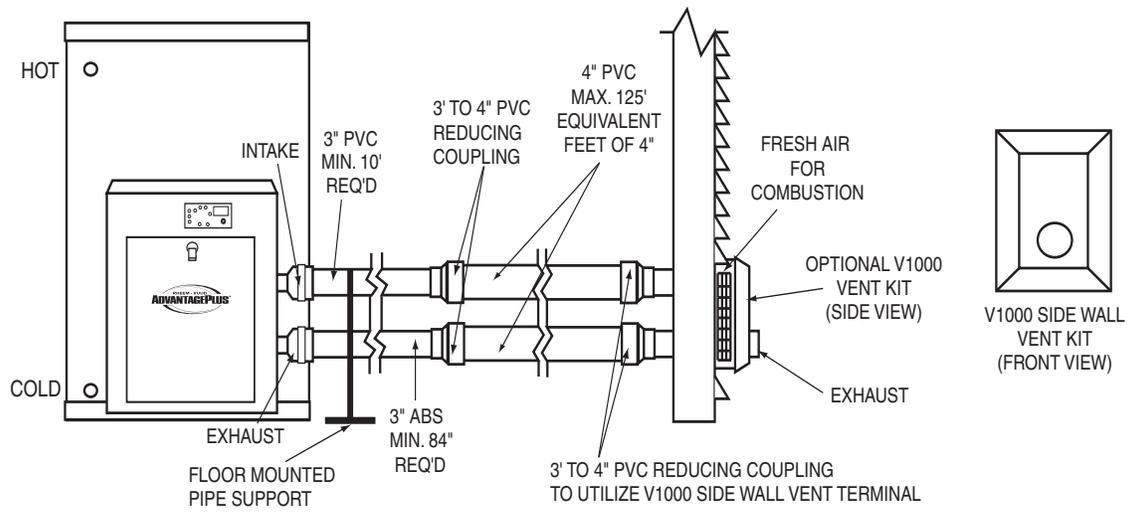
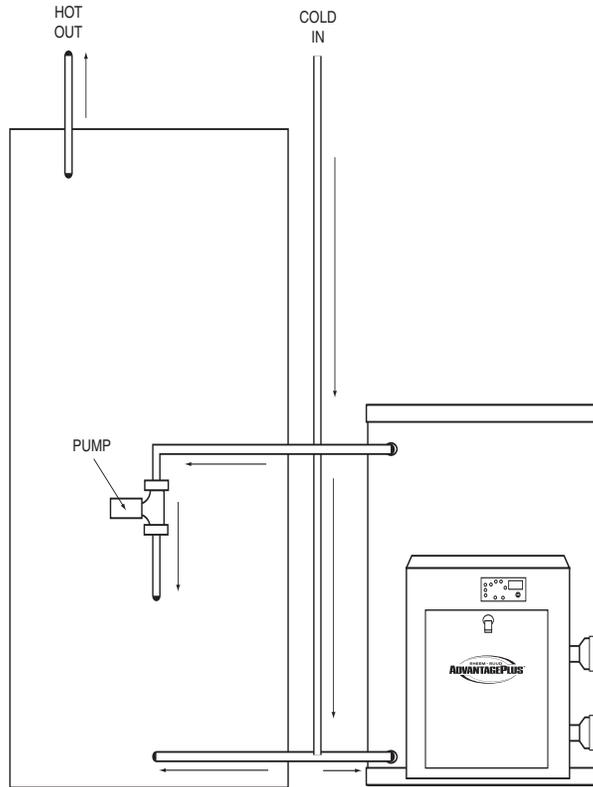


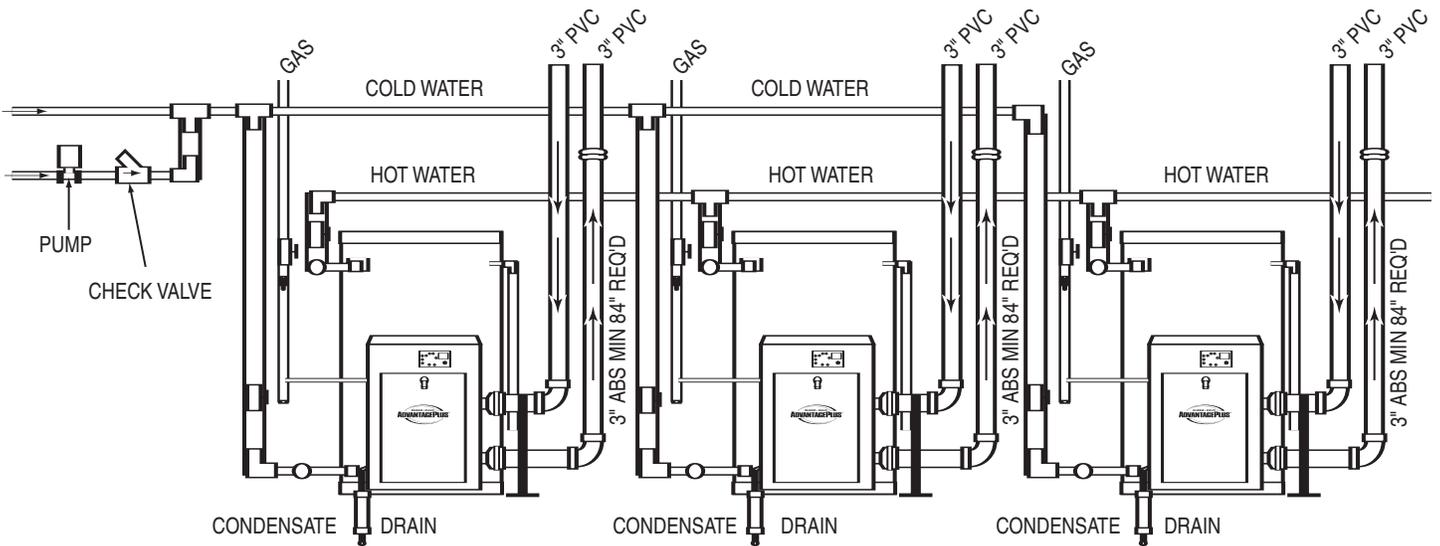
FIGURE 7 - SIDE WALL VENTING USING THE V1000 VENT KIT  
3" → 4" → 3" (SIDE VIEW)\*

\*NOTE: THE ONLY TIME 4" CAN BE REDUCED BACK TO 3" IS WHEN THE V1000 VENT KIT IS UTILIZED.

## AdvantagePlus with Storage Tank



**Sample Reverse Manifold and Piping Diagram for the AdvantagePlus.  
Check Local Codes for specific piping requirements.**



THE INFORMATION CONTAINED IN THIS MANUAL IS FOR GUIDANCE ONLY. THE FACTORY CANNOT BE HELD RESPONSIBLE FOR ANY PROBLEMS ENCOUNTERED WITH INSTALLATION METHODS SHOWN.

**If there is a back flow preventer, or any type of a no return valve in the system, then you must install an additional tee for a suitable potable thermal expansion tank.**

## Sequence of Operations

Action	System Lights (LEDs) Flashing LED indicates a problem		TROUBLESHOOTING
Tank is cold, full of water, gas supply is connected to gas control valve and heater is connected to a 120 VAC circuit. Gas valve is set to the ON position.	None. No power has been applied.	<b>NO</b>	Fill tank Ensure gas connections are present and no leaks Ensure water heater is properly vented
<b>YES</b>			
Turn electric to main power to ON. The control will display "00" which is a diagnostic check; then "120" which is the control voltage; then "08" which means plus or minus setting is 8° (4° above and 4° below) from thermostat setting; then "??" where ?? is the temperature of the water in the tank.	LINE 24 VAC ECO/VENT SWITCH CONTROL HEALTH	<b>NO</b>	See Flashing LED table  Unit is polarity sensitive. Ensure GREEN polarity LED on main control board is on.
<b>YES</b>			
Thermostat calls for heat. Water temperature inside the tank has dropped more than 4° below the thermostat setting.	LINE 24 VAC ECO/VENT SWITCH CONTROL HEALTH WATER TEMPERATURE	<b>NO</b>	See Flashing LED table
<b>YES</b>			
Combustion blower is powered for a 40 second pre-purge cycle.	LINE 24 VAC ECO/VENT SWITCH CONTROL HEALTH WATER TEMPERATURE COMB BLOWER	<b>NO</b>	See Flashing LED table
<b>YES</b>			
Once there is sufficient combustion airflow, the pressure switch activates.	LINE 24 VAC ECO/VENT SWITCH CONTROL HEALTH WATER TEMPERATURE COMB BLOWER PRESSURE SWITCH	<b>NO</b>	See Flashing LED table
<b>YES</b>			
Igniter begins 30 second warm up period.	LINE 24 VAC ECO/VENT SWITCH CONTROL HEALTH WATER TEMPERATURE COMB BLOWER PRESSURE SWITCH IGNITER ELEMENT	<b>NO</b>	See Flashing LED table
<b>YES</b>			

## Sequence of Operations

Action	System Lights (LEDs) Flashing LED indicates a problem	TROUBLESHOOTING
<p>Power is applied to the gas valve. Gas flows into the burner chamber.</p> <p>Igniter remains on for an addition 4 seconds.</p> <p>Burner lights.</p> <p>Presence of flame is rectified.</p>	<p>LINE</p> <p>24 VAC</p> <p>ECO/VENT SWITCH</p> <p>CONTROL HEALTH</p> <p>WATER TEMPERATURE</p> <p>COMB BLOWER</p> <p>PRESSURE SWITCH</p> <p>IGNITER ELEMENT</p> <p>GAS VALVE</p>	<p style="text-align: center;"><b>NO</b></p> <p>See Flashing LED table</p> <p>If flame is not rectified, unit will make 2 more ignition trials. If there is no flame rectification after the third attempt, unit will go into LOCKOUT (flashing "LOC"). Press the red reset button to clear lockout condition.</p> <p>Unit will wait approximately 60 minutes; then clear itself; then make another three attempts for ignition.</p>
<b>YES</b>		
<p>Water is heating.</p> <p>(Notice igniter element LED is OFF.)</p> <p>Verify flame presence through sight window.</p>	<p>LINE</p> <p>24 VAC</p> <p>ECO/VENT SWITCH</p> <p>CONTROL HEALTH</p> <p>WATER TEMPERATURE</p> <p>COMB BLOWER</p> <p>PRESSURE SWITCH</p> <p>GAS VALVE</p>	<p style="text-align: center;"><b>NO</b></p> <p>See Flashing LED table</p>
<b>YES</b>		
<p>Water reaches thermostat setting - plus 4°.</p> <p>Gas valve closes. Burner turns off.</p> <p>Combustion blower runs for an additional 30 seconds to purge the burner chamber of combustion gases.</p>	<p>LINE</p> <p>24 VAC</p> <p>ECO/VENT SWITCH</p> <p>CONTROL HEALTH</p> <p>COMB BLOWER</p> <p>PRESSURE SWITCH</p>	<p style="text-align: center;"><b>NO</b></p> <p>See Flashing LED table</p>
<b>YES</b>		
<p>Water is heated to thermostat setting.</p> <p>Blower motor stops.</p> <p>Heater returns to idle state.</p>	<p>LINE</p> <p>24 VAC</p> <p>ECO/VENT SWITCH</p> <p>CONTROL HEALTH</p>	<p style="text-align: center;"><b>NO</b></p> <p>See Flashing LED table</p>

## Display Board LEDs

### What they mean, controller functions, possible causes and suggested service remedies.

LED Flashing	Controlling Function	Possible Cause	Service Remedy
LINE Does not have 120 VAC	Monitors incoming AC line voltage. ON when line voltage is present.	Check Breaker Wiring disconnected Plugs on module disconnected or loose	Turn breaker ON Check wiring Reseat plugs on control module
24 VAC Does not have 24 VAC	Monitors incoming voltage from the transformer. ON when secondary 24 VAC is present.	Transformer wiring problem Transformer is defective	Repair wiring Replace transformer Reseat plugs on control module
ECO/VENT SWITCH  Water in tank too hot  or  Venting has a problem  or  Water in tank too low	Monitors the ECO switch. ON when ECO switch is closed (normal position).  Monitors water temperature in the tank and exhaust vent temperature.  To diagnose, must determine which function is at fault.	Water temp probe unplugged or damaged Vent temp probe unplugged or damaged Water in tank is too hot (ECO is activated). Check water temp in tank on display board Vent switch overtemp switch is open No or not enough water in tank.	Check connector. Repair wiring  Check connector. Repair wiring  Normal when water gets too hot. Cool tank. Determine cause for over temperature. Check venting for obstructions Check orifices to insure they match fuel type. Press reset button and recheck. Make sure tank is full of water.
PRESSURE SWITCH  Combustion air blockage	Monitors the air pressure switch. ON when the pressure switch is closed. Means there is sufficient combustion airflow.	Combustion air blockage  Blower not operating  Air switch stuck open or closed	Check intake and exhaust piping and flue for obstructions Check and repair blower wiring; replace blower motor Replace air switch
WATER TEMPERATURE Something is wrong with the temperature probe or no or low water in tank	Monitors water temperature inside the tank (Thermostat). ON when the water temp drops below set point (temperature setting).	Temp probe wiring is unplugged Probe open internally Probe wiring shorted Probe shorted internally	Check connector or repair wiring Replace probe Repair short Replace probe
GAS VALVE  Ignition lock out  No flame rectification	Monitors the gas valve output. ON when power is applied to the gas valve  Unit will make three (3) successive trials; then lock out.	Broken or corroded burner ground wire Connectors on controlled panel unplugged Gas valve shut OFF Clogged gas valve Faulty gas valve Defective control Gas valve improperly adjusted	Check wire and connection at burner Check and reseat connections  Turn gas valve ON Replace gas valve Replace gas valve Replace control Adjust gas valve correctly
BLOWER Power to blower	Monitors the blower motor output. ON when power is applied to the blower.	No power to blower Blower is bad	Check for power to blower Repair or replace wiring Replace blower
IGNITOR Power to ignitor	Monitors ignitor element output. ON when power is applied to the ignitor	No power to ignitor Ignitor is bad	Check for power to ignitor Repair or replace wiring Ignitor current draw is too low. See ignitor lockout on page 17 Replace ignitor
CONTROL HEALTH System board OK	Monitors the controllers hardware (circuit boards) and software. ON when controller is functioning OK	System problem on circuit board	Press red reset button. If error occurs repeatedly, replace main control board
GREEN LED ON MAIN CONTROL BOARD Proper ground and polarity	Monitors polarity and ground circuit. ON when ground and polarity are OK. Attempts to fire for 4-6 seconds; then	Polarity is reversed Poor or incomplete ground	Correct polarity Ensure adequate grounding to unit and in electrical circuit

## Trouble Shooting Guide

NATURE OF TROUBLE	POSSIBLE CAUSES	SERVICE
No Hot Water	Manual switch turned off (if equipped) Blown service panel fuse or breaker  See flashing LED light on display board  Improper or loose wiring to control board Electrical polarity is reversed. Green LED on display board is not on. Gas Valve turned "OFF" Low gas pressure causes lockout Not enough gas pressure for demand of system Bad gas regulator before heater or gas regulator is too small for load Bad gas meter or meter too small for load Supply pipe is less than 3/4 inch diameter Gas regulator too close to heater Venting restricted enough to cause lockout	Turn to ON Replace or reset  Rectify problem by diagnosing using the Display Board LED chart Check and tighten Reconnect electrical supply in proper polarity  Turn gas valve "ON" Check gas pressure when unit fires Increase pressure to 7" - 14" w.c. on inlet side of gas valve Replace regulator  Replace meter Replace with 3/4 inch pipe Must be at least 10 feet from heater Check and clear venting pipes and vent termination
Not Enough Hot Water	Thermostat set too low Heater is undersized	Increase thermostat setting Resize and compare
Water Too Hot	Thermostat setting too high	Lower thermostat setting
Slow Hot Water Recovery	Improper gas supply Venting restricted - but not enough to cause lockout	Check gas pressure Check and clear venting pipes and vent termination
Noisy Water Heater  (Includes banging, huffing and puffing)	Puffing on ignition Loud pop on ignition Huff and puff during operations Intermittent huffing and puffing	Adjust gas valve Adjust gas valve Adjust gas valve Check for re-circulation under venting
Excessive Relief Valve Operation	Excessive water pressure (just a little from the T&P)  Excessive water temperature (approx. 2/3 of tank volume is on the floor)	Check for open or closed system. Install thermal expansion tank. Install proper expansion tank on cold side. Check ECO/vent switch LED flashing; lower setting or replace thermostat/ECO probe.
Rusty Water	Excessive iron content Dielectric unions installed	Have water analyzed. Install filter (if necessary). Install non-dielectric unions
Water On Floor Around Unit	Condensate removal system is not working	Check condensate line for blockage Check condensate line is directed to floor drain Condensate pump not working (if equipped) Drain line is "vapor locked". Install a vent in the condensate drain line
Water heater is leaking	Cold in or hot out joints (connections) T&P valve Temperature/ECO probe Inner tank has a pin hole	Check joints and repair Check, tighten and/or replace Check, tighten and/or replace Replace water heater

### HOW TO OBTAIN SERVICE ASSISTANCE

Should you have any questions about your new water heater, or if it requires adjustment, or routine maintenance, it is suggested that you first contact your installer, plumbing contractor or previously agreed upon service agency. In the event that the firm has moved, or is unavailable, refer to the telephone directory commercial listings or local utility for qualified service assistance.

Should your problem not be resolved to your complete satisfaction, you should then contact the Manufacturer's National Service Department at the following address:

RHEEM MANUFACTURING COMPANY  
2600 Gunter Park Drive East  
Montgomery, Alabama 36109-1413

You may also obtain technical assistance by calling 1-800-432-8373.

When contacting the manufacturer, the following information should be made available:

1. Model and serial number of the water heater as shown on the rating plate attached to the jacket of the water heater.
2. Address where the water heater is located and can be seen.
3. Name and address of installer and any service agency who performed service on the water heater.
4. Date of original installation and dates any service work was performed.
5. Details of the problems as you can best describe them.
6. List of people, with dates, who have been contacted regarding your problem.

## **MOST COMMON ADVANTAGEPLUS INSTALLATION CONCERNS**

### VENTING:

VENT LENGTH TOO LONG - OVER 85'  
VENTING NOT PITCHED PROPERLY - CONDENSATE BUILD UP IN VENT  
EXHAUST GAS RE-CIRCULATION - VENT TERMINALS NOT USED, WRONG FITTINGS USED, SIGHT PROBLEMS  
BUSH IN FRONT OF VENT TERMINAL  
INSIDE CORNER OF BUILDING FOR VENT LOCATION  
OVERHANG WITH VENT UNDERNEATH  
COMPOUND ROOF PITCH, OR ABOVE ROOF FIRE WALL  
ADDITIONAL FITTINGS INSTALLED INTO TERMINALS  
VENT SIZED FROM 3" TO 4" BY USING BUSHINGS - INSTEAD OF REDUCING COUPLING OR REDUCING ELBOW  
VENT CHANGED FROM 3" TO 4" - WITHOUT GOING REQUIRED 10' ON BOTH INTAKE AND EXHAUST  
VENTING NOT CLEANED AND GLUED TOGETHER FOR PRESSURE TIGHT JOINTS  
INTAKE AIR CONTAINING EXHAUST FROM ANOTHER VENT OR APPLIANCE

### GAS SUPPLY:

GAS PRESSURE TOO LOW - NEED 7" GAS PRESSURE UP TO 14" GAS PRESSURE  
GAS METER TOO LOW IN CAPACITY  
GAS REGULATOR NOT SIZED PROPERLY - TOO LOW IN CAPACITY  
GAS PIPE TOO SMALL - 3/4" MINIMUM GAS SUPPLY SIZE  
GAS REGULATOR TOO CLOSE TO APPLIANCE - NEED 10' OF PIPE FOR EVERY 200,000 BTU'S PER HOUR  
GAS REGULATOR WITH LONG VENT OR BLEED VENT ORIFICE - REGULATOR SLOW TO RESPOND  
GAS METER RESTRICTION, OR IN NEED OF REPAIR/REPLACEMENT  
GAS SUPPLY PRESSURE DROPS BELOW 3-1/2" WHEN APPLIANCE FIRES

### ELECTRICAL:

APPLIANCE NOT GROUNDED  
ELECTRICAL POLARITY REVERSED - FLAME WILL LIGHT BUT GO BACK OUT IN 4-6 SECONDS VOLTAGE TOO LOW OR TOO HIGH  
APPLIANCE CYCLES, BUT NO IGNITION - LOOK FOR GLOW FROM IGNITOR, IF NOT, REPLACE IGNITOR

### PLUMBING:

DIELECTRIC UNIONS INSTALLED - RUSTY WATER

### CONDENSATE:

CONDENSATE LINE NOT PITCHED TO DRAIN  
CONDENSATE LINE NOT DRAINING DUE TO LONG RUN WITHOUT VENT  
CONDENSATE PUMP NOT WORKING  
CONDENSATE TRAP PLUGGED WITH PVC SHAVINGS

### BURNER:

EXTREMELY LOUD BANG ON IGNITION - BURNER FAILED OR END CAP OFF  
RED BURNER DECK AS SEEN THROUGH VIEW PORT - GAS VALVE NEEDS ADJUSTMENT

### GAS VALVE:

PUFFING ON IGNITION - ADJUST GAS VALVE  
LOUD POP ON IGNITION, THEN RUNNING SMOOTH - ADJUST GAS VALVE  
HUFF AND PUFF DURING OPERATION - ADJUST GAS VALVE  
RUNNING GREAT BUT INTERMITTENTLY HUFFING OR POPPING - CHECK FOR RE-CIRCULATION UNDER VENTING  
IT IS IMPORTANT TO NOTE FOR MAINTENANCE PURPOSES: THE THREAD ON THE END OF THIS GAS VALVE AND NIPPLE IS A LEFT HAND THREAD.

## **SEALING ADVANTAGEPLUS AS PER N.S.F. STANDARD NUMBER 5**

TO SEAL THE BASE OF BOOSTER TO THE FLOOR TO PREVENT SEEPAGE UNDERNEATH, PER N.S.F. STANDARD #5 - APPLY A 3/8" BEAD OF RTV SILICONE (AS SHOWN HERE), COMPLETELY AROUND TANK.

