

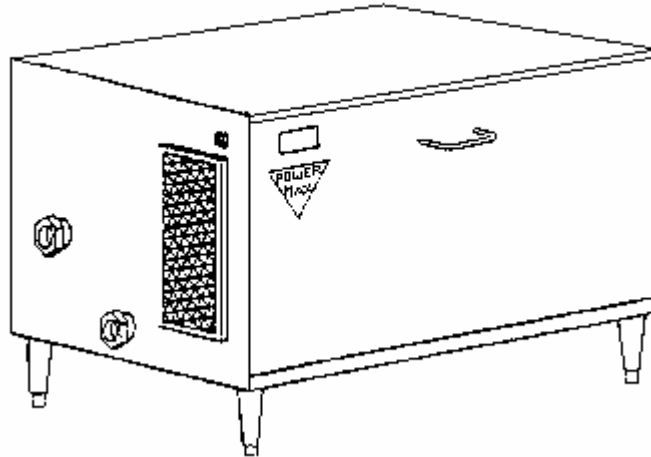
# INSTALLATION & OPERATION MANUAL

DO NOT DISCARD THIS MANUAL!

**POWERMAX™**

GAS INFRA-RED WATER BOOSTER HEATERS

Model PM200 and PM400



## IMPORTANT FOR YOUR SAFETY

**WARNING:** IF THESE INSTRUCTIONS ARE NOT FOLLOWED EXACTLY, FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

-Do not store or use gasoline or any other flammable liquids or vapors in the vicinity of this or any other appliance.

### -WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electrical switch
- Do not use any phone in the area
- Immediately call your gas supplier from another location.
- Follow gas suppliers instructions
- If you cannot reach the gas supplier, call the local fire dept. or 911

-If overheating should occur or the automatic gas valve fails to operate properly, turn off the manual gas valve on the gas supply piping to the appliance.

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

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Tested to: ANSI Z21.10.3 1998  
CAN/CGA 1-4.3 M98  
NSF Std. 5, 1992

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## **GENERAL INFORMATION**

The POWERMAX™ gas fired, infra-red water booster heater provides 180 degree sanitizing rinse water for commercial dishwashing machines. Dishware and utensils used in the preparation and serving of food are required by Health Codes and the National Sanitation Foundation (NSF) to be sanitized by hot (min. 180 degrees Fahrenheit) water or a chemical sanitizing solution to destroy bacteria and parasitical organisms. The POWERMAX™ booster heater operates as a semi-instantaneous water heater. As 180 degree rinse water is drawn from the unit, incoming supply water flow activates the burner and pump to circulate the water through a high efficiency finned copper coil heat exchanger. Heat is provided by an advanced infra-red ceramic fabric power burner which heats and maintains a constant supply of 180 degree rinse water. When the dishwasher is not in use, the POWERMAX™ continues operating for a few minutes before going into a stand-by mode, operating only as needed to maintain a small (approx. 4.5 gallon) reservoir of 180 degree water for the next dishwashing rinse demand.

## **INSTALLATION CODES**

Installation must be performed in accordance with state and local codes, or, in the absence of local codes, with the following: National Fuel Code, ANSI Z223.1 (latest edition) the National Electric Code (NEC) ANSI/NFPA 70 (latest edition). Canada: CAN/CGA B149.1, CAN/CGA B149.2 and CSA C22.2 No. 1 (latest edition).

## **UNPACKING**

Immediately after unpacking, check thoroughly for any possible shipping damage. If the POWERMAX™ is found to be damaged, contact the carrier immediately (15 days maximum). Be sure to save all the packaging materials for shipper's inspection.

## **LOCATING THE POWERMAX™ BOOSTER HEATER**

Locate the POWERMAX™ so that all required clearances are maintained. The appliance must be located in an area that is clear and free from combustible materials, including gasoline and other flammable or corrosive liquids and vapors. The booster heater should not be located in an area where water leakage could cause damage to adjacent areas or areas below the unit. If this is not possible, the booster heater should be installed in an adequate catch pan (preferably stainless steel) that is properly drained. If appliance is installed on carpeting, it must be installed on a wood or metal panel extending beyond the full width and depth of the appliance by at least 3 inches (76.2mm) in each direction. The booster heater should be installed with no more than five feet of pipe between the 180-degree outlet and the dishwasher rinse valve (as specified by NSF-5). If the piping exceeds five feet, the optional circulation return kit must be installed to maintain proper temperature at the dishwasher rinse valve. The POWERMAX™ may be installed up to 150 feet from the dishwasher when using the circulation kit. Call factory for details.

## **INSTALLATION CLEARANCES**

Minimum clearances from combustible or non-combustible construction - 8" (fire 2", service 8") Left side, 2" Right side, 6" Back, 0" Top, 24" Front (minimum for service). The four 6" adjustable legs allow the unit to be leveled on uneven floors by screwing the feet up or down as needed.

## COMBUSTION AIR / VENTILATION

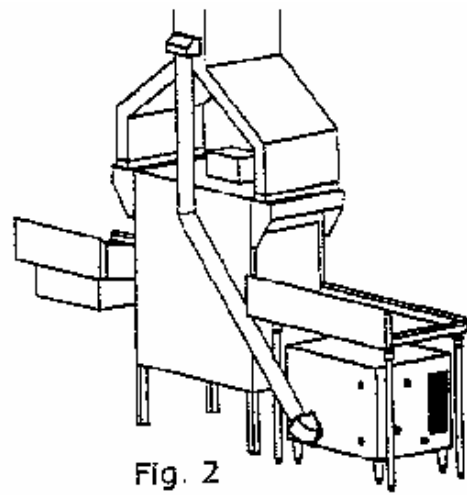
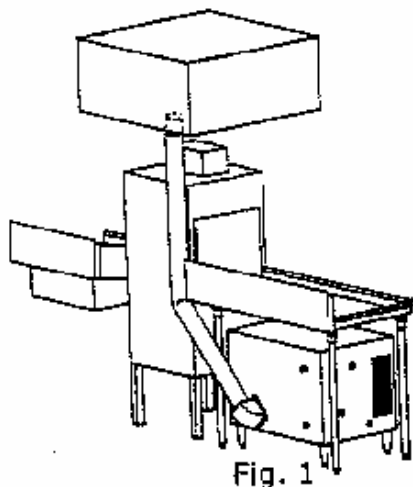
The POWERMAX™ must be provided with an adequate supply of air for proper combustion and ventilation as required by the National Fuel Gas Code, ANSI Z 223.1 or any local codes that supercede the National Code. Do not obstruct the combustion and/or ventilation air supply openings.

**CAUTION:** Combustion air must not be contaminated by corrosive vapors or fumes, i.e. salt, chlorine, refrigerant gases, detergents, paints, cleaners, etc.. Any damage caused by insufficient or contaminated combustion air or improper venting will not be covered under the warranty.

## EXHAUST VENTING

The POWERMAX™ Booster Heater is classified as a category IV appliance (positive flue pressure, flue gas temperature of approximately 190 degrees Fahrenheit, possible condensate). Vent piping must be one of the types detailed in this manual or a factory approved (in writing) alternate and must be installed according to the vent pipe manufacturers instructions. All joints must be properly sealed and secured to maintain joint integrity. All vent piping must slope toward the appliance a minimum of 1/4 inch per foot of length. The National Fuel Gas Code, ANSI Z223.1 requires that the booster heater be vented in one of the following three ways:

1. Into the dishwasher exhaust system. (See fig.1). The vent pipe must not penetrate any grease filter, but should terminate within the hood "capture zone". In cases of a "pantleg" type of vent (see fig. 2), the vent pipe may terminate below an approved 'eyebrow' penetration of the duct. When vented into the dishwasher exhaust system, an electrical interlock must be provided (by others) to prevent the appliance from firing if the exhaust system is not providing sufficient draft for any reason.



2. Through the ceiling/roof (see fig.3) or through a sidewall (see fig. 4). Type B-1 vent pipe (inch min. diameter) may be used when venting vertically through the roof, provided a one inch minimum clearance to combustible material is maintained throughout and the vent terminates into a listed wind cap above the roof.

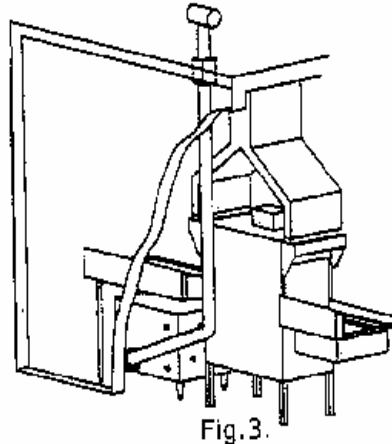


Fig.3.

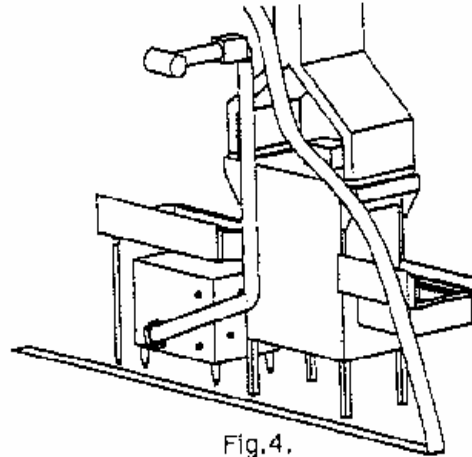


Fig.4.

3. Vented freely into the room or space where it is installed, provided that:
  - a) A Mechanical exhaust system is present in the space where the booster heater is installed.
  - b) An electrical interlock is provided (by others) so that the booster will not fire if the exhaust system is not providing adequate ventilation to the area.
  - c) The total BTU input rating of all the unvented gas appliances installed divided by the total cubic foot volume of the room area (including any adjacent areas that cannot be physically closed off from the installation area) does not exceed 20 BTU's per hour per cubic foot of space.

For **sidewall** venting, the booster heater should be located as close as possible to the wall being used. The minimum and maximum wall thickness is determined by the wall thimble available from the vent manufacturer. Refer to the vent manufacturer's installation instructions.

All horizontal runs of vent pipe must have a minimum rise of 1/4 inch per foot of length and must be supported every 5 feet or less (3 feet in Canada) and at every elbow.

For **horizontal** venting: The total length of approved 4 inch diameter vent pipe can be a maximum of 40 feet, including two 90 degree elbows and one termination vent. For each elbow above two, reduce the total allowable vent length by ten feet. Minimum horizontal vent length is 2 feet.

For **vertical** venting: The maximum length of approved 4 inch diameter vent pipe is the same as above; the same requirements for elbows and termination vent apply; the minimum length for vertical venting is 5 feet. An auxiliary power vent kit is available for installations where the vent length must exceed these lengths. Call the factory for assistance. Additional requirements when venting through a **sidewall**:

-The vent terminal shall be located at least three feet **above** any forced air inlet located within ten feet; at least four feet below **and** four feet horizontally from, or one foot above

any door, opening window or gravity air inlet into any building. It shall also have a minimum horizontal clearance of four feet from any electric meter, gas meter, regulator, relief valve or other equipment.

-The vent terminal shall be located not less than seven feet above grade when it is adjacent to public walkways.

-The bottom of the vent terminal shall be located at least twelve inches above grade or ground or the normally expected snow accumulation level.

The snow level may be higher on walls exposed to prevailing winds.

-Avoid areas where local experience indicates that condensate drippage may cause problems, such as above planters, patios, public walkways or areas where condensate or vapor could cause a nuisance or hazard, or where its discharge could be detrimental to the operation of regulators, relief valves or other equipment.

**Examples of ACCEPTABLE VENT PIPING/ See Appendix A**

MANUFACTURER	MODEL	MATERIAL SPECIFICATION	Part Name	3" Part Number	4" Part Number
Heat-Fab Inc. 38 Haywood St. Greenfield, MA 01301	Saf-T-Vent	AL 29-4C Stainless Steel	Tee Rain Cap Mitre / Straight	7390TEE 5300C1 7390GC	7490TEE 5400C1 -
Z-Flex US, Inc. 20 Commerce Park North Bedford, NH 03110	Z-Vent	AL 29-4C Stainless Steel	Tee Rain Cap Termination Box	#02SVSTTX-3 #02VRSRCX03 #02SVSRTX-3	#02SVSTTX-4 #02VRSRCX04 #02SVSRTX-4
Flex-L International, Inc. 6385 Kennedy Rd Mississauga, ON L5T2W4	StaR-34	AL 29-4C Stainless Steel	Termination Tee Wall Thimble	SRTT03 SRWT153	SRTT04 SRWT154

**GAS PIPING**

The gas inlet pipe size is 3/4 inch NPT, male thread, located at the lower right front corner of the appliance. The gas supply piping must be sized to adequately provide the input BTU/hr rate for the appliance at the specified flowing pressure (see table 1). The maximum inlet gas pressure must not exceed the maximum value shown in table 1. The minimum gas pressure shown in Table 1 is for purposes of input adjustment.

**FLOWING Gas Pressure Requirement (not static)**

Inches W.C. (Water Column)			
Natural Gas/LP	Incoming Line Pressure		Manifold Pressure
	Minimum	Maximum	
<b>PM200</b>	<b>4.5"NG/10"LP</b>	<b>10.5"NG/14"LP</b>	<b>3.5"NG/7.5"LP</b>
<b>PM400</b>	<b>4.5"NG/10"LP</b>	<b>10.5"NG/14"LP</b>	<b>3.5"NG/7.5"LP</b>

TABLE 1

The gas valve is provided with a pressure tap to measure gas pressure downstream, which is also the manifold pressure (fig. 5.). The gas piping must have a sediment trap ahead of the heater gas controls and an approved manual shut-off valve (provided by others) located outside the jacket and easily accessible. The heater and its gas connections must be leak tested before placing the appliance in operation. DO NOT use an open flame for leak testing. The heater must be *isolated* from the gas supply piping by closing its individual manual shut-off valve during any pressure testing of the gas supply piping at test pressures equal to or less than **1/2 p.s.i.g.** (3.5 kPa). The heater and its individual shut-off valve must be disconnected from the gas supply during any pressure testing of that system at test pressures in excess of **1/2 p.s.i.g.** (3.5 kPa). Dissipate test pressure from the gas supply line *before* re-connecting the heater and its manual shut-off valve to the gas supply line.

**CAUTION: Failure to follow this procedure may damage the gas valve and cause a dangerous condition. Over pressured gas valve damage is not covered under warranty.**

NOTE: Do not use Teflon™ tape on gas line threads. Use only a flexible thread sealant approved for use with fuel gases.

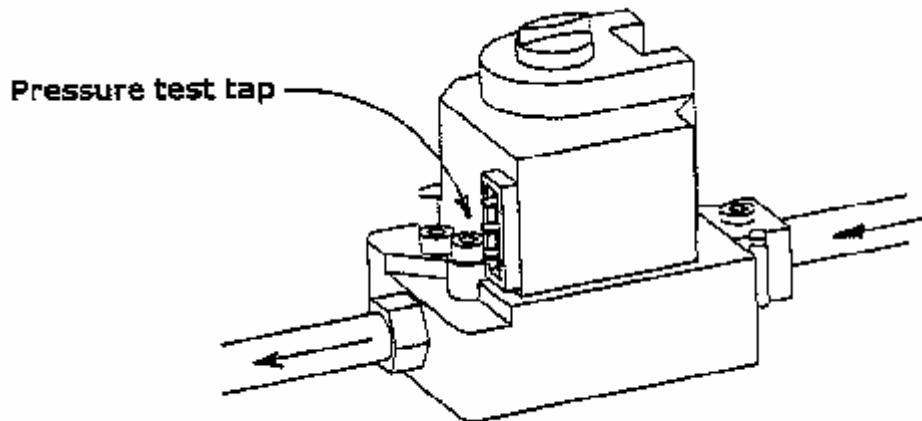


Figure 5.

## WATER REQUIREMENTS

Local water conditions vary greatly between even near-by locations and can greatly affect the performance and maintenance requirements of warewashing equipment, including your booster heater. Proper water conditions will provide lower chemical costs, improved cleaning performance, reduced spotting and longer equipment life as well as more efficient labor use and reduced damage to dishware and utensils. Proper water treatment for effective and efficient performance of this equipment will vary depending upon the make-up of the local water supply.



Recommended water hardness is 4-6 grains of hardness per gallon. Chlorides must NOT exceed 50 parts per million. Water hardness above 6 grains per gallon should be treated with a proper water conditioner (water softener or in-line treatment). Water hardness below 4 grains per gallon also requires water treatment to reduce its corrosive effects. Sediment, silica, chlorides or other dissolved solids may require particulate filtration or reverse osmosis treatment. Proper water treatment has been shown to reduce machine cleaning, mineral build-up, detergent usage and corrosion of metal surfaces in booster heaters and dishwashers.

**Damage caused by water conditions is not covered under warranty.**

## WATER PIPING

**WARNING: All piping and plumbing connections must comply with applicable sanitary, safety and plumbing codes.**

**CAUTION: All piping and any components connected to this appliance for the purpose of space heating shall be suitable for use with potable water. Toxic chemicals, such as used for boiler treatment, shall not be introduced into the potable water used for space heating. This appliance, when used to supply potable water, shall not be connected to any heating system or component(s) previously used with a non-potable water heating appliance or system.**

The inlet and outlet water connections are 1 inch NPT (inlet is 1" female pipe, outlet is 1" male pipe). An inlet and outlet union adaptor is provided with your POWERMAX™ Booster Heater.

The inlet water supplied to the booster heater should be a minimum of 110-degrees Fahrenheit, except in the case of single rack, door type dishwashers and some "water-saver" conveyor machines, in which case incoming water can be as low as 45 degrees Fahrenheit. DO NOT connect the POWERMAX™ Booster Heater to a cold water supply pipe if it is to be used with a full flow conveyor dishwasher.

Recommended flowing water pressure to the booster heater is 45 p.s.i. Flowing water pressure at the dishwasher rinse valve should be 20 p.s.i. An optional pressure regulating valve and pressure gauge for the booster heater outlet is available from Vanguard Technology if the dishwasher is not equipped with these items. The supply water inlet to the booster heater does not require a pressure-regulating valve unless the supply water pressure exceeds 50 p.s.i. A full-flow shut off valve must be provided in the water supply piping to the booster heater. Installation of a suitable water hammer arrester is recommended between the booster heater and the dishwasher rinse valve.

A drain valve assembly is provided for installation on the lower outlet at the back of the booster heater.

The Temperature and Pressure Relief valve is installed at the left side of the booster heater. Install a suitable 3/4" i.d. drainpipe from the discharge of the Temperature and Pressure Relief valve to a suitable drain or catch pan with drain. The Temperature and Pressure Relief valve should be manually test-operated at least once annually to ensure that it is functioning properly. Be careful when operating the relief valve.

Follow instructions on the tag located on the Temperature and Pressure Relief valve to avoid contact with hot water discharge and to prevent water damage from operation of the valve.

Repair or alteration of the Temperature and Pressure Relief valve in any way is prohibited by National Safety Standards and local codes. **DO NOT PLUG THE RELIEF VALVE OR INSTALL A SHUT OFF VALVE OR ANY OTHER RESTRICTION IN THE DISCHARGE DRAIN LINE!** The booster heater should be located as close to the dishwasher rinse valve as possible. If the booster heater is installed more than 5 feet from the dishwasher rinse valve, an optional rinse water re-circulation kit is available from Vanguard Technology and must be used to insure a consistent water temperature of 180-degrees at the rinse valve (Fig.6.).

**NOTE: All water supply piping to the booster heater must be completely flushed of all debris and flux residue before connection to the booster heater. Damage caused by debris or aggressive flux residue will not be covered under warranty**

If booster heater is installed in a closed water supply system, such as one having a backflow preventer in the water supply line, means shall be provided to control thermal expansion. Contact the water supplier or local plumbing inspector on how to control this situation or call the factory.

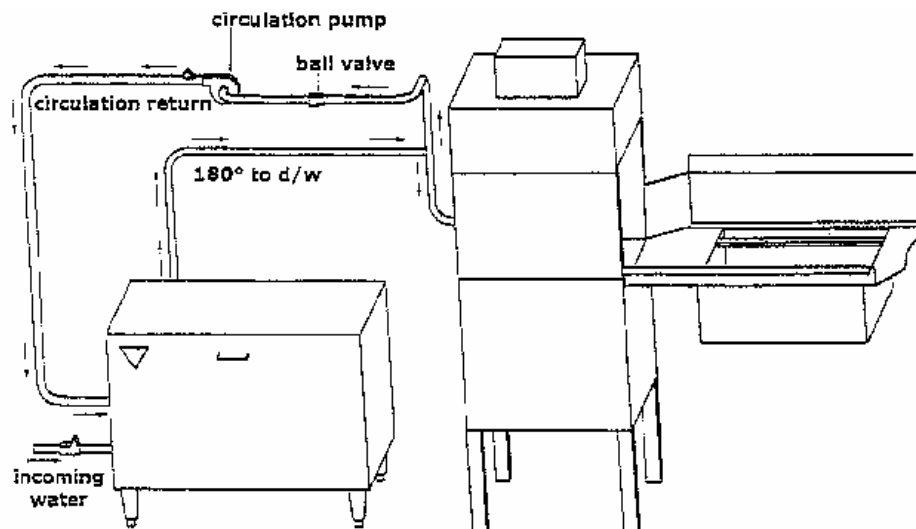


Fig. 6

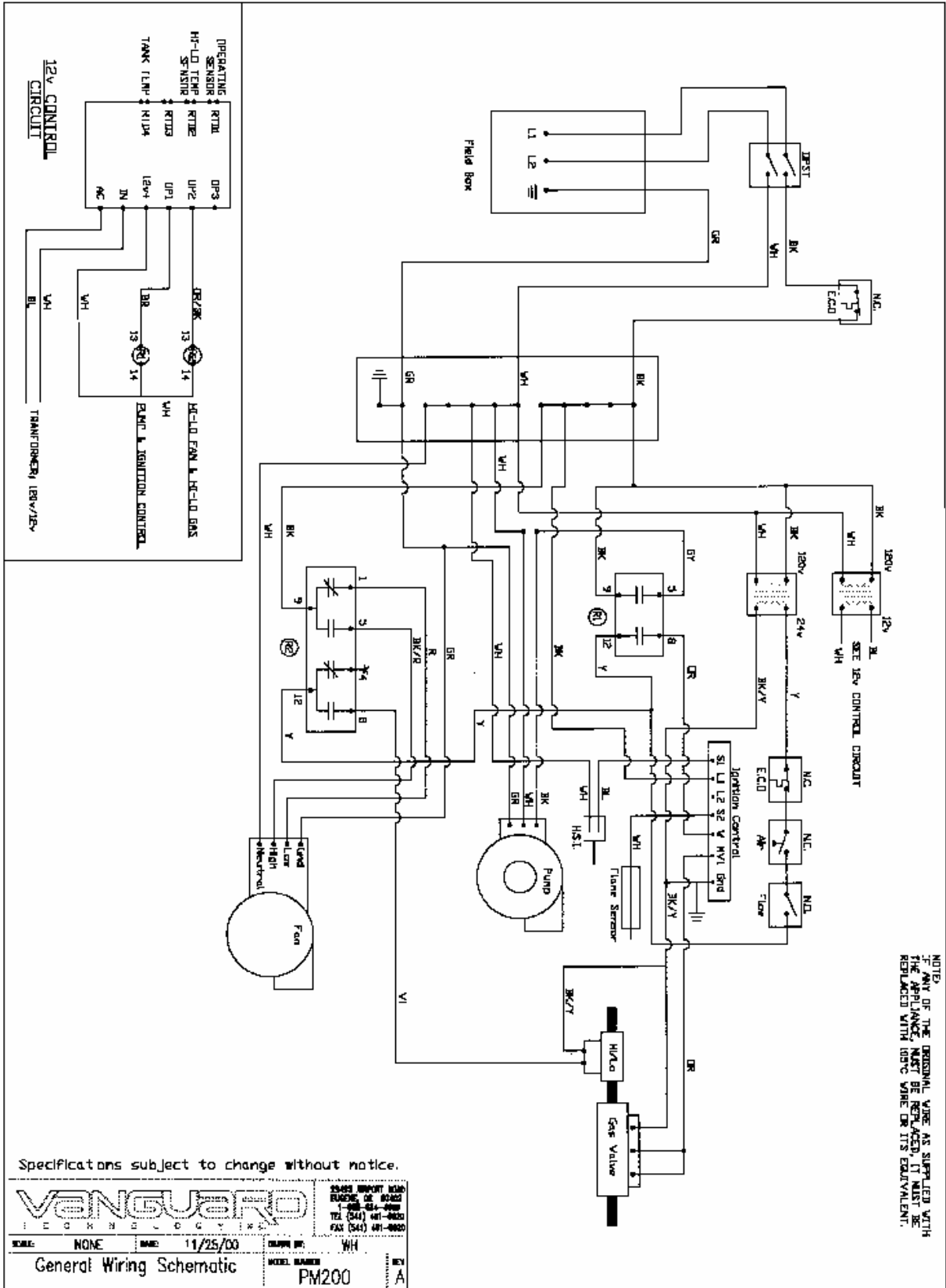
## ELECTRICAL

The electrical power supply requirement for the booster heater is 120 volts, AC, 60Hz, 6.0 amps or less. Field wiring connections and electrical grounding must comply with local codes, or, in the absence of local codes, with the latest edition of the National Electric Code (NEC), ANSI/NFPA 70. NOTE: Polarity must be observed for the booster heater to operate properly. Consult wiring diagram. Provide a separate fused circuit from the main electrical panel to the booster heater and a means of disconnecting within sight of the heater. Electrical connection is made from the bottom left front of the unit and into the 2"X4" field wiring connection box. All internal electrical components are factory wired and operate with the heater control system. NOTE: If it is necessary to replace any of the original wiring, it must be replaced with 105 degree centigrade rated wire or its equivalent.

**CAUTION:** DO NOT TURN THE POWER SWITCH ON UNTIL THE BOOSTER HEATER HAS BEEN FILLED WITH WATER AND ALL AIR HAS BEEN PURGED FROM HEAT EXCHANGER AND THE ACCUMULATOR TANK.

If an auxiliary power vent is installed, or in certain cases, if the booster heater is vented through the dishwasher exhaust system, an airflow-proving switch must be installed in the duct system to interrupt power to the booster heater and prevent its operation without sufficient draft. The airflow-proving switch is provided by others. If the optional circulation kit (for remote booster installation) is used, it is wired separately from the booster heater through the provided lighted switch box.

**CAUTION:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.





## OPERATING SEQUENCE

The booster heater is designed to produce 180-190 degree sanitizing rinse water for commercial dishwashing machines. Specific performance depends upon the exact water flow and supply water temperature. (See table)

### PowerMax200™ Performance Data

Temperature rise	Gallons per Minute	Gallons per Hour
40° F	8.7	520
50° F	7.0	420
60° F	5.8	348
70° F	5.0	300
140° F	2.5 (7.5 for 15 sec. Per minute)	150

After the necessary power, water, gas and vent connections are completed correctly and all air is purged from gas and water piping, the unit is started by turning on the power switch located on the top, front of the left side panel. The combustion air fan will start and run continuously and the digital temperature display will light, showing the water temperature in the accumulator tank. If the tank temperature sensor detects water temperature below the set point, it will turn on the internal circulating pump, prove water flow, combustion air flow and hi-limit compliance and activate the hot surface igniter. Following a 3 second warm up for the igniter, the gas valve opens and the burner ignites. If the burner flame is not proved within a few seconds, the gas valve automatically closes. This cycle will repeat 3 times. If ignition/flame is not proved the control will go into automatic lock-out, requiring a re-set. Re-set is accomplished by turning power switch to 'off' for 10 seconds and then turning back on. When the tank water temperature exceeds the thermostat set point, the burner will shut off until the next call for heat.

The internal circulating pump will operate whenever the thermostat is calling for heat. The combustion air blower operates continuously whenever the 'on-off' switch is on.

The operating temperature control is factory-set and is not to be user-adjusted. If temperature rise is not satisfactory, call your service agency and/or call the factory.

## POWERMAX<sup>tm</sup> START-UP PROCEDURE

**For your safety, read completely before operating.**

**CAUTION:** DO NOT turn Power Switch 'on' until the booster has been filled with water and all air has been purged from the water lines and accumulator tank.

### FILL THE BOOSTER HEATER

Open the water supply valve at the Booster Heater water supply inlet and fill Booster Heater. Manually open the temperature/pressure relief valve on the left side of the cabinet to vent air from water piping. Cycle dishwasher to ensure that all air is purged from the system and to flush out any contaminants left from piping process.

### CHECK ELECTRIC CONTROLS

Do this procedure with the manual gas valve CLOSED (gas supply off). With water supply valve open (water side under pressure) and with manual gas supply valve in CLOSED position (no gas flow to unit), push power supply rocker switch on left, top side of cabinet to ON position. Combustion air fan should start, digital temperature readout should illuminate and indicate water temperature in accumulator tank and LED indicators in readout panel should illuminate. If water temperature is below control set point, circulating pump will start, air flow, water flow and hi-limit E.C.O.'s will prove and ignition system will be powered. Red LED on ignition control will illuminate briefly, confirming internal self-check. Following 2-3 seconds igniter warm-up (observe igniter through viewing window to verify), an audible 'click' will be heard from the gas valve opening. With gas supply off, ignition will not occur and flame-proving sensor will shut off gas valve. This process will repeat for, 3 cycles, after which the ignition system will automatically lock-out, requiring a manual re-set. The combustion fan will remain on low speed, providing a continuous purge of the combustion chamber. Manual re-set is accomplished by turning off power switch on booster left side panel for 10 seconds, then turning back on.

FOR YOUR SAFETY, READ BEFORE OPERATING

**WARNING! - IF YOU DON'T FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

- A. This appliance DOES NOT have a standing pilot ignition system. It is equipped with a hot *surface* ignition device that automatically lights the burner. DO NOT attempt to light the burner by hand.
- B. Before starting the appliance, smell all around the appliance area for gas odor. Be sure to smell next to the floor because some gases are heavier than air and will collect on the floor.



WHAT TO DO IF YOU SMELL GAS

- DO NOT try to light any appliance.
- DO NOT touch any electric 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 and/or '911'.


- C. Use only your hand to push in and turn the gas control knob. NEVER use tools. If the knob will not turn by hand, do not try to repair it. Call a qualified service technician. Using force or attempting to repair may result in a fire or explosion.
- D. Do not operate this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and replace any part of the control system and any gas control that has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Turn off electrical power to appliance at switch on upper left side panel.
3. Remove front access panel by lifting on handle until bottom of panel is released, tilt bottom of panel away from unit and remove.
4. This appliance is equipped with an ignition device which automatically lights the burner(s). DO NOT try to light the burner(s) by hand.
5. Turn the gas control knob  clockwise to the 'OFF' position. (Fig. 7)
6. Wait 5 minutes to clear out any gas. If you smell gas, stop and follow the instructions under "WHAT TO DO IF YOU SMELL GAS" (ABOVE). If you do not smell gas, proceed to the next step.
7. Turn gas control knob counterclockwise  to the 'ON' position.
8. Turn on electrical power to the appliance. Be careful not to contact any live electrical connections when access panel is open.
9. If appliance does not ignite, there may be air in the gas supply system. Repeat the cycle several times to remove air.
10. If the appliance will not operate, follow the instructions under "TURN OFF GAS TO APPLIANCE" (following) and call your service technician or gas supplier.
11. Replace front access panel.



## **TO TURN OFF GAS TO APPLIANCE**

1. Turn off all electric power to the booster heater if service is to be performed.
2. Turn off manual gas valve in gas supply piping.
3. Remove front access panel by lifting panel to release bottom, tilting panel away from unit and removing panel.
4. Push in and turn gas control knob clockwise  to the 'OFF' position.
5. Replace front access panel.

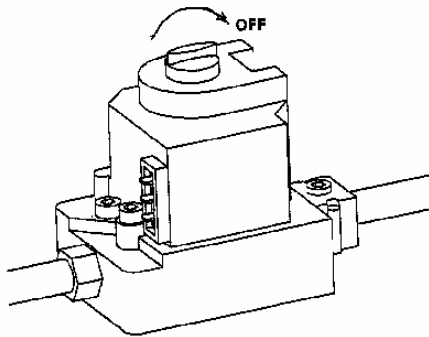


Fig. 7

### **WARNING!**

IF OVERHEATING OCCURS OR THE GAS SUPPLY FAILS TO SHUT OFF CORRECTLY, DO NOT TURN OFF OR DISCONNECT ELECTRIC SUPPLY TO THE PUMP. SHUT OFF GAS SUPPLY AT THE MANUAL GAS VALVE IN GAS SUPPLY PIPING. IF WATER IS LEAKING FROM UNIT, AFTER TURNING OFF GAS, LET BURNER COOL, THEN TURN OFF POWER AND SHUT OFF WATER SUPPLY VALVE.

## **MAINTENANCE**

### Lubrication

The water pump motor and the combustion air blower are permanently lubricated and require no periodic maintenance. Auxiliary power vent motor (depending upon model) may or may not need periodic adjustment or lubrication. Consult power vent manual.

### Vent System

Check the vent system annually for damage and/or obstruction. Any deformation of the vent system should be examined carefully to determine the cause of the deformation. The problem **MUST** be rectified and any damage to the vent system **MUST** be repaired.

### Check Burner Flame Condition

When the burner is operating properly, the flame will appear to have a light orange base with a blue tint as you look through the burner observation window and across the burner surface (fig.8 ). Inspect the burner periodically through the observation window. If areas of the burner appear different or if the observation window is obscured, contact your authorized service agency to have the burner inspected for proper operation. If the burner is burning bright orange, red or white; it is too hot and will burn up igniters at an excessive rate. Call factory and/or authorized service company to adjust air shutter.

### Piping and General Condition

Periodically inspect the booster heater for any signs of water leakage, combustion by-product leakage (soot, etc.), or wiring damage (electrical arcing, insulation damage). Contact your authorized service agency to correct any damage or improper operation that is discovered.

### Check Air Filter

Regularly remove and inspect externally mounted air filter on the left side of booster. Filter is easily cleaned with soap and water. A clogged filter will restrict flow of combustion air which can lead to malfunction and internal damage. Damage caused by a blocked or clogged filter is not covered under the warranty.

### TROUBLE SHOOTING

**CAUTION:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

PROBLEM	CAUSE	REMEDY
3. On-Off switch powered, Unit does not operate.	<ul style="list-style-type: none"> <li>a. No power to heater.</li> <li>b. Manual reset Hi-limit tripped.</li> <li>c. Vent fan interlock not proving (if auxiliary power vent or E-Z Vent system) is being used.</li> </ul>	<ul style="list-style-type: none"> <li>a. Check circuit breaker</li> <li>b. Manually reset hi-limit. Determine cause. If hi-limit trips again, call service.</li> <li>c. Turn on fan, check switch.</li> </ul>
2. Unit energized, blower not operating, pump not operating, burner(s) not on.	<ul style="list-style-type: none"> <li>a. Fan defective.</li> <li>b. Fan relay defective or wiring disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>a. Check, replace fan.</li> <li>b. Check, correct.</li> <li>c. Check, clean air filter</li> </ul>
3. Unit energized, blower and pump operating, burner(s) are NOT on, ignition control LED flashing.	<ul style="list-style-type: none"> <li>a. Igniter Defective</li> <li>b. Water flow switch not proving.</li> <li>c. Air flow/flue blockage switch not proving.</li> <li>d. Control relay(s) defective.</li> <li>e. Control sensor(s) defective.</li> <li>f. Control board defective</li> <li>g. Ignition control defective.</li> <li>h. Burner flame not proving</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace igniter or call Service</li> <li>b. Check, replace flow switch.</li> <li>c. Clear flue. Repair or replace switch,</li> <li>d. Call Service</li> <li>e. Call Service</li> <li>f. Call Service</li> <li>g. Call Service</li> <li>h. Check, replace flame sensor</li> </ul>
4. Unit energized, blower on, pump not operating, burner(s) NOT on.	<ul style="list-style-type: none"> <li>a. Pump defective</li> <li>b. Relay defective</li> </ul>	<ul style="list-style-type: none"> <li>a. Call Service</li> <li>b. Call Service</li> </ul>

**Note: For service and/or parts call your authorized service agency or the factory @ 1-800-624-4809**

## REPLACEMENT PARTS LIST

When ordering parts, always refer to the Model number and Serial Number. The data plate is mounted on the electrical panel face behind the front cover panel. NOTE- Part numbers may change without notification. To obtain the most recent part numbers contact the Factory or your authorized Vanguard service agency.

Model PM200, 199,900 BTU/Hr. & Model PM400, 399,800 BTU/Hr.

<b>PART#</b>	<b>DESCRIPTION</b>	<b>PART#</b>	<b>DESCRIPTION</b>
19052-01612	Blower	20000-00303	Orifice, LP, PM
10050-00039	Board, Temp. Control	20000-00302	Orifice, NG, PM
10592-20000	Control Panel, Complete	20000-00031	Orifice, Pilot, PM LP
10050-00043	Display, Digital Temp.	20000-00030	Orifice, Pilot, PM NG
32200-34209	ECO, Hi-Limit, PM	20021-20001	Pilot Hood Assm w/Ign.Plate, gasket
10051-02383	ECO, Hi-Limit, Manual Reset	75220-90011	Pump, Grundfos W/O Housing 26-99F
19052-20075	Filter, Air FF-5	75220-26099/	Pump, Grundfos, 26-99BF complete
19020-70200	Flex Tube, Gas, 1" x 18"	10080-00025	Relay, Power
19020-70201	Flex Tube, Gas, 7/8x 12"	10050-00042	Sensor, Flame, 18" Lead Wire.
19020-70202	Flex Tube, Gas, 1/4ODX18"	10550-00141	Sensor, Temp PM 41"
10080-02466	Gas Control Valve, Honeywell	19010-70001.159	Solonoid, Hi-Lo Gas, LP
10080-02602	Gasket, Igniter Plate	19010-70001.250	Solonoid, Hi-Lo Gas, NG
75220-90051	Gasket, Pump Flange	10080-19101	Switch, Air
10080-02465	Ignition Control, Fenwal	10070-00110	Switch, Water Flow, 1".
40000-40004	Legs, Black	10080-00071	Switch, Sq. Rocker.
50304-20001	Manifold, Cold-Lower, 200	10570-00103	Transformer, 120V/ 24V
50303-20001	Manifold, Cold-Upper, 200	10070-00104	Transformer, 120V/12v, 596
50603-20001	Manifold, Hot, 200	19025-70015	Tube, Vent Pipe Drain
10080-02601	Mini-Igniter, 120V, 250 C	19025-70012	Tube, Air Switch
20000-00304	Orifice, Hi-altitude NG/LP, PM	13053-07501	Valve, T & P. 3/4"



## LIMITED WARRANTY:

Products manufactured by Vanguard Technology, Inc. are warranted to be free from defects in material and workmanship, when installed and maintained in accordance with Vanguard's instructions and in normal use and service for the time periods, terms and conditions as set forth below:

- 1) For a period of **One Year** from date of installation, but no longer than 18 months from factory shipment, Vanguard will, at its sole discretion, repair or replace defective parts, assemblies or entire units, including labor costs of its authorized service agency. Travel expense of Vanguard's authorized service agent will be paid for the first ninety (90) days of this period, not to exceed sixty (60) miles or two (2) hours.
- 2) For an additional **Four Years**, Vanguard warrants the fin tube heat exchanger in the PowerMax Gas Booster to be free from defects in material or workmanship. At Vanguard Technology's sole discretion and in accordance with this warranty, defective heat exchangers will be replaced on a pro-rated and parts only basis. i.e. Owner will pay a percentage of the current list price of a replacement heat exchanger as follows: Failure within first year, no charge; within second year, 20%; within third year, within fourth year, 60%; within fifth year 80%.
- 3) The stainless steel accumulator is covered by a limited lifetime warranty and is warranted to be free from leaks for this time. Any attached gauges; controls or other parts are subject to the standard one-year parts and labor warranty.

This warranty is limited to the foregoing and does not apply to defect or malfunction resulting from or caused by installation, operation or maintenance not in accordance with manufacturer's instructions, damage related to shipping, accident, abuse, fire, flood, or other acts of God; units operated in corrosive or other damaging atmospheres or at temperatures outside specified operating range. Damage caused by freezing, improper water conditions (excessively

acidic or alkaline water, excessive pressure, chemical contamination, sediment build-up, etc.), incorrect electrical supply or connection, insufficient combustion air or negative draft, insufficient water supply, stray current or voltage conducted through water piping, or unauthorized alteration shall in no way be covered under this warranty. Cleaning of filters, pumps, valves, burners, fans or electrical connections, tightening of threaded connections and/or adjustment or calibration of controls is considered a part of normal installation and/or maintenance and is not covered under this warranty. Hot surface igniters are considered a consumable item, similar to a spark plug, and are not generally considered a warranty item. Accessory components sold but not installed by Vanguard are covered by a one-year parts-only warranty. Warranty on replaced parts or assemblies shall be the lesser of 90 days or the unexpired portion of the original warranty. Factory reconditioned and tested parts may be used to satisfy claims under this warranty. Warranty work shall be done only by Vanguard Technology's authorized service agency during normal working hours. Overtime labor will not be paid under this warranty.

There are no other expressed or implied warranties of any kind, including but not limited to any implied warranty of merchantability or fitness for any particular purpose or usage. The remedies under this warranty as set forth here-in are at the exclusion of all others and Vanguard Technology, Inc., neither assumes nor authorizes anyone to assume for it any other obligations. In no event shall Vanguard Technology, Inc. be liable for any remote or consequential damage of any nature, no matter how arising or from any cause whatsoever, or any amounts in excess of the selling price of the product. Vanguard Technology's policy of constant Quality Improvement means that prices, specifications, and policies are subject to change at any time and without notice.

### VANGUARD TECHNOLOGY, INC.

29495 Airport Road, Eugene, OR 97402

541-461-6020 • FAX 541-461-6023

800-624-4809

R12/03

**TYPICAL SPECIAL STAINLESS STEEL VENTING**  
For use with Category II, III, IV appliances

Contact Local Building or Fire Officials About Restrictions and Installation Inspections in your area as well as National codes:

USA -National fuel gas code ANS1-Z223.1

CANADA -CAN/CGA-B 149.1 or .2 Fuel Burning Installation Code

Please refer to appliance manufacturers' instructions to determine proper sizing and connection of venting system to appliance, including maximum horizontal length, maximum height, and installation clearances (air spaces). The proper operation of the vent system and appliance requires parts specified by Z-FLEX with no deletions or substitutions. NOTE: Co-venting with other appliances is prohibited

PARTS LIST

<b>COMPONENT</b>	<b>3" SYSTEM CAT. #</b>	<b>4" SYSTEM CAT. #</b>	<b>COMPONENT</b>	<b>3" SYSTEM CAT. #</b>	<b>4" SYSTEM CAT. #</b>
10 FOOT PIPE	SVEPWC0310	SVEPWC0410	ADJUST. FLASHING	SVSADJ03	SYSADJ04
8 FOOT PIPE	SVEPWC0308	SVEPWC0408	REDUCER 4" TO 3"	SVSERWC0403	SVSR0404
5 FOOT PIPE	SVEPWC0305	SVEPWC0405	FLAT FLASHING	SVSSCS03	SVSSCS04
4 FOOT PIPE	SVEPWC0304	SVEPWC0404	LOCKING BAND	SVSLBX03	SVSLBX04
3 FOOT PIPE	SVEPWC0303	SVEPWC0403	FIRESTOP SUPPORT	SVSFSS03	SVSFSS04
2 FOOT PIPE	SVEPWC0302	SVEPWC0402	FTRESTOP SPACER	SVSFSX03	SVSFSX04
1 FOOT PIPE	SVEPWC0301	SVEPWC0401	TERMINATION TEE	SVSTTX03	SVSTTX04
6 INCH PIPE	SVEPWC03.5	SVEPWC04.5	TERMINATION BOX	SVSRTX03	SVSRTX04
90 °ELBOW	SVEEWC0390	SVEEWC0490	RAIN CAP	SVSRCX03	SVSRCX04
45 ELBOW	SVEEWC0345	SVEEWC0345	TOP SUPPORT	SVLSX03	SVLSX04
HORJZ. DRAIN TEE	SVEDWC03	SVEDWC04	STORM COLLAR	SVSSCX03	SVSSCX04
VERTICAL DRAIN TEE	SVEVWC03	SVEVWC04	Z-VENT SEALANT	GE106X	
WALL THIMBLE	SVSWTX03	SVSWTX04	WM TERM COUPLING	SVSTPX03	
WM GV STARTER	SVEWMG03		AMETEK FAN CONN.	SVSACA03	
DRAIN TUBE KIT	SVEDTK		WM CGI STARTER	SVEWMFA03	

Z-FLEX recommends that the installation be performed by an experienced professional who works with venting systems on a-regular basis. These instructions are intended as a guide to assist a professional installer.

When the Z-VENT system is installed, the following should be observed:

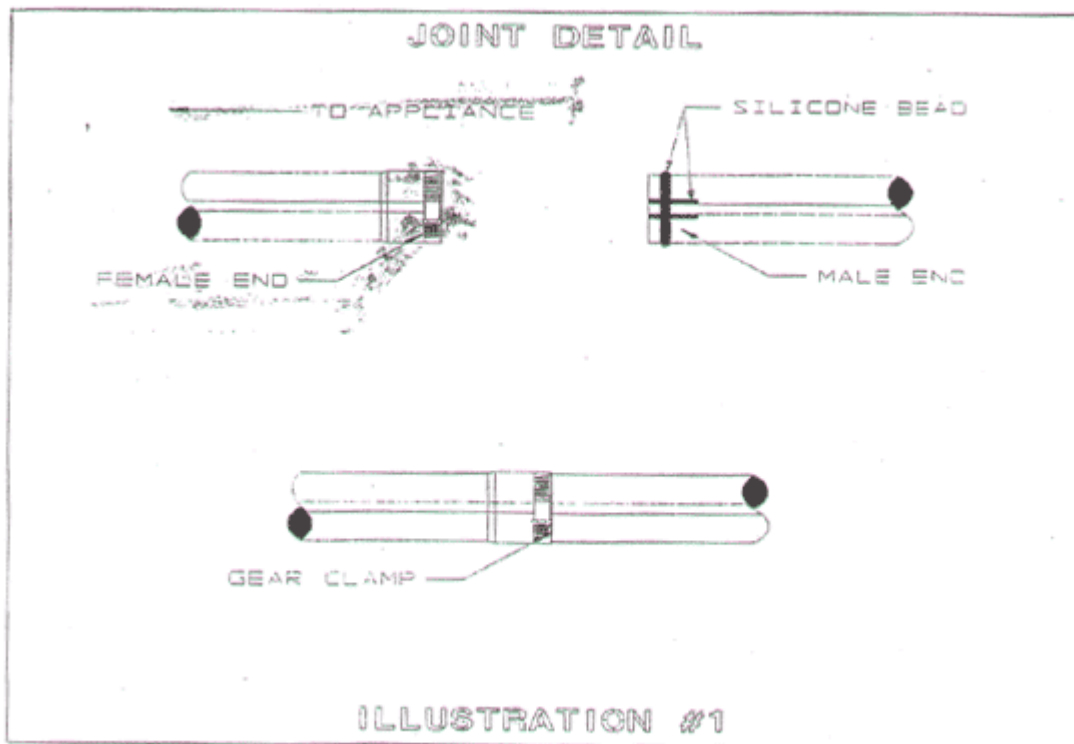
1. A venting system that exits the structure through a sidewall or the like, shall terminate not less than 12 inches (254 mm) above the ground (see illustration # 2, page 4).
2. The termination of a system shall be located above the snow line in geographical areas where snow accumulates. The termination area should be kept clear of snow and ice at all times.
3. The vent shall not terminate less than 7 ft. (2.13 m) above a paved sidewalk or driveway.
4. The termination shall be 6 ft. (1.8 m) or more from the combustion air intake of any appliance.
5. The system shall terminate more than 3 ft. (.91 m) from any other building opening, gas utility meter, service regulator or the like.
6. Exterior mounted venting systems should be enclosed below the roof line with a chase to limit condensation and protect against mechanical failure.

**NOTES:**

- A. The Z-FLEX SPECIAL STAINLESS VENT SYSTEM is for use only with appliances having a positive vent pressure of 3" of water column or less.
- B. Except for installation in one and two family dwellings, a venting system that extends through any zone above that on which the connected appliance is located shall be provided with an enclosure having a fire resistance rating equal to or greater than that of the floor or roof assemblies through which it passes
- C. Do not place any type of insulation in any required air spaces surrounding the venting system.
- D. A termination must be used on all installations to assure proper operation and to prevent debris from entering the venting system.

**JOINT PROCEDURE**  
(see illustration #1 below)

1. The outside of male end and inside of female end of pipe must be cleaned before applying silicone bead. Remove dirt, grease, and moisture from surface to be sealed. Dry surface or allow to dry thoroughly.
2. Apply high temperature silicone approximately one half inch from end around male end of pipe and along both sides of seam for one inch in an even 1/4" bead as per illustration #1.
3. Pipes can now be pushed together as far as they will go. The seams on pipes should be aligned and oriented upwards in all horizontal applications. Apply another bead of silicone around this joint and smooth out.
4. Tighten gear clamps (15 N/LB. MAX.).
5. Check all joints and seams for tightness prior to using vent system.
6. Allow the sealant to cure for one hour before operating the appliance. Length of time required for full cure depends upon thickness of application and other factors such as weather, ambient temperature, humidity, etc. All sealants must be used within the time limitations marked.

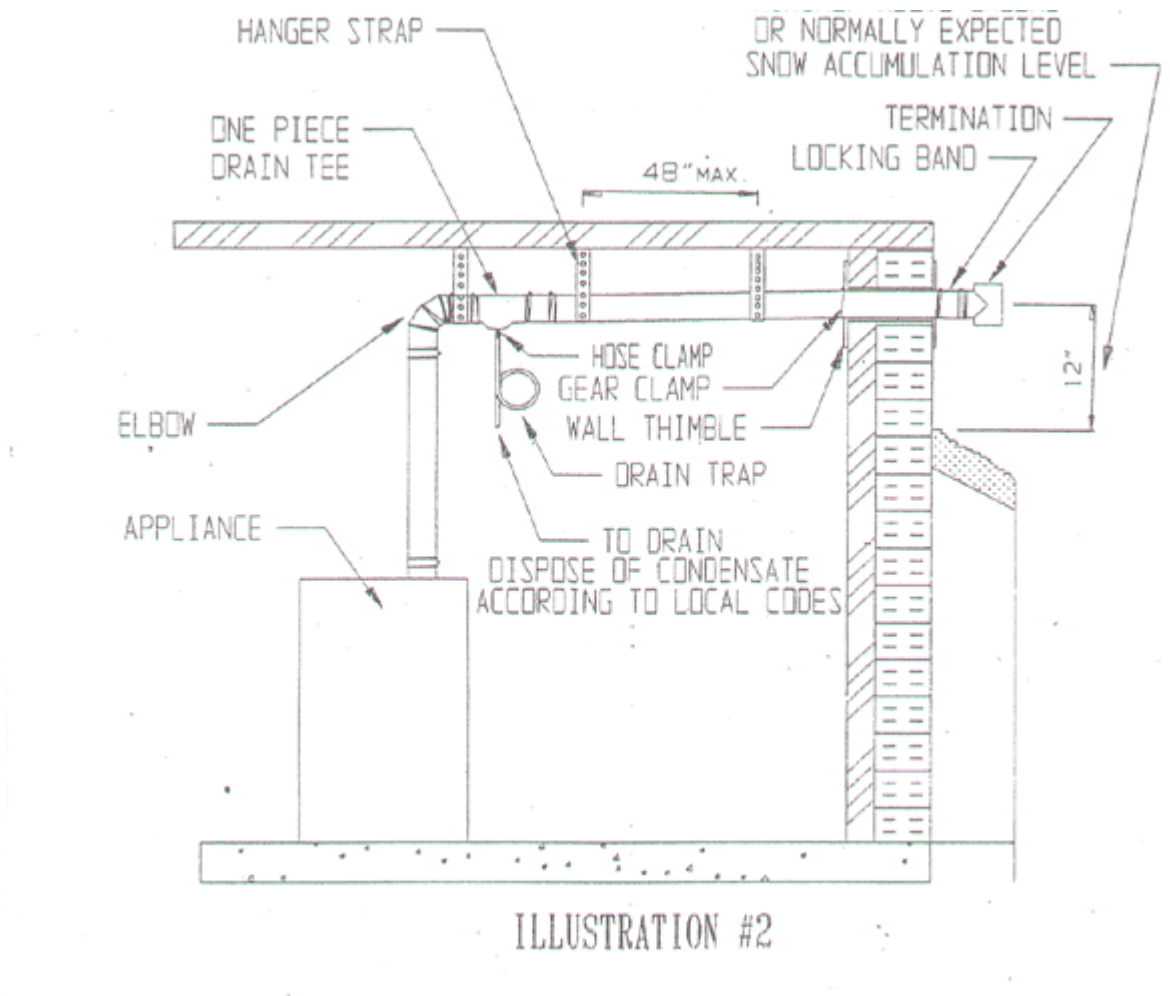


**CLEARANCE TO COMBUSTIBLES**

SYSTEM OPERATING	CLEARANCE ENCLOSED		CLEARANCE UNENCLOSED		SEALANT REQUIRED
	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	
300°F (149°C)	8" (200 mm)	4" (100 mm)	1" (25 mm)	1" (25 mm)	G.E 108 DOW CORNING 732 Z-FLEX Z-VENT SEALANT
480°F (249°C)	8" (200 mm)	4" (100 mm)	1" (25 mm)	N/A	G.E 106 Z-FLEX Z-VENT SEALANT

**\*Note:** Flexible elbows parts # SVEFEX03 AND SVEFEX04 **must not** be enclosed

## SIDE WALL VENTING INSTALLATION



### SIDE WALL VENTING INSTALLATION

(see illustration #2)

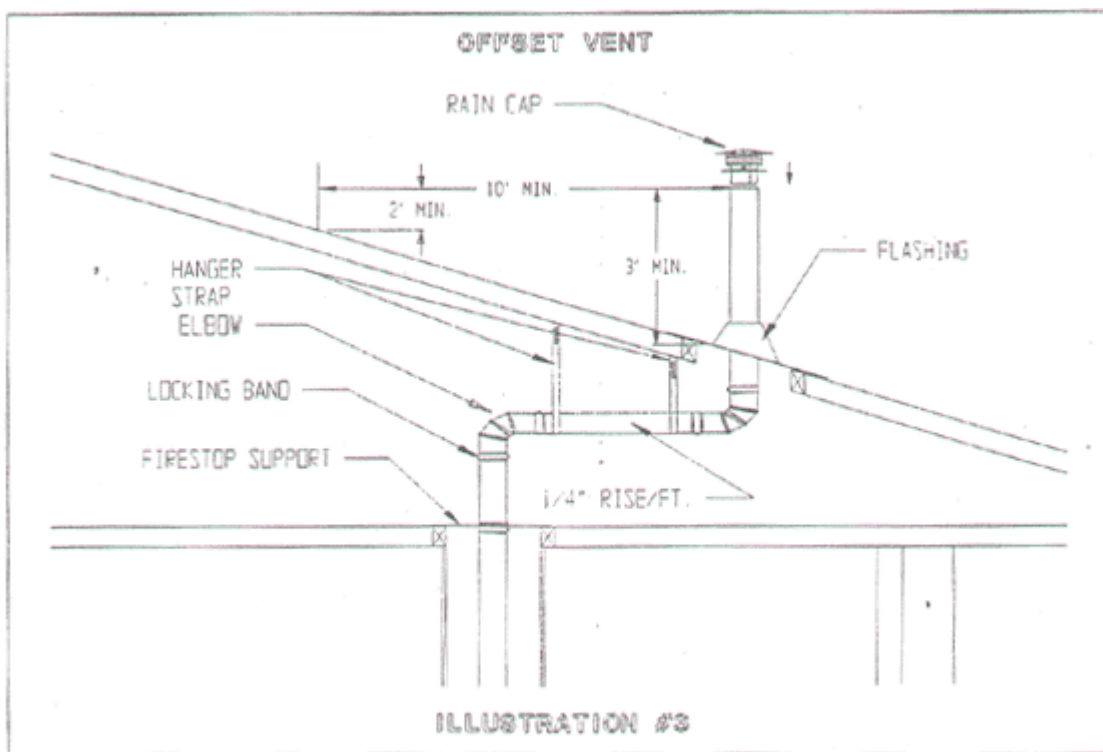
1. Install wall thimble into wall, observing the aforementioned rules and/or local building codes. Select the point of wall penetration where the minimum  $1/4"$  per foot of slope (6.4 mm per 305 mm) can be maintained. The pipe can be located between joists spaced 16" (400 mm) on centre. The pipe may be mortared in directly without using a wall thimble, if the wall is non-combustible. Penetrating a combustible wall requires the use of a wall thimble. A framed opening is required to insert the thimble halves. The thimble is adjustable for different wall thicknesses. Caulk around outside edge of plates as necessary and fasten to wall using suitable screws or nails. The vent pipe must be sealed at wall thimble as per code regarding continuous vapor barrier.
2. The system can now be assembled through the thimble (attach the termination first - note "UP" arrow) and then back to the appliance as per illustration using **JOINT PROCEDURE** as described on page #3. A gear clamp (or locking band) must be installed around the pipe in position so that the system cannot be removed in or out of wall. This applies to both combustible and non-combustible walls.



3. The system must be supported along its horizontal length at all elbow locations and joints (every *forty-eight* inches or less) using straps around pipes maintaining clearance to combustibles as per table.

Any horizontally installed portion of a venting system shall have a slope (upwards for Category II, III, or IV appliances or (upwards for Category III or IV appliances) not less than 1/4" (6.4 mm) every 12 inches (305 mm) to prevent collection of condensate at any location in the assembly. The components of the system **must not be penetrated** by fasteners either when joining pipes and fittings or using support straps. The lengths of pipe may be cut on non-expanded end using aviation snips or a hacksaw (24 tpi). The cut end must be filed or sanded smooth before joining. When installing the condensate tube, be sure to form a trap by means of a 3" (76.2 mm) loop filled with water. This tube must be 3/8" ID high temperature silicone for at least the first 6 inches (152 mm) and attached with a gear clamp or hose clamp. The effluent must be disposed of according to local regulations.

**NOTE:** Z-FLEX recommends using a neutralizer kit when using a condensate trap. A condensate pump may be required.



#### VERTICAL VENTING

**NOTE:** The vent termination must be at least 3 ft. (1 m) above the roof line and 2 ft. (.61 m) higher than any part of a structure within 10 ft. (3.1 m). The total vertical distance of the vent system from appliance flue collar to the rain cap termination and the maximum length of offsets shall not exceed that specified in the appliance manufacturer's installation instructions. No continuous vertical run shall be longer than sixty feet (18.3 m). All horizontal sections must observe the rules for **HORIZONTAL VENTING**. The clearance to combustibles inside a chase shall be no less than 4" (100 mm).

1. Prior to beginning the installation loosely assemble all parts required to make sure all parts are present.
2. Locate position for venting system and proceed to cut holes for firestop support and firestop spacers. All vertical installations require the use of a support. Frame the opening of the floor using lumber which is dimensionally consistent with the structural members. Insert the support from beneath the framed opening and secure with nails or screws as required. Refer to JOINT PROCEDURE before assembling system.



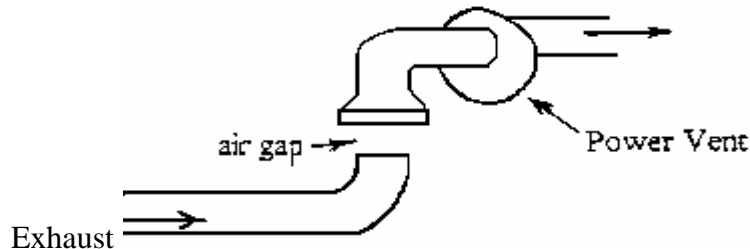
## Factory Authorized PowerMax Start-Up Verification Worksheet

**Job Name:** \_\_\_\_\_

**Job Location:** \_\_\_\_\_

**Dealer Name:** \_\_\_\_\_ **Serial #** \_\_\_\_\_

- Verify incoming water temperature to booster heater is 110E to 140E.
- Verify size of vent piping. \_\_\_\_\_" dia.
- Is there any horizontal vent piping? **YES / NO (Circle one)** How much? \_\_\_\_\_ ft.
- Is vent pipe correct pipe for application? 'Z'-vent Mfg. By Z-Flex U.S., Saf-T-Vent Mfg. By Heat Fab., Inc., or StaR-34 By Flex-L International. All are constructed of AL29-4C<sup>tm</sup> Stainless Steel.
- If an auxiliary power vent is being used, is it installed with an indirect connection, per drawing?



- If used, is power vent installed and operating correctly? **YES / NO (Circle One)**
- Must come on with burner and continue for 4 minutes after burner shutdown.
- Verify electrical connection to unit is correct and to NEC code.
- Verify size, volume, pressure and type of gas supply & that they are in accordance with manufacturers specification: **3.25" w.c. NG or 8" w.c. LP; Check at test port on gas valve.**
- Verify gas supply pipe size. \_\_\_\_\_" dia.
- Verify pipe size, flow pressure and volume of water supply to unit according to manufacturers specifications. Water supply pipe size. \_\_\_\_\_" dia.
- Does dishwasher have pressure-regulating valve and gauge? Flow rinse pressure must be 18-20 p.s.i. **YES / NO (Circle one)**
- Verify that pipe length from booster accumulator outlet or circulating loop to rinse valve does not exceed 5 feet. (NSF maximum) and is correct diameter (both supply and return) \_\_\_\_\_" dia.
- Verify that unit has been flushed properly; both water & gas piping.
- Check all gas connections for leaks.
- Check all water connections for leaks.

Factory Authorized Start-Up - Verification Worksheet - continued

- ❑ Bleed air from accumulator and heat exchanger through temperature/pressure relief valve.
- ❑ Turn power switch 'on'.
- ❑ Burner(s) will activate until accumulator temperature setting is reached. Output temperature sensor should reduce burner to low flame shortly before burner shuts off.
- ❑ When unit is at temperature, flush approx. 25 gal. of hot water through the unit before shutting off.
- ❑ Check flame color and condition through view window. Burner should have a light orange base with a blue tint. Air shutter may be adjusted to achieve this flame.

**FOR CIRCULATOR OPTION:** In addition to above.....

- ❑ Verify circulator pump is operating & pumping in right direction. Pump should be located in return side of circulator loop and pumping toward booster.
- ❑ Verify pipe is sized properly, (complete loop should be 3/4" I.D. minimum for 1 dishwasher and 1" I.D. for 2 dishwashers or dishwashers with both rinse and fill valves filling through booster), and insulated to minimum R-4 throughout the loop.
- ❑ **Call factory if booster is being used to heat Dishwasher wash tanks.**

**Comments and Recommendations:**

**Service Agency:** \_\_\_\_\_

**Address:** \_\_\_\_\_

Please make 2 copies and send to Facility Manager & Vanguard Technology Inc.

**For any assistance, please call factory at: 1-800-624-4809**

\_\_\_\_\_  
**Technician Signature**

\_\_\_\_\_  
**Technician Name (please print)**

\_\_\_\_\_  
**Date**

