INSTALLATION AND SERVICE MANUAL

SWIMMING POOL HEATERS
150,000 -399,999 BTU MODELS

SPECIAL INSTRUCTIONS TO OWNER

NOTE: Retain this manual for future reference.

This manual supplies information for the installation, operation, and servicing of the appliance. It is strongly recommended that this manual be reviewed completely before proceeding with an installation.

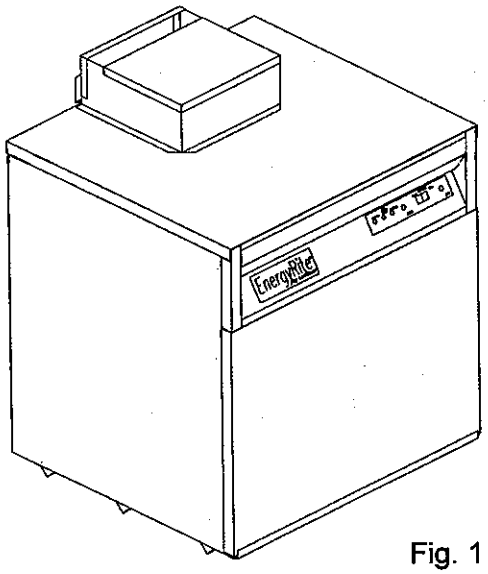


Fig. 1

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids 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 your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

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

WARNING: Should over-heating occur or the gas supply fail to shut off, turn off the manual gas control valve to the appliance.

WARNING: IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL. FOR ASSISTANCE OR ADDITIONAL INFORMATION CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER.

DO NOT USE THIS APPLIANCE IF ANY PART HAS BEEN UNDER WATER. IMMEDIATELY CALL A QUALIFIED SERVICE TECHNICIAN TO INSPECT THE UNIT AND TO REPLACE ANY PART OF THE CONTROL SYSTEM AND ANY GAS CONTROL WHICH HAS BEEN UNDER WATER.

PREVENTION OF FREEZING

Heat exchangers and headers damaged by freezing are not covered by warranty.
Refer to **WINTERIZING** section.

CONTENTS

SPA AND HOT TUB SAFETY

The following safety rules must be observed while operating a spa or hot tub.

1. Spa or hot tub water temperatures should never exceed 104° F (40° C). A temperature of 100° F (38° C) is considered safe for a healthy adult. Special caution is suggested for young children.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. Pregnant women beware! Soaking in water above 102° F (39° C) can cause fetal damage during the first three months of pregnancy (resulting in birth of brain- damaged or deformed child). Pregnant women should observe the 100° F (38° C) maximum rule.
4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4° F (2° C).
5. Persons with medical history of heart disease, circulatory problems, diabetes or blood pressure problems should obtain their physician's advice before using spas or hot tubs.
6. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines or anticoagulants, should not use spas or hot tubs.

WARNING: To minimize the possibility of serious personal injury, fire, damage to your pool heater or improper operation, never violate the following safety rules:

1. Always keep the area around your pool heater free of combustible materials, gasoline, pool chemicals and other flammable liquids and vapors.
2. Never cover your unit, lean anything against it, store trash or debris near it, stand on it, or in any way block the flow of fresh air to your pool heater.

WARRANTY

Factory warranty (shipped with unit) does not apply to units improperly installed or improperly installed or improperly operated. Experience has shown that improper installation or system design, rather than faulty equipment, is the cause of most operating problems.

1. Excessive water hardness and high alkalinity causing a lime build-up in the copper tube is not a fault of the equipment and is not covered under the manufacturer's warranty. (See section on water chemistry)
2. Excessive pitting and erosion on the inside of the copper tubes may be caused by too much water velocity through the tubes. (See section on bypass and pump requirements)

CHECKING EQUIPMENT

Upon receiving equipment, check for signs of shipping damage. Pay particular attention to parts accompanying the heater which may show signs of being hit or otherwise being mishandled. Verify total number of pieces shown on the packing slip with those actually received. In case there is damage or shortage, immediately notify carrier.

PERFORMANCE

Your Pool Heater has been designed to operate scale-free and trouble free for many years. Particular attention should be directed to the following items.

1. Correct installation and piping of heater.
2. Provide correct gas supply and combustion air.
3. Insure continuous water circulation.
4. Maintain proper pool/spa water chemistry.

CODES

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code, ANSI Z223.1.

ELECTRICAL REQUIREMENTS (USA)

The appliance is wired for 120 volt service. The heater when installed, must be electrically grounded in accordance with the requirements of the authority having jurisdiction or in the absence of such requirements, with the latest edition of the National Electrical Codes ANSI/NFPA No. 70.

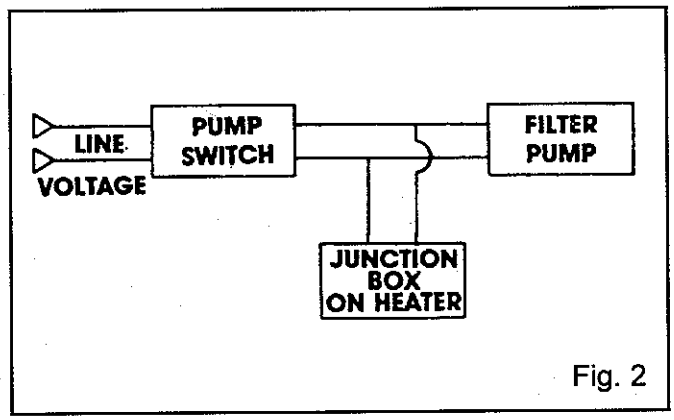


Fig. 2

Electrical power circuits to the pool heater must be installed with a ground fault circuit interrupter. Follow local codes for installation of this device.

1. All wiring between the unit and field installed devices shall be made of type T wire [63° F (35° C) rise].
2. Line voltage wire exterior to the appliance must be enclosed in approved conduit or approved metal-clad cable.
3. The pump must run continuously when heater is "on".
4. Do not install any switch which can disconnect pump without disconnecting heater.
5. Check heater controls and pump voltage.
6. Do not energize heater or pump until system is full of water. Serious damage may result.
7. All wiring must be in accordance with all local, state, or federal codes.
8. Provide circulating pump with proper overload protection.
9. Where magnetic starter is used for pump, wire auxiliary contacts in starter in "series" with heater control circuit.

CLEARANCES

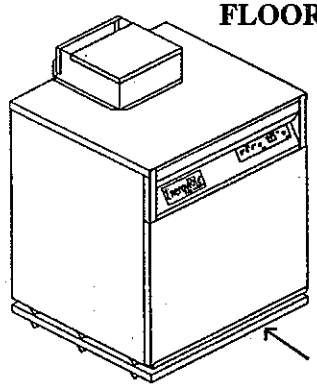
Clearances from Combustible Construction:
Right Side - 3" (24" for service)
Rear - 3" (3" minimum from any surface)
Left Side - 3"
Front - ALCOVE (24" for service)
Top - 3" (24" for service)
Flue - 2"
Water Pipes - 1"
Maintain 3" minimum clearance for adequate operation.
Allow sufficient space for servicing pipe connections, pump and other auxiliary equipment, as well as the appliance.

LOCATION

These units are suitable for indoor or outdoor installation. Venting options and configurations are illustrated in the venting section.

1. Locate the unit so that if the water connections should leak, water damage will not occur. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the unit. The pan must not restrict combustion air flow. Under no circum stances is the manufacturer to be held liable for water damage in connection with this unit, or any of its components.
2. The unit must be installed so that the ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance operation and service (circulator replacement, control replacement, etc.)
3. The appliance must be placed on a level, non-combustible floor. Concrete over wood is not considered non-combustible.
4. The appliance must not be installed on carpet.

FLOOR KIT



Optional Special Combustible Floor Base

Fig. 3

5. If the appliance must be installed over a combustible floor, the Optional Special Combustible Floor Base must be used. The unit must be centered on the base as shown in Figure 3. Refer to the parts illustration or rating plate for appropriate base part number.
6. Outdoor models require the use of the factory supplied outdoor vent cap. This cap is mounted on all units as shipped from the factory. Outdoor models have special location and clearance requirements. These are specifically addressed in the venting section under outdoor installation. A windproof cabinet protects the unit from weather.
7. Indoor installations require that the factory installed outdoor vent cap be removed from the unit to allow the installation of the flue. Specific instructions for the removal of the outdoor cap are addressed in the venting section. Indoor installations require adequate combustion and ventilation air for proper operation.
8. This heater must be installed at least 5 feet from the inside wall of a pool unless separated from the pool by a solid fence, wall or their permanent barrier.

CAUTION

Under no circumstances should the equipment room ever be under a negative pressure. Particular care should be taken when exhaust fans, compressors, air handling units, etc. may rob air from the heater. The combustion air supply must be completely free of any chemical fumes which may be corrosive to the heater. Common chemicals which must be avoided are fluorocarbons and other halogenated compounds, most commonly present as refrigerants or solvents, such as freon, trichloroethylene, perchloroethylene, chlorine, etc. **Combustion air must be free of dust and fumes from chemicals used for pool/spa water treatment.** These chemicals, when burned, form acids which quickly attack the copper tubes, headers, flue collector, and heater stack. The result is improper combustion and premature heater failure.

COMBUSTION & VENTILATION AIR

Provisions for combustion and ventilation air must be in accordance with Section 5.3, Air Combustion and Ventilation, of the latest edition of the National Fuel Gas Code ANSI Z223.1, or applicable provisions of the local building codes.

The equipment room must be provided with two openings to assure adequate combustion and proper ventilation.

1. If air is taken directly from outside the building:
   a. Combustion air opening, 1 square inch per 2,000 BTU input. This opening must be located near the floor.

   b. Ventilation air opening, 1 square inch per 2,000 BTU input. This opening must be located near the ceiling.

2. If air is taken from another interior space, each opening specified above should have a net free area of one square inch for each 1,000 BTU of input.

VENTING (General)

Vent installation for connection to gas vents or chimneys must be in accordance with Part 7, "Venting of Equipment," of the latest edition of the National Fuel Gas Code, ANSI Z223.1, or applicable provisions of the building codes.

Adequate combustion and ventilation air must be supplied to the mechanical room in accordance with the latest edition of the National Fuel Gas Code, ANSI Z223.1 or applicable provisions of the local building codes.

The distance of the vent terminal from adjacent buildings, windows that open and building openings MUST comply with the latest of the National Fuel Gas Code, ANSI Z223.1.

Vent connection is made directly to the top of the unit. No additional draft diverter is required on single unit installations. Multiple unit installations with combined venting require barometric dampers to regulate draft at each unit.

The negative draft must be within the range of .01 to .08 inches water negative to insure proper operation. All draft readings are made while unit is in stable operation (approximately 2 to 5 minutes).

OUTDOOR INSTALLATION

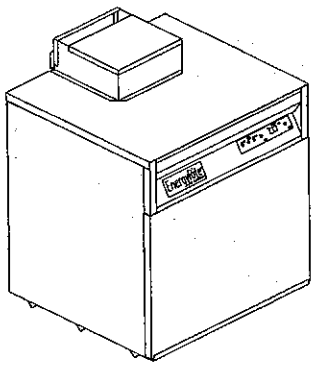


Fig. 4

This pool heater is self venting when installed outdoors with the factory supplied vent cap. This vent cap is installed on the top of the heater as shipped from the factory. No additional vent piping is required.

WARNING: Outdoor models MUST be installed outdoors and must use the vent cap supplied by the manufacturer. Personal injury or product damage may result if any other cap is used or if an outdoor model is used indoors.

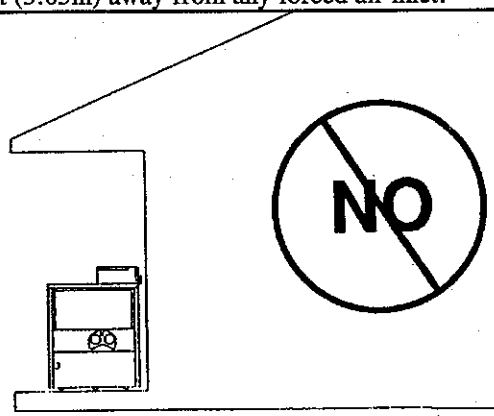
Combustion air supply must be free of contaminates (See Combustion and Ventilation Air). To prevent recirculation of flue products into the combustion air inlet, follow all instructions in this section.

The venting areas must never be obstructed. Keep area clean and free of combustible and flammable materials. Maintain a minimum clearance of 3" (76.2mm) and a minimum of 3" (76.2mm) clearance to the air inlet. To avoid a blocked flue condition, keep the outdoor cap, outlet and drain slot clear of snow, ice, leaves, debris, etc.

Multiple unit outdoor installations require 48" (1.22m) clearance between vent caps.

The outdoor vent cap must be located 4 feet (1.22m) below and 4 feet (1.22m) horizontally from any window, door, walkway or gravity air intake.

The combustion air inlet is located above the control panel. This opening must always be at least one foot (0.30m) above grade and above normal snow levels. The unit must be at least 10 feet (3.05m) away from any forced air inlet.



DO NOT INSTALL ON PORCH OR UNDER A ROOF

Fig. 5

The unit must be at least 3 feet (0.91m) outside any overhang. Do not install in locations where rain from building runoff drains will spill onto the heater.

Do not locate the unit where water from sprinklers may spray directly on the unit. Water may damage controls or other electric components.

DO NOT INSTALL UNDER A DECK.
A unit located so that high winds can deflect off adjacent buildings, walls and shrubbery may experience operational problems such as recirculation, bad combustion or damage to controls. The unit should be located at least 3 feet (0.91m) from any wall or vertical surface to prevent adverse wind conditions from affecting performance.

Flue gas condensate can freeze on exterior walls or on the vent cap. Frozen condensate on the vent cap can result in a blocked flue condition. Some discoloration to exterior building or unit surfaces can be expected. Adjacent brick or masonry surfaces should be protected with a rust resistant sheet metal plate. The venting must be inspected periodically to insure proper operation.

INDOOR INSTALLATION

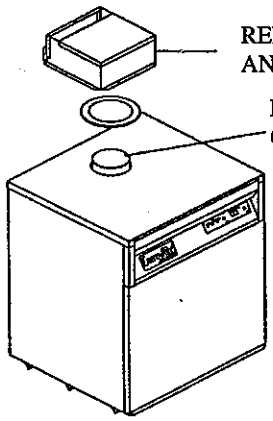


Fig. 6

When installing this pool unit indoors, the factory supplied outdoor vent cap MUST be removed to allow connection of the vent pipe. Remove the mounting screws and lift the cap to expose the flue connection. **Discard the outdoor vent cap. It must not be used on indoor installations.** Vent connection is made directly to the top of the unit. No additional draft diverter is required on single unit installations. Multiple unit installations with combined venting require barometric dampers to regulate draft at each unit.

The negative draft must be within the range of .01 to .08 inches water negative to insure proper operation. All draft readings are made while unit is in stable operation (approximately 2 to 5 minutes). A vent system with excessive draft may require installation of a barometric damper.

The flue outlet pipe sizes are:
150,000 BTU - 5"
200,000 BTU - 5"
250,000 BTU - 5"
300,000 BTU - 5"
399,999 BTU - 6"

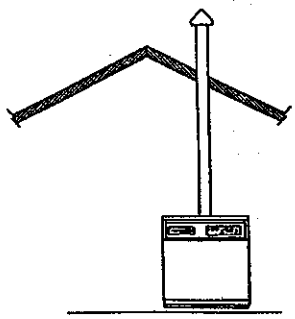


Fig. 7 **CONVENTIONAL VENTING ONLY**

The vent terminal should be vertical and exhaust outside the building at least 2 feet (0.61m) above the highest point of the roof within a 10 foot (3.05m) radius of their termination. The vertical termination must be a minimum of 3 feet (0.91m) above the point of exit.

A vertical termination less than 10 feet (0.91m) from a parapet wall must be a minimum of 2 feet (0.61m) higher than the parapet wall.

A vent cap must be installed on the termination. The vent cap should have a minimum clearance of 4 feet (1.22m) horizontally from and in no case above or below, unless a 4 foot (1.22m) horizontal distance is maintained from electric meters, gas meters, regulators and relief equipment.

Follow all requirements in the General Venting section for venting flue products to the outdoors, obtaining adequate combustion and ventilation air and general installation instructions.

Locate units as close as practicable to chimney or gas vent.

The connection from the vent to the stack or vent termination outside the building MUST be made with listed Type "B" double wall (or equivalent) vent connectors and must be as direct as possible with no reduction in diameter.

Horizontal portions of the venting system shall be supported to prevent sagging. Follow manufacturer's instructions.

Vent connectors serving appliances by natural draft shall not be connected into any portion of a mechanical draft system operating under positive pressure.

To avoid a blocked flue condition, keep the vent cap clear of snow, ice, leaves, debris, etc.

Flue gas condensate can freeze on exterior walls or on the vent cap. Frozen condensate on the vent cap can result in a blocked flue condition. Some discoloration of exterior building or unit surfaces can be expected. Adjacent brick masonry surfaces should be protected with a rust resistant sheet metal plate.
Common venting systems may be too large when an existing unit is removed. At the time of removal of an existing unit, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

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

The venting must be inspected periodically to insure proper operation.

GAS SUPPLY

Verify unit is supplied with type gas specified on data plate. Consult factory for installations above 2,000 feet elevation. All gas pressure noted in inches-water column.

INLET PRESSURE: Measured upstream of gas valve and pressure regulator. Inlet pressure tap located at main gas cock.

TABLE A

	Nat. Gas	LPG
Max. (150,000 - 399,999)	14"	14"
Min. (150,000 - 300,000)	5"	11"
Min. (399,999)	5.5"	11"

The maximum inlet gas pressure must not exceed the value specified. Minimum value listed is for the purposes of input adjustment.

MANIFOLD PRESSURE: Measured downstream of main gas valve.

TABLE B

BTU Input	Nat. Gas	LPG
150,000-399,999	4.0"	10"

Insure that all gas pipe, regulators and meters are properly sized for the rated BTU service. Do not use flexible gas connectors. All Gas cocks and valves must be fully ported to insure adequate gas supply to the heater.

A manifold pressure tap is located on the downstream side of the combustion gas valve. A 90° ell with plug is provided for easy access. remove lower side jacket panel below water connections to access pressure tap. All gas pressure measurements should be made using a slack tube manometer to insure correct results.

INSTALLATION SAFETY WARNING: LP (propane) gas is heavier than air and will remain at floor level if there is a leak. Basements, crawl spaces, alcoves, and areas below ground level will serve as pockets for accumulation of leaking gas. Before lighting, sniff at floor level. IF YOU SMELL GAS, follow instructions on PAGE ONE of INSTALLATION & SERVICE MANUAL. Shut off gas at LP tank outside of building. DO NOT OPERATE APPLIANCE UNTIL LEAKAGE IS CORRECTED.

LP gas cylinders shall be located outdoors and away from the pool structure in accordance with the latest edition of the Standard for the Storage and Handling of Liquified Petroleum Gases, ANSI/NFPA 58, and applicable local codes.

GAS CONNECTIONS

1. Safe operation of unit requires properly sized gas supply piping. See data below.
2. Gas pipe size may be larger than heater connection. Reduction in gas line may be made only at opening to gas valve.
3. Installation of a union is suggested for ease of service.
4. Install a manual main gas shutoff valve when Local Codes require.
5. A trap (drip leg) should be provided in the inlet of the gas connection to the unit.
6. Route bleeds and vents to the atmosphere outside the building when required by Local Codes.

GAS PRESSURE TEST

1. The heater and its individual shutoff valve must be *disconnected* from the gas supply piping system during any pressure testing of that system at test pressure in excess of 1/2 PSIG (3.5kPa).
2. The heater must be isolated from the gas supply piping system by *closing* the manual shutoff valve during any pressure testing of the gas supply piping system at test pressure equal to or less than ½ PSIG (3.5 kPa).
3. The heater and its gas connection must be leak-tested before placing it in operation.

LOW PRESSURE NATURAL GAS PIPING
SINGLE UNIT INSTALLATIONS
SUGGESTED GAS PIPE SIZE
TABLE C

BTU Input	DISTANCE FROM METER				
	0-50'	51-100'	101-200'	201-300'	301-500'
150,000	¾"	1"	1¼"	1¼"	1½"
200,000	1"	1¼"	1¼"	1½"	2"
250,000	1"	1¼"	1¼"	1½"	2"
300,000	1¼"	1½"	1½"	1½"	2"
399,999	1¼"	1½"	2"	2"	2"

For each elbow or tee, add equivalent straight pipe to total length from table.

LOW PRESSURE NATURAL GAS PIPING
MULTIPLE UNIT INSTALLATION
BTU CAPACITY OF PIPE
TABLE D

Nominal Iron Pipe Size (in.)	Length of Pipe in Straight Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
¾	369	256	205	174	155	141	128	121	113	106	95	86
1	697	477	384	328	292	267	246	256	210	200	179	164
1¼	1,400	974	769	677	595	543	502	472	441	410	369	333
1½	2,150	1,500	1,210	1,020	923	830	769	707	666	636	564	513

Maximum capacity of pipe in thousands of BTU's per hr for gas pressures of 14" water column (0.5 PSIG) or less and a pressure drop pf 0.5 Inch Water Column (NAT GAS, 1025 BTU's per cubic foot of gas, based on 0.60 specific gravity gas.)

SINGLE OR SECOND STAGE
LOW PRESSURE PROPANE GAS PIPING
SINGLE UNIT INSTALLATIONS
SUGGESTED GAS PIPE SIZE
TABLEE

BTU Input	DISTANCE FROM METER			
	0-50'	51-100'	101-200'	201-300'
150,000	¾"	1"	1"	1"
200,000	¾"	1"	1"	1¼"
250,000	1"	1"	1¼"	1¼"
300,000	1"	1¼"	1¼"	1½"
399,999	1"	1¼"	1¼"	1½"

For each elbow or tee, add equivalent straight pipe to total length from table.

FIRST STAGE HIGH PRESSURE PROPANE PIPE SIZING

LENGTH	SIZE
0-100 ft.	1/2" copper tubing
101-200 ft.	5/8" copper tubing

FITTINGS TO EQUIVALENT STRAIGHT PIPE
TABLE F

Diameter Pipe (in.)	¾"	1"	1¼"	1½"	2"	3"	4"	5"
Equivalent Length of Straight Pipe	2'	2'	3'	4'	5'	10'	14'	20'

For each elbow or tee, add equivalent straight pipe to total length.

WATER CONNECTIONS

This pool heater is equipped with an automatic, built-in bypass in the front header. This by-pass is flow actuated to maintain proper flow through the heater at flow rates less than 100 GPM. If water flow rate exceeds 100 GPM, an auxiliary by-pass must be installed. See auxiliary by-pass section for piping and adjustment.

Minimum flow rates to insure proper operation are as follows:

150,000 BTU - 15 GPM
200,000 BTU - 20 GPM
250,000 BTU - 25 GPM
300,000 BTU - 30 GPM
399,999 BTU - 40 GPM

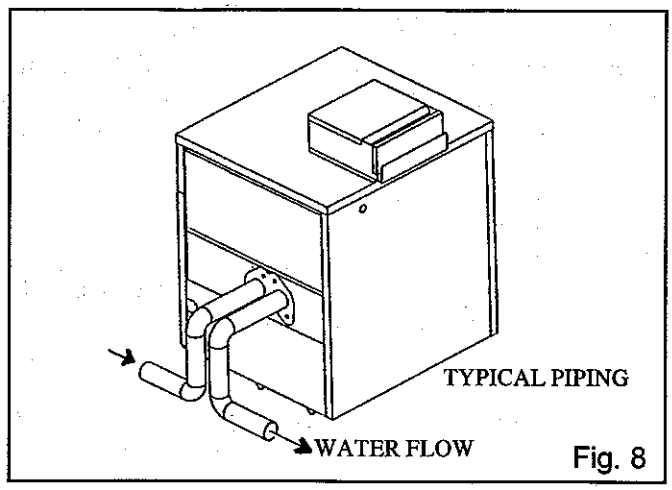


Fig. 8

INLET-OUTLET CONNECTIONS

Connection to the pool heater can be made with threaded 2" pipe or slip connection of 1½" or 2" pipe. 2" pipe may be directly threaded into the flanged header connection. A gasket is provided to allow a flanged compression attachment of 2" copper pipe. An additional gasket is also provided to allow a flanged compression attachment of 1½" copper pipe to the header. Minimum pipe size for installation of the pool heater is 1½" I.D.

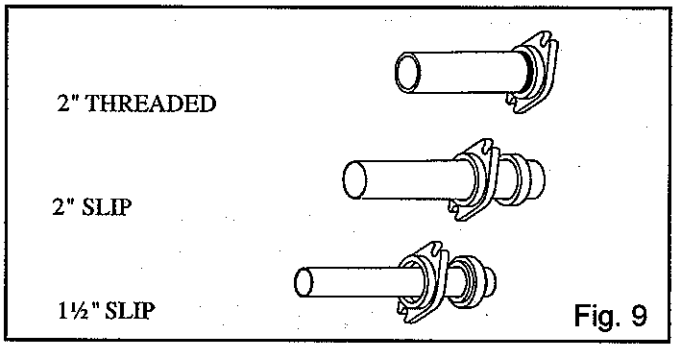
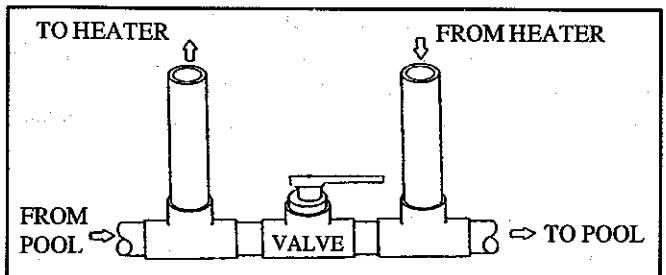


Fig. 9

A metallic pipe heat sink is not required on pool heater installations.

PVC, CPVC or other high temperature plastic piping may be used to pipe directly to the header of the pool heater if permitted by local codes. When the heater is used with a spa or therapy pool CPVC or metallic pipe is recommended. **A silicon type sealant with a high elasticity must be used at flanged connections to prevent leakage.** This helps to compensate for the large differences in the expansion and contraction of the materials used in piping and the flanged connections. The filtration pump MUST operate simultaneously to insure there is no damage to PVC piping connected directly to the unit. A check valve should be installed in the piping to the heater if there is the possibility of "back-syphoning" when the pump stops.



AUXILIARY BY-PASS Fig. 10

AUXILIARY BY-PASS

When flow rates exceed 100 GPM, a portion of this water flow MUST be diverted with an external by-pass. High performance pumps can provide flows in excess of 100 GPM. An auxiliary by-pass as shown in Figure 10 MUST be installed. The by-pass valve allows the proper volume of water to be supplied to the pool heater to prevent sweating and condensate. The by-passed water prevents needless pressure drop and reduction in flow rates.

ADJUSTMENT OF AUXILIARY BY-PASS

1. Backwash and clean filters.
2. Start with by-pass valve in half open position.
3. Start the pool heater.
4. Check the temperature of the outlet piping from the pool heater. It should be slightly warm to the touch.
5. If the pipe is hot, close the by-pass valve to increase flow. If the pipe is cold, open the by-pass valve to decrease low to the pool heater and increase temperature rise.
6. High water flow can cause condensate and operational problems which are non-warrantable.

AUTOMATIC CHLORINATORS AND CHEMICAL FEEDERS

All chemicals must be diluted into the pool or spa water before circulated through the pool heater. Any concentration of chlorine in the pool heater can cause damage to the unit. Do not place chlorine tablets or bromine sticks in the skimmer. High chemical concentrations will result when the pump is not running.

Chlorinators must feed downstream of the heater and have an anti-syphoning device to prevent chemical back-up in the heater when the pump is shut off.

IMPORTANT: High chemical concentrations from improperly adjusted feeders and chlorinators can cause rapid corrosion to the heat exchanger. This damage is non-warrantable.

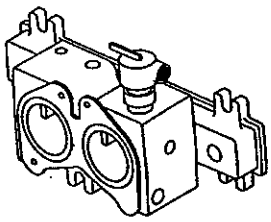


Fig. 11

RELIEF VALVE

An operational temperature and pressure relief valve may be field installed in the front header if required by local code. Open the upper side jacket panel above the water connections to access the mounting. Remove the 3/4" NPT plug on the header for installation. The relief valve should be properly sized. The relief valve should be manually operated at least once a year.

PLACING THE POOL HEATER IN OPERATION

Pre-Start Check List

Before attempting to start the pool heater verify that the following items have been checked:

1. Verify proper location and installation of the pool heater.
2. Check gas piping and insure line is purged of all air.
3. Insure that the pool is properly filled. Do not operate pool heater if improperly filled.
4. Check to insure that all water connections are tight.

5. Relief valve, if used, has been piped to a suitable floor drain.
6. Combustion air openings are not obstructed in any way.

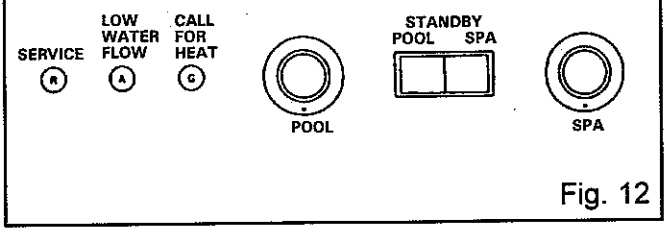


Fig. 12

OPERATIONAL / DIAGNOSTIC LIGHTS

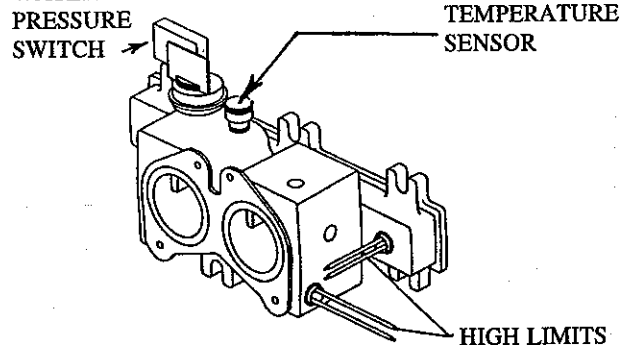
The control panel features diagnostic and operation lights and dual temperature controls with a selector switch (pool standby spa). The lights indicate burner on (green), low water flow (amber), and service ignition system (red). See maintenance section to correct control sensed operation problems.

TEMPERATURE ADJUSTMENT

This pool heater is equipped with a electronic temperature control. Inlet water temperature is sensed. Dual temperature set point controls are provided to allow settings for pool and spa operation. These controls are located on the front control panel. A selector switch is provided to switch between the two settings. If operating pool only, set unused control to lowest setting. The selector switch has a center standby position where no setting is selected.

HIGH LIMITS

This pool heater is equipped with two automatic high limit controls. They are set to stop operation of the pool heater at high water temperatures.



FRONT HEADER

Fig. 13

WATER PRESSURE SWITCH

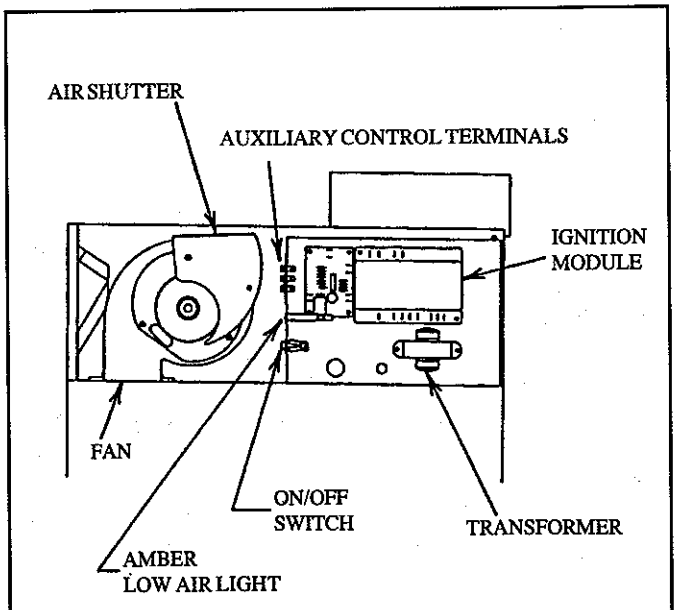
The pressure switch is factory preset for normal installations at deck level. The switch will turn on an amber light on the control panel and stop operation of the pool heater on low water flow. (See Diagnostic Lights) Do not adjust the pressure switch unless the pool heater is located more than four feet above or below the deck level.

PRESSURE SWITCH ADJUSTMENT

The pressure switch is located in the front header, behind the upper side jacket panel, above the water connections. When required, the pressure switch can be reset with the following procedure:

1. Clean filter and skimmer.
2. Start filter pump.
3. Set thermostat to highest setting.
4. Turn the adjustment knob on the pressure switch clockwise until the amber light on the front control panel turns on. Light will not turn on if system pressure exceeds 5 PSI.
5. Slowly turn the adjustment knob counter-clockwise until amber light goes off. Turn knob an additional ¼ turn counter-clockwise.
6. Turn pump off and on several times. The heater should shut down immediately when the pump stops and the amber light will turn on.
7. If the heater does not shut down immediately as the pump stops, repeat steps 4, 5 and 6 until proper operation is achieved.
8. Reset thermostat to desired temperature setting.

WARNING: Operation of the pool heater without proper flow will cause immediate non-warrantable damage to the heat exchanger.



END VIEW OF UNIT

Fig. 14

ON-OFF POWER SWITCH

A power switch is located inside the jacket, behind the upperside panel above the water connections. Turn off main power when the heater will not be operated for extended periods of time.

AUXILIARY CONTROL CONNECTIONS

A terminal strip is provided on the internal control housing to allow field installation of additional controls. This control housing is located behind the upper side jacket panel, above

the water connections. Remove the jumper on terminals R and W to install the remote mounted control. These terminals can be used to connect remote temperature controls, time clock or any type of remote switch. When the circuit between terminals R and W is broken the pool heater will cycle off.

NOTE: ALL JACKET PANELS MUST BE IN PLACE FOR UNIT TO OPERATE.

FOR YOUR SAFETY READ BEFORE OPERATING

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

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. DO NOT try to light the burner by hand.

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

— **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.

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

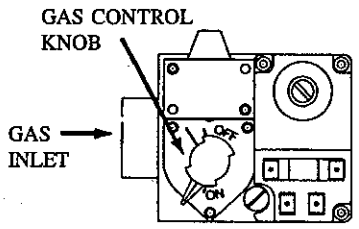
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTIONS
150,000-399,999 BTUs

1. Stop! Read the safety information above on this page.
2. Open the left top jacket panel to access the controls.
3. Set the thermostat to the lowest setting.
4. Turn off all electrical power to the appliance.
5. This appliance is equipped with an ignition device which automatically lights the pilot. DO NOT try to light the burner by hand.
6. Push in the gas control knob slightly and turn clockwise ↷ to "OFF".

NOTE: On the 36C valve, knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.

7. Wait five (5) minutes to clear out any gas. If you then smell gas, STOP! Follow "B" in safety information. If you don't smell gas, go on to next step.
8. Turn the gas control knob counterclockwise ↶ to "ON."
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. If the appliance will not operate, follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.



GAS VALVE Fig. 15

TO TURN OFF GAS TO APPLIANCE

1. Open left top jacket panel to access the controls.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance if service is to be performed.
4. Push in gas control knob slightly and turn clockwise ↷ to "OFF." Do not force
5. Replace control access panel.

ENERGY SAVING RECOMMENDATIONS

1. Keep the pool/spa covered when not in use. This will cut heating cost, reduce water evaporation, conserve chemicals and reduce load on the filtering system.
2. Reduce pool thermostat to 78° or lower, reduce spa temperature to 100°.
3. Use an accurate pool/spa thermometer to monitor water temperature.
4. Mark the proper temperature settings on your pool/spa thermostats and discourage further adjustments.
5. Use a time clock to start filter pump no earlier than 6 a.m. during pool/spa season. This is the time when nightly heat loss stabilizes.
6. Turn the pool/spa heater off and drain during long periods when the pool will not be used (winter, vacations, etc).
7. Follow a regular program of preventative maintenance for your heater each new swimming season. Check heat exchanger, controls, burners and operation of the unit.
8. For pools used only on weekends, the thermostat may be set lower than 78° during the week. Lower setting to a range that can be easily achieved in one day's operation of the pool heater.

MAINTENANCE

Listed below are items that should be checked to ensure safe and reliable operation. Verify proper operation after servicing.

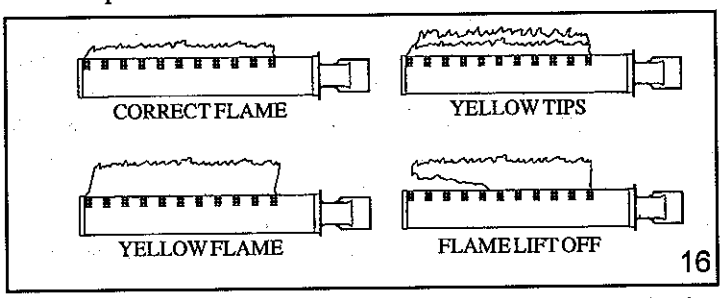
> CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

1. Examine the venting system at least once a year.

   Outdoor installations: Check vent cap for proper mounting, corrosion or any obstruction of the flue outlet.

   Indoor installation: Check the vent pipe joints and connections for tightness, corrosion or deterioration. Have the entire system, including the venting system, periodically inspected by a qualified service agency.

2. Using the view port, located behind the lower end jacket panel, below the water connections, visually check main burner flames at each start up after long shutdown periods or at least every six months.
   a. **Normal Flame:** A normal flame is blue, without yellow tips, with a well defined inner cone and with no flame lifting.
   b. **Yellow Tip:** Yellow tip can be caused by blockage or partial obstruction of air flow to the burner(s).
   c. **Yellow Flames:** Yellow flames can be caused by debris blocking the flow of primary air to the burner(s), and venturi tubes not properly in place or excessive gas input. This condition MUST be corrected immediately.



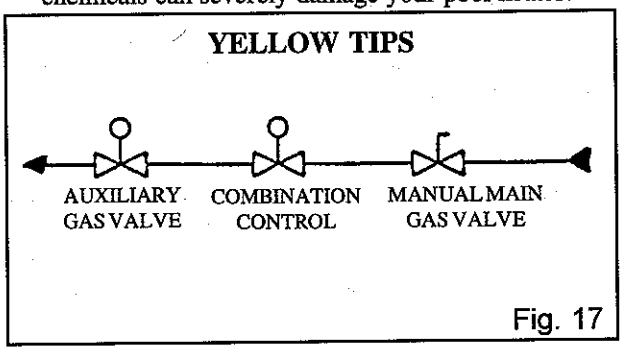
   d. **Lifting Flames:** Lifting flames can be caused by overfiring the burner(s) or excessive primary air.

3. Flue Gas Passageway Cleaning Procedures: Any sign of soot at the burners or jacket indicates a need for cleaning. The following cleaning procedure MUST only be performed by a qualified service agent or installer. Proper service is required to maintain safe operation. Properly installed and adjusted units seldom need flue cleaning. All gaskets on disassembled components MUST be replaced on reassembly. Gasket kits are available from your distributor.
   a. Turn off main power to unit.
   b. Turn off gas supply.
   c. Remove the front outer jacket panel below the control panel.
   d. Disconnect manifold and gas valve from gas piping and remove.
   e. Disconnect wiring from ignitor/sensor. These assemblies are fragile. Use care to avoid breakage when removing.
   f. Remove inner jacket screws and manifold seals.
   g. Slide inner jacket/burner tray assembly out toward front of unit. Use caution.
   h. Remove soot from burners and heat exchanger with stiff nylon brush. Damaged burners must be replaced. Use a vacuum to remove loose soot from surfaces and inner chamber.
   i. Carefully reinstall jacket panels and burner tray. Use new gasket material for proper air seal.
   j. Reassemble and test for gas leaks.

4. Keep appliance area clear and free from combustible materials, gasoline and other flammable vapors and liquids.

5. Check frequently to be sure the flow of combustion and ventilating air to the unit is not obstructed.

6. Combustion air must be free of dust and fumes from chemicals used for pool water treatment. These chemicals can severely damage your pool heater.



NOTE: The gas train and controls assembly provided on this unit have been tested under the applicable American National Standard to meet minimum safety and performance criteria such as safe lighting, combustion and safety shutdown operation.

HOT SURFACE IGNITION SYSTEM

This unit uses a silicon carbide hot surface ignitor to light the burners. The electronic ignition control supervises the ignitor, starts the combustion air fan and opens the gas valve on a call for heat. This hot surface ignition module is not repairable. The hot surface ignitor is a 120VAC circuit. There are no user serviceable parts in the ignition system. Any modification or repairs will invalidate the warranty and may create hazardous conditions that could result in property damage, personal injury, fire, explosion and/or toxic gases. Faulty units should be replaced with a new unit.

DIAGNOSTIC LIGHTS

There are four diagnostic lights on the unit, three on the control panel and one inside the top side panel above the water connections.

CONTROL PANEL LIGHTS

Amber Light is ON: Indicates a low water flow condition.

1. Backwash the filter
2. Clean the skimmers
3. Check operation of the pump
4. If amber light remains on, call for service

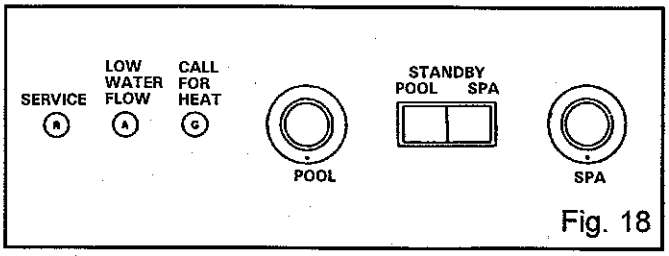


Fig. 18

Red Light is ON: (Service) Reset of ignition system required

1. Turn 120VAC power switch OFF, wait 30 seconds and turn on. Switch is located behind upper side jacket panel, above water connections.
2. If red light stays on or reoccurs, call for service.

Green Light is ON: Burners on providing heat to pool.

1. Light will be on during all burner operation.
2. Light cycles with thermostat operation.

INTERNAL LIGHT - Located behind upper side jacket panel, above water connections.

Amber Light is ON: Indicates low combustion air flow or blocked flue condition.

1. Check venting system and vent cap for restrictions. Flue must be properly sized and installed. Vent cap must allow free flow of flue products.
2. Check combustion air inlet to unit, located above control panel. There should be no restriction or blockage of this open area.
3. Check combustion air fan for operation. Fan should run when thermostat calls for heat.
4. If combustion air is unobstructed and adequate, vent system is correct and fan is running and the amber light remains on, the air shutter on the fan may need adjustment.

COMBUSTION AIR ADJUSTMENT

The combustion air fan is preset at the factory and does not require readjustment in most installations. Insure that adequate combustion air is available, the venting is correct and the manifold gas pressure is correct before proceeding. Use the following procedure to adjust combustion air.

1. Remove the upper side jacket panel above the water connections.
2. Turn on the heater so that the fan is running.
3. Locate the air shutter on the fan and loosen the locking screw on the shutter.
4. Slowly open the shutter to the point where the amber light goes out. Open the air shutter an additional 1/8 inch and tighten the locking screw on the air shutter. Make sure that the light does not come back on when the jacket panel is replaced.
5. Let the unit fire and observe its operation. If the heater has a vibration on operation or the red service light turns on, the air shutter is open too much. Repeat the adjustment procedure.
6. If problem persist, call for service.

FACTS ABOUT WATER CHEMISTRY

Factors which affect pool and spa water and, more importantly, the efficiency of your new pool/spa heater are:

1. PROPER FILTRATION
2. PROPER CIRCULATION
3. DISINFECTION AND OXIDATION
4. pH CONTROL AND TOTAL ALKALINITY
5. ALGAE CONTROL

The water chemistry of your pool or spa changes daily due to natural evaporation of the water and the addition of chemicals. Chemicals are used to sanitize and control algae growth in the pool. Their addition must be carefully monitored. If there is an imbalance in the pool water chemistry, the minerals in the pool water will precipitate out and collect in the pool, filter system and the pool heater. The accumulation of minerals or scale in the pool heater due to a chemical imbalance will cause a non-warrantable failure of the heat exchanger and its components.

pH is the most important factor in maintaining proper balance in your pool/spa water. pH is the measurement of the acidity or alkalinity of water. The chart below shows the ideal pH range and what can happen when the pH increases or decreases from the ideal of 7.2 to 7.8

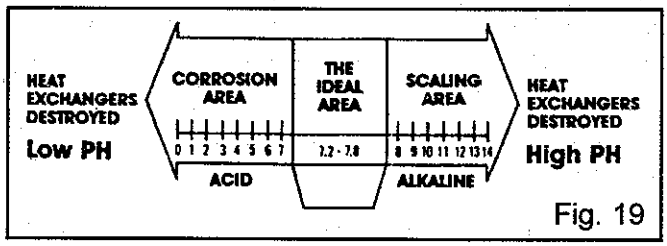


Fig. 19

If the pH becomes too high, it lowers the ability of chlorine to destroy bacteria and algae, water can become cloudy, filter elements may become blocked, and scale formation will occur in the pool and heat exchanger. If the pH becomes too low the water becomes acid. You can have eye burn and skin irritation, etching of the plaster, corrosion of metal fixtures and the resulting stains on the plaster, degradation of sand and gravel filters and corrosion of the copper tubes in the heat exchanger. **Damage to the pool heater due to improper pH is non-warrantable.**

We recommend using a four-way test kit to monitor the following levels to insure proper operation of your pool heater:

Test	Recommended Level
Correct pH	7.2 - 7.8
Chlorine Residual	1.0 - 5.0 PPM
Total Alkalinity	80 - 120 PPM
Calcium Hardness	175 - 350 PPM

Chlorine residual is the chlorine remaining in the pool water after it is consumed in the process of destroying bacteria, algae and other oxidizable materials.

Total alkalinity is the measurement of the total amount of alkaline chemicals in the water. Alkalinity controls pH. Sodium bicarbonate is used to raise total alkalinity.

Calcium hardness can be raised by the addition of calcium chloride, and lowered by the addition of Tri-sodium Phosphate or its equivalent.

The corrosive level of pool water can also be measured by the Langlier Saturation Index. This index is calculated by a formula which uses operating temperatures, total alkalinity, pH, calcium hardness and total dissolved solids. The optimum Saturation Index value is zero. A negative value indicates a corrosive condition. Your pool/spa dealer can provide additional data and equipment to make this measurement if a problem exists.

HEAT EXCHANGER INSPECTION

Tubes

This pool heater is especially designed to operate without accumulation of scale in the heat exchanger, even in very hard water. Periodic inspections of the tubes should be made to be sure that no scale is accumulating. Water piping should be disconnected at the flanges. The front header can be removed to inspect the tubes. A scale deposit of paper thickness is normal. Heavier deposits should be cleaned out. If scale is found in the tubes, THE CAUSE SHOULD BE FOUND AND CORRECTED. Removal and cleaning of the heat exchanger must be performed by a qualified serviceman or installer.

The probable cause is improper water chemistry. Check the following possible causes:

1. High pH.
2. Improper adjustment of an external bypass.
3. Inadequate pump flow.

Always be sure pump is in good operating condition and runs continuously when the pool heater is operation.

PREVENTION OF FREEZING

Heat exchangers and headers damaged by freezing are not covered by warranty. If equipment is subject to freezing temperature, the following precautions must be observed.

FREEZE PROTECTION

Although these units are AGA/CGA certified for outdoor installations - such installations are not recommended in areas where the danger of freezing exists unless proper freeze protection is provided.

1. If system pump does not run continously, an additional pump must be installed to provide constant circulation through the pool heater. This will help prevent freezing.
2. A snow screen should be installed to prevent snow and ice accumulation around the pool heater.
3. If for any reason the pool heater is to be shut off when temperatures may be below 35° F (2° C), you must winterize the unit:

    1. **Shut off gas supply.**
    2. **Shut off water supply.**
    3. **Shut off electrical supply.**
    4. **Remove the lower side jacket panel below the water connections.** ***Figure 20***
    5. **Locate the three (3) drains on the bottom of the front header.** ***Figure 21***
    6. **Open all three (3) drains and allow the heat exchanger to drain completely. Leave drains open until Spring.**
    7. **Drain pump.**

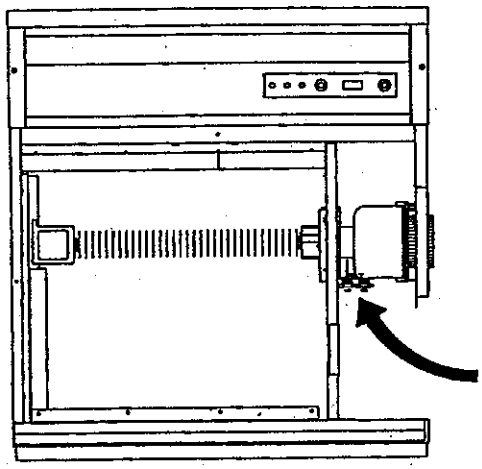
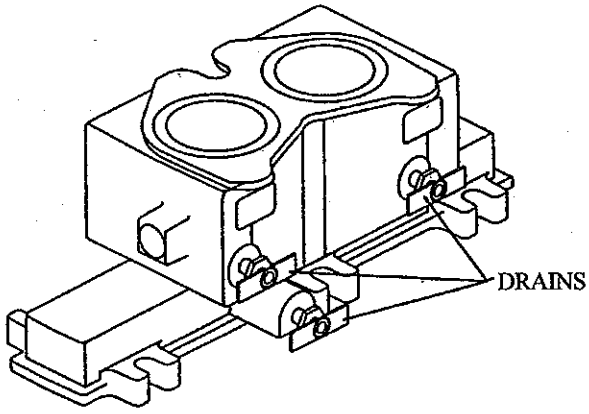


Fig. 20



FRONT HEADER BOTTOM VIEW

Fig. 21

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