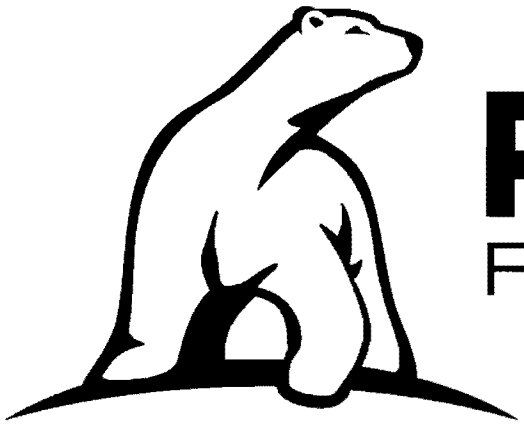
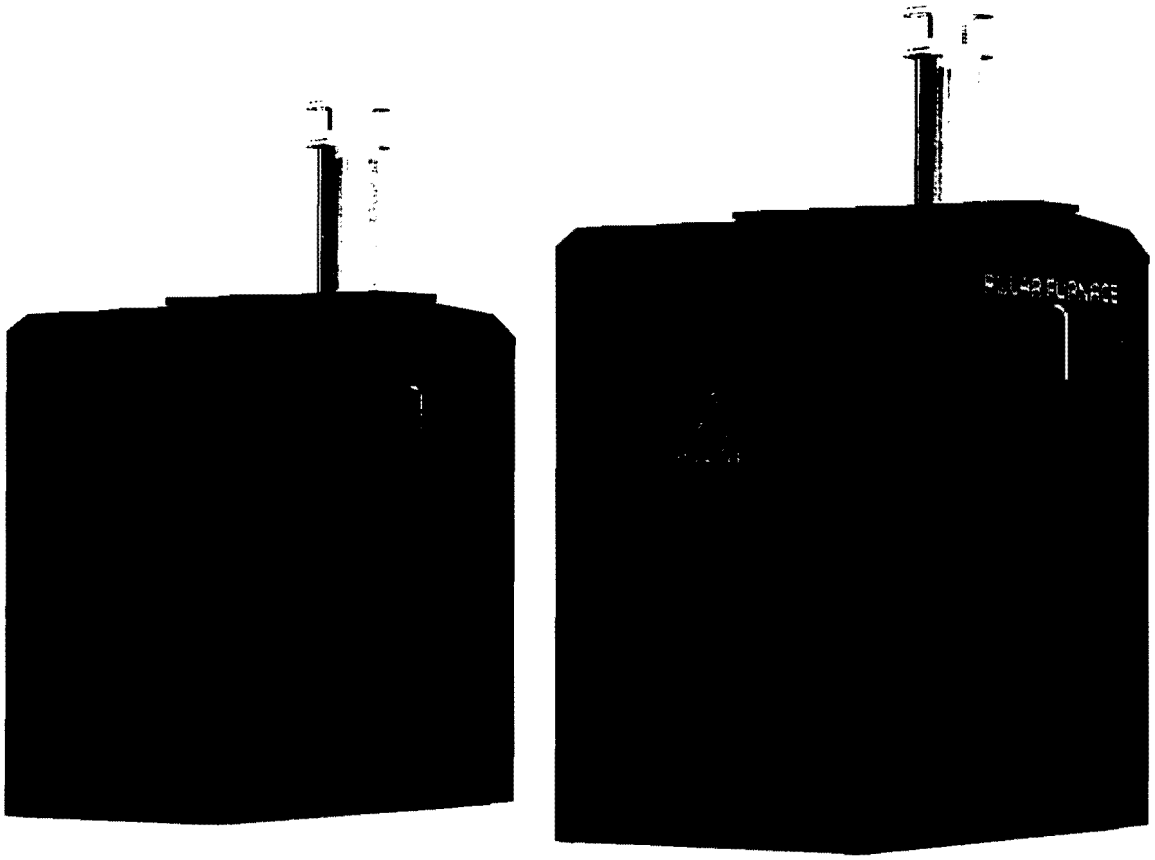
Owner's Manual

for Polar Furnace® Down Draft Heater



POLAR
FURNACE



IMPORTANT: Read and fully understand this manual prior to installing and/or operating a Polar Furnace heater.

POLAR FURNACE DOWN DRAFT HEATER
25 YEAR LIMITED REPLACEMENT WARRANTY

Polar Furnace Mfg. Inc. (The Company) warrants the water jacket and fire chamber of the heater identified herein to be free from defects in material and workmanship during normal use for a period of two years from the date of original purchase to the original purchaser of this heater. In year one and two The Company will cover the cost of replacing or repairing the fire chamber and water jacket onsite or at our factories including materials, parts, travel and labor. Electric and electronic components as well as high temperature refractory and the heater housing are limited to a 12 month 100% replacement warranty. In years 3 and 4 this warranty is limited to 80% of cost of repair of the fire chamber and water jacket at The Company's then current rates and is limited to the cost of material and parts required for repair only. Only the manufacturer at address on this certificate will determine in its sole and absolute discretion all warranty issues, and work claimed under warranty must be approved in writing by The Company prior to any repairs being started.

If repair is not feasible for any reason as judged by The Company our obligations under this warranty are limited to providing a replacement heater per the following schedule. For the 25 year warranty period the following pro-rated replacement charge will apply.

Schedule of charges for replacement of the complete heater.

From 1 through 2 years	Company's then current list price less 100%
From 3 through 4 years	Company's then current list price less 70%
From 5 through 6 years	Company's then current list price less 40%
From 7 through 10 years	Company's then current list price less 25%
From 11 through to 25 years	Company's then current list price less 15%

All replacement heaters are FOB our factory unless otherwise specified in this warranty.
The warranty period on any replacement heater is from the date of the sale of the original heater.

General Conditions of this warranty.

The warranty contained herein shall be voided if the heater is not installed and operated as instructed in the owner manual. The warranty registration form, delivery checklist, and customer acceptance must be completely filled in and signed by the customer and dealer and submitted to The Company for this warranty to be valid. Heater must never be pressurized and pressurizing the heater voids this warranty. A properly qualified tradesperson/s should perform all installations. If chimney needs be extended an appropriately certified and approved insulated chimney must be used. Your dealer may charge you for a service call to do warranty work. Parts will be replaced on an even exchange basis.

Polar Furnace heaters are not intended to be the only source of heat. A backup system should be in place to prevent resultant damage due to a lack of heat. Door seals, light bulbs, fire tending tools, heat shields, hearth plates and any other wear items are not covered under this warranty. The insulated chimney is not covered under this warranty. High temperature refractory materials are warranted for 1 year under this warranty. In use, small cracks can occur in high temperature refractory and will not affect the performance of the heater. Damage caused by abuse, accidents, improper use, improper installation, excess creosote buildup, overheating, freezing, corrosion, negligence, accidents in transit, and pressurization are not covered under this warranty. Damage resulting from modifications or alterations will not be covered under this warranty. If the serial number on the equipment is defaced, altered or removed this warranty is void. Damage caused by burning flammable materials (such as petroleum products) or any other material besides properly prepared wood will void this warranty. This warranty is limited to defective parts repair and/or replacement only, and excludes any incidental and consequential damages. Only nontoxic antifreeze that meets and/or is approved per all applicable regulations and standards may be used. The Company will not be responsible for any environmental damages or charges resulting from use of toxic and or unapproved types of antifreeze. Antifreeze will breakdown over a period of time and therefore should be tested annually to insure adequate freeze protection. Always dispose of antifreeze per federal, state, provincial, local or any applicable laws and regulations. Loss of antifreeze under any situation and condition is not covered under this warranty. The Company is not responsible for replacement of water, water treatment, antifreeze, removal, disposal, costs of transportation, or shipping charges. Warranty does not cover any plumbing, boiler piping, valves, controls or any other component or system external to the boiler package. WARNING, The Company will not warranty the inside of the fire drum due to ash corrosion. Rotation of ashes and/or stirring of firebox corners must be performed as per the operator manual instructions and as displayed on the maintenance list located on the side of the heater. WARNING, The Company will not warranty the water jacket due to corrosion from corrosive or improperly treated water. An appropriate water treatment must be added and maintained and receipt retained for proof of use to establish any warranty claims. We will not be liable to any contingency beyond our control including war, strikes, floods, government restrictions or short supply of material. We will not be liable for any labor cost, except above schedule. This warranty replaces and supersedes any and all other warranties, expressed or implied, directly and or indirectly whether at law, common law, equity and/or statute and constitutes the only warranty of The Company and the only liability of The Company. This warranty constitutes the entire agreement between the parties with respect to the subject matter and supersedes all prior agreements, negotiations, discussions, undertakings, representations, warranties and understandings, whether written or verbal. This Warranty is governed by, and is to be construed and interpreted in accordance with the laws of Manitoba and the federal laws of Canada applicable in Manitoba. The purchaser and The Company each irrevocably agree to submit to the jurisdiction of the courts of Manitoba. The Company's limitation of liability pursuant to any warranty shall be equivalent in all respects to the sum of $1.00.

Polar Furnace Mfg. Inc.

Box 157. Sperling, Manitoba. R0G 2M0

PH: 1-204-626-3485 FAX: 1-204-626-3326

NOTICE: Fill out the form on page 5 to activate this warranty.

POLAR FURNACE MFG. INC.
WARRANTY ACTIVATION FORM—DOWN DRAFT HEATER

WARRANTY REGISTRATION FORM

Customer's Name:_____ Dealership Name: _____

Address:_____ Address: _____

City, State/Prov. Code:_____ City, State/Prov. Code:_____

Phone: (____)_____

Serial No._____ Date of Purchase: _____/_____/_____

DELIVERY CHECKLIST

_____ Review owner's manual.

_____ Describe installation methods and recommendations.

_____ Review warranty and service requirements.

_____ Identify safety hazards and demonstrate proper operation.

_____ Explain required maintenance schedule.

_____ Describe possible problems from using different types of wood.

_____ No warranties are validated unless this form and registration are completed and returned.

CUSTOMER ACCEPTANCE

I have inspected the Polar Furnace heater with the customer and reviewed all items on the delivery checklist. I have thoroughly instructed the customer on the equipment identified herein and thoroughly reviewed the operator's manual. The customer has accepted responsibility for the operation and maintenance of the product identified herein.

Date: _____ Dealer's Rep. Signature: _____

The dealer rep. and I have inspected my new Polar Furnace heater and reviewed all items on the delivery checklist. The dealer rep. has reviewed the operator's manual with me and has thoroughly instructed me on the equipment herein. I assume full responsibility for the operation and maintenance of the product identified herein.

Date: _____ Owner's Signature: _____

A nominal fee may be charged for service calls. All sales are final. Heater approved for use with well-seasoned wood only. Suitability of use is the customer's decision. The customer is responsible for insuring conformance to local bylaws and regulations. A backup heating system is strongly recommended.

White—Polar Furnace copy	Yellow—Dealer copy	Pink—Customer copy

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For service and support on your Polar Furnace contact your local dealer

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TABLE OF CONTENTS

INTRODUCTION

The Polar Furnace G-Series Heaters are wood-fired, downdraft, hydronic heaters. The downdraft burning design allows for controlled combustion of wood which results in far lower smoke and particulate emissions and higher efficiency when compared to other designs.

!! NOTICE !!

The Warranty Activation form is located on page 5. This form must be thoroughly completed and the white copy returned to Polar Furnace Mfg. Inc. to ensure product support and warranty activation.

G-Series heaters are tested and approved by CSA INTERNATIONAL to CSA/CSA-366.1-M91 and UL2523

G-Series heaters are tested to EPA test Method 28 WHH and are EPA Phase II qualified.

SAVE THESE INSTRUCTIONS

Keep this manual for as long as you own the Polar Furnace heater. Read and understand these instructions before installing or operating this heater.

WARNINGS & CAUTIONS

!!WARNING!! All installations and operations must follow the applicable federal, provincial, state, and local codes for wiring, plumbing, chimney installation, chimney extension(if required) and firing of this unit. When the relevant local codes differ from this manual, the local codes take precedence.

!!WARNING!! Strictly maintain the following clearances around the heater to any combustibles including fuel storage. Front - 24", Right - 6", Left - 1", Rear - 6", Top - 2", Flue - 6".

!!WARNING!! DO NOT burn garbage, gasoline, engine oil, coal, tires, railroad tiles or anything other than wood in the heater. Do not use chemicals or fluids to start the fire.

!!WARNING!! Burn wood only! Dry seasoned wood is preferable. The manufacturer does not recommend burning treated or contaminated wood. (i.e. railroad ties or pressure treated lumber)

!!WARNING!! All Polar Furnace heaters operate at atmospheric pressure. DO NOT, in any way, obstruct, block or plug the overflow/fill pipe located on top of the heater. DO NOT install a pressure relief valve. Open rear access cover before filling with water. This boiler should not be connected to an existing heating system unless a water to water or water to air heat exchanger is used.

!!WARNING!! Use of a raincap with an approved spark arrestor is required.

!!WARNING!! Most Polar Furnace heaters are installed outdoors. All clearances on door panel should be observed. Always keep area around and in front of fire door cleared from combustible materials. DO NOT store fuel within clearances listed on label.

!!WARNING!! Polar Furnace heaters are CSA certified for outdoors and indoors. When used indoors special care must be taken to insure the installation conforms to local installation requirements. Plan for make up air, ventilation of smoke when opening door, chimney clearances and heights, and clearances from combustibles. Consult local professionals. Field installations must satisfy CSA CAN/CSA-B365 installation code for solid fuel burning appliances as well as any other applicable standards or regulations. If extended chimney height is needed, use an insulated chimney system.

!!WARNING!! Installation should be completed by appropriately qualified individuals.

!!WARNING!! Never let small children play near or tamper with the heater. Only responsible adults should operate the heater. Outer surfaces may be hot during operation. Ensure children do not touch heater.

!!WARNING!! Always open the load door slowly while standing well back and behind the door. Open the outer door and wait one minute before opening inner doors. Do not look directly into the fire chamber until at least 60 seconds have passed after opening the load door. Failure to do so may result in serious injury from flashbacks.

!!WARNING!! Keep fuel door tightly closed during operation.

!!WARNING!! In case of a runaway fire, disconnect the heater from the electrical supply and ensure all doors are closed. Check to ensure the air supply gates are not stuck open. Check aquastat settings. Add water to ensure that the heater is not low on water.

!!WARNING!! DO NOT operate heater unless the water level gauge shows that the water jacket is in the "Full" range.

!!WARNING!! Be concerned about ground water and insulate the distributions pipes to avoid excessive wood consumption.

!!WARNING!! The secondary combustion chamber, heat exchanger and areas above and below the heat exchanger should be cleaned regularly to remove accumulated creosote and ash.

!!WARNING!! Cleaning the firebox, flue pipes, chimney, heat exchanger and fan is especially important at the end of the heating season to minimize corrosion. All accumulated ash MUST be removed.

!!WARNING!! Care should be taken to avoid potential smoke problems. Downdraft heaters can smoke if not operated properly with properly prepared wood. Be a responsible neighbor and use properly seasoned firewood. Use a chimney extension if required.

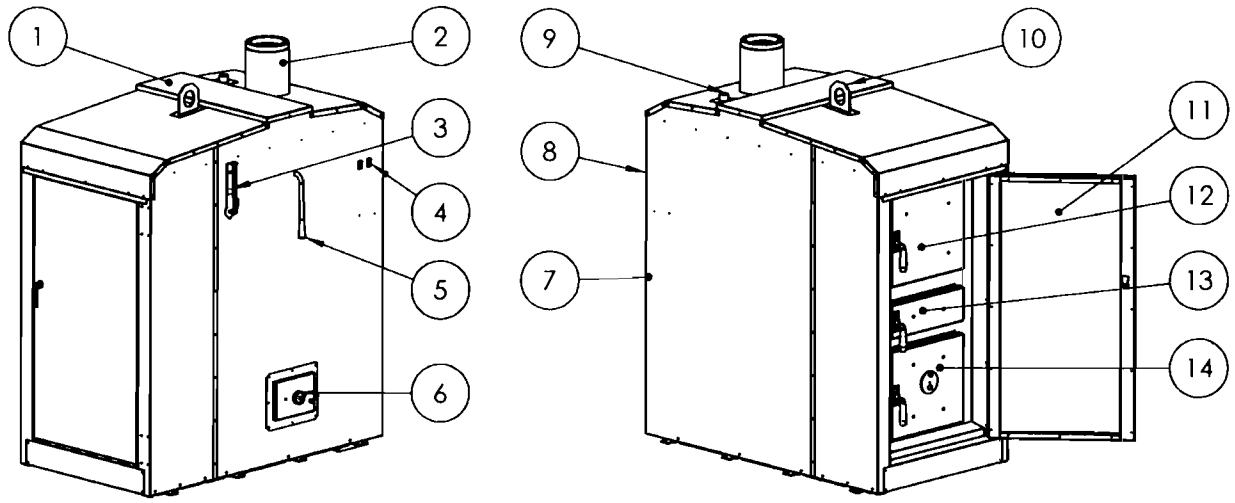
Minimize Smoke Emissions. Burn Wisely.

- Be concerned about smoke emissions and smoke odour from the heater.
- Consider prevailing wind direction when choosing a site location for the heater.
- Water can be piped a long distance with minimal heat loss. This is a good option to avoid smoke related problems.
- Don't burn garbage. Burn only well-seasoned firewood.

Safety First!

- Be safety conscious.
- Clear ground around heater.
- Use non-combustible cement blocks, patio blocks or cement base under heater.
- Install the rain cap on the chimney. Use an approved spark arrestor.
- Use a good quality pipe for hot water distribution.
- **ALWAYS HIRE APPROPRIATELY QUALIFIED INSTALLERS.**

HEATER COMPONENTS



Item #	Description
1	Heat Exchanger Access Cover
2	Chimney Hookup
3	Water Level Sight Gauge
4	Combustion Cycle ON/OFF Switch, Auxiliary Switch
5	Flue Cleaning Actuator Lever
6	Heat Exchanger Bottom Cleanout
7	Rear Bottom Access Panel—Plumbing Hookup, Damper Setting
8	Rear Top Access Panel—Fan Access, Electrical Access
9	Overflow/Fill Pipe
10	Lifting Hook
11	Main Outer Door
12	Loading Door
13	Ignition Door
14	Front Bottom Cleanout Door

All installation work must be completed by appropriately qualified personnel and must conform to all applicable standards, regulations and local codes (e.g. CAN/CSA-B365 Installation Code for Solid Fuel Burning Appliances).

Heater Fire Clearances

All G-Series Heaters are CSA approved to the following fire clearances. No combustibles should be stored within these measurements.

Front	24"
Back	6"
Left Side	1"
Right Side	6"
Top	2"
Chimney	6"

Consult with your insurance company to ensure that the boiler to building clearances are acceptable. Failure to do so may void insurance. The manufacturer assumes no liability in the event of damages to personnel or buildings.

Indoor Installation

Polar Furnaces are CSA certified for both indoor and outdoor installation. However, care must be taken whenever a heater is near or inside a building. When installed indoors, proper air supply is required for combustion and ventilation. Continuous air supply is mandatory. Installation must conform to all applicable codes and standards. Consult a heating professional.

Chimney

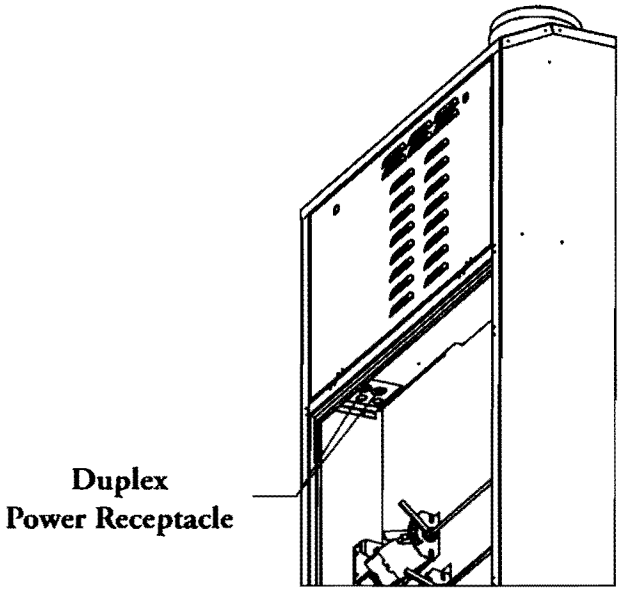
Chimney installations must conform to all applicable regulations and standards. All chimney extensions must be completed with approved prefabricated chimney pipe. The rain cap with spark arrestor must be installed at all times. Chimney extensions may require periodic cleaning.

Electrical Requirements

Electrical Rating: 120V AC, 6 amps, 60Hz. Installation must meet federal, provincial and local codes and must be completed by qualified personnel only. Wire must be rated and approved for direct burial if is to be included in the same trench as the water lines. Heater power connection box is located at rear of heater inside rear access panel. Minimum supply conductor ampacity is 15 amps. Maximum over current device is 15 amps. Use copper conductors only.

Power for Circulation Pumps

At the back of the heater there is a standard duplex receptacle for plugging in and powering up the 2 pumps. See the diagam below.



Underground Water Distribution Pipes

An 18" deep ditch is recommended. When passing under a driveway or traffic area a 36" to 48" ditch is preferable. Prevent the underground pipe from lying in water. Use a high quality insulated, waterproof piping system for underground water distribution. (e.g.Thermoflex Insulated Pex Pipe)

Waterline Hookups In Buildings

Do **NOT** connect to an existing system unless a water to water or water to air heat exchanger is used. It is recommended that a qualified installer complete the installation.

Filling the Water Jacket

!! WARNING !!
Do NOT start a fire in the heater before filling the heater water jacket with water. Starting a fire in the heater without first filling the water jacket can damage or destroy this heater.

!! DANGER!!
Do NOT pressurize this heater. This heater is designed with an open system type water jacket. Pressurizing the heater could result in damage to the heater, damage to property, and could cause severe bodily injury and even death.

!! WARNING !!
Before filling the water jacket, test the water to ensure the pH level is within the acceptable range of 7-9.9. Water that is NOT within this allowable range must NOT be used to fill the water jacket. Please review the "Water Testing and Treatment" section in this manual for instructions on how to test the pH of the water you intend to use.

Antifreeze

This heater is a hydronic heater. This means that it operates by heating water that is inside the water jacket part of the heater. This water jacket must be filled with water or a water/glycol mixture before operating the heater. Filling the water jacket can be achieved by adding water through the overflow pipe on top of the heater or by hooking the water supply hose to the drain/fill valve located inside the rear access panel. Alternately, the water jacket can be filled by adding water into any part of the hot water distribution piping. Fill the heater until the water level is in the green "FULL" zone.

!! WARNING !!
Use only approved environmentally friendly antifreeze. Many types of antifreeze are banned in specific areas. Propylene glycol is legal in most areas. Check with local authorities to ensure that propylene glycol use is legal in your area.

Water Treatment

Review the "Water Testing and Treating" section of this manual before filling the water jacket. See instructions included in the startup water treatment kit which shipped with this heater.

Using the Water Level Sight Tube

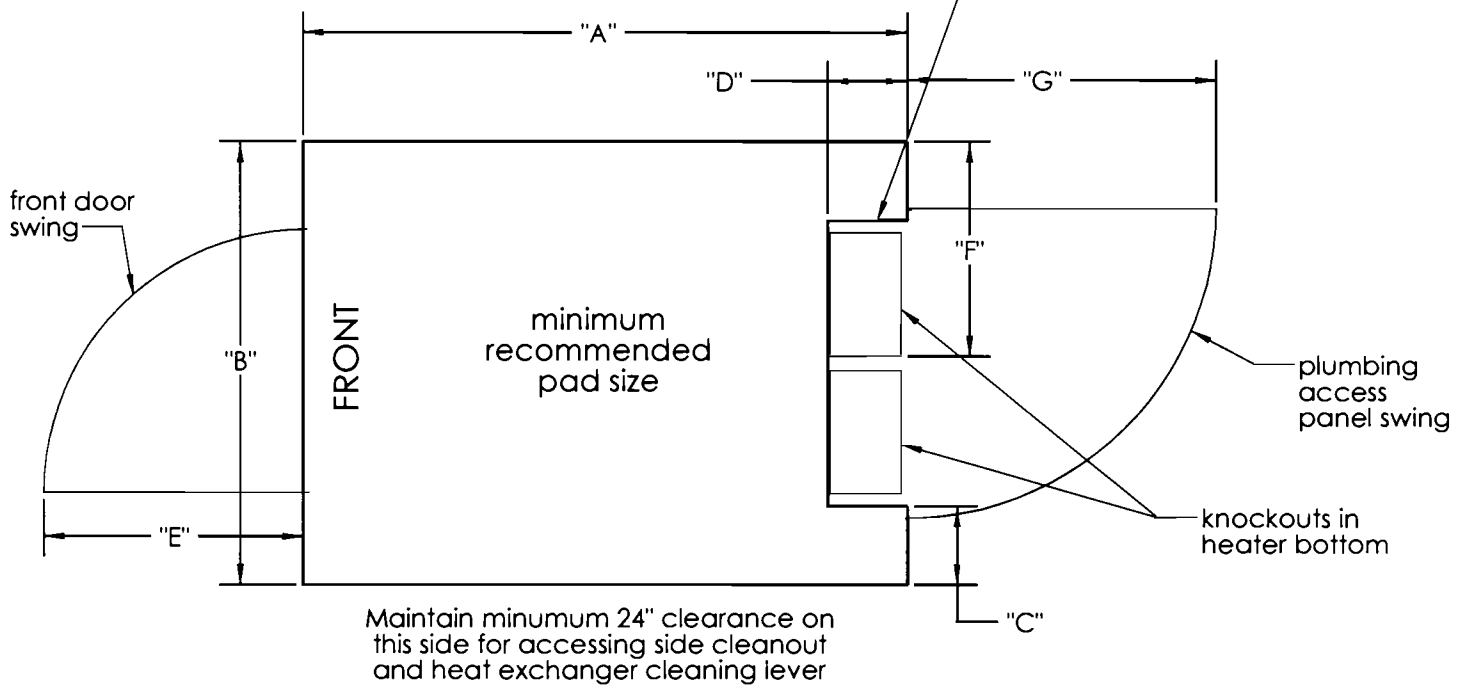
The water level sight tube is located on the side of the heater. To check the water level in the heater turn the valve handle into the vertical position. The sight tube will fill with water showing the level of the water in the water jacket. If the level is in the red "ADD" zone add water until the level is in the green "FULL" zone. After using the water level sight tube always turn the handle back into the horizontal position and the water will drain from the sight tube.

Heater Delivery

Wash the heater immediately following delivery to remove salt and dirt from shipping. Inspect the heater for shipping damage. If damaged, make note of it on carrier shipping paperwork. Check to insure all of the following items were shipped with the heater: 12" insulated chimney extension, rain cap, water treatment kit, owners manual. If any items missing make note on carriers paperwork of missing items.

G-Series Foundation Drawing

The cutout at back of the foundation is to accomodate the water supply and return lines so that they can penetrate into the back of the heater from beneath the foundation. The heater bottom panel has knockouts in place for this purpose.



Dimension	G2	G3
"A"	61.5	70
"B"	45	51
"C"	8	8
"D"	8	10
"E"	26.5	28
"F"	22	25
"G"	32	37

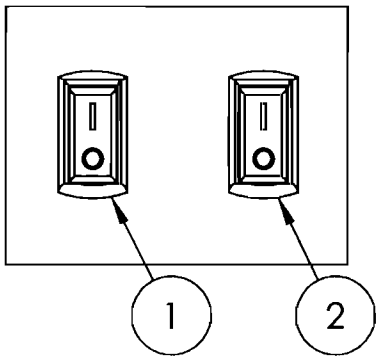
The G-series heaters should rest on a cement or patio block surface. The foundation for the pad can be made from cement, crushed rock, packed A-base or any other noncombustable material that will support the weight of the heater.

The water supply and return pipes must be installed so that they are protected against damage from an outside occurance and protected against sunlight, freezing and fire.

POLAR FURNACE MFG. INC. Box 159, Sperling, Manitoba, R0G 2A0		PART NUMBER G-Series - Pad
DIMENSIONS ARE **INCHES** UNLES SPECIFIED TOLERANCES ARE: ± 0.5" all dimensions subject to change without notice	MATERIAL	
	NAME	
	WEIGHT	NEXT ASSEMBLY / SHEET 1 OF 1
	DRAWN BY	THIS DRAWING AND ALL INFORMATION THEREON IS THE PROPERTY OF POLAR FURNACE MFG. INC. IT IS LOANED CONFIDENTIALLY AND MUST NOT BE USED IN ANY WAY DETRIMENTAL TO OWR INTEREST

Controls Overview

The heater controls include 2 aquastats located inside the rear top access panel and 2 switches located on the right side of the heater towards the rear of the heater as well as one temperature gauge located inside the front main access door. One aquastat controls the combustion process. The second aquastat is the high temperature shutdown to prevent overheating of the heater if the control aquastat fails for any reason. One switch turns the combustion cycle on and off. The second can be wired to control an auxiliary or optional function. (e.g. oudoor light).



Item #	Name	Function Description
1	Combustion Switch	For switching the combustion cycle ON or OFF. In the ON position the combustion cycle will only start if the controller is calling for heat.
2	Auxiliary Switch	For switching auxiliary item ON or OFF. (e.g. Light)
3	High Temp. Aquastat	(Not SHOWN—located inside rear top access panel). Switches fans off if controller fails and boiler overheats.
4	Control Aquastat	(Not SHOWN—located inside rear top access panel). Controls when combustion starts and stops.

Controls Functionality

Combustion Switch

This ON/OFF switch switches the combustion cycle on or off. When the switch is in the "OFF" position the combustion cycle will not start even when the controller is signaling for the combustion cycle to start. When the combustion switch is at the "ON" position the combustion cycle will start but only if the temperature control aquastat is also signaling the combustion cycle to begin.

!! WARNING!!
Switching the Combustion Switch to OFF does not cut off all power to the fan and actuators. Disconnect the main power supply before servicing the fan and/or actuators.

Auxiliary Switch

Used to switch an auxiliary or optional item ON or OFF. (e.g. outdoor light)

Control Aquastat

The control aquastat is used to set the water temperature at which the heater switches the combustion fan off and at which water temperature the combustion fan switches on during normal operation. The control aquastat is set to 185°F with a 15 degree differential at the factory. In most installations this setting will work well. The control aquastat should never be set higher than 185 or lower than 175.

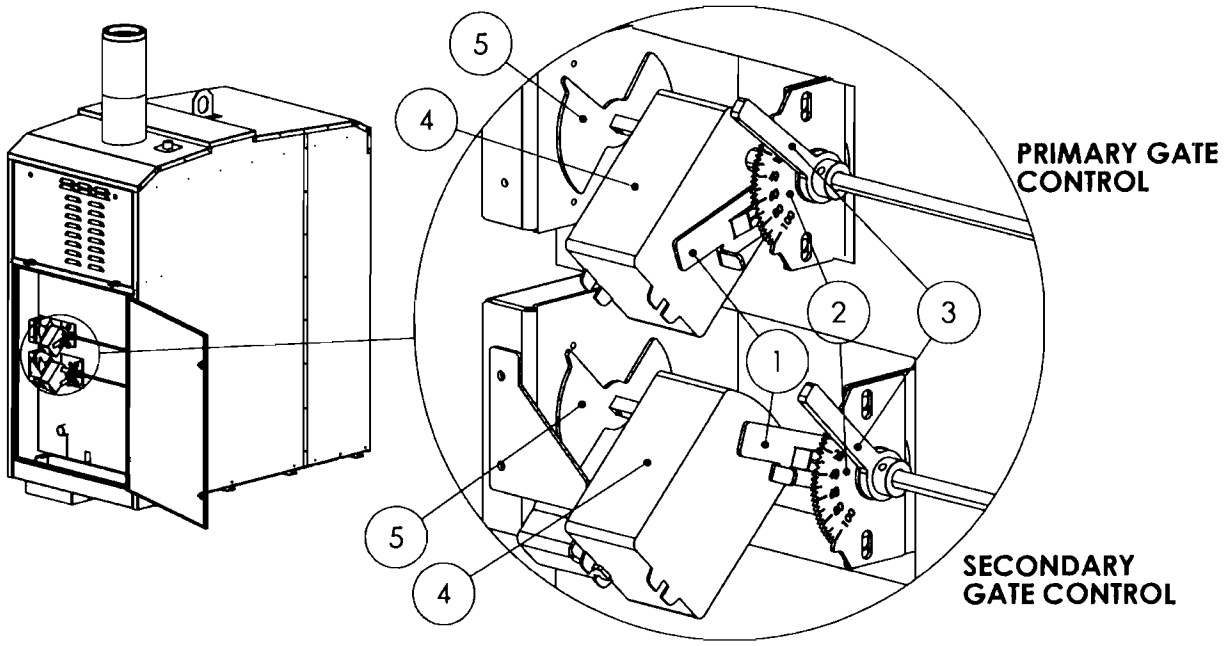
High Temperature Aquastat

The high temperature aquastat is used to protect the heater against over heating if the control aquastat should fail. If the high temperature set point is reached the fans are switched off. The high temperature shutdown aquastat is factory set to 195. It should never be set higher than 195 and should be at least 8 degrees higher than the control aquastat set point.

Temperature Gauge

Provides a reading of the water temperature inside the water jacket.

Primary Air & Secondary Air Controls



Item	Feature	Function Description
1	Gate Adjustment Lever	Spring loaded lever can be pulled slightly sideways and moved upwards or downwards to set how far the air gate opens.
2	Indicator Dial	Used as a reference to show how much the air gate will open when adjustment lever is set to different positions.
3	Rotation Stop	Rotates when actuator turns and stops rotation when it hits the Gate Adjustment Lever.
4	Spring Return Actuator	Opens the air gate when the combustion fan turns on. Gates will open to the position set by the Gate Adjustment Lever.
5	Air Gate	Air Gates open to the amount set on the Gate Adjustment Lever when the actuator rotates

!! WARNING !! Maintain minimum distances between heater and combustibles.

!! WARNING!! Have a clearly understood plan of how to handle a chimney fire.

!! WARNING!! Keep area around heater clear of combustibles.

Flashbacks

!! CAUTION !!

ALWAYS KEEP BODY AND FACE WELL AWAY FROM LOAD DOOR, ACCESS DOORS AND CLEANOUT DOORS WHILE OPENING THEM. FAILURE TO DO SO CAN RESULT IN SERIOUS BODILY INJURY FROM FLASHBACKS.

When opening any access panels on the heater there is a danger of flashbacks. It is important to understand what causes flashbacks before operating the heater. Read the following explanations carefully and be sure to understand what flashbacks are before attempting to operate the heater.

Cause of Flashbacks

The root cause of flashbacks is the accumulation of oxygen-starved hot gases inside the fire chamber. These gases cannot combust without oxygen. Opening the load door allows fresh air and oxygen to mix with the hot gases causing them to ignite, burn suddenly or explode.

Conditions Causing Flashbacks

There are some combustion conditions that greatly increase the risk of flashbacks. It is important to understand these conditions. **It is important to note that flashbacks can occur at any time when any of the front heater doors are opened and are not limited to the condition described below.**

The Combustion Fans Have Just Shut Off

Once the heater reaches the point where the water temperature is high enough, the controller shuts off the combustion fans. When the fans stop blowing, actuators also close off the air supply openings. This stops any new air and oxygen from getting into the fire chamber. At this point the fire chamber is still extremely hot. The heat in the fire chamber continues to bake the wood and it continues to break down into combustible smoke and gases. Without oxygen these combustible hot gases do not burn off and accumulate in the fire chamber. When a door is opened, fresh air and oxygen mix with the hot combustible gases which then ignite and explode. **Always keep face and body well away from door when opening the load door, ignition door, bottom and side cleanout doors.**

Hot Surfaces

There are surfaces on the boiler that get hot. Always wear protective leather gloves when working on or around the heater, when loading the heater and when performing maintenance on the heater.

Smoke Inhalation / Eye Irritation

Burning wood produces smoke. Avoid inhaling smoke. Whenever there is smoke, wait until smoke has cleared before proceeding to load the heater or perform maintenance work.

!! DANGER !!

NEVER PRESSURIZE THIS HEATER! NEVER block or obstruct the overflow/vent pipe located on the roof of the heater (item #9 on page 15). Pressurizing this heater could result in very serious injury and damage to the heater and property!!

Before You Begin

Do not use any flammable liquid (gasoline, lighter fluid, diesel, etc) to help start or maintain a fire in the heater as this can result in serious bodily injury and can cause damage to the heater and property.

Do not burn anything other than properly prepared wood in the heater. Do not burn garbage, treated wood, plastic, oil, coal or anything other than properly prepared fire wood.

Be sure to keep all combustibles outside of the fire clearances as specified. See page 16 of this manual for minimum fire clearances.

The heater is designed to have an open or unpressurized water jacket. Pressurizing the heater can cause damage the heater, property and/or cause bodily harm.

Wood Fuel Considerations

Dry firewood is the only recommended fuel source for the G-Series heaters. The moisture content of the wood being used to fuel the heater must be between 15% and 26%. The best way to determine wood moisture content is with a moisture meter, although with practise, moisture content can be estimated accurately without a moisture meter. As a general rule, hardwood cut, split and stacked for one year under cover will usually have dried to within the 15%-26% moisture content level. Wood that has been properly stored for two years is best. The manufacturer cannot be responsible for problems related to using wood that is not adequately dry. Using fuel types that are freshly cut may result in unpredictable operation, poor efficiency and a shortened heater life. Logs or split pieces of wood with a diameter of less than 6" are best. Larger pieces can be burned but the heater will not perform as well.

Generally you will be more satisfied with the heater when burning drier wood. With drier wood the heater will

- burn less wood,
- be more efficient,
- smoke less,
- will be easier to set,
- easier to light,
- will have less creosote buildup and
- will last longer.

Dry wood burning is better wood burning!

Starting and Operating the Heater the First Time

Before starting the heater for the first time, the installation should be inspected and approved by an individual with appropriate qualifications (electrician, plumbing and/or heating contractor etc.) The heater and all heating system piping must be properly filled with water.

When starting the heater for the first time after purchasing or when starting for the first time at the beginning of a heating season, follow the following steps:

1. Switch the fan switch to the **ON** position.
2. Place a layer of small pieces of wood kindling and newspaper onto the fire chamber floor. Do not plug the slot at the bottom of the fire chamber.
3. Add at least 12 inches of smaller firewood no larger than 2" across on top of the kindling.
4. Fill the fire chamber as full as desired with regular pieces of firewood.
5. Close the top loading door and open the front middle ignition door.
6. Light the newspaper/kindling on the fire chamber floor.
7. Leave the middle door open a crack until the kindling has caught well.
8. After kindling has caught well close the front middle ignition door.
9. Insure all 3 front doors are closed tightly and close outer door.

Stoking the Heater

When filling the fire chamber, place the wood lengthwise inside the fire chamber. Stack the wood inside the chamber as neatly as possible. Lay the first few piece into the fire chamber carefully since dropping them can damage the ceramics. Never place wood into the secondary fire chamber (front bottom door). See the "Wood Fuel Consideration" section on page 27 for information on which wood is suitable as fuel for the heater.

Managing the Ash/Coal Bed

After using the heater for several days you will notice a buildup of ash and coals at the bottom of the fire chamber. When left undisturbed for several more days, this layer can become a hard insulating layer which will negatively impact the performance of the heater. This layer must be stirred on a regular basis. **The ash building up in the corners at the bottom of the fire chamber must be stirred daily or at every loading.** If the ash buildup becomes excessive part of it can be removed. Always leave an inch or two of stirred ash and coals in place to protect the bricks from logs dropping onto them during loading.

Keep the Primary Air Holes Clear From Obstruction.

The primary air holes are located towards the bottom and along both sides of the fire chamber. Before loading the heater open the middle ignition door and use the scraper tool to clear coals and ash that may be covering the primary air holes. This will make the heater burn cleaner and more efficiently.

Disposal of Ashes

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground well away from all combustible materials.

Shutting Down the Heater

The heater combustion cycle can be turned off manually by switching the combustion switch to the OFF position. This will not stop the combustion cycle from turning on when the loading door is opened. To completely shut down the heater, the main disconnect switch powering the heater must be turned off.

Fractional Load/Summer Use

A fractional (or partial) load is a very small heat load that may be placed on the heater during the spring, summer and fall months. An example of a fractional load would be when the heater is used to heat domestic water only during this period. In a fractional load-type situation, fill the chamber only with as much wood as needed to provide heat for the next several hours. For example, if a half chamber load of wood is needed to provide heat for the next several hours, fill the chamber only half way. This will help make the heater last longer. If possible, do not use the heater during summer months to provide heating for domestic hot water only. Use an alternate supply of heat for this purpose. The heater will last the longest if it is working hard. A tiny partial load like domestic hot water heating during summer is harder on the heater and can shorten its life. If using the heater in the summer for domestic hot water only add as little wood as possible when filling the heater. If you notice the ash at the bottom of the heater is wet or moist, stop using the heater for only a partial load.

Operating Temperature

The water temperature in the water jacket should always be above 150°F. Maintaining proper water temperature in the heater is important for two reasons:

1. Proper combustion—cool water cools the combustion process which reduces the combustion efficiency.

2. Heater longevity—cool water causes condensation to form on the fire-side surfaces. This condensation results in creosote buildup throughout the heater. Moisture or water mixed with ashes is corrosive and will shorten the life of the heater.

Setting the Primary and Secondary Air Gates

The air gates regulate how much primary and secondary air gets delivered to the fire. The primary air gate regulates the amount of air delivered to the primary fire chamber. The secondary air gate regulates the amount of air delivered to the secondary chamber. (See page 25 for air gate diagram) By changing the air gate settings the heater BTU output rate can be increased or reduced, also different amounts of primary and secondary air may be needed depending on the type and moisture content of the wood being burned. The G-Series has a very stable combustion system by design. As long as the moisture content of the wood being burned doesn't change dramatically, the air gates will rarely need adjusting.

Air Gates Location

The primary and secondary air gates are located inside the rear bottom access panel (item number 7 on page 15).

Factory Settings

At the factory, the primary gate is set to 50% open and the secondary gate is set to 20% open. These settings will work well in most situations provided properly prepared and well-seasoned wood is used. See the "Wood Fuel Consideration" section on page 27 for information on which wood is suitable as fuel for the heater.

General Air Gate Adjustment Guidelines

Wood Moisture Content

Wetter wood generally will need more primary air and less secondary air
Drier wood generally will need less primary air and the same or more secondary air.

Wood Size

Larger diameter logs will reduce the output rate of the heater. Smaller diameter or pieces that have been split smaller will increase the output rate of the heater. Larger logs will generally require less secondary air while smaller logs will generally require more secondary air.

Soft Wood vs Hard Wood

Softer woods generally will burn faster and need more secondary. Harder woods will generally burn slower and require less secondary air.

Is My Heater Burning Wood Properly?

Chimney Smoke

Good combustion is characterized by no visible smoke coming from the chimney. If the heater is smoking when the air gates are set to the factory settings it is highly likely that wet wood is being burned.

Secondary Flame Characteristics

How well the heater is burning can be gauged by viewing the secondary flame through the peep hole in the front bottom door. During optimal combustion this flame will have at least some blue flame in it. If you see blue the heater is well set. Depending on which part of the combustion cycle the heater is in, there will be more or less blue flame. When there is a heavy bed of coals in the fire chamber the flame should have more blue than orange and yellow. When the heater has just started burning on a fresh load of wood there will be very little blue flame and mostly orange and yellow flame.

Ceramics Glow

If the combustions cycle is long enough the ceramics will begin to glow bright orange from the high temperatures in the secondary chamber. The glow from the bricks may make the blue flame hard to see during the day time and it may seem that there is no flame at all in the secondary chamber.

General Maintenance

Proper maintenance of the heater is important for reliable, efficient and safe operation. Proper maintenance will also result in a longer service life of the heater. There are daily, monthly, and end of season guidelines that should be understood and followed.

Tools Needed for Operation and Maintenance

To operate and maintain the heater the following tools are needed.

- A steel poker or rod.
- Heat exchanger brush (included with heater).
- Scraper/ash puller (included with heater).
- Ash shovel (included with heater).

Daily Maintenance

Every day when loading the heater with wood

- Stir the ashes in the corners of the fire chamber with the poker or scraper/ash puller every time you load the heater. If left unstirred, the ash in the corners of the fire chamber can become damp and corrosive.
- Use the scraper tool and/or ash shovel to pull aside or remove the ashes that may be covering the combustion holes along the bottom side edges of the fire chamber.

Weekly Maintenance

At least once a week, check the water level in the sight glass. Keep the heater as full of water as possible. If you are constantly adding water you may have a leak in the system. It is important to locate and repair this leak. Regularly adding water to the heater can reduce the life of the heater. At least once a week, work the flue cleaning lever on the side of the heater back and forth several times. This will maintain the heater's efficiency.

Monthly Maintenance

Approximately once a month (depending on firing rate and wood type) most of the ash and coals that have accumulated throughout the heater should be removed. These can be removed through the front ignition door and through the side cleanout door.

NOTE: Leave 1 or 2 inches of ash and coals at the bottom of the fire chamber to protect the ceramics from getting damaged by falling logs during loading.

Annual/End of Season Maintenance

Remove the fire chamber skirting/liner by lifting the pieces up and off the retaining pins/hangers. Remove any heavy creosote buildup behind the skirting. It is not necessary to clean the creosote off down to the bare metal. Hard baked creosote will actually protect the steel against corrosion. Remove any creosote which may be plugging the primary air supply ports located towards the lower part of the fire chamber. There are 3 ports/side. Replace any skirting that is heavily warped or which is worn thin.

Check and replace the anode rod if necessary. (See "Anode Rod" section below)

Check water to insure proper nitrite and pH levels. Adjust levels if necessary. See "Water Testing and Treatment" section for water testing and treating information. Water test and treatment kits can be purchased from the Topline online store.

End of Season Preparation

Creosote and/or ash mixed with water produces a corrosive acid. This acid can form inside the fire chamber during the off season. It is important that the heater be properly prepared for the off season period when the heater is idle to avoid formation of this acid. All the ash and coals should be removed from all the chambers and heat exchanger. (If possible the chimney should be sealed off with a plastic cap or wrap to insure no water gets into the heater. Insure all doors are tightly closed.

!!REMEMBER!!
ASH + MOISTURE = CORROSIVE ACID.

CORROSIVE ACID WILL CORRODE AND DAMAGE THE HEATER. REMOVE ALL THE ASH AND COALS AND CREOSOTE FROM THE FIRE CHAMBER WHENEVER THE HEATER IS SHUT DOWN FOR MORE THAN 3 WEEKS.

Maintaining Tight Door Seals

Maintaining tight door seals will help keep the heater performing properly. The fiberglass rope used to seal the fire chamber doors should be inspected regularly. If a glass rope becomes too flattened and/or worn it should be replaced.

A leaky poor door seal results in slow but steady combustion of wood during the off cycle. This results in more wood being used which reduces the overall efficiency of the heater.

Anode Rod

The heater is protected by a sacrificial anode rod. A sacrificial anode rod works by "sacrificing" itself and corroding first before the heater steel corrodes. Over time corrosion will wear the anode rod down until it is completely sacrificed (or used up). In order to keep protecting the heater from corrosion the anode rod need to be replaced from time to time. The length of time the anode rod will help protect the heater will vary depending on the chemistry of the water. It is recommended that the anode rod is checked once a year and replaced if it has worn down to less than 3/8 inch diameter. The anode rod can be accessed by removing the top heat exchanger cover. The rod can be loosened and removed with a wrench or socket ratchet set.

Creosote

If creosote builds up inside the front bottom cleanout door, on the heat exchanger tubes, on the fan or in the chimney, the heater is likely not working properly. Consult with the local dealer to get the heater working properly.

Overview

Properly testing and treating the water in the heater water jacket is important to control waterside corrosion. Untreated or improperly treated water can reduce the life of the heater. The water in the heater should be tested and if necessary treated to maintain proper Nitrite and pH levels. A Startup Water Treatment Kit is included with each heater. Further treatment supplies can be purchased through the Topline Distributing online store. To find the online store go to www.polarfurnace.com and click on the TOPLINE STORE link.

Drawing Water for Testing

!!CAUTION!!:

Water in water jacket could be very hot. Draw water with Caution!!

IMPORTANT!!

All water samples drawn for testing should be allowed to cool to room temperature before testing with test strips.

Collecting Water

Water can be drawn from the water jacket at the water level sight gauge. Open the valve and unclip the clear plastic tube from the holder and bend the clear tube downwards. Let water run from the tube for 10 seconds. Don't collect the first water draining from the tube; after 10 seconds direct the water into a clean container. Collect about 10 ounces of water.

Nitrite Treatment

Initial Nitrite Treatment (after filling the water jacket for the first time)
The Polar Furnace Startup Water Treatment Kit includes several white "pucks". These pucks are Sodium Nitrite. Each puck will treat approximately 60 gallons of water. Dissolve each puck individually in a 1 gallon container or pail. When the pucks have fully dissolved pour the water into the overflow/vent pipe on top of the heater.

Determining the Nitrite level in the water

Note: When testing for the nitrite level for the first time (after completing the initial treatment) let the water circulate for 24 hours before completing this test.

After the water sample has cooled to room temperature dip the Nitrite test strip into the water sample drawn from the heater for 2 seconds. Then remove and shake. Hold the strip level and after 1 minute match against the nitrite level color chart. The nitrite level must be between 600 and 1200 ppm.

Adjusting the Nitrite Level Up

If the nitrite level is lower than 600 ppm dissolve another half puck of nitrite treatment in a 1 gallon container or pail and pour into the overflow/vent pipe. Circulate the water for at least 24 hours before testing for the new nitrite level.

Adjusting the Nitrite level Down

If the nitrite level is too high drain 20 gallons of water from the water jacket and refill with fresh untreated water. Circulate the water for at least 24 hours before testing for the new nitrite level.

Water pH Levels

Determining the pH level of the water

NOTE: Before filling the water jacket check the pH of the water to be used to fill the water jacket to insure it is within the allowable range. Use only water that has a pH level within the allowable range.

After the water sample has cooled to room temperature dip the pH test strip into the water sample drawn from the heater for 2 seconds. Then remove and shake. Hold the strip level and after 1 minute match against the pH level color chart. The pH must be between 7 and 9.9.

Adjusting the pH level Up or Down

If the pH level is not within the allowable range after filling the water jacket, treatments kits for adjusting the pH level up or Down can be purchased from the Topline online store.

Determining the Propylene Glycol Level (if used)

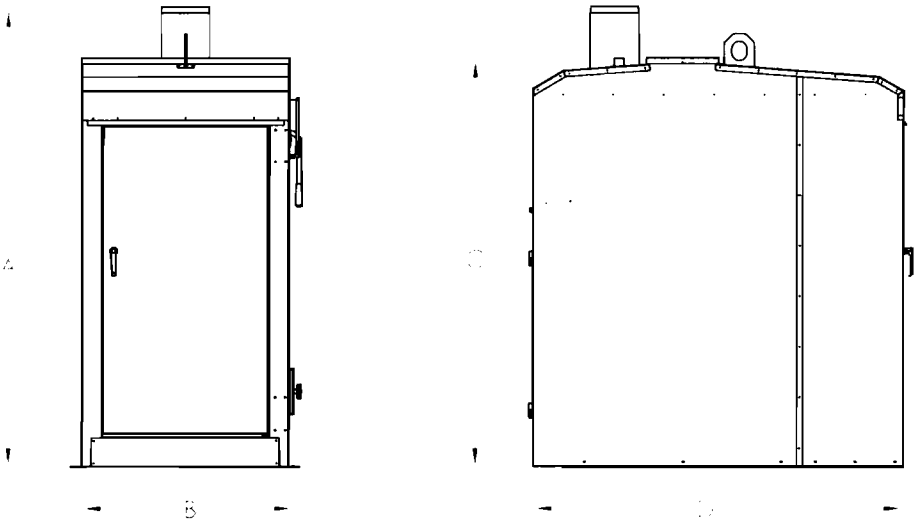
To test the propylene glycol to ensure adequate freeze protection for your area, use the following method:

After the water sample has cooled to room temperature dip the glycol test strip into the water sample drawn from the heater for 2 seconds. Then remove and shake. Hold the strip level and after 1 minute match against the propylene glycol level color chart to determine the freeze protection level.

Purchasing Additional Water Testing and Treatment Kits

Water testing and treatment supplies can be purchased through the Topline online store. To find the online store search for www.polarfurnace.com and click on the TOPLINE STORE link on the home page.

HEATER MODEL SPECIFICATIONS

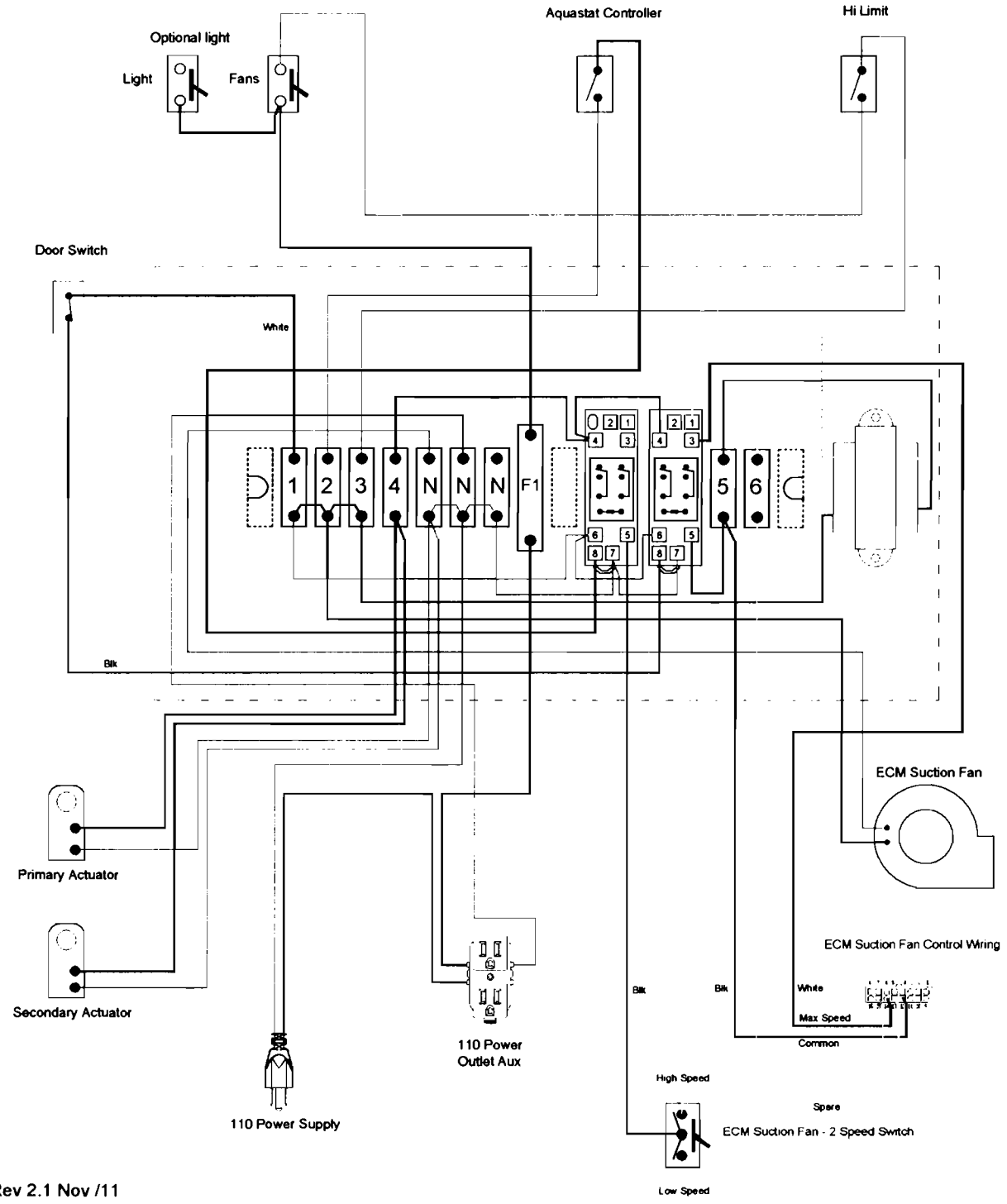


Heater Specifications

Specifications	U of M	G2	G3
Overall Height x Width x Length	C x B x D-inch	66 x 35 x 62	74 x 42 x 68
Weight	lbs	2200	2750
Wood Load Door Opening (W x H)	inch	15 x 14	15 x 18
Max. Wood Length	inch	21	27
Diameter of Supply and Return Fittings	inch	1.5	1.5
Chimney Connection (Approx. Height)	A-inch	74	81
Chimney Diameter	inch	6	6
Water Capacity	US gal.	160	250
Fire Chamber Volume	ft^3	5.6	12.7
Max continuous output	BTU/Hr	160 000	200 000
8 hr. output rating	BTU/Hr	60 000	140 000
Voltage	V/Hz	120/60	120/60

Specifications subject to change without notice

G-Series Wiring Schematic



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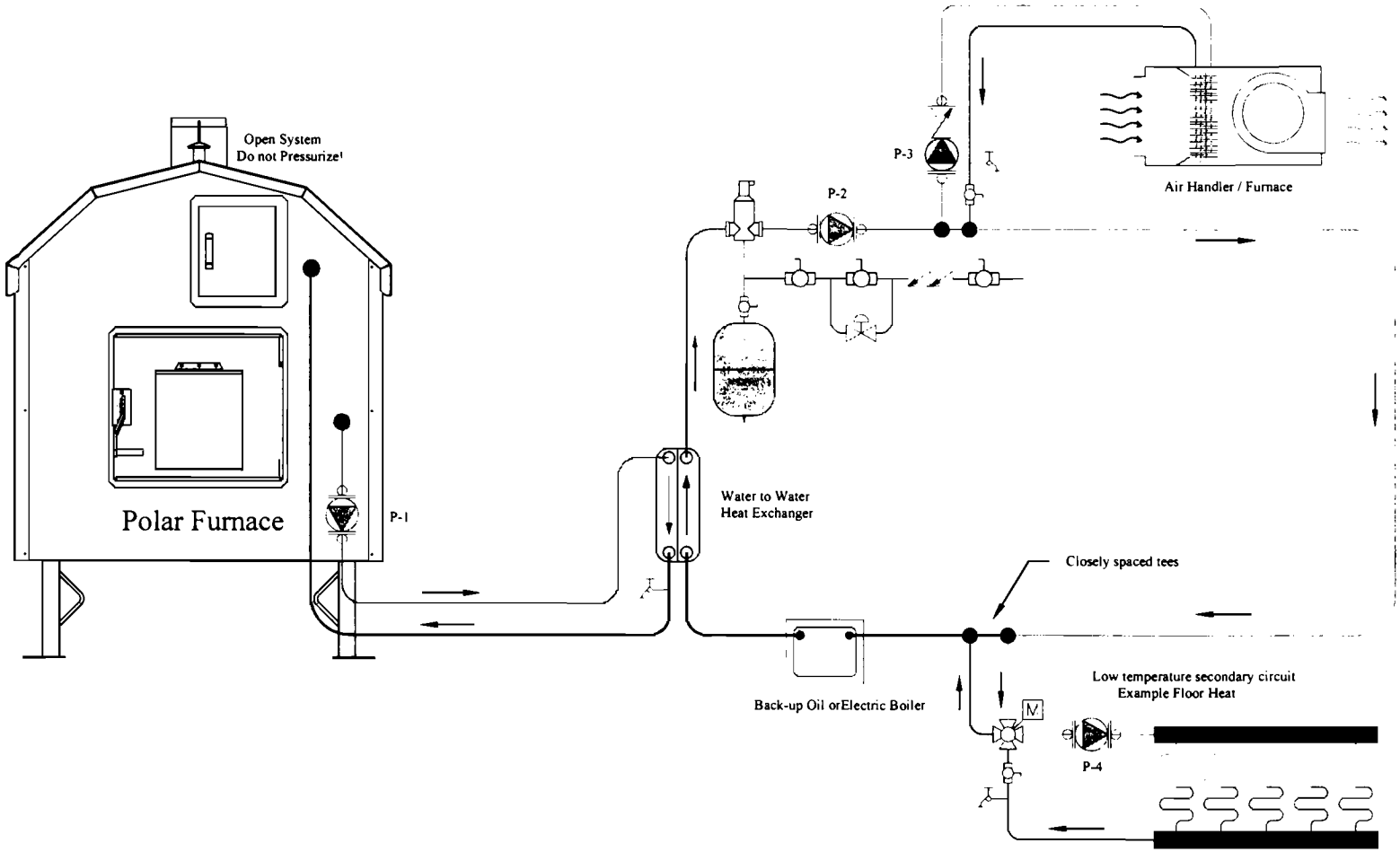


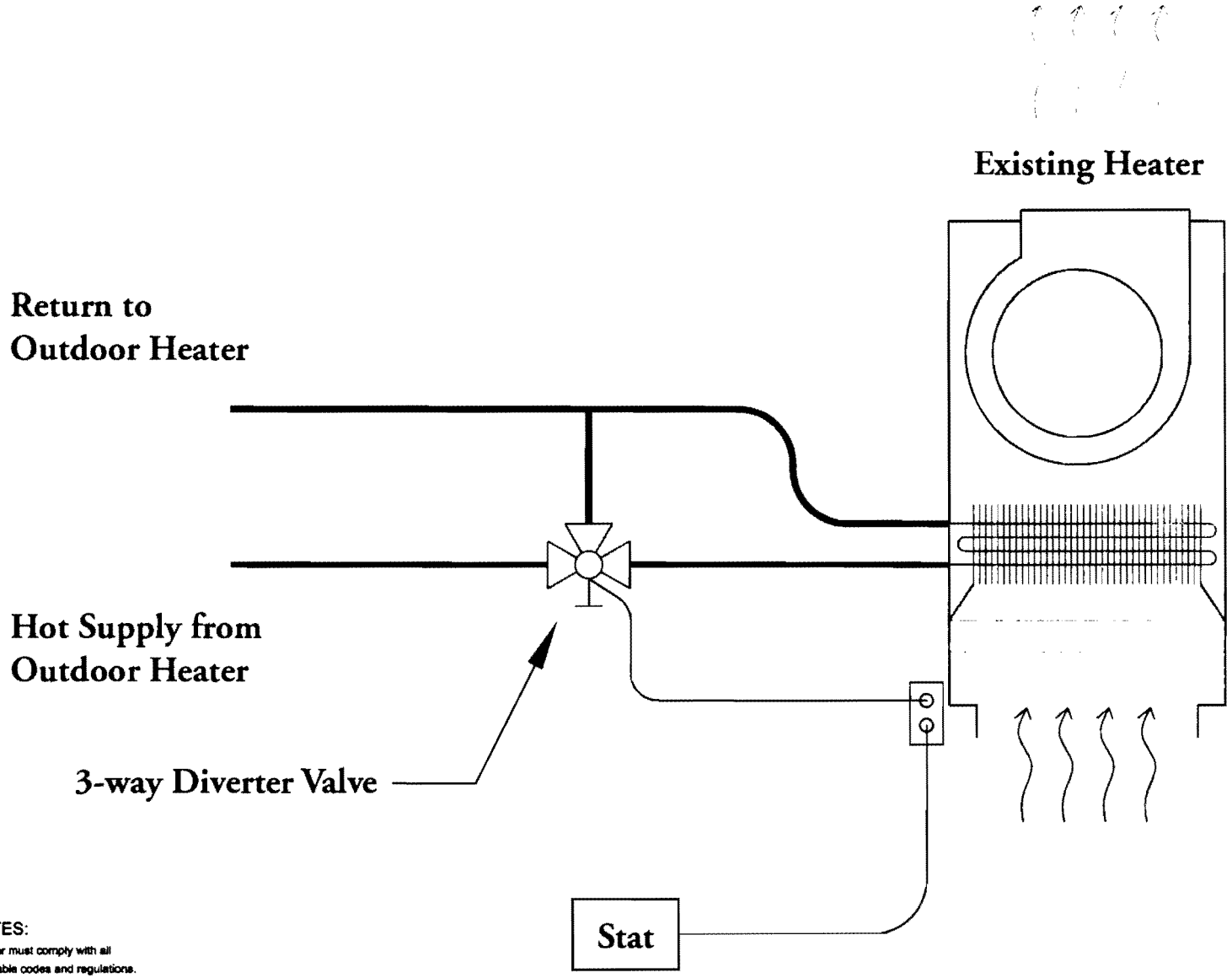
NOTES
Installer must comply with all applicable codes and regulations
For illustration purposes only

P-1 Circulates constantly
P-2 Circulates constantly
P-3 Circulates on thermostat call
P-4 Circulates on thermostat call

INSTALLATION EXAMPLES

For service and support on your Polar furnace contact your local dealer

In-House Piping Example for Forced Air



NOTES:
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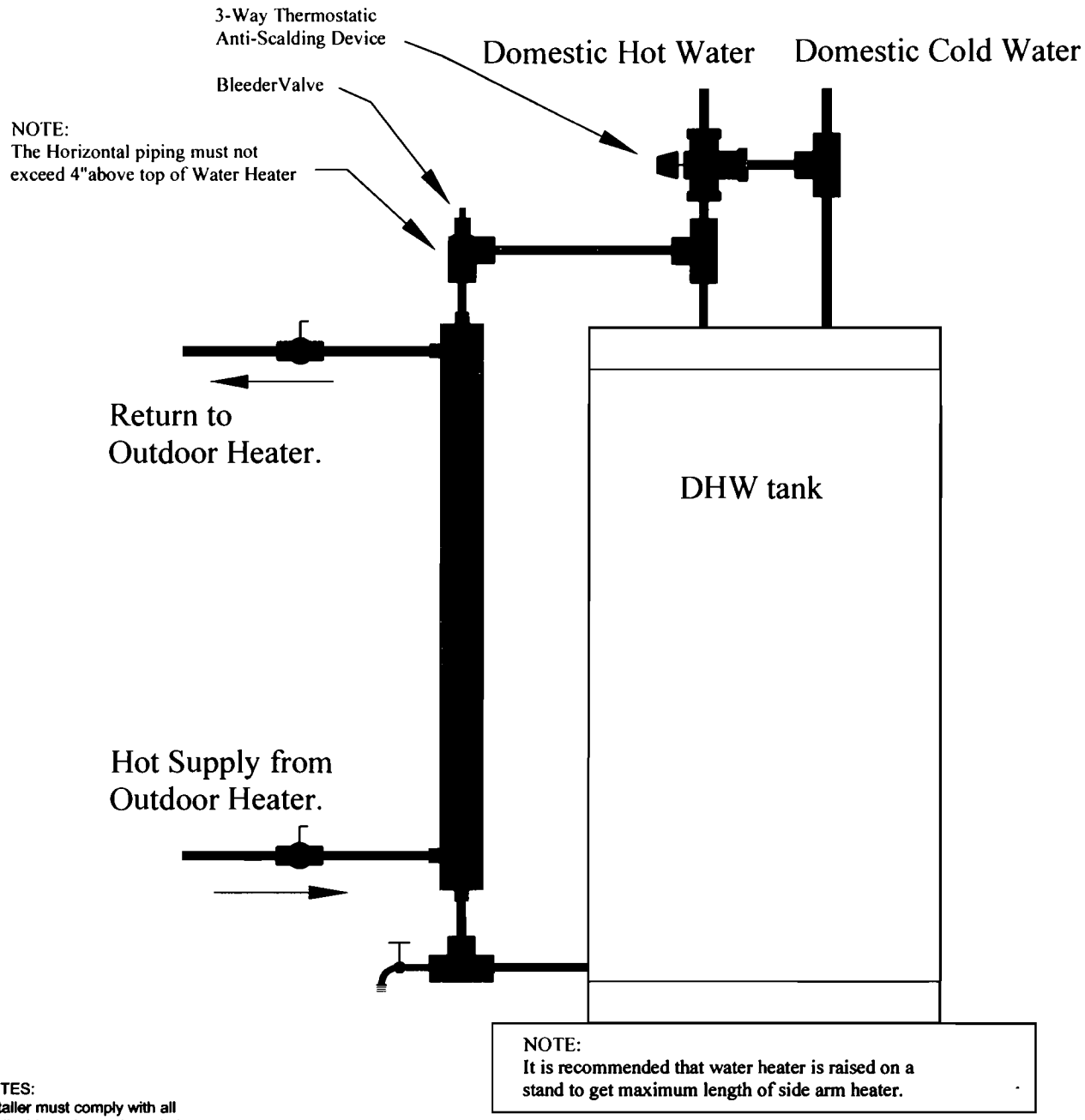
Electric Hot Water Tank:
Sidearm Installation Example



NOTES:
Installer must comply with all
applicable codes and regulations.
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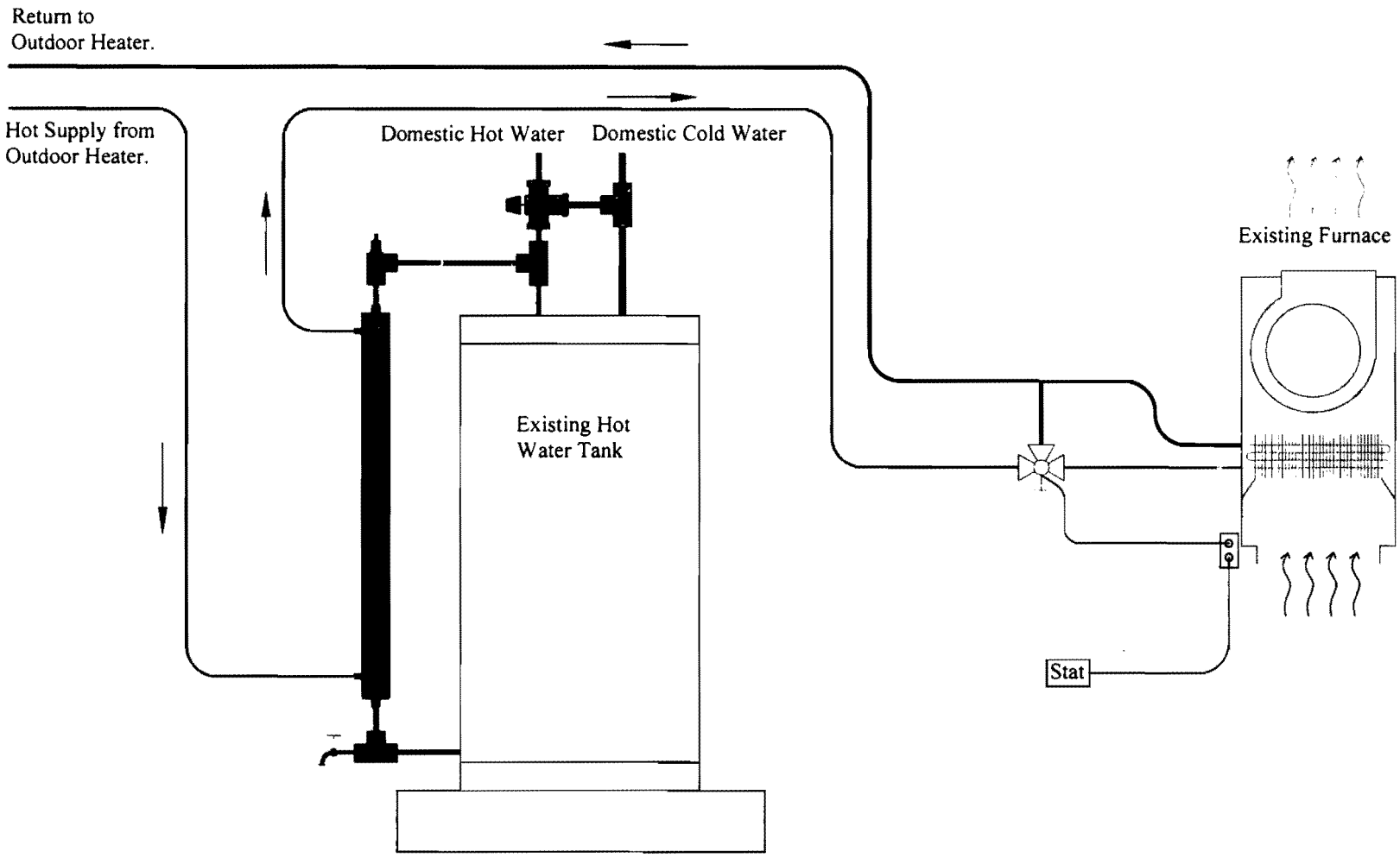
Hot Water Tank Side Arm and Existing Heater Installation Example



NOTES:
Installer must comply with all applicable codes and regulations.
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Notes:

Polar Furnace Mfg. Inc.

Box 157. Sperling, Manitoba. R0G 2M0

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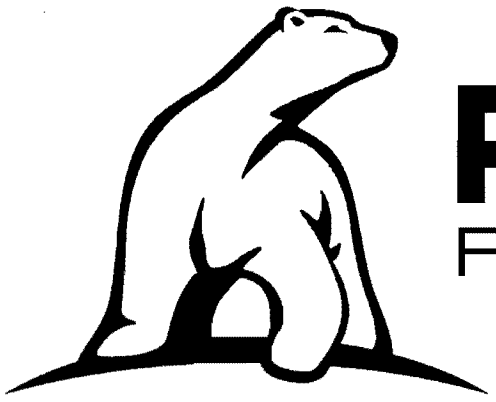
contact your local dealer.



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Revision 1.0