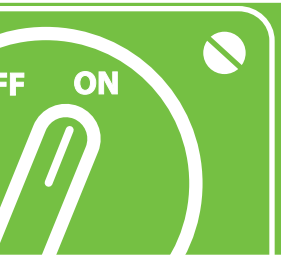
Operation Manual

American Pressure Inc.



Artic Steam Operation

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This symbol is used to identify safety information about hazards that can result in personal injury. A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.

⚠ DANGER

Indicates a hazard which, if not avoided, *will result in death or serious injury.*

⚠ WARNING

Indicates a hazard which, if not avoided, *could result in death or serious injury.*

⚠ CAUTION

Indicates a hazard which, if not avoided, *might result in minor or moderate injury.*

CAUTION

CAUTION, when used *without* the alert symbol, indicates a situation that *could result in damage to the equipment.*

Read Safety Manual before operating

For additional service and maintenance information, see the Service Manual

Table of Contents

Installation

Location

This machine should be installed by only qualified technicians. The machine should be set upon a level surface where it will not be affected by strong winds, rain, snow, extreme heat, and freezing temperatures. Install the machine considering locations for chemical pick-up, fuel connections, electrical connections, water hook-up, venting, and maintenance.

Electrical

Connect machine to an electrically grounded circuit that is fused or circuit-breaker-protected. The circuit must match that which is specified in the ELECTRICAL section under MODEL SPECIFICATION.

Extension Cord

The use of an extension cord that has undersize wire compared to the amp draw of your machine will adversely limit the starting load carrying abilities of the motor and machine's performance. Use only extension cords that are intended for outdoor use. These extension cords are identified by a marking "Acceptable for use with outdoor appliances; store indoors while not in use." Use only extension cords having an electrical rating not less than the rating of the product. Do not use damaged extension cords. Use an extension cord in good repair free of frays or cracks in the outer covering. Do not abuse extension cord and do not yank on any cord to disconnect. Keep cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting the product from the extension cord.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

CAUTION

The ground fault circuit interrupter cordon this machine does not provide protection on extension cords. Try NOT to use extension cords if possible.

⚠ WARNING

To reduce the risk of electrocution, keep all connections dry and off the ground. Do not touch plug with wet hands.

NOTE: The ground fault circuit interrupter cordon this machine does not provide protection on extension cords. Try NOT to use extension cords if possible.

Copper Wire Size Minimum AWG	Machine AMP Draw* 3 Conductor Wires	Machine AMP Draw* 2 Conductor Wires
16	10	13
15	--	--
14	15	18
12	20	25
10	25	30
8	35	40
6	45	55
4	60	70
2	80	95

Based on Ambient Temperature of 86˚F (30˚C)
Based on no more than 100 feet
* Use AMP Draw indicated the same or higher than your machine output.

EXAMPLE: Machine AMP Draw 51, use 55 (2 Conductor): The thermostat type of cord shall be C, PD, E, EO, EN, S, So, SRD, SJ, SJO, SV, SVO, SP.

The thermo set plastic types shall be ET, ETT, ETLB, ETP, ST, STO, SRDT, SJT, SJTO, SVT, SVTO, and SPT.

Venting

This machine emits carbon monoxide, a deadly gas, and must be vented if used in an enclosed area. Improper venting can cause poor combustion, delayed ignition, down drafts, and the possibility of freezing the coil. Contact your distributor or local heating and air conditioning dealer for proper materials. Local codes must be observed.

Water Supply

This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure specified in the GENERAL section of the MODEL SPECIFICATIONS.

Barrier

We recommend a barrier be installed between the machine and wash area to prevent moisture from coming in direct contact with electrical controls, motors and transformers. This will increase the machine's life and lessen electrical problems.

Water Temperature Variation

On machines not equipped with a temperature control device, the temperature of the discharged water is dependant on the incoming water temperature. Some minor adjustment to the fuel input may be required if the incoming water is significantly different than 50˚F.

CAUTION

If a non winterized machine has been exposed to sub-freezing temperatures, it must be thoroughly armed to above freezing before operating, failure to warm machine can cause damage to pump and other components.

⚠ WARNING

Carbon Monoxide Hazard

Water Conditions

Local water conditions affect the coil adversely more than any other element. In areas where troublesome conditions may exist with like equipment (such as water heaters), we recommend the use of a water softener.

Freezing

This machine must be protected from freezing according to storage section of MACHINE MAINTENANCE.

Cold Weather

As the weather becomes colder, fuel becomes thicker and may become so viscous that the fuel will not flow properly. As viscosity increases, the thicker oil can cause delayed ignition, poor spray patterns, and rumbling fires. As moisture will quickly destroy fuel pumps, make certain that tank openings are secure and moisture cannot enter. In cold weather areas, frost build up will occur in fuel tanks. As the weather warms it turns to condensate, and the water will be in the tank. Keep the tank clear of water, as moisture reaching the fuel pump will cause rust, and the pump will bind. A full fuel tank will lessen condensation build up.

Chemicals

Mix chemicals per the chemical manufacturer's printed directions. Follow all mixing, handling, application, and disposal instructions. Wear gloves, boots, goggles, and protective clothing appropriate for the chemical being used.

Venting

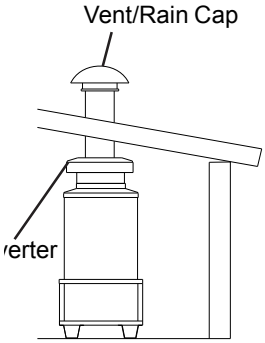
The information contained herein is offered for reference only. You must comply with local codes and investigate through your gas and other utility companies when installing, as there may be some special local requirements you must comply with. Also see ANSI Z223.

Venting

Draft Diverters (stacked cleaners)

Oil fired machines use a force air burner. The oil burner can be influenced by "natural Draft" even though they have their own fan. A bell type drat diverter must be used here also.

A draft diverter must be used on all cleaners that are



stacked. This included any chimney even if not expelled to the outside.

Use a draft diverter of the inverted funnel or bell type that meets all codes for capacity and materials. Mount the draft diverter directly to the stacking flange on the machine.

The draft diverter's function is to insure that the barometric pressures are as close to the same as possible at the air inlet and outlet to the coil and will not be changed by either up drafts or down drafts.

Installation of a draft diverter WILL *not prevent the coil from freezing.* In areas where freezing temperatures are common, some type of down draft prevention must be used. Check local codes for acceptable methods for the prevention of down drafts.

Venting Installation Information

Never reduce the stack size. The diverter and stacking should be the same size as the stack opening on the machine.

Straight stacking through the roof is preferred. Horizontal runs are not desirable, but if necessary, be sure to pitch the stack upward at a rate of two inches per foot. When horizontal stacks are used, vertical stacking must extend at least two feet for every foot of horizontal stack.

Stack extension above the roofline should be sufficient to clear the peak of the roof (refer to ANSI Z223.1 page 100 of SPECIFICS).

A rain cap U.L approved should be installed on the stack.

Operation

Operating Instructions

Basics of Winterization

The idea is simple, in practice it becomes an art, a quick guide to the use of steamers at below freezing temperatures - Never stop the flow of water!

The Rules:

1. Never stop the flow with water in your system. Water will freeze when it is colder than 32°F
2. Always visually verify water flow out of the nozzle before turning on the burner/ heat.
3. Always have good antifreeze in the steamer before turning it off.
4. In case of a problem, get the machine someplace warm as fast as possible, then figure it out.

Pre Start -Up

Antifreeze:

There are a number of products that are used for antifreeze, ethylene glycol(typical automotive, green antifreeze), propylene glycol(Some RV, and Sierra), windshield washer fluid. We recommend ethylene glycol for the testability, function, and cost. Any chemical product should not be discharged on the ground, and care should be taken to prevent spills. Ethylene glycol or green antifreeze can generally be purchased at 100% strength, labeling will vary so make sure to read the fine print on the concentrate.

Some things to remember about ethylene glycol, antifreeze:

1. 100% or straight antifreeze will Freeze at 10°F, so it is important to dilute it properly
2. 70% antifreeze will give you the best protection at -60°F
3. As you use it it will become more diluted and more will be needed
4. Testers are available at most stores, purchase one and make use of it.

Procedure for start up with a cold steamer, full of anti-freeze.

As the temperature gets colder these procedures become more important. The below procedure demonstrates what you might expect to use as a best practice when temperatures are about 5-10°F

Find your water source in the house, preferably a utility room or laundry tub, using an outside hookup is just asking for extra problems and will often not work properly in the winter. Connect your garden hose to cold water only (NEVER SUPPLY HOT WATER TO MACHINE).

-Tip- Use a ball valve on the garden hose so you can turn the water on/off from outside - Tip-

Turn on water and have your ball valve open slightly so a trickle of water comes through the garden hose and prevents it from freezing. Put this in a snow bank and leave the water flow. This will keep your garden hose from freezing.

Find an electrical outlet that you can hook your steamer to, it will draw about 10 amps. The utility room is a great place to find an outlet; avoid circuits with many lights and appliances. Instruct your customer not to unplug your steamer or use a vacuum on the same circuit.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

CAUTION

If a non winterized machine has been exposed to sub-freezing temperatures, it must be thoroughly armed to above freezing before operating, failure to warm machine can cause damage to pump and other components.

⚠ WARNING

This machine should be operated only by personnel insructed in and familiar with its operation. The discharge produced is up to 300°F/150°C and can cause serious bodily injury to you and anyone coming in contact with it.

Warm up the machine before hooking up water.
The metal and antifreeze in the steamer will be the same temperature as the air. If you put water to the machine before warming it up it can flash freeze and cause many problems. To warm up the machine, put the wand in the float tank, turn on the pump. Once you observe the flow of antifreeze in this closed loop system, turn on the burner for 5 seconds, and then off for 15 seconds. Keep using 5 seconds of burner each 20 seconds of recirculating. After you do this for a few minutes you should notice the fluid is getting warm. When you notice the connections are warm to the touch it is time to introduce water. You do not want to preheat the machine to temperatures over 120°F.

Hookup water to your machine
Your steamer is currently circulating antifreeze. Get your garden hose from the snow bank and if you have not had it on, make sure you turn it on for a minute to ensure it is not full of ice chunks and frozen material. Once you are sure you have liquid water flowing through your garden hose, hook it up to the Arctic Steamer. Direct the flow of antifreeze from the nozzle to a 5 gallon pail or other container, and turn on the water. In the course of about a minute and a half the water will push the antifreeze through the system, once the discharge turns from green to clear/white, direct it away from the antifreeze container so you do not needlessly dilute it.

– Tip – After you are pumping water, push down on the float valve to make sure the water supply can overflow the tank, if it can't it is only a mater of time before you run low on water, recirculate the water or winterize the machine and address the water supply problem. **– Tip –**

Operating

Electrical: Connect the machine to an electrically grounded circuit that is fuse or circuit breaker protected. Do not use any type of adapter. If the correct type of receptacle is not available, the have on installed by a qualified electrician.
Oil Level: Check the oil level in the water pump.
Belt: Make sure belt tension and condition is as specified in MACHINE MAINTENANCE.
Stack Cover: Remove the stack cover (if so equipped).
Fuel Filter: Inspect fuel filter for evidence of water contaminants.
Fuel: Make sure the fuel lines are open (CAUTION: Closed valves will DAMAGE the fuel pump and void warranty). Use #1 or #2 diesel. Make sure the fuel supply is sufficient to complete the job. See the GENERAL section of MODEL SPECIFICATIONS for the fuel tank capacity.
Water Supply: This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PREFORMANCE section, and a minimum water inlet pressure of 40 PSI/ 0.68 BAR.
Lime: Water containing large amounts of lime, calcium or other similar materials can produce a coating on the inside of the spray tip, impact nozzle and coil pipe.
Float Tank: Check the float tank to assure it is full and the float valve shuts off securely.

CAUTION

A good flow of water must be flowing from the end of a gun for 30 seconds before proceeding. Lack of water can cause damage to the water pump and like components.

CAUTION

Do not run the machine with the burner switch in the on position when the fuel tank is empty or with tank valve closed. This will cause damage to the fuel pump and void warranty.

Operation Start -Up

Using your Arctic Steamer:

1. With the gun assembly in hand and with a good flow of water turn the switch to the 'pump' position.
2. Turn the switch to the "burner" position.

In the course of about 3 minutes you will go form cold water to a constant output of 280-290°F steam.

At about 240-250°F you will see the discharge change in sound and appearance. It will go from sounding coarse to sounding smooth. In addition a steady drip of condensation will appear at the bottom of the steam spray. This drip will stay around until about 310°-325°F

CAUTION - If you had accidentally hooked to a hot water heater or the homeowner decided hot water would speed you up, you will visibly be able to see the spray is too hot from the change in the spray. Generally increasing over 290°F will not increase productivity and may damage hoses.

Use the steam to remove pieces of ice, first by melting channels, and then between the roof and the ice. Let the steam do the work, do not force a piece of ice loose as a shingle may be damaged. Be mindful of the size of the pieces and what is below your work area. The closer you keep the nozzle to the ice the faster you will work.

Operation Shut Down

1. Turn the switch to the 'pump' position.
2. After cool, clear water is coming from the end of the wand, turn switch to the 'off' position.
3. Turn off the water supply.
4. Fill a 1-gallon container with Ethylene Glycol type antifreeze. Minimum should be a mixture of ½ antifreeze and ½ water strength before each use, as the antifreeze will dilute with use.
5. Pour the anti-freeze solution into the float tank.
6. Turn on the switch to the "PUMP" position.
7. When it begins to come out green at the nozzle, direct the nozzle back into the

float tank, allow the mixture to circulate for a few minutes.

8. Turn on the switch to the “OFF” position.
9. Use your antifreeze tester to make sure the mixture in your tank gives you proper protection.
10. Disconnect electrical supply.
11. Fill the fuel tank with kerosene or #1 or #2 diesel.
12. It is recommended to install a coil cover to keep coil free of debris.
13. Place machine in a dry place protected from weather condition.
14. Store your garden hose in the warm cab of your truck as it contains water.

Overview

Overview:

Warm the machine
Remove antifreeze
Verify Flow, Turn on Burner, and Work.
Cool Down
Winterize
Turn Off

WARNING: **NEVER TURN OFF THE MACHINE WITH WATER IN IT.**

Machine Maintenance

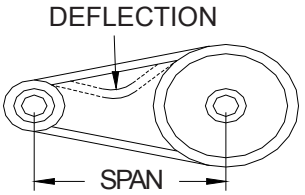
Machine Maintenance

Belt Tension

Deflection for each inch of span between pulley centers with a 6-pound force applied in the middle of the span.

Example: A 6-pound force applied at the middle of an 8-inch span should produce a deflection of 8/64 inch or 1/8 inch.

Belts can be tightened or loosened by loosening the nuts holding the pump assembly to the motor mount. Then tighten or loosen the j-bolt on the motor mount. Retighten the pump assembly after the desired tension is reached.



Machine Maintenance

Steam Nozzle Maintenance

Remove the steam nozzle from the gun assembly.

Blow out debris with the compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in de-scaling solution or replaced. If the steam impact is worn, replace with one specified in the GENERAL section of MODEL SPECIFICATIONS or MODEL EXPLODED VIEW.

Before replacing steam nozzle flush the machine per “FLUSHING.”

Reinstall steam nozzle to gun assembly.

Coil Back Pressure Check

Coil Back Pressure Check

A regular maintenance schedule for descaling your heating coil is essential to insure its longevity.

The frequency of descaling depends upon the amount of use and the condition of the water.

1. Check the condition of your water pump unloader valve. Remove the hose and gun assembly from the coil outlet.
2. Remove any flow restrictions, such as guns and hoses, from the coil outlet.
3. Install a pressure gauge between the water pump and coil inlet.

Discharge Volume	Back Pressure
GPM	**Requiring Descaling**
2-3	50 PSI
3-4	75 PSI
4-5	100 PSI
6	150 PSI
8-10	175 PSI
Use a 1000 PSI pressure gauge	

4. Turn on the water supply. Check the float valve to assure float tank is full and the float valve shuts off securely.
5. Check the position of the ball valve on the outlet line of the float tank assuring it is in the open position.
6. Turn on the switch to the “PUMP” position. If the coil back pressure reading is above that found in the chart above then your machine needs to be de-scaled.

A separate descaling pump is recommended so that scale and other chemicals will not come in contact with your water pump and cause premature wear.
NOTE: Contact your local dealer for descaling of your unit.

7. Disconnect the water supply.
8. Disconnect the electrical supply.
9. Reinstall the hose and gun assembly.
10. Remove the pressure gauge.

Descaling instructions are available upon request.

Flushing

1. Connect machine to an electrically grounded circuit that is fuse or circuit breaker protected.
2. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the MODEL SPECIFICATIONS.
3. Turn on the water supply.
4. Check the float tank to assure it is full and the float valve shuts off securely.
5. Remove spray tip from gun assembly.
6. With the gun assembly in hand and with a good flow of water turn switch to the PUMP position.

Machine Maintenance Schedule

MOTOR DRIVEN OIL FIRED CLEANERS	daily	Each HR 1st 8 HRS	AFTER 1ST 50	EVERY 50 HRS	EVRERY 100 HRS	EVERY 500 HRS	YEARLY
Oil Bath Water Pump:							
Oil Level- check and add as needed per PUMP SERVICE insert	●						
Oil Change- drain and refill per PUMP SERVICE insert CAUTION: Used oil must be disposed into an environmentally safe container and brought to an oil recycling center			●			●	
Oil Contamination- milky color indicates water	●						
Hoses:							
Blistering, loose covering	●						
Abrasion of cover exposing reinforcement	●						
Cuts exposing reinforcement	●						
Belts:							
Cracks or fraying	●						
Belt tension- For correct belt tension, see MACHINE MAINTENANCE insert	●						
Filter-Water:							
Check water inlet hose screen for debris		●		●			
Check float tank screen for debris	●						
Leaks:							
Check for water and build up of scale at pipe connections	●						
Fuel:							
Adequate fuel supply	●						
Filter-Fuel:							
If contaminants are present see FUEL FILTER insert	●						
Remove and replace fuel filter.						●	
Screen-Fuel Pump:							
Check fuel pump screen for debris. See OIL BURNER MAINTENANCE insert					●		
Burner Nozzle:							
Replace nozzle as specified in BURNER section of MODEL SPECIFICATIONS or BURNER ASSEMBLY insert							●
Guards and Shields:							
Check that all guards and shields are in place and secure							●

Troubleshooting

Pressure Cleaner

Trouble	Possible Cause	Remedy
Spray Too Hot	Incoming water Too Hot.	Connect machine to cold water.
Low operating pressure	Insufficient water supply.	The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE section, and minimum water inlet pressure specified in the GENERAL section of the MODEL SPECIFICATIONS section.
	Incoming water hose too small.	Use larger water supply hose.
	Water supply hose too long.	Use shorter water supply hose.
	Belt slippage.	Tighten belt per instructions in MACHINE MAINTENANCE insert.
	Worn belt.	Replace belt per CLEANER EXPLODED VIEW.
	Impact Nozzle worn or wrong size.	Replace with Nozzle specified in the GENERAL section of MODEL SPECIFICATIONS.
	Dirty or worn check valves in water pump	See PUMP TROUBLESHOOTING.
	Water supply hose kinked.	Straighten hose
	Inlet filter screen clogged	Clean water filter screen or hose inlet screen.
	Motor runs slow.	See “Pump engine starts slow or overheats and stops.”
	Air leak in inlet plumbing.	Tighten all fittings.
	Defective water pump.	See PUMP TROUBLESHOOTING.
	Leaking discharge hose.	If a water leak is found, DO NOT OPERATE THE MACHINE. Disconnect the power and replace hose.
Excessive, unusual noise	Defective pump.	See PUMP TROUBLESHOOTING.
	Defective motor.	Call service technician or take engine to repair/warranty station.
	Pulleys rubbing.	Adjust shields or pulley(s)
	Misalignment of pump & motor	Realign pump and engine.
Belts slipping	Belts too loose.	Tighten belt per instructions on MACHINE MAINTENANCE.
	Excessive back pressure.	See “Excessive back pressure” below.
	Defective water pump.	See PUMP SERVICE.

Water Heater Troubleshooting Continued

Excessive back pressure	Nozzle built up with lime.	Remove and clean, or replace Nozzle with nozzle specified in the GENERAL section of MODEL SPECIFICATIONS. Flush machine per FLUSHING in MACHINE MAINTENANCE.
	Water pump turning too fast.	See MODEL SPECIFICATIONS.
	Coil built up with lime	De-lime coil.
	Relief valve defective.	Remove and replace.
Pump motor will not start (motor does not hum)	No power.	Use a different outlet, check fuses in main disconnect switch. Replace fuse if blown.
	Defective motor starter or ON/OFF switch.	Call service technician.
	Defective motor.	Call service technician, or take motor to Repair/Warranty station.
Pump motor will not start (motor hums)	Pump frozen.	Machine must be thoroughly warmed to above freezing.
	Defective motor.	Call service technician or take motor to Repair/Warranty station.
	Defective water pump.	See PUMP SERVICE.
	Excessive back pressure.	See “Excessive back pressure” above.
Pump motor starts slow or overheats and stops	Low voltage	See “Low voltage” below.
	Excessive back pressure.	See “Excessive back pressure” above.
	Defective motor.	Call service technician, or take motor to Repair/Warranty station.
Pump motor stops and will not start	Motor starter “kicked out” (if so equipped) or thermal overload tripped.	Turn motor starter off to reset, then turn on, or push thermal overload reset button on motor.
	Excessive back pressure.	See “Excessive back pressure” above.
	Defective motor.	Call service technician, or take motor to Repair/Warranty station.
Low voltage	Incoming voltage incorrect.	Have a qualified technician check the motor terminal voltage. Correct voltage is in MODEL SPECIFICATIONS.
	Not large enough extension cord.	Use an extension cord with amperes of watts rating as high as or higher than that or the MODEL SPECIFICATIONS.
	Too long extension cord.	Shorten extension cord.
Machine shocks operator	Machine improperly grounded.	STOP operating machine. Call service technician.
	Outlet not grounded	Have properly wired outlet installed.

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