

LittleJET™ Wash Station

*Cleaning Systems from
HelioJET Cleaning Technologies, Inc.*

Installation

Operation

Maintenance

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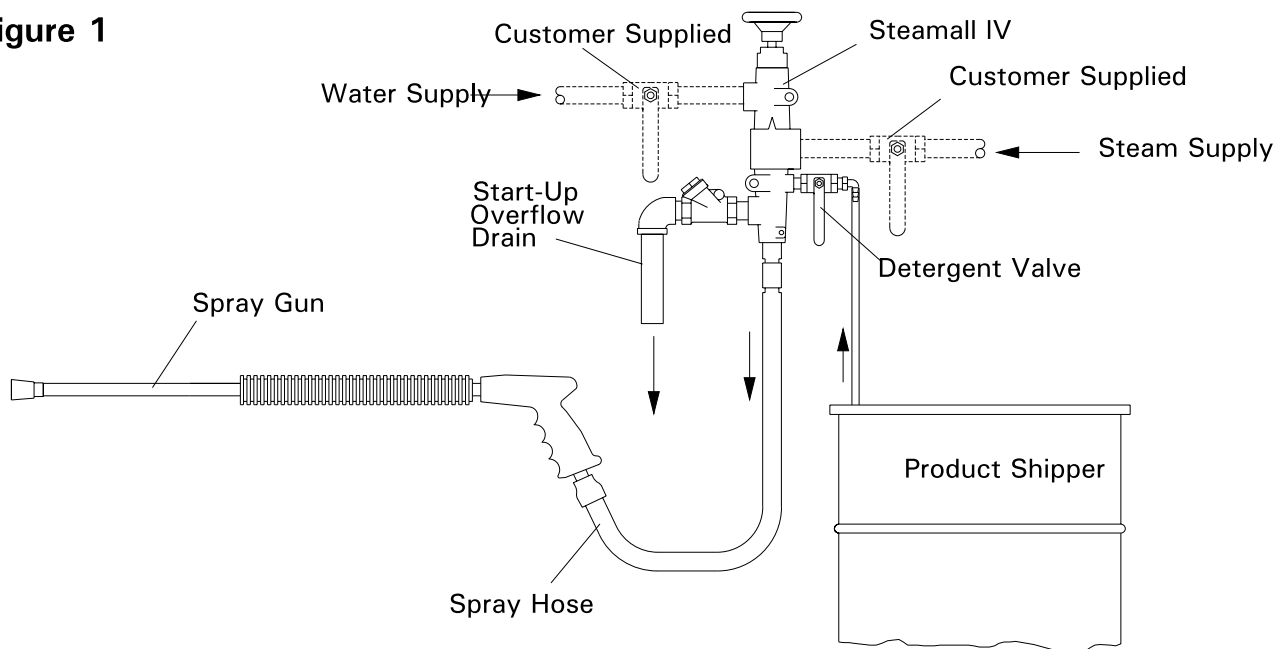
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PRINCIPLE OF OPERATION

The *LittleJET™* is a high pressure hot water wash station that utilizes proven HeliopAC™ technology. This model of the HeliopAC™ provides 3-7 gpm of hot water (with or without detergent) for cleaning. The system utilizes plant steam and cold water to operate. No electricity is required, and it has no moving parts.

Figure 1



PRINCIPLE OF OPERATION: The LittleJET™ HeliopAC provides a means of mixing steam, cold water, and detergent to generate a high pressure hot water solution for cleaning. Cold water enters the unit and encounters incoming steam traveling at supersonic velocity. As the steam condenses into the cold water, momentum and heat transfer occurs. This transfer causes a significant increase in the velocity of the water stream, while creating a vacuum condition in the unit which allows liquid cleaning agents to be siphoned into the system. This high velocity mixture is then converted to high pressure as a restriction is applied by the nozzle located at the tip of the spray gun.

Liquid detergent is siphoned into the unit automatically, with concentration controlled by a metering orifice. The detergent supply valve can be closed in order to accommodate a hot water rinse.

CHEMICAL SAFETY PRECAUTIONS: The HeliopAC hose can be safely used with alkaline cleaners or steam phosphatizing chemicals. It should NOT be used with solvent cleaning products or hydrochloric acid (muriatic acid), except as outlined in the "Maintenance" section of this operating manual.

SAFETY PRECAUTIONS: This equipment is designed to dispense hot water and various cleaning compounds which may be hazardous to personnel and/or equipment. Precautions should be taken to protect the operator, personnel, and equipment in the application area. Use in a well ventilated area with safety equipment that conforms to the standards of all regulating agencies. Wear a face shield, wet suit, boots, and gloves. Refer to this operating manual for proper operating procedures and maintenance requirements.

INSTALLATION REQUIREMENTS:

1. Steam Requirements:

Dry steam is required to operate the PAC. If an unusual amount of condensate appears in the steam supply line, install a steam trap within two feet of the unit.

Working Pressure

The minimum steam pressure required to operate the unit varies depending upon the water supply pressure available to it. Please note that the greater the water pressure supplied to the PAC, the greater the discharge pressure at the spray gun. However, steam supply pressure must be adequate.

Review the table below to verify that your available steam pressure is adequate.

Plant Water Pressure (PSI)	20	40	60	80	100
Minimum Steam Pressure Required (PSI)	35	45	60	70	90
Discharge Pressure (PSI)	130	200	260	310	350

Note: This table represents minimum steam pressure required for normal operation. Steam supply pressure may always be higher. Maximum recommended steam pressure is 150 PSI.

Note: If water pressure is too great for available steam pressure, you may reduce it by throttling the supply valve.

CAUTION! It is recommended that steam supply pressure is not more than 100 PSI greater than (differential) the incoming water supply pressure. If this condition exists, erratic start-up and operation may occur. This can cause steam to invade water supply line and discharge from the overflow drain.

Supply Line

3/4" pipe for runs of up to 50 feet.
1" pipe for runs from 50 -100 feet.
1-1/4" for runs of 100-500 feet.

A dedicated steam supply line is best. If this is not possible, check the entire length of the available steam line from the boiler to the PAC. If the steam line is to be shared by other equipment, find out when and for what period of time it will be in use. If it will be used during a time the PAC is expected to be in operation, the combined steam load may be too great, causing the supply to the PAC to be insufficient. This situation will result in erratic operation. To avoid this problem, reschedule equipment operating times.

Remove any potential flow restrictions such as an undersized pipe or valves that may be in the line.

Volume

500 lbs./hr. (approximately 17 boiler horsepower)

Note: If the boiler is not capable of supplying the minimum flow rate of 500 lbs./hr., operation will be erratic.

2. Water Requirements :

Working Pressure

20 to 100 PSI

Temperature

MUST NOT EXCEED 80°F

Supply Line

3/4" pipe for runs up to 50 feet.
1" pipe for runs from 50 - 100 feet.
1-1/4" for runs between 100 - 500 feet.

The 3/4" water supply line must always be dedicated exclusively to the PAC in order to maximize performance and insure stable operation. Never under size or attempt to share the water supply line with other equipment or outlets in the plant.

3. Start-Up/ Overflow Requirements:

Overflow Line

Pipe the start-up/overflow line downward to a safe drainage location using no less than 3/4" rigid pipe. To prevent movement and ensure safety, firmly anchor all piping.

Pipe the end of the start-up overflow line to a drain. Ensure that the end of the pipe can be seen from the PAC location.

Never submerge the start-up/overflow pipe into a floor drain or sump. Always leave space between the end of the pipe and any waste water level in order to prevent possible siphoning.

Never route overflow piping upward. This can impede start-up and operation.

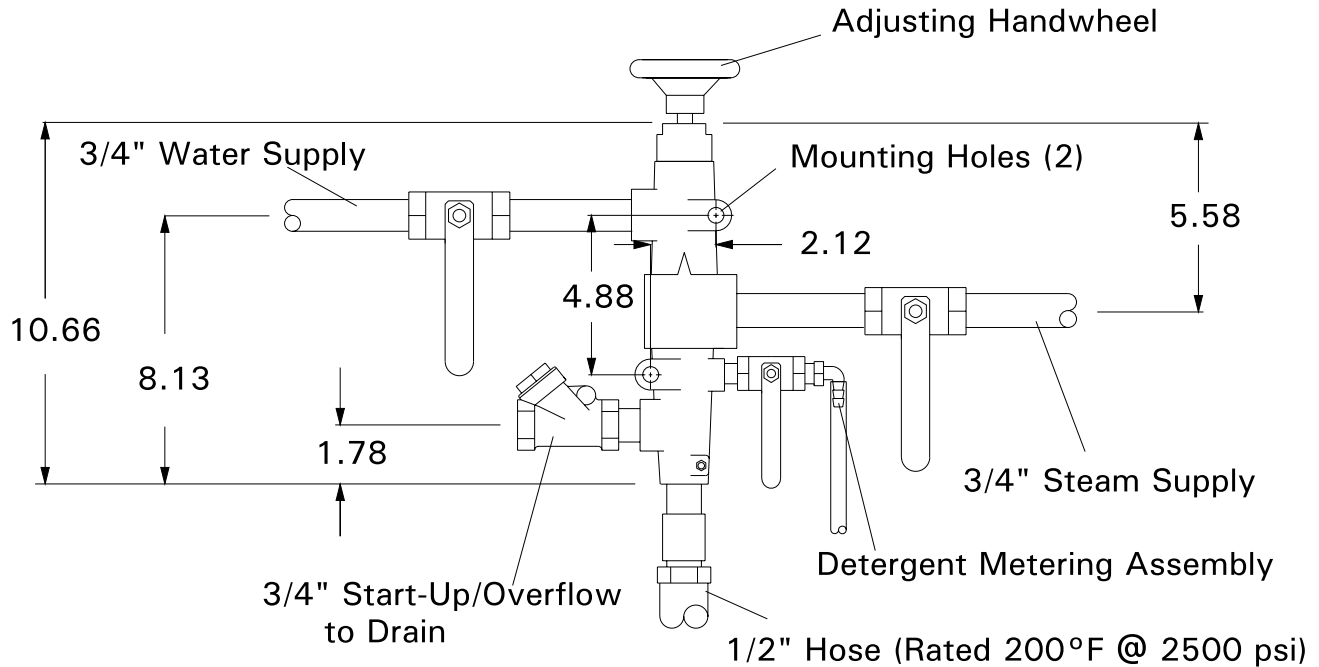
Caution:

In some cases thrust may develop in the start-up/overflow line. To prevent movement, firmly anchor all piping. Never use flexible hose on the start-up/overflow line. Always use hard pipe and be sure the selected drain can handle hot water. Firmly anchor overflow piping; never plug, undersize, or restrict in any way. Never pipe the overflow near an occupied area. Be sure personnel are always safe from overflow splash.

INSTALLATION INSTRUCTIONS:

Refer to Figure 2 (below) and PAC Schematic (page 13)

1. Determine a suitable location to mount the PAC.



2. Figure 2 illustrates the mounting hole locations and dimensions needed for mounting the PAC. Mark the mounting hole locations as shown.
3. Drill two 3/4" dia. x 1-1/2" deep holes at the mounting hole locations marked in step #2.
4. Seat two lead wall anchors (provided) into the drilled holes.
5. Thread into each wall anchor a 3/8" x 8" threaded rod (provided).
6. Place mounting hardware in order as follows : 3/8" lock washer, 3/8" hex nut threaded down tight against wall, 1/2" x 4" tubing spacer, and another 3/8" lock washer.
7. Slide the PAC onto both threaded rods through the two mounting holes on the unit. Push tight against the lock washers and spacers.
8. Thread the two remaining 3/8" hex nuts onto the threaded rod ends and tighten. This will fasten the PAC securely in place, approximately 4" away and parallel to the wall.
9. Flush all supply lines to remove any debris that may cause plugging in the PAC.
10. Connect the cold water supply to the PAC. See "Installation Requirements" section.
11. Connect the steam supply to the PAC. See "Installation Requirements" section.
12. Connect start-up/overflow piping to the PAC. See "Installation Requirements" section.

Installation Instructions:

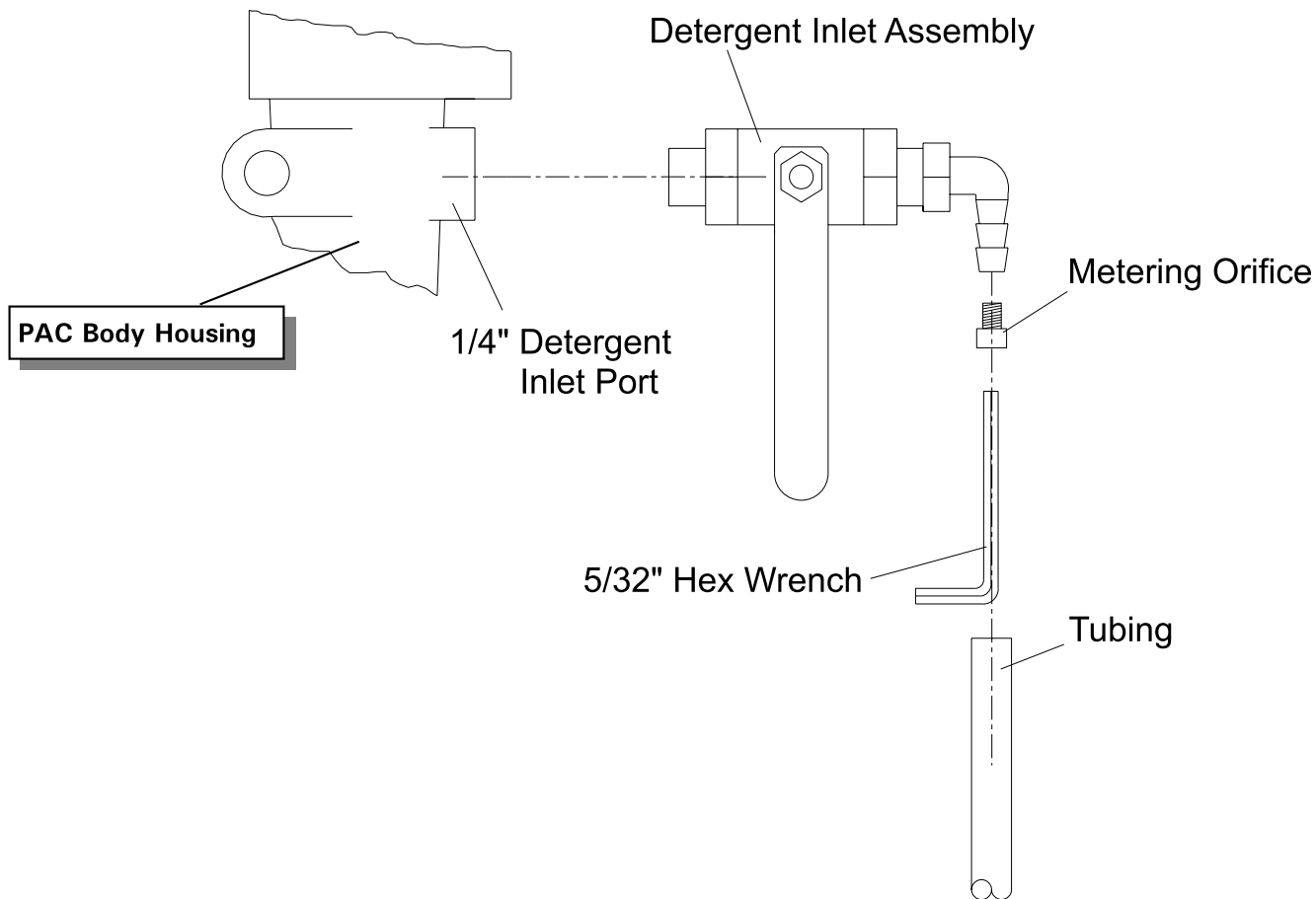
13. Connect the discharge spray hose and spray gun to the PAC. See Fig. 1
14. Install the detergent inlet assembly as illustrated in Fig. 3 below.
15. Use the metering orifice selection table and Fig. 3 to select and install the proper metering orifice. Tighten metering orifice with 5/32" hex wrench (provided).

METERING ORIFICE SELECTION

Orifice Number/ Size	None	#128	#085	#063	#042
Dilution Ratio	12%	9%	6%	3.5%	1%

** Dilution ratios are based on water thin products. Water supply temperature of 70° F. and water supply pressures of 50 psi. Variations will occur.*

Figure 3



PREPARING FOR INITIAL START-UP:

1. Water and steam supply lines must be thoroughly flushed before connecting the PAC in order to remove debris that is typically present in new piping installations. Plugged internal orifices will prevent start-up and require that the unit be dismantled for cleaning.
2. Be sure that the PAC has been installed strictly in accordance with the installation requirements of this manual. Follow all local codes. Overflow shall be of rigid pipe and firmly anchored.
3. Be sure all condensate has been purged from the steam supply line before attempting to start the PAC .

INITIAL CALIBRATION AND START-UP:

1. Turn adjusting Handwheel clockwise until it reaches the full bottomed position.
2. Firmly hold the Spray Gun, with trigger open, pointing the nozzle in a safe direction either at floor or drain. (If the HelioPAC is supplying another type of Spray Equipment, open any supply valves in order to allow water to flow to it.)
3. Open cold water supply fully. Water will flow from the start-up/overflow drain line. (Never open steam supply first.)
4. Slowly open steam supply valve to the full open position.
5. Slowly turn adjusting Handwheel counter-clockwise until water ceases to expel from the start-up/overflow drain. The PAC is now running. To complete the adjustment, raise the Handwheel an additional 1/4 turn.

Note: If you adjust the Handwheel too high, steam vapor will discharge from the start-up/overflow drain. Adjust only as directed in step 5.

6. To turn the PAC off, see "Shut Down Procedure" section.

Important Notes:

- Do not attempt to use the Handwheel as a temperature or pressure adjustment. It is not for the purpose of obtaining various operating temperatures or pressures.
- The Handwheel is a one time adjustment that provides a correct water to steam ratio within the PAC unit.
- The Handwheel is only to be used as directed for initial start-up purposes.

SUBSEQUENT START-UP PROCEDURE:

After the initial Handwheel calibration is complete, operate the PAC using the following procedure. The Handwheel should not require any further adjusting if the initial calibration procedure was done properly and there are no significant changes in the water or steam supply conditions.

1. Hold Spray Gun firmly, with trigger open, and point it in a safe direction.
2. Fully open the water supply valve to the PAC. Water will flow to drain from the start-up/overflow.
3. Open steam valve SLOWLY, bleeding off any condensate that may be in the line. Fully open the steam supply valve. Water flowing to the start-up/overflow drain will cease. When this occurs, the PAC is running.
4. Open the Detergent Valve (if applicable).
5. Spray the items to be cleaned with the pressurized, hot water, detergent solution.
6. To rinse, close the Detergent Valve.
7. To turn the unit off, see "Shut Down Procedure" below.

SHUT DOWN PROCEDURE:

1. Close Detergent Valve if open.
2. Close steam supply valve.
3. Close water supply valve.

CAUTION: Do not close the water valve before closing the steam valve or live steam will discharge from the start-up/overflow drain and Spray Gun.

MAINTENANCE:

Spray gun nozzle:

It is important to inspect the Spray Gun nozzle on a regular basis. Over a period of time the nozzle orifice may enlarge due to wear. Enlarged nozzles reduce discharge pressure and can decrease cleaning effectiveness.

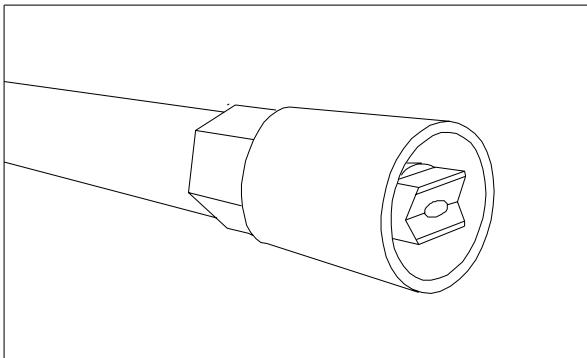
If a nozzle becomes damaged so that the nozzle orifice opening becomes reduced in size, it may cause the PAC to continually discharge water and/or steam vapor from the start-up/overflow drain. Always keep extra replacement nozzles on hand.

Never replace the original nozzle with an arbitrary size. The PAC is designed to be used with a specific size for proper operation. Oversized nozzles will reduce pressure output. Undersized nozzles will cause continuous overflow to the drain and inadequate performance.

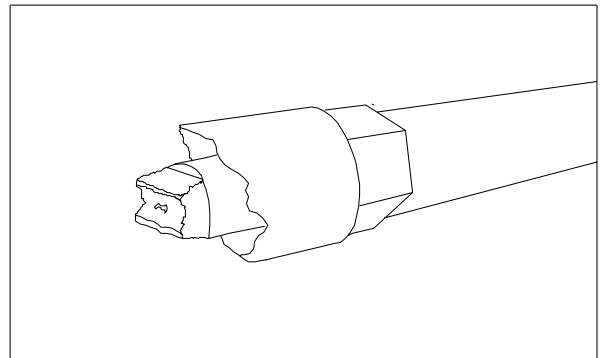
Using an oversized nozzle will not increase the flow output of the PAC but, rather, will reduce discharge pressure and cleaning effectiveness.

Similarly, using a nozzle orifice that is smaller than that which is specified, will not increase pressure output of the PAC. Rather, it will prevent the unit from starting properly and cause it to continually pass water and/or steam vapor to the start-up/overflow drain.

Always keep spray gun nozzle well maintained.



New Spray Gun Nozzle



Damaged Spray Gun Nozzle

Spray Gun:

If the spray gun becomes damaged and must be replaced, be sure to use the original model or an authorized alternate. For proper start-up and operation, the PAC must be equipped with the proper spray gun as supplied by the manufacturer. Other spray guns commonly available on the market cause flow restrictions which in turn create excessive back pressure to the PAC. Excessive back pressure results in continuous overflow to drain and reduced impact pressure, which will hamper cleaning performance.

Discharge Hose:

Inspect the discharge spray hose regularly. If any leaks or ruptures develop, replace immediately to avoid a possible safety hazard.

Never undersize the spray hose. The HelioPAC is designed to be used with a specific internal diameter spray hose. Undersized hose will hinder start-up and cause the unit to malfunction and discharge water and/or steam vapor continuously to the start-up/overflow drain.

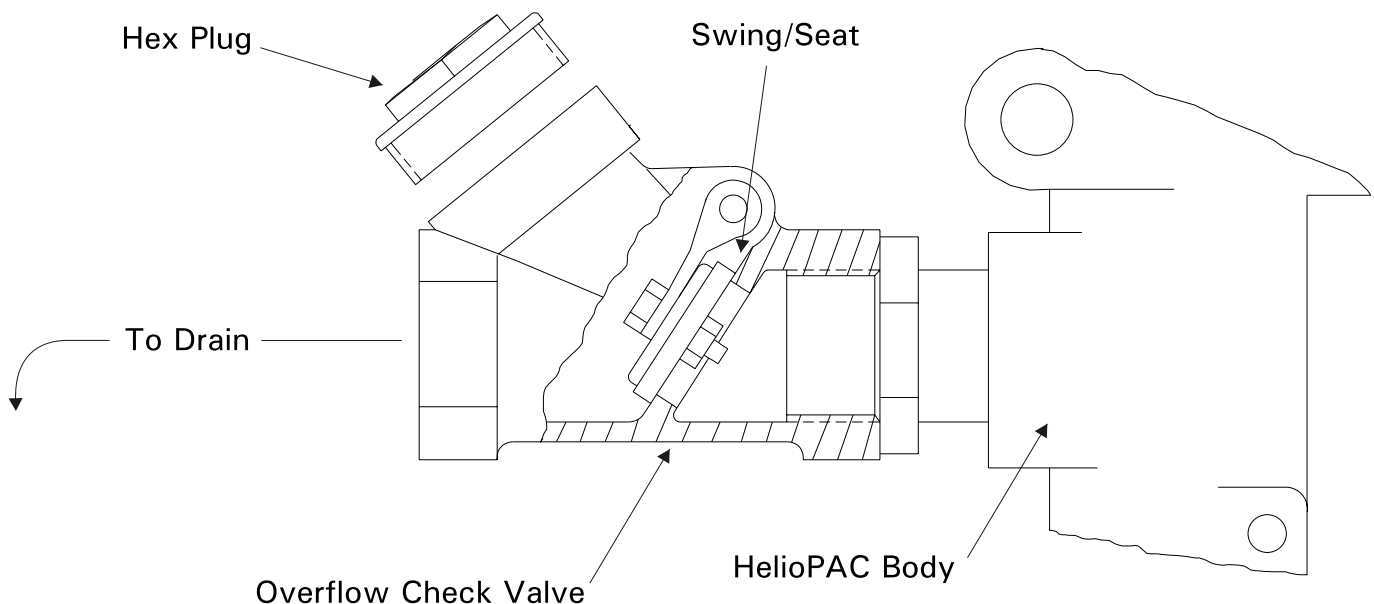
Always be sure to use a durable spray hose that is rated for at least 1000 psi and 200°F.

Check Valve Function:

During the normal start-up procedure, the PAC discharges water via the Start-up/overflow Drain. After the steam supply valve is opened to the unit, the overflow ceases and a vacuum condition develops in the PAC. The 1-1/4" Check Valve, (located on the start-up/overflow) allows water to exit the unit for proper start-up. Once start-up occurs, it prevents air from entering the system.

Inspect and Replace as Needed:

Open the hex plug located on top of the Check Valve to inspect the swing/seat. If the swing/seat does not open properly, it can create a flow restriction which can prevent start-up and cause continuous overflow to the drain.



CLEANING AND DESCALING:

Scaling may occur in the HelioPAC. How severe this will be depends on how often it is used and how hard the local water is. It is recommended that the unit be inspected and serviced once every six months.

SERVICING: EXTERNAL INSPECTION

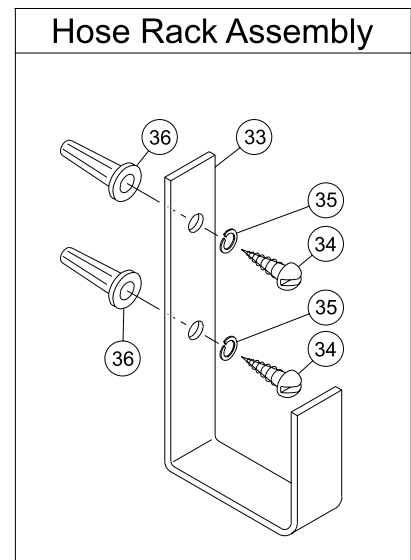
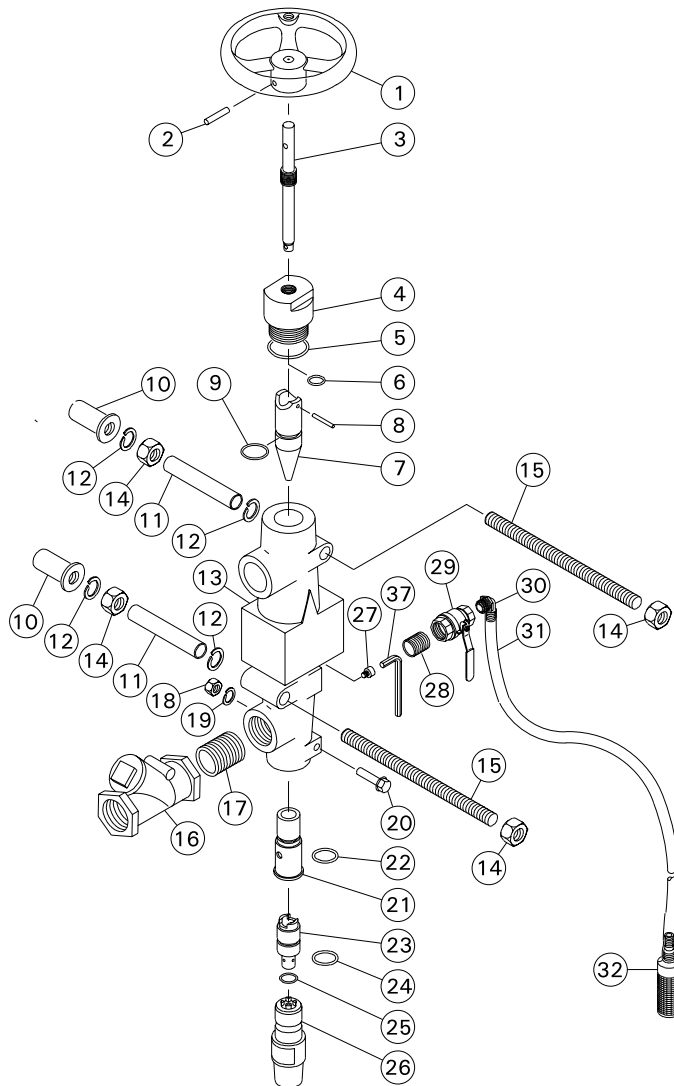
Visually, inspect the outside of the PAC for any signs of water leakage. This may occur around pipe joints, the Plug and Shaft, or where the Diffuser fits into the Body Casting. If leakage is present, pipe joints should be tightened and O-rings replaced.

SERVICING: INTERNAL INSPECTION AND MAINTENANCE

1. Loosen Plug (item 4) and turn it counter-clockwise using the wrench flats. If necessary, turn the adjusting Handwheel also.
2. Remove Plug, Shaft, and Water Jet assembly. Visually, inspect the Water Jet inside and out for any scale build-up. If scale is present, separate the Water Jet from the Shaft by removing the Dowel Pin using a drive punch. (O-ring on Shaft should be replaced at this time if needed.)
3. To remove the Diffuser (item 26), first loosen the 1/4" Hex Nut (18) and remove along with the Lock Washer (19) and the 1/4" Hex Bolt (20). Pull the Diffuser down and out of the Body Casting (13).
4. The Mixing Chamber (21) and Amplifier (23) will need to be pushed down from the top to be removed. Insert a rod approximately 5/8" diameter and 16" long (example: 3/8" schedule 40 pipe) through the top of the PAC Body Casting where the Water Jet (7) would normally enter. Use the rod to push the Mixing Chamber and Amplifier down and out of the Body Casting.
5. Separate the Amplifier and Mixing Chamber. Inspect both parts for any mineral or scale build-up and remove O-rings.
6. Soak the Water Jet, Mixing Chamber, and Amplifier in descaling solution. Use a small, soft brush to remove the scale.

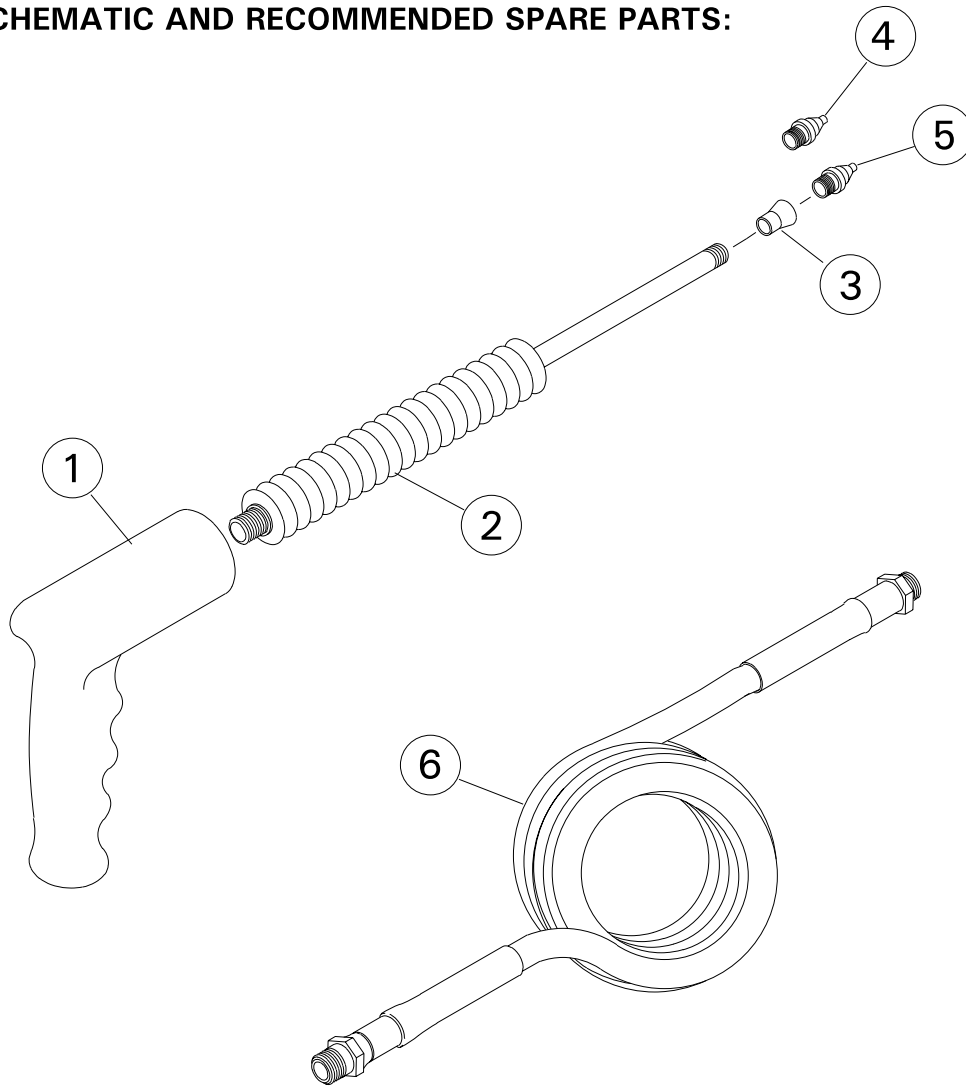
NOTE: Muriatic acid or other descaling solution should be used.
16 oz./gallon water

SCHEMATIC AND RECOMMENDED SPARE PARTS:



<u>Item</u>	<u>Description</u>	<u>Part #</u>	<u>Item</u>	<u>Description</u>	<u>Part #</u>
1	Handwheel	200452	21	Mixing Chamber	100147
2	Dowel Pin	615010	22*	O-Ring (Mixing Chamber)	611037
3	Adjusting Shaft	100149	23	Amplifier	100146-225
4	Plug	200449	24*	O-Ring (Amplifier)	611037
5*	O-Ring (Plug)	611045	25*	O-Ring (Diffuser)	611042
6*	O-Ring (Shaft)	611046	26	Diffuser	200450-145
7	Water Jet	100148-150	27*	4 - Metering Orifices	S-100108
8	Dowel Pin	615022	28	Nipple-1/4" x Close	616214
9*	O-Ring (Water Jet)	611030	29	Ball Valve-1/4" SST	BV-1/4-02
10	2 - Lead Anchors	612061	30*	90° 1/4" NPT x 1/4" Barb	S 100129
11	2 - Tube - 3/8"x4"	632103-04	31	Tubing-3/8"OD x 1/4"ID	632030
12	4 - Lockwasher - 3/8"	613011	32*	Chemical Filter	632104
13	Body Casting	400053-02	33	Hose Rack-SST	100151
14	4 - Hex Nut - 3/8"	614017	34	2 - Screws #14 Panhead	612059
15	2 - Threaded	612058-08	35	2- Lockwasher 1/4"	613008
16*	Check Valve 3/4"	CV-3/4-04	36	2 - Bantam Plugs-5/16"	612060
17	Nipple-3/4" x Close	616216	37	Hex Key L-Shaped-5/32"	

SPRAY GUN SCHEMATIC AND RECOMMENDED SPARE PARTS:



<u>Item</u>	<u>Description</u>	<u>Part #</u>
1	Gun Handle	636030
2	Gun Barrel	636029
3*	Nozzle Protector	NP-001
4*	Nozzle, 0° Angle	100054-0030
5*	Nozzle, 15° Angle	100054-1530
6*	Hose, High Pressure 1/2" x 3/8" 25' (Rated 2500 PSI @ 200°F)	632064-025-01

*Recommended Spare Parts

TROUBLE SHOOTING:

SYMPTOM: Constant discharge of water from the overflow port.

POSSIBLE CAUSE	CORRECTION
1. Steam supply closed.	1. Open.
2. Steam supply is not dry.	2. A. Bleed off condensate. B. Install a steam trap.
3. Proper spray gun not being used.	3. Use Helios supplied spray gun only.
4. Plugged spray gun or nozzle.	4. Clean or replace both.
5. Spray nozzle too small.	5. Use proper size nozzle. Be sure nozzle orifice is not damaged or crushed.
6. Steam supply erratic.	6. A. Check boiler capacity. B. Check supply pipe size. C. Use regulating valve.
7. Steam pressure inadequate.	7. Increase supply pressure. (See steam requirements page 4.)
8. Internal parts limed up.	8. See Maintenance Section.

SYMPTOM: Constant discharge of steam from overflow port.

POSSIBLE CAUSE	CORRECTION
1. Water supply closed.	1. Open.
2. Inadequate or erratic water supply.	2. Reconnect to adequate supply.
3. Water supply is over 80°F	3. Supply with cold water less than 80°F.
4. Steam pressure inadequate	4. Increase steam supply pressure. (See Steam Requirements page 4.)

Note: To avoid operational problems, please be sure this equipment has been installed and maintained strictly as outlined in this manual.



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