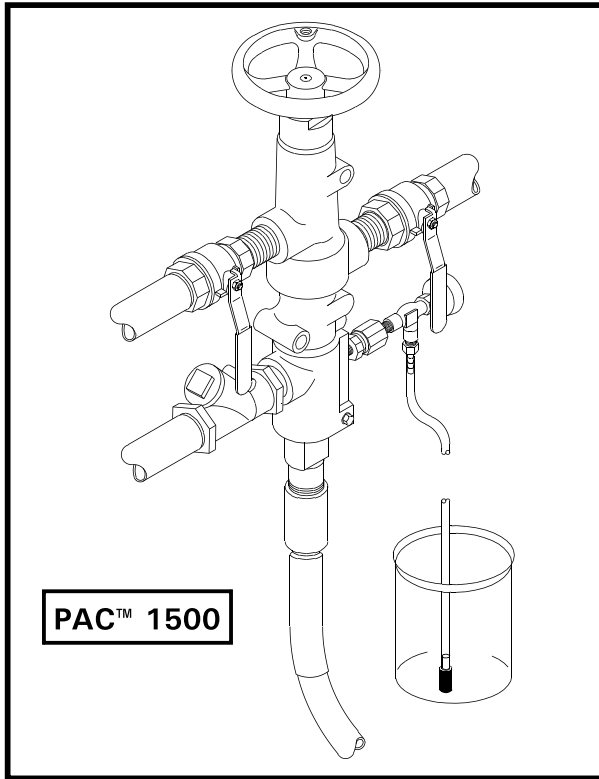


HelioPAC™ 1500

Operation Installation



1500 APPLICATIONS

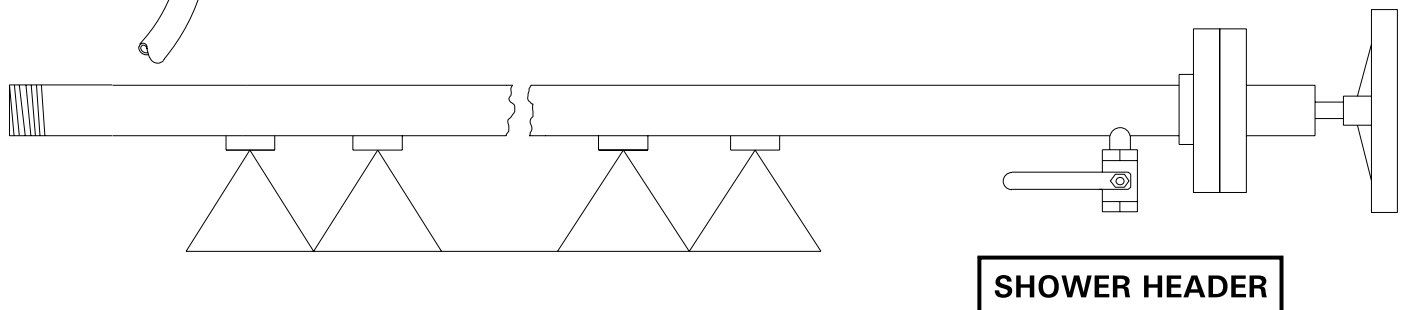
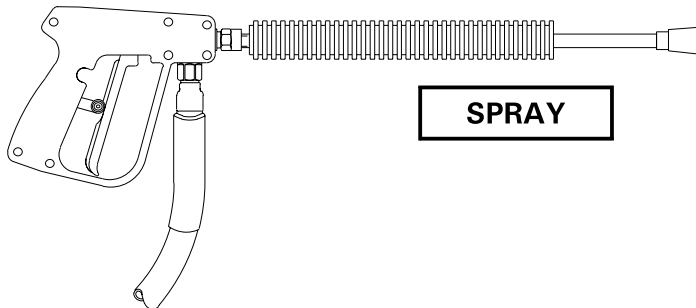
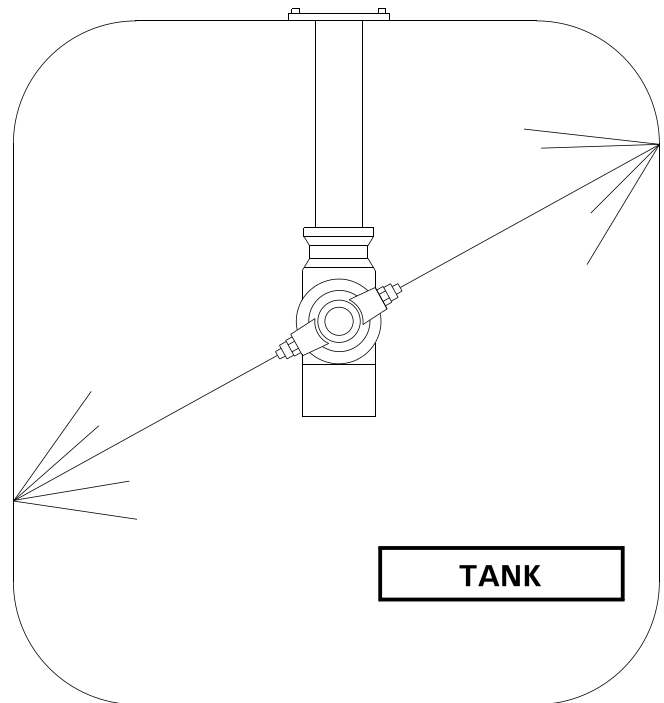
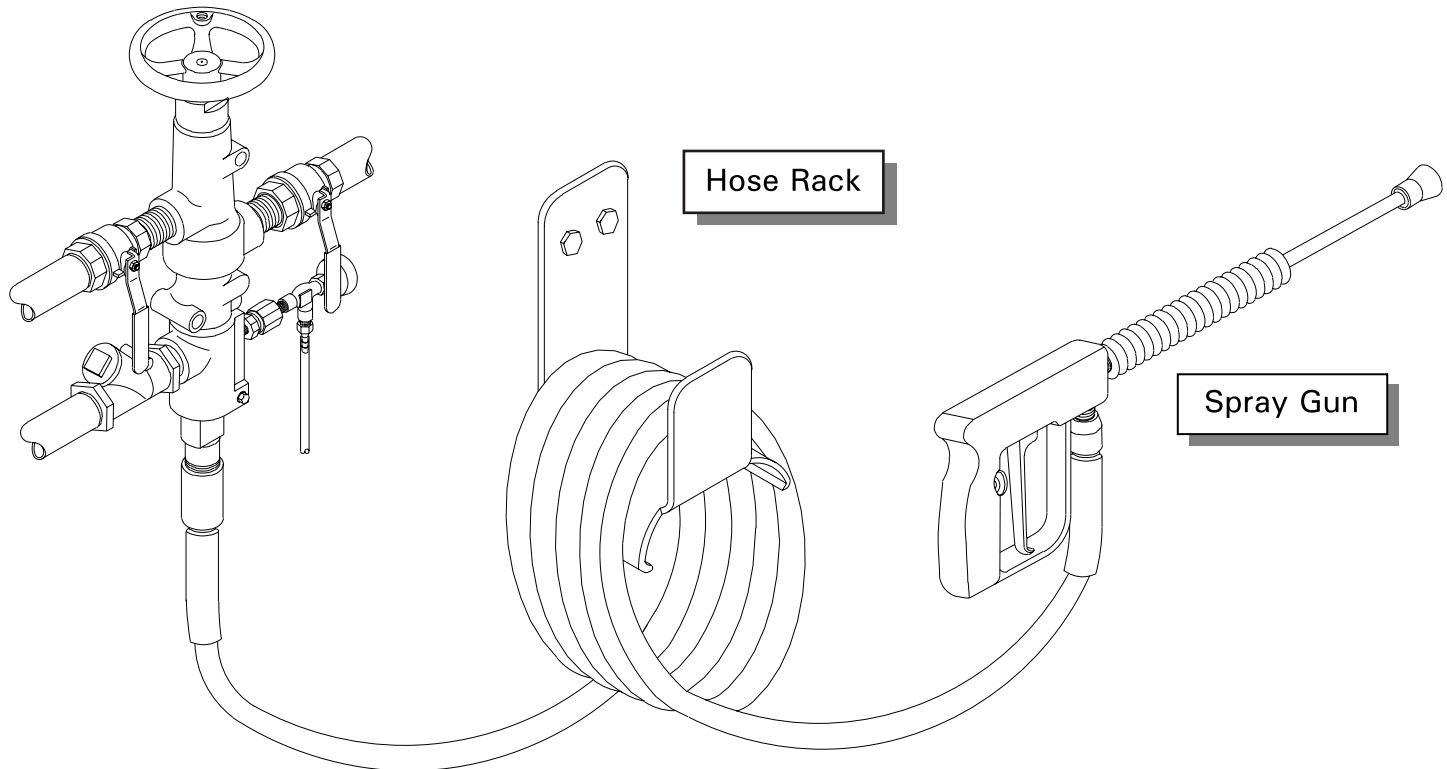


Table of Contents

HelioJET™ 1500 Principle of Operation:	3
Installation:	
Steam Requirements	4
Water Requirements	5
Start-up/overflow Drain Requirements	
HelioPAC™ 1500 Installation	6
Initial Calibration and Start-up:	8
Routine Start-up and Shut down:	9
Maintenance:	
Spray Gun Nozzle	10
Spray Gun	
Discharge Hose	11
Overflow Check Valve	
HelioPAC™ 1500 Cleaning and Descaling	12
HelioPAC™ 1500 Schematic	13
HelioPAC™ 1500 Parts List	14
Trouble Shooting:	
Hose Vibration and Bounce	15
Other trouble Shooting Tips	16

HelioJET[®] 1500 Principle of Operation

HelioPAC[™] 1500



DEFINITION OF TERMS: The term HelioPAC[™] refers to Pressure Amplifier Condenser. This device is able to combine existing in-plant steam and cold water to generate hot water at amplified pressure, ideal for cleaning. The term HelioJET[®] refers to the complete packaged system, as supplied by HelioJET Cleaning Technologies. The HelioJET may include hose, spray gun, etc. The HelioPAC is at the heart of all HelioJET systems.

PRINCIPLE OF OPERATION: The HelioPAC 1500 provides a means of mixing steam, cold water, and detergent to generate a pressurized 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, and creates 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, or other spray device.

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 HelioPAC 1500. If an unusual amount of condensate appears in the steam supply line, install a steam trap within two feet of the unit.

Supply Pressure

The minimum steam pressure required to operate the HelioPAC 1500 varies depending upon the water supply pressure available to it. Please note that the greater the water pressure supplied to the HelioPAC, the greater the discharge pressure at the Spray Gun. However, steam supply pressure must be adequate.

Request and review the applicable [1500 Performance Graph](#) to verify that your available steam pressure is adequate.

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.

Note: Performance Graph represents minimum steam pressures 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, contact the HelioJET Technical Service Department to receive a water-jet orifice replacement.

Supply Line

1-1/4" supply pipe.

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 HelioPAC 1500. If the steam line is shared with 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 HelioPAC 1500 is expected to be in operation, the combined steam load may be too great, causing the supply to the HelioPAC 1500 to be insufficient. This situation will result in erratic operation. To avoid this problem, reschedule equipment operating times.

Remove any unnecessary flow restrictions such as under-sized pipe or unnecessary valves that may be in the line.

Volume

Request a 1500 Performance Graph for steam consumption data.

Note: If the boiler is not capable of supplying the minimum steam flow requirement, operation will be erratic.

Installation Requirements

2. Water Requirements:

Supply Pressure	20 to 200 PSI
Temperature	Must not exceed 80°F
Supply Line	1-1/4" pipe.

The 1-1/4" water supply line must always be dedicated exclusively to the HelioPAC 1500 in order to maximize performance and ensure 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 Drain Requirements:

Drain Line	Pipe the Start-up/overflow Drain line downward to a safe drainage location using no less than 1-1/4" rigid pipe. To prevent movement and ensure safety, firmly anchor all piping.
------------	---

Pipe the end of the Start-up/overflow Drain line to a drain. Be sure that the end of the pipe can be seen from the HelioPAC 1500 location.

Never submerge the Start-up/overflow Drain. Be sure to pipe it 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.

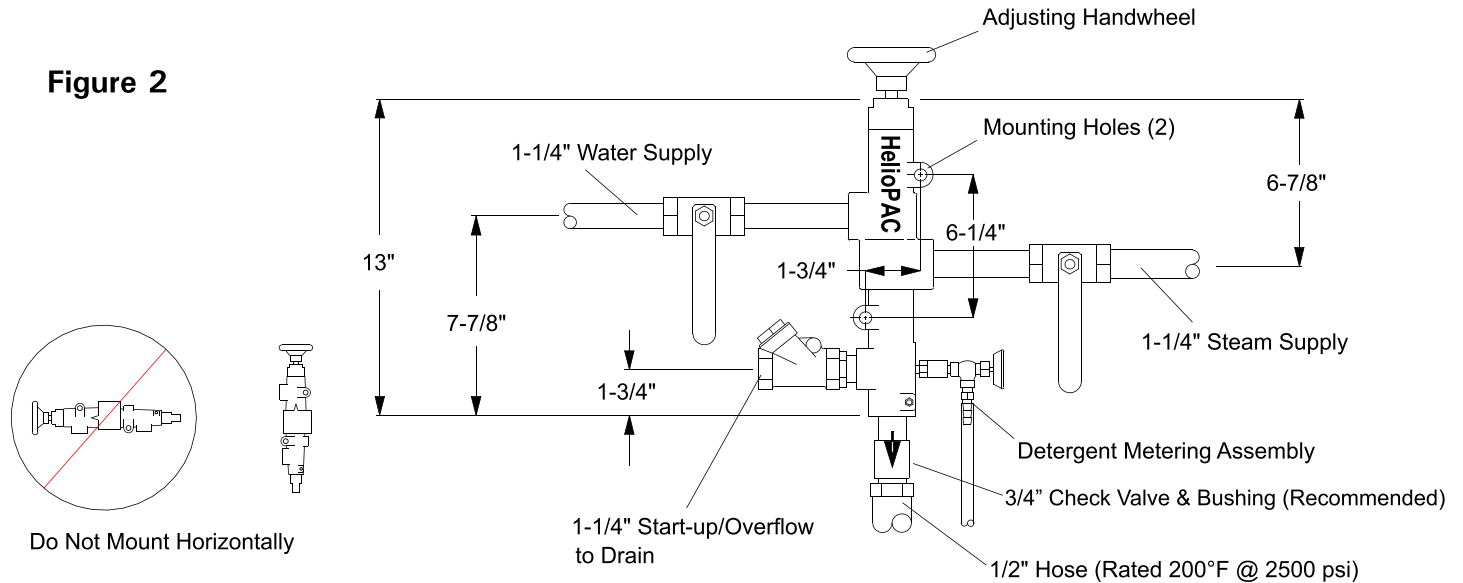
Caution:

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

HelioPAC™ 1500 Installation

Refer to Figure 2 (below) and HelioJET 1500 Schematic (page 13)

1. Determine a suitable location to mount the HelioPAC 1500.



2. Figure 2 illustrates the mounting hole locations and dimensions needed for mounting the HelioPAC 1500. 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 HelioPAC 1500 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 HelioPAC™ 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 HelioPAC 1500.
10. Connect the cold water supply to the HelioPAC 1500. See "Installation Requirements".
11. Connect the steam supply to the HelioPAC 1500. See "Installation Requirements".
12. Connect Start-up Drain piping to the HelioPAC 1500. See "Installation Requirements".
13. Connect Discharge outlet to Spray Gun/Hose or other specified spray equipment (see figure 1 page 3).

Installation

Important Note:

Flow Rate and Nozzle Delivery

The HeliopAC 1500 is designed with internal orifices that determine the output flow capacity of the unit. Because the HeliopAC delivers a fixed flow rate of water, discharge pressure is determined by the amount of back pressure created from the Spray Gun, Nozzle, Hose combination or other spray equipment provided. HeliopAC Cleaning Technologies has specifically engineered this Spray Equipment to provide optimum performance and reliability in the field.

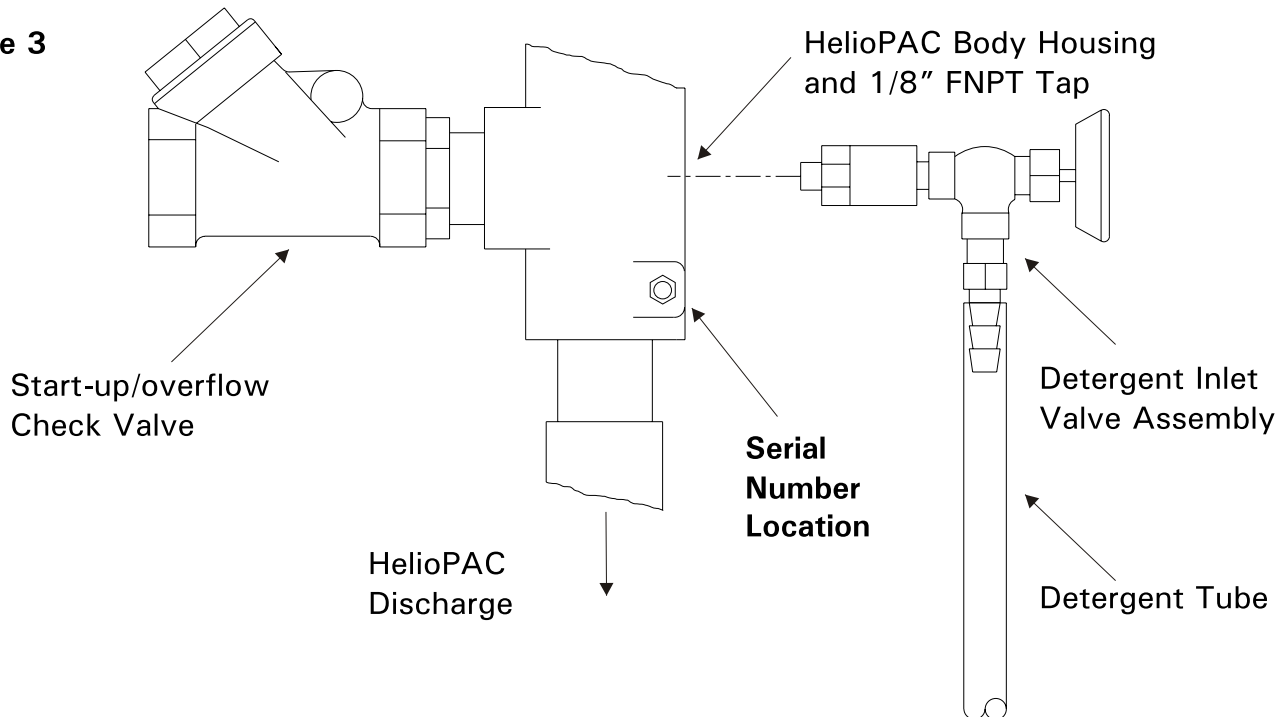
Deviations in spray equipment will likely cause the following operational problems:

1. Under sized spray equipment will create excessive back pressure to the HeliopAC and will cause the unit to continually discharge water and/or steam vapor to the Start-up/Overflow drain. The HeliopAC will be unable to start and operate properly.
2. Over sized spray equipment will allow the HeliopAC to operate without overflow to drain, however, the unit will not develop adequate back pressure.

If you plan to use spray equipment not provided by HeliopAC Cleaning Technologies, contact the HeliopAC's Technical Sales Department at 585-768-8710. Please provide the serial number of your HeliopAC 1500 when you call (see figure 3 below).

14. Install the Detergent Inlet Assembly (sold separately) as illustrated in Figure 3 below.

Figure 3



Initial Calibration and Start-up

Preparing for Initial Start-up:

1. In order to remove debris that is typically present in new piping installations, the water and steam supply lines must be thoroughly flushed before connecting the HelioPAC 1500. Plugged internal orifices will prevent start-up and require that the unit be dismantled for cleaning.
2. Be sure that the HelioPAC 1500 has been installed strictly in accordance with the installation requirements of this manual. Follow all local codes. Start-up/overflow Drain shall be rigid pipe and firmly anchored.
3. Be sure all condensate has been purged from the steam supply line before attempting to start the HelioPAC 1500.

Initial Calibration and Start-up:

1. Turn adjusting Handwheel clockwise until it reaches the fully 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 equipment other than a Spray Gun, be sure to open necessary valves in order to allow water to flow to the spray apparatus.
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. Turn adjusting Handwheel counter-clockwise until water ceases to discharge from the Start-up/overflow drain. When overflow ceases, the HelioPAC is running. To complete the adjustment, raise the Handwheel an additional 1/4 turn (do not exceed one additional 1/4 turn of the Handwheel).

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 HelioPAC 1500 off, see "Shut Down Procedure" (next page).

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 HelioPAC 1500.
- The Handwheel is only to be used as directed for initial start-up purposes.

Routine Start-up and Shutdown

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

Routine Start-up Procedure:

1. Hold Spray Gun firmly with trigger open and point it in a safe direction.
2. Fully open the water supply valve to the HelioPAC 1500. Water will flow to drain from the Start-up/overflow.
3. Open steam valve **slowly**, bleed 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 HelioPAC 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. Live steam will discharge from the Start-up/overflow drain and Spray Gun.

Maintenance

Spray Gun Nozzle:

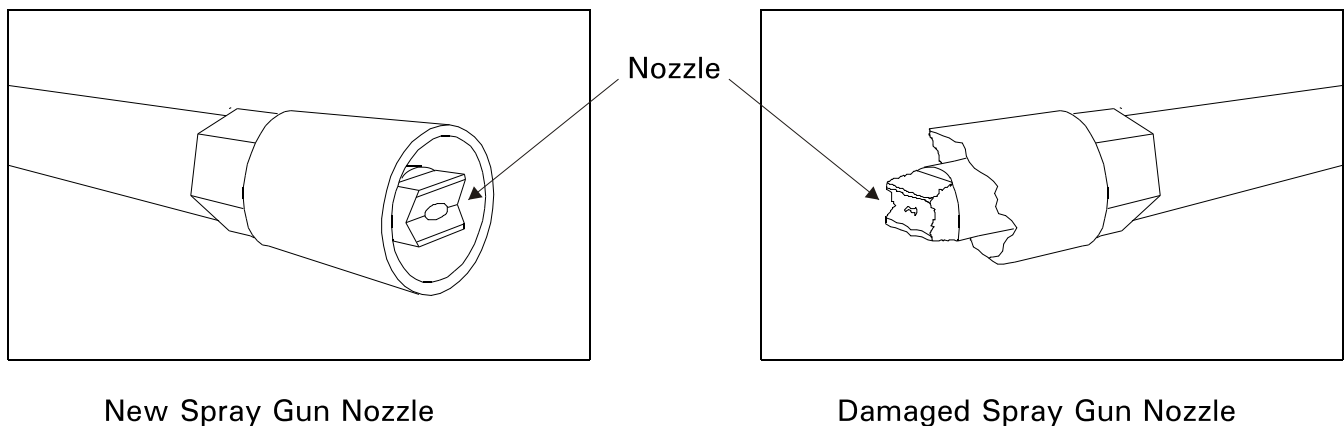
It is important to inspect the Spray Gun Nozzle on a regular basis. Over a period of time, the Nozzle Orifice may enlarge due to wear. Enlarged Nozzles reduce discharge pressure and can decrease cleaning effectiveness.

If a Nozzle becomes damaged so that the orifice opening becomes reduced in size, it may prevent the HelioPAC 1500 from siphoning liquid detergent properly, or cause it 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 HelioPAC 1500 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 HelioPAC 1500, but will instead reduce discharge pressure and cleaning effectiveness. Similarly, a Nozzle orifice that is smaller than that which is specified will not increase output pressure. Instead, 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 the Spray Gun Nozzle well maintained.



Spray Gun:

If the Spray Gun becomes damaged and must be replaced, be sure to use the original model or an approved alternate. For proper start-up and operation, the HelioPAC 1500 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 HelioPAC 1500. Excessive back pressure results in continuous overflow to the Start-up/overflow drain and reduced impact pressure which will hamper cleaning performance.

Maintenance

Discharge Spray 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 diameter Hose. An undersized Hose will hinder start-up and cause the HeliopAC 1500 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.

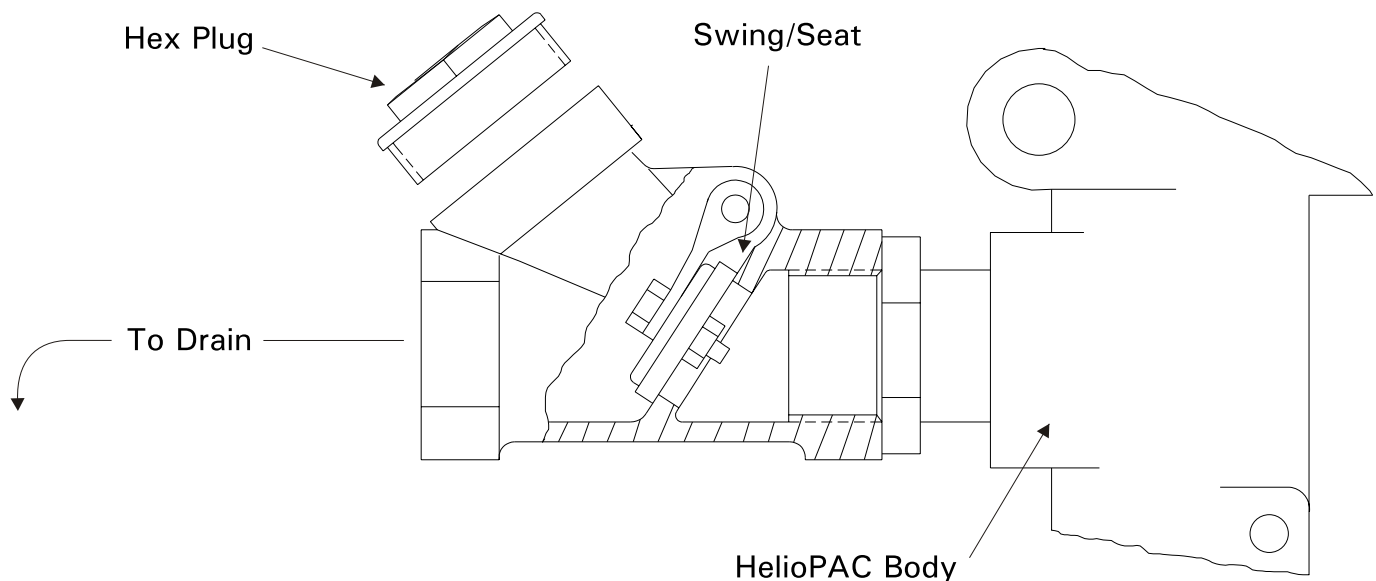
Check Valve Function:

During the normal start-up procedure, the HeliopAC 1500 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 HeliopAC. 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; this allows liquid detergent to be siphoned into the HeliopAC™.

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. This can prevent start-up and cause continuous overflow to the drain or allow air to enter, preventing detergent pick-up from occurring.

Overflow Check Valve:



HelioPAC™ 1500 Cleaning and Descaling:

Scaling may occur in the HelioPAC 1500. How severe this is depends on how often it is used and how hard the local water is. It is recommended that the unit be inspected and serviced every six months.

SERVICING: EXTERNAL INSPECTION

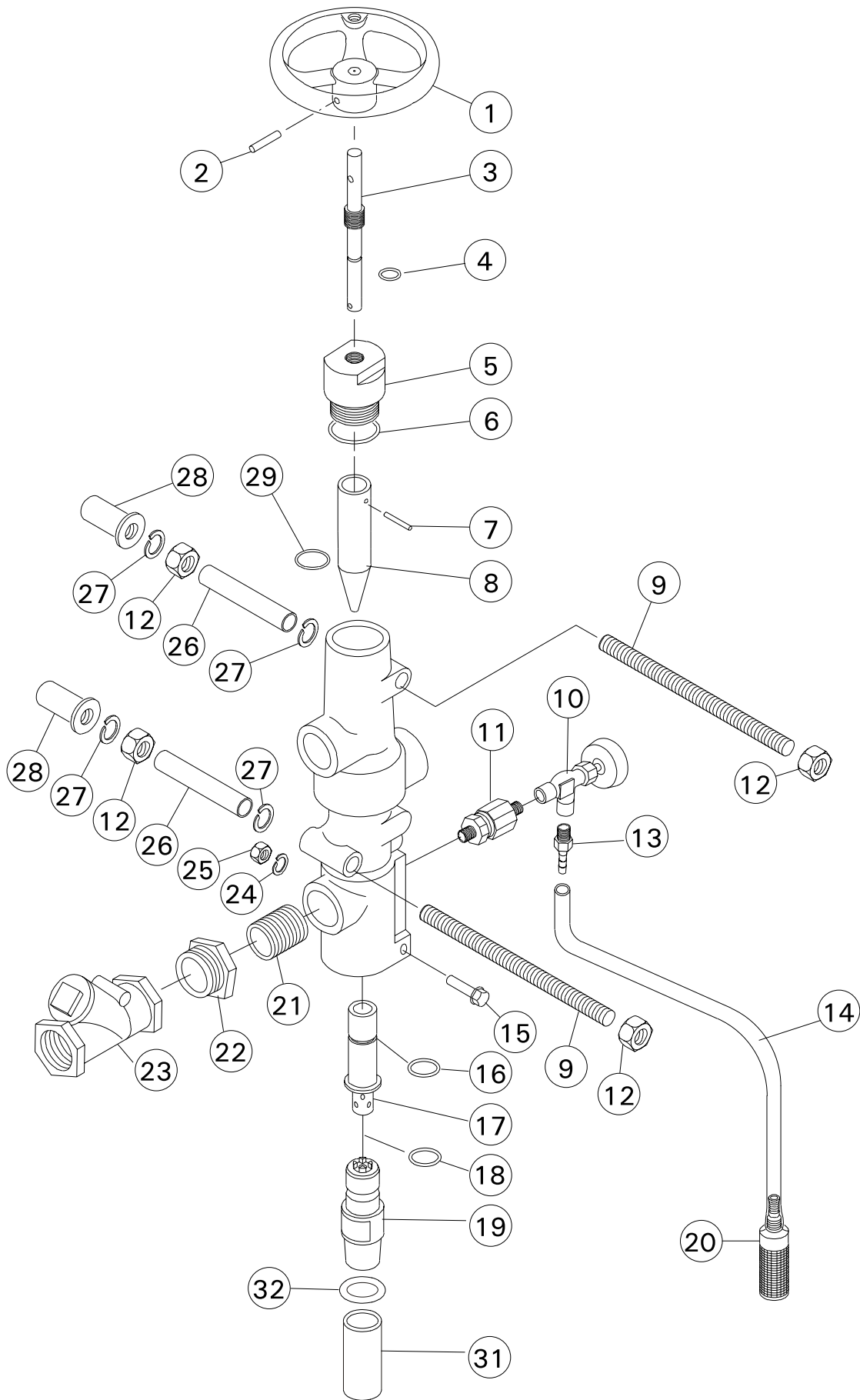
Visually inspect the outside of the HelioPAC 1500 for water leaks. This may occur around pipe joints, Plug and Shaft, or where the Diffuser fits into the Body Casting. If leaks are present, pipe joints should be tightened and O-Rings replaced.

SERVICING: INTERNAL INSPECTION AND MAINTENANCE

1. Loosen Plug (item 5) by turning counterclockwise using the wrench flats. If necessary, turn the Handwheel (1) also.
2. Remove Plug, Shaft, and Waterjet assembly (items 1-8). Visually inspect the Waterjet inside and out for any scale build-up (brown discoloration on the outside tip of the Waterjet is normal). If scale is present, separate the Waterjet from the Shaft (3) by removing the Dowel Pin (7) using a drive punch. The O-Ring (4) on Shaft should be replaced at this time if required.
3. To remove the Diffuser (19), first loosen the 1/4" Hex Nut (25) and remove along with the Lock Washer (24) and the 1/4" Hex Bolt (15). Pull the Diffuser down and out of the Body Casting. Inspect the Diffuser internally for signs of erosion and pitting.
4. The Mixing Chamber (17) must be pushed down from the top to be removed. Insert a rod approximately 5/8" diameter & 16" long (example: 3/8" schedule 40 pipe), through the top of the HelioPAC 1500 Body Casting where the Waterjet would normally enter. Use the rod to push the Mixing Chamber down and out of the Body Casting. **Caution: Always remove O-Ring (18) before attempting to remove the Mixing Chamber. As the Mixing Chamber exits the 1500 body housing the O-Ring will be damaged.**
5. Inspect for any mineral or scale build-up and remove the O-ring if necessary.
6. Soak the Waterjet, Mixing Chamber, and Diffuser in descaling solution as required. Use a small, soft brush to remove the scale. Use muriatic acid (16 oz./gallon water) or other descaling solution.
7. After descaling, inspect the Mixing Chamber and Diffuser internally for signs of wear, such as erosion and pitting. If wear is present, it may be time to replace these two components (see pages 13-14). Left unattended, worn parts can cause excessive overflow and prevent the siphoning of cleaning agents through the Detergent Metering Valve. Please keep in mind that in most cases it takes several years of operation for significant wear to occur, and there are many other conditions that can cause excessive overflow, etc. Please review the trouble shooting section before replacing these components.

HelioPAC™ 1500

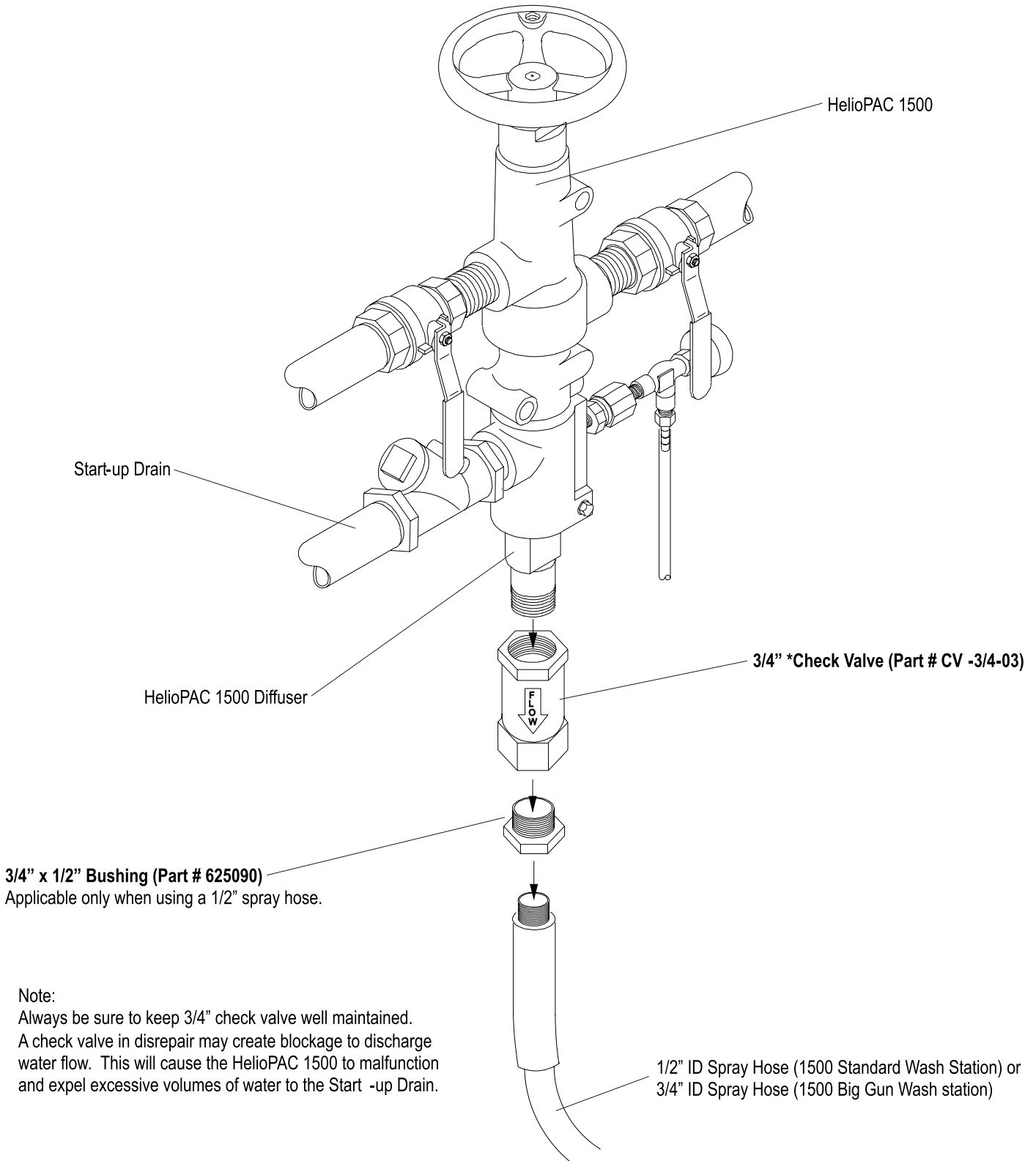
Parts Schematic



<u>Item</u>	<u>Description</u>	<u>Part Number</u>
1	Handwheel	200189-375
2	Dowel Pin	615008
3	Shaft	200289
4	O-Ring (Shaft)	611002
5	Plug	200291
6	O-Ring (Plug)	611025
7	Dowel Pin	615010
8	Waterjet	200290-XXX
9	3/8 X 8" Rod	612058-08
10	<u>Detergent Inlet Valve</u>	
	Brass	NV-1/8-02
	Stainless Steel	NV-1/8-04
11	<u>Check Valve</u>	
	Brass	CV-1/8-05
	Stainless Steel	CV-1/8-02
12	3/8 Nut	614017
13	Hose Barb	632037
14	Detergent Tube	632030
15	1/4 Bolt	612028
16	O-Ring (Mixing Chamber)	611006
17	Mixing Chamber	200292
18	O-Ring (Diffuser)	611019
19	Diffuser	200335-XXX
20	Strainer	632059
21	Nipple	616089
22	Bushing	625046
23	Check Valve	CV-1-1/4-04
24	Lock Washer	613008
25	Hex Nut	614011
26	Tube Spacer	632103-04
27	Lock Washer	613011
28	Lead Anchor	612061
29	O-Ring (Waterjet)	611026
30	1500 Body Housing	400028
Sold Separately		
31	3/4 X 1/2" Bushing	625090 (when 1/2" hose is used)
32	3/4" SS Piston Check Valve	CV-3/4-03 (Recommended)
	O-Ring Replacement Kit	S-100085

Trouble Shooting

Vibration and Bouncing of Discharge Hose. To prevent vibration of discharge spray hose when spray gun is in the off position, install *Check Valve as follows.



3/4" x 1/2" Bushing (Part # 625090)
Applicable only when using a 1/2" spray hose.

Note:
Always be sure to keep 3/4" check valve well maintained. A check valve in disrepair may create blockage to discharge water flow. This will cause the HelioPAC 1500 to malfunction and expel excessive volumes of water to the Start -up Drain.

Trouble Shooting

Problem:

Continuous overflow of water and/or steam from the Start-up/overflow Drain.

Remember, when the system is operating properly, overflow will cease when you pull the trigger on the Spray Gun. When the Gun is off, it is normal for water to bypass through the Start-up/overflow Drain. If there is overflow even when the Spray Gun is in use, see the possible causes and corrections below.

<u>Possible Cause</u>	<u>Correction</u>
1. HelioPAC Handwheel is not in proper adjustment.	1. See pages 8-9 for proper calibration and start-up procedure.
2. Improper Spray Gun or hose being used.	2. Use HelioJET supplied equipment (see pages 10 & 11).
3. Partially plugged Spray Gun or Nozzle.	3. Clean or replace both.
4. Spray Nozzle too small.	4. Use proper size Nozzle. Be sure Nozzle orifice is not damaged or crushed (see page 10).
5. Steam or water supply valve closed.	5. Open.
6. Steam supply is not dry.	6. A. Remove condensate from line. B. Install a steam trap.
7. Steam supply pressure is inadequate or erratic.	7. Review the HelioJET 1500 Performance Graph and determine whether or not your steam supply pressure is above the recommended minimum. If you find that your steam pressure is inadequate at the source and you are not able to increase it, contact the HelioJET Technical Sales Department at 1-716-768-8710 to receive information regarding corrective internal replacement parts.
8. Steam <u>pressure</u> adequate at source but <u>capacity</u> inadequate.	8. A. See performance data for boiler requirements. B. Check supply line size, and remove all possible flow restrictions.
9. Water supply is too warm.	9. Water supply must be less than 80°F.
10. Inadequate or erratic water.	10. Reconnect to adequate supply. Never undersize supply lines.
11. Diffuser, Mixing Chamber, or Waterjet limed up or plugged with debris.	11. Inspect and clean as required (see pages 12-14).

Trouble Shooting

Problem:

HelioPAC will not pick-up detergent.

If there is no water or steam discharging from the Start-up/overflow Drain during operation but the unit will still not siphon liquid cleaning agents, check these possible causes and corrections:

Note: The HelioPAC will not siphon liquid cleaning agents if there is any discharge from the Start-up/overflow Drain. If overflow is present, see page 15 and correct it before continuing.

<u>Possible Cause</u>	<u>Correction</u>
1. Detergent Inlet Valve is closed.	1. Open.
2. Detergent Inlet Assembly is plugged with debris.	2. Disassemble and clean as required.
3. Nozzle at end of Spray Gun is damaged (crushed or undersized).	3. Replace Nozzle.
4. Overflow Check Valve is leaking and allowing air to enter, causing a disruption of the vacuum within the 1500 .	4. Inspect, clean, or replace Overflow Check Valve as required (page 11).

Problem:

Lack of discharge pressure at Spray Gun or other spray device.

Note: If overflow of water or steam from the Start-up/overflow accompanies a lack of discharge pressure, see page 15 and first address the overflow problem.

<u>Possible Cause</u>	<u>Correction</u>
1. Oversize Spray Nozzle, creating insufficient back pressure.	1. Use only supplied or recommended equipment (see page 10).

Limited Warranty

Products manufactured by HelioJET Cleaning Technologies are warranted to the original user to be free of defects in materials or workmanship for 24 months from the date of original factory shipment.

HelioJET Cleaning Technologies' liability under this warranty shall be limited to repairing or replacing at HelioJET's option without charge, after factory inspection of product by HelioJET Cleaning Technologies. HelioJET will not be liable for any costs of removal, installation, transportation, or any other charges which may arise in connection with a warranty claim.

Valves, pumps, switches and electrical components sold but not manufactured by HelioJET Cleaning Technologies carry the above warranty for 12 months. Valve replacement seats and accessories such as hoses, spray guns, and nozzles are not warranted.

HelioJET will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with HelioJET's printed installation drawings. To obtain service under this warranty, the defective product must be returned to HelioJET factory in LeRoy, New York, together with proof of purchase, failure date, and supporting installation data. Any defective products to be returned to the factory must be sent freight prepaid; documentation to support the warranty claim and/or a Return Material Authorization must be included if so instructed.

HELIOJET WILL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES OR EXPENSES ARISING FROM INSTALLATION, USE OR ANY OTHER CAUSES. THERE ARE NO EXPRESS OR IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH EXTEND BEYOND THOSE WARRANTIES DESCRIBED OR REFERRED TO ABOVE.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages and some jurisdictions do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction.

Notes:



57 North St., Suite 120
Le Roy, NY 14482
1-800-444-3546
www.heliojet.com