

HDA Metal Diaphragm Chemical Injection Pump Leak Detection Technology Operating Manual



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Congratulations! You have chosen the finest, most versatile, chemical injection pump made; designed to superior specifications for long life, reliable performance, and low maintenance. To maximize the Series HDA's durability and to ensure proper operation, please read and follow this manual. Failure to correctly install and maintain the pump is the primary cause of premature pump failure and voids the product warranty.

NOTE: This IOM applies to the CheckPoint Series HDA Chemical Injection Pump, part number HDA#####10.

NOTE: Important illustrations, graphs, and charts are located throughout this manual.

1. INTRODUCTION

1.1 *Scope*

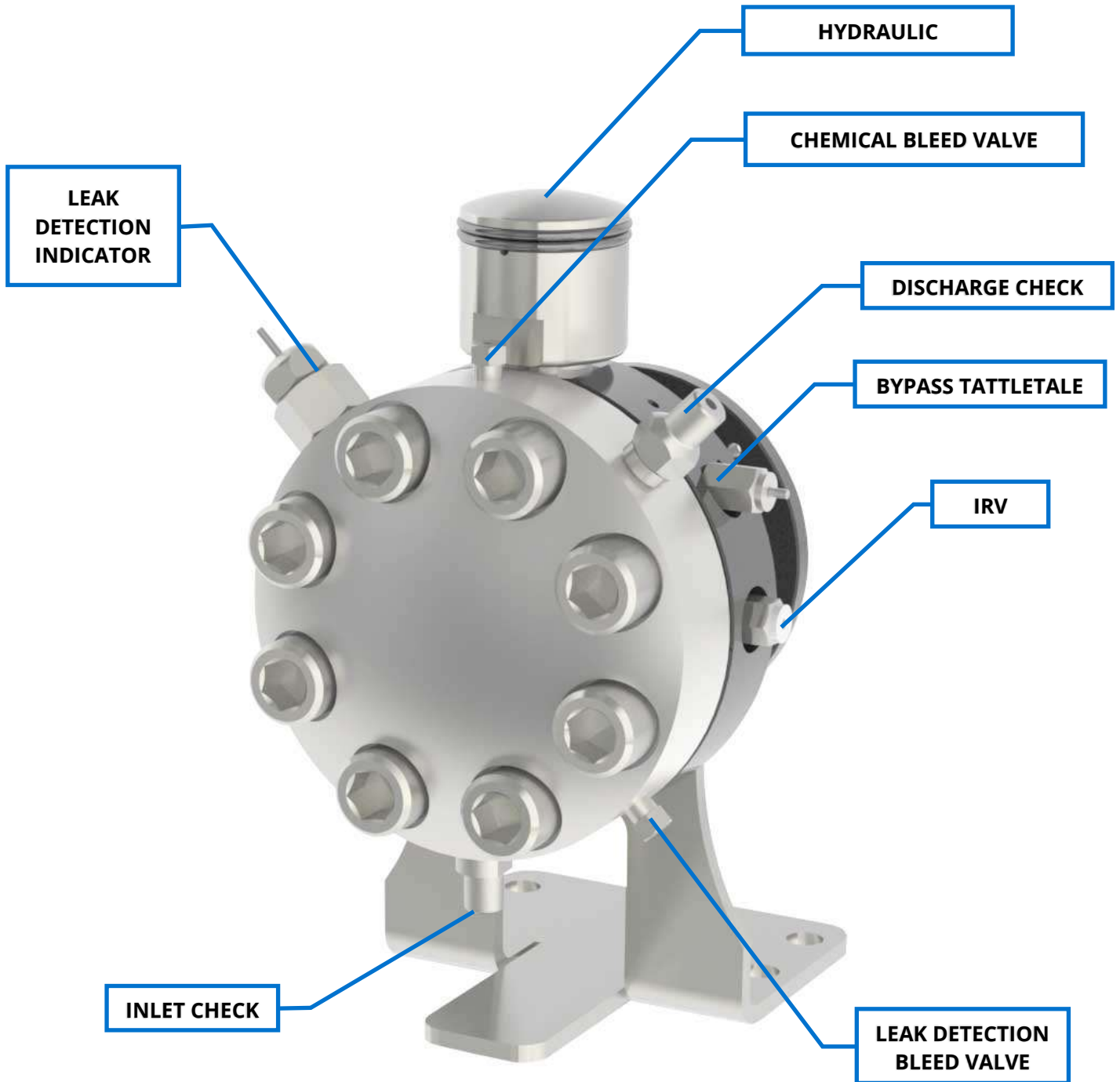
This IOM covers the Series HDA pump head installation and operation. Safe system design and mechanical drive systems for this pump head are covered in other manuals.

1.2 *Description*

The Series HDA is a chemical pump that uses reciprocating motion to pressurize hydraulic fluid on one side of a diaphragm set, causing the diaphragms to flex outward into a chemical head. The other side of the diaphragm set is in contact with the chemical, which is pumped out at the same pressure as the hydraulic fluid. The hydraulic fluid is stored in a reservoir connected to the pressure chamber by a self-bleeding burp valve. The burp valve allows air in the system to automatically return to the reservoir and separate from the hydraulic fluid. The diaphragm set consists of three stainless steel disks that are constrained between the chemical head and hydraulic body. There are no elastomer seals on the chemical side, as the diaphragms are deformed by a radial groove clamping system.

The pump head has several safety and indication features. The first safety feature is an internal relief valve on the hydraulic supply side, which limits the pressure the pump can supply. When this safety system has been activated, a tattletale indicator is activated and remains so until reset. This indication allows the user to see if an event has occurred in the past, even if it is not currently happening. The diaphragm set consists of three stainless steel disks which, due to their thickness, can flex quite easily. If any one of the diaphragms fails, the pump will continue to pump without cross-contamination between the hydraulic oil and the chemical. Failure of the diaphragm will activate a leak detection indicator. This leak detection system can be a simple popup tattletale, a gauge, or an electrical indicating signal.

The Series HDA can be driven by either an electrical or pneumatic drive unit. The hydraulic plunger and bushing are constructed of strong ceramic materials for long life and low wear. This material selection allows for repeatable and consistent pumping of chemical.



1.3 Specification

Minimum Speed	4 Strokes Per Minute
Maximum Speed	180 Strokes Per Minute
Minimum Required Inlet Pressure	0 PSIG (0 BARG)
Maximum Allowable Inlet Pressure	1,000 PSIG (69 BARG)
Minimum Allowable Discharge Pressure	0 PSIG (0 BARG)
Maximum Allowable Discharge Pressure	1,000 PSIG (69 BARG)
Design Pressure	6,000 PSIG (414 BARG)
Maximum IRV Set Point	1,500 PSIG (103 BARG)
Maximum Discharge Flow	70 US GPD (265 LPD)
Maximum Stroke Length	1" (25.4 mm)
Hydraulic Oil Capacity	10 Fl Oz, (295 ml)
Hydraulic Fluid	Mobil DTE 10 Excel 22 recommended, or equivalent ISO VG 22 Hydraulic Oil
Metallic Diaphragms (Qty. 3)	316SS (optional materials available)

1.4 Features

- Metallic Diaphragms
- Triple Diaphragm Construction
- Diaphragm Leak Detection
- IRV (Internal Relief Valve)
- IRV Tattletale
- Capable of Pumping with No Back Pressure Requirement
- Continuous Bleeding Burp Valve
- One Press Hydraulic Bleed

1.5 Options

The HDA pump has several innovative features and options. Two prominent options are the leak detection and IRV activation signaling. These signals alert operators of impending failure of the pump system.

1.5.1 Leak Detection Signaling

The leak detection system provides indication of a compromised diaphragm while maintaining pumping capacity.

1.5.1.1 Mechanical Tattletale Indicator

The mechanical tattletale is a popup indicator that can be reset without disassembly. When a leak is detected, the system will cause an indicator plunger to rise as a visual indication of the leak. The indicator can be reset by pressing the indicator back down or by relieving the pressure at the leak detection bleed valve.



1.5.1.2 Pressure Gauge Indicator

A pressure gauge indicator provides a reading of the pressure in the leak detection system and will indicate a compromised diaphragm or any other issue. The pressure on the gauge can be reset by opening and re-closing a bleed port on the gauge manifold.



1.5.1.3 Electrical Pressure Switch (not shown)

When pressure exceeds 100 PSIG, an electrical switch unit installed in the leak detection port provides a discrete signal to a computer controlled operating system.

1.5.2 IRV Activation Signaling

When a hydraulic overpressure event occurs, the error can be recorded mechanically or electronically.

1.5.2.1 Mechanical Tattletale Indicator

The mechanical tattletale is a popup indicator that can be reset without disassembly. When an overpressure relief event occurs, the system will cause an indicator plunger to rise as a visual indication of the relief. The indicator can be reset by pressing the indicator back down into its housing. The indicator is not self-resetting and will indicate an event that has occurred but is not actively occurring.



1.5.2.2 Electrical Pressure Switch (not shown)

An electrical switch unit can be installed in the Tattletale port to provide a discrete signal to a computer controlled operating system.

2. INSTALLATION

2.1 *Inspection*

2.1.1 Before installation, please inspect the pump carefully. If the pump appears to have sustained damage in transit, call your CheckPoint Authorized Distributor or CheckPoint Customer Service directly at +1 (504) 340-0770 to report and confirm damage. If it is determined that damage occurred in transit, a carrier claim will be required.

2.2 *Storage*

The Series HDA pump has been thoroughly tested at the CheckPoint factory prior to shipment. This testing required all fluids and lubricants to be filled. Prior to shipping, these lubricants were drained. Residual lubrication that did not drain will protect the internal components from corrosion. Although our pumps can be placed in service without environmental protection, we suggest they are stored indoors until being commissioned.

2.3 *Unpacking*

The HDA pump can be shipped as a single pump head or as part of a completed pump. When shipped as an individual pump, the pump is secured with expanding foam to protect it during shipment. The Series HDA pump will sit upright on its base but may tip over if moved. Please ensure that unpackaged pumps are securely placed in a safe area.

2.4 *Safety*

When shipped as a completed pump, the unit is not safe until the mounting base is secured to its final location. Vertical units have a high center of gravity and can be easily tipped over, causing damage to the pump and injury to others. Please ensure that the pump is securely fastened to a firm base at all times.

The Series HDA can generate pressures that exceed the working pressure of the pump. The IRV (Internal Relief Valve) is designed to keep the maximum output of the pump below 1,500 PSIG at all times. Secondary process reliefs are still required for a safe system.

2.5 Mounting

- CheckPoint requires horizontal mounting for the Series HDA. Improper mounting will result in oil leakage from the hydraulic reservoir vent. The Series HDA base is provided to ensure proper orientation.
- The pump may be mounted to a skid or other surface in a number of ways; however, clamping around the outside of the pump can permanently affect the cylindricity of the injection head and/or damage the protective coating, thereby voiding the product warranty. Proper mounting techniques increase accessibility during maintenance and troubleshooting. Your CheckPoint HDA purchase includes a standard predrilled base for proper pump mounting.

2.6 Connecting the Chemical Supply

2.6.1 Always clean suction lines and check chemical containers to ensure that they are free of all foreign matter, sand, sludge, or chemical buildup.

NOTE: Even new chemical tanks can contain debris, which may cause system damage. Removing foreign debris from suction lines and chemical containers will substantially extend the life of the packing and other pump components.

NOTE: A presuction in-line chemical filter is strongly recommended if early packing failure is observed. Abrasive particles carried into the pump through suction plumbing is a common cause of packing failure. CheckPoint offers a range of chemical filters suitable for use with the Series HDA.

2.6.2 Connect the chemical suction line to the suction check valve on the injection head. The suction check valve is a male 1/4" NPT. Do not over-tighten NPT connections. For more information regarding proper NPT connections, please request a CheckPoint NPT Connection Procedure Guide.

NOTE: To prevent leakage, apply Teflon™ tape, or equivalent thread sealant, to the check valve threads prior to attachment.

NOTE: To operate properly, the check valve MUST remain directly attached to the chemical head. Never relocate the suction check valve away from the chemical head.

2.6.3 Connect your discharge line to the injection head discharge check valve. Care must be taken not to over-tighten NPT connections. Please consult CheckPoint for more information regarding the proper NPT connection procedure. A CheckPoint NPT Connection Procedure guide is available upon request.

2.7 Drive Requirements

- The HDA pump head is unpowered and requires a mechanical reciprocator to function. The HDA can currently be mounted to the FXA mechanical drive unit with a ¾" stroke. The FXA incorporates a discharge flange, which acts as the rear cover of the Series HDA.
- CheckPoint recommends a motor/gear reducer combination not exceeding 80 rpm at the FXA drive input shaft. The maximum rated rotational speed of the FXA input shaft is 120 RPM. NEVER EXCEED 120 RPM.

3. OPERATION

3.1 Initial Startup

3.1.1 Filling the Hydraulic System and Chemical Head

NOTE: Bleeding the pump consists of priming the hydraulic portion and then priming the chemical side. Voiding the hydraulic fluid and the chemical fluid completely of gas may require repeating the following process a few times, followed by letting the pump run for a short time.

NOTE: Prior to initial pump operation, ensure that the suction check valve is connected to adequate chemical supply.

- Open the process block valve. This will allow the process pressure to reach the chemical head or in-line check valve. Observe and correct any leakage.

CAUTION: The Series HDA pumps are capable of producing pressures in excess of 15 KSI. If the discharge line is blocked for any reason, the pump can generate pressures in excess of the indicated rated pressures. A relief valve **MUST** be placed between the discharge port and the process flow to **PREVENT CATASTROPHIC FAILURE OF PROCESS EQUIPMENT OR BODILY HARM**. CHECKPOINT IS NOT RESPONSIBLE FOR ANY DAMAGE CAUSED BY OVER-PRESSURIZATION.

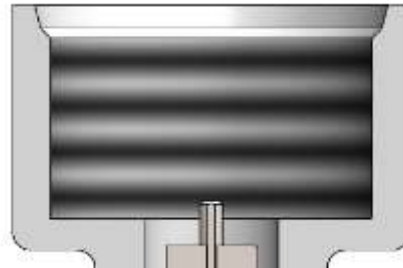
NOTE: Always open the process block valve prior to operating the pump. Operating the pump with a closed block valve can generate enough pressure to activate the IRV and allow pumped hydraulic fluid to bypass. This will heat and possibly damage the hydraulic fluid. Improper procedures may reduce the life of your CheckPoint pump.

- Open the chemical supply block valve.
- Open the process block valve.
- Remove the reservoir top cover (shown below) to access the purge pin.



CAUTION: NEVER OPERATE THE PUMP WITHOUT THE CHEMICAL SUPPLY OPEN. DOING SO MAY DAMAGE THE METAL DIAPHRAGMS AND VOID PUMP WARRANTY.

- Slowly add 175 – 200 ml of hydraulic oil to the reservoir. As the oil enters the system, air will percolate up through the reservoir. Continue until air stops rising from the reservoir. The final oil level should be at least above the internal reservoir threads.



- Running the pump during fill can speed up the time required to fill the hydraulic system. Sufficient oil remains in the hydraulic system from testing prior to shipping; therefore, running the pump while filling will not cause damage to the hydraulic components.

3.1.2 Bleeding of Hydraulic system

- Start the pump via the Start/Stop switch or VFD.

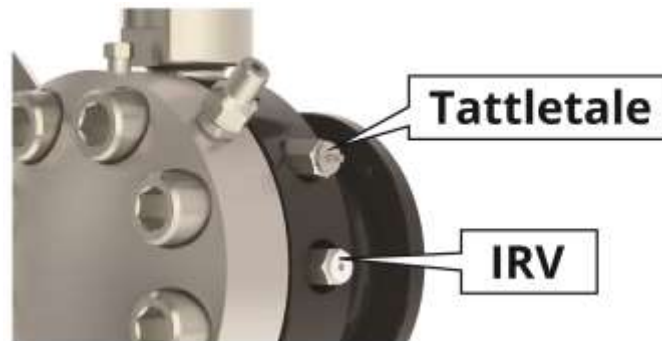
NOTE: Prior to initial pump operation, ensure that the suction check valve is connected to an adequate chemical supply, and that all valves connecting the chemical are open.

NOTE: The hydraulic system includes a burp valve inside the reservoir and is designed to eliminate the small amounts of gas that collect inside the system. To eliminate the large collections of gas that can occur at startup, the pump also includes a purge pin.

- With the pump stroking, hold the purge pin down for several cycles to allow trapped air to escape, then release. Repeat until no gas is released from the system.

NOTE: The purge pin will not remove all the air in the system. Additional air may be in the IRV (Internal Relief Valve) circuit.

- Air trapped in the IRV (Internal Relief Valve) circuit is bled by causing the IRV to open. The following procedure can only be performed after the chemical head is bled and is moving chemical through the discharge check.



The IRV is preset at the factory to open at 1,500 PSIG.

The IRV is integral to the pump's hydraulic system, and its purpose is to protect the pump components from damage due to excessive hydraulic fluid pressure. If so equipped, your pump contains an indicator that activates only if hydraulic fluid flows through the IRV.

- To bleed the IRV circuit, close the process block valve. The hydraulic pressure will reach the setting of the IRV causing fluid to flow through the IRV and back to the reservoir. As the fluid passes through the IRV, the tattletale (if so equipped) indicator will indicate as fluid bypasses. Gas in the circuit will be routed to the reservoir and exhaust to atmosphere.
- Open the process block valve after 5 seconds, and push the tattletale indicator closed.

3.1.3 Bleeding of Chemical Head

NOTE: The chemical head can only be bled after the initial bleeding of the hydraulic system.

- Open the chemical bleed screw 1½ to 2 turns. The pump will begin to pull air and chemical through the chemical supply plumbing, into the head, and out of the bleed port. Leave the valve open until a solid stream of chemical pumps out of the bleed port each stroke.



NOTE: If the pump is not new, it is possible for dried or solidified chemical to be present in the bleed and check valve assemblies. If your pump does not bleed when following the directions above, try cleaning these items in solvent and replacing them.

- Close the bleed screw until chemical flow stops. Torque the bleed screw to 10 in-lb.

CAUTION: DO NOT OVER-TIGHTEN THE BLEED SCREW, ONLY TIGHTEN UNTIL CHEMICAL STOPS FLOWING. APPLYING EXCESS TORQUE TO THE BLEED VALVE MAY IMPAIR FUTURE VALVE OPERATION.

3.2 Normal Operation

3.2.1 Set Delivery Volume / Vary Pump Stroke Rate

The Series HDA pump flow rate is adjusted by changing the cycle rate of the mechanical drive system.

NOTE: The stroke length of the Series FXA mechanical reciprocator remains constant at all times.

Pump Delivery Volume is controlled using two methods depending on your setup:

- VFD or Variator - Vary the RPMs of the power drive mechanism. Refer to the operating manual for your specific power drive.

Adjusting the motor's RPM during operation will not damage the Series HDA pump. Refer to your power drive manufacturer's manual to determine the effects of adjusting RPM during operation.

4. MAINTENANCE

The CheckPoint Series HDA is designed to provide trouble-free operation for many years with little adjustment, lubrication, or other routine maintenance. However, like any other device, proper maintenance can extend the life of the product. This can include periodic cleaning of the chemical inlets and lubrication.

4.1 Preventative maintenance

4.1.1 Elastomers

Check valve elastomers (O-rings) are the only elastomers in contact with the chemical being pumped. These elastomers have a fixed life and should be replaced every 3 years.

4.1.2 Lubrication

No special lubrication is required for the HDA pump. The hydraulic fluid acts as both a working fluid and lubricant.

4.1.2.1 Periodic Inspection

For proper operation, oil must be above the centerline of the pump. Remove the top breather vent and inspect the fluid level monthly. Add oil as required to maintain proper levels.

4.1.2.2 Oil Change

The hydraulic fluid used in the HDA is a working fluid and can absorb moisture during normal operation. CheckPoint suggests that this fluid be drained and replaced every 8,000 hours.

4.2 Decommissioning

Draining the pump's hydraulic fluid is the only action required prior to disassembly and packaging for transport.

5. TROUBLESHOOTING

5.1 Pump runs, but chemical does not discharge at the correct rate

5.1.1 Suction check valve may be clogged with debris To flush, allow the pump to cycle at its maximum rate for at least 60 seconds. If no improvement is noted, remove the suction check valve from the body of pump. Blow the check out with air or water pressure. If the first attempts are unsuccessful, a check rebuild could be necessary.

NOTE: CheckPoint FailSafe™ check valves do not need replacement when they do not check properly. A simple rebuild kit is available to replace the O-rings, which will correct all but the most severe check problems. Corrosion of the valve seat, retainer, or poppet indicates an incorrect check valve material. Please contact CheckPoint to request chemical compatibility information.

NOTE: Always replace Teflon™ tape or other appropriate thread sealant on check valve threads during reinstallation, to avoid chemical leakage or the introduction of air to the chemical head.

5.1.2 Pump may have lost prime and became “air locked” Check to ensure that there are no leaks in any process lines, particularly upstream of the pump, within the chemical suction lines. If air is introduced through the suction side, the pump may lose prime. A common source of air in the supply is the block valve ahead of the suction check. Check this valve to make sure the stem packing is tight and that the materials of construction are compatible with the chemical being pumped. Finally, with pumps supplying chemical into gas lines, it is possible that the discharge port may be leaking. A leaky discharge port may allow gas under pressure to “back into” the chemical head.

5.1.3 Check valves may have been relocated away from the chemical head of the pump The checks must stay directly attached to the head in order to facilitate chemical movement.

5.1.4 Chemical may be obstructed from entering the pump Pumping upstream of the chemical head may allow a blockage which prevents chemical from getting to the suction check valve. A common example is an in-line chemical filter becoming clogged with debris. Solution - clean out suction plumbing and clean or replace chemical filter.

5.1.5 Chemical supply line size or configuration may cause NPSHa to drop below NPSHr.

5.1.6 Calibration gauge may be reading incorrectly due to clogged air vent If the calibration gauge is not reading correctly, it may appear that the chemical is not getting into the process. Check for an obstruction in the gauge or in the air vent atop the gauge.

5.2 IRV continues to activate

- Ensure process pressure is not above 1,000 PSI.
- Check setpoint of IRV (factory set at 1,500 PSI)

5.3 Leak detection activation

Reset system and confirm activation during operation. A broken diaphragm will activate the indicator within two strokes of the pump. Diaphragm replacement is required if indication continues.

5.4 Pump does not stroke

5.4.1 Check power to motor Ensure that the required amount of power is supplied to the motor and that the motor is turned on.

5.4.2 Motor power is too low Ensure proper motor sizing for the particular application. Contact CheckPoint or your Authorized CheckPoint Distributor for sizing assistance.

5.5 Pump is excessively noisy

5.5.1 Drive components may be worn The motor or gear reducer may be worn. Contact your drive component manufacturer.

5.6 Miscellaneous

If you are experiencing an operating problem not listed above, or if none of the above troubleshooting actions solve your operating problem, please contact your Authorized CheckPoint Distributor, or contact CheckPoint directly at +1 (504) 340-0770 or HELP@cppumps.com. We will work to assist you in determining the appropriate next steps. Once CheckPoint has had the opportunity to assist you with troubleshooting your problem, please keep in mind the following information regarding repairs:

5.6.1 CheckPoint offers exchange programs to keep you in service We will ship you a rebuilt pump, which you will be able to install prior to sending us your existing pump. Upon receipt of your pump, we will tear it down, rebuild it, and report to you our findings. We offer a fixed-price exchange plan, an actual-cost plan, and a consigned exchange plan. Please contact CheckPoint to learn more about our unique exchange services.

5.6.2 Nothing beats factory-direct repairs Although the Series HDA pump has been designed to be easy to operate and repair, the best way to ensure continued reliable service is to have your pump repaired by the CheckPoint factory. OEM repair services ensure CheckPoint quality and reliability.

5.6.3 Remember that after you repair your CheckPoint pump, it should perform like new If your pump is anything less than exceptional, call us to determine what can be done to restore the pump to “like-new” performance.

5.6.4 Training sessions are available CheckPoint strives to maintain excellence in all that we do, and we are happy to share. If you would like to train your employees regarding anything involving CheckPoint Pumps & Systems, please contact us to discuss training options.