

Installation and Operating Instructions

Neptune Caisson Pump



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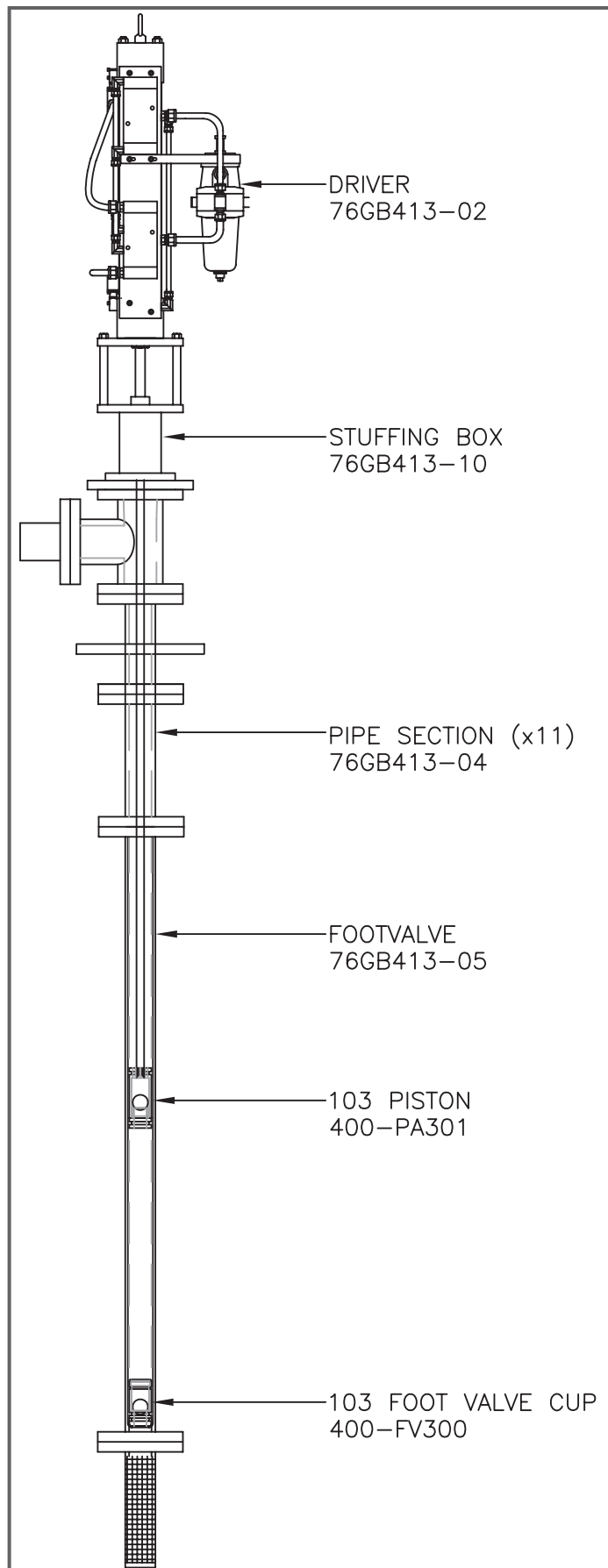
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SECTION 1

SHIPMENT INSPECTION

Examine the components carefully to make sure no damage has occurred to the pump cylinder, top head drive motor assembly, drive rod and piston. This Neptune Pump should remain in it's shipping carton until it is ready to be installed.



SECTION 2

PRE-INSTALLATION CHECKLIST

Before beginning installation, the following checks should be made. They are all critical for the proper installation of this Neptune Pump.

A Condition of the caisson.

If the pump is to be installed in a new caisson, the caisson should be fully developed and bailed or blown free of drill cuttings and pipe casing debris. The construction of the Neptune Pump makes it resistant to abrasion; however no pump, made of any material, can forever withstand the destructive wear that occurs when constantly pumping sandy fluid. Determine the actual depth of the caisson, the static water level in the caisson, and the draw down level at the pumps maximum capacity. The pump selection and setting depth should be based on this data. The inside diameter of the caisson should be checked to ensure that it is not smaller than the pump.

B Condition of the water.

Neptune Pumps are designed to pump fluids that are up to 275°F / 135°C (Thermoplastic construction up to 200°F / 93°C and stainless steel up to 275°F / 135°C). Fluids can be a viscous consistency and fluids can contain gas. Sludge and grit can decrease the pump performance and the drive piston life expectancy.

C Installation Depth.

Pumping sand or caisson sediment and debris can occur when the pump cylinder bottom intake is installed lower than the top of the caisson screen or within five feet of the caisson bottom. This can decrease the life of the drive piston seals and wear the drive piston housing.

D Power supply.

The drive motor power demand for the Neptune Pump is 58 to 152 psig, which is equivalent to 400 to 1050 kPag.

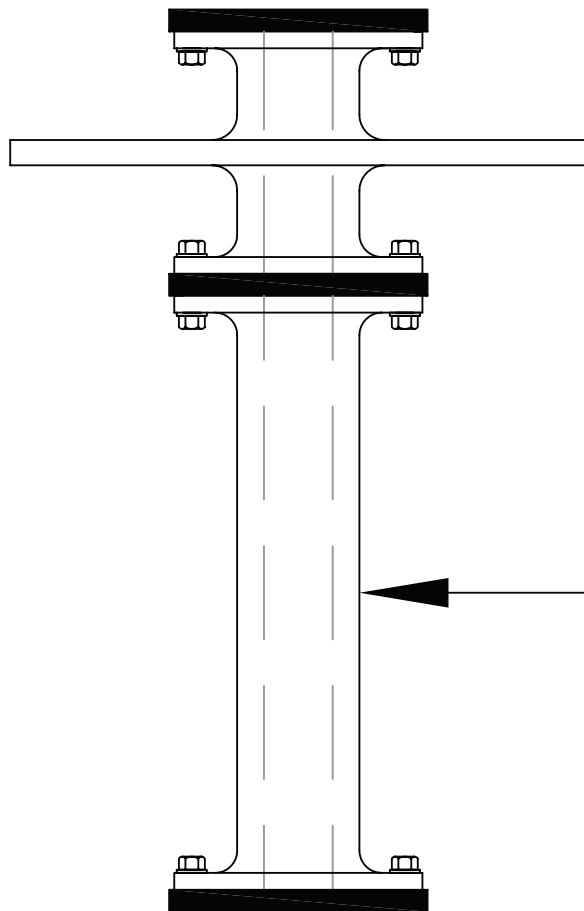
SECTION 3

NEPTUNE PUMP WELLHEAD PREPARATION

Step 1

Prepare caisson by removing all debris, caps or other closures, thus opening the caisson pump installation. Below is an illustration of a typical caisson completions.

*Well casings may be vertical or horizontal.



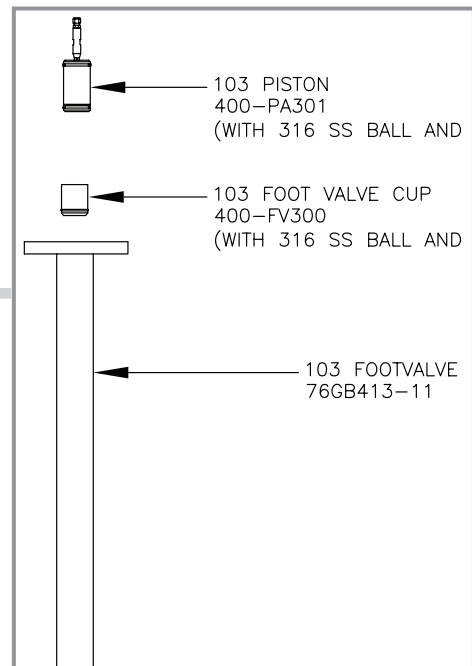
PIPE SECTION (x11)
76GB413-04

NEPTUNE FOOT VALVE INSTALLATION

Step 2

Attach foot valve assembly to bottom section of riser pipe.

Note: If using liquid level control device refer to separate installation sheet.

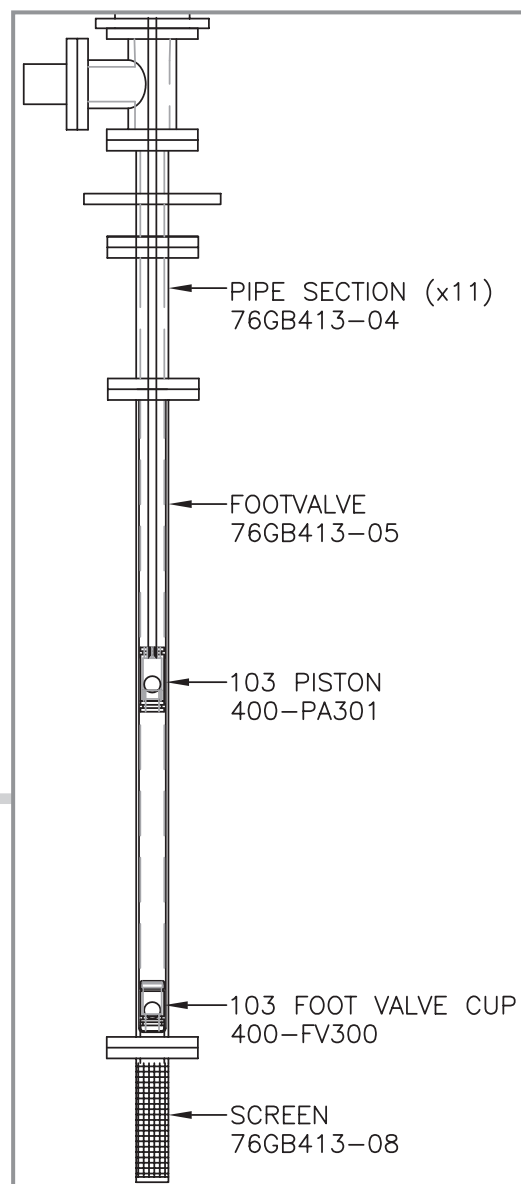


NEPTUNE RISER PIPE AND WELL CAP

Step 3

- Install all riser pipe until inlet screen is at specified depth and attach caisson cap assembly onto riser pipe.
- Attach caisson cap assembly to top of caisson.
- This riser pipe is to be suspended from the top of the caisson, not to be standing on bottom.
- Please refer to "Lifting Clamp Use" on Page 17, 18.

Note: Caution: keep pipe clear of dirt and debris. Blackhawk recommends the use of a sling, hoist or lifting clamp for the installation of the riser pipes and pump. The manufacturer's operating instructions should be followed when using all such ancillary installation equipment.



DRIVE ROD/PISTON INSTALLATION

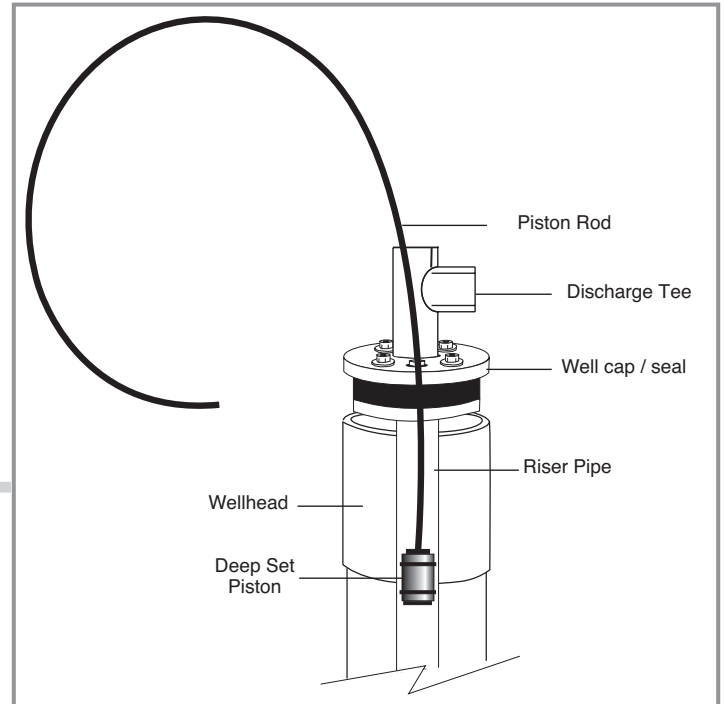
Step 4

- A. Uncoil piston-rod-assembly
(Lay coil out in open area. Stand in middle of coil when uncoiling.)

(Caution: Coil under tension!)

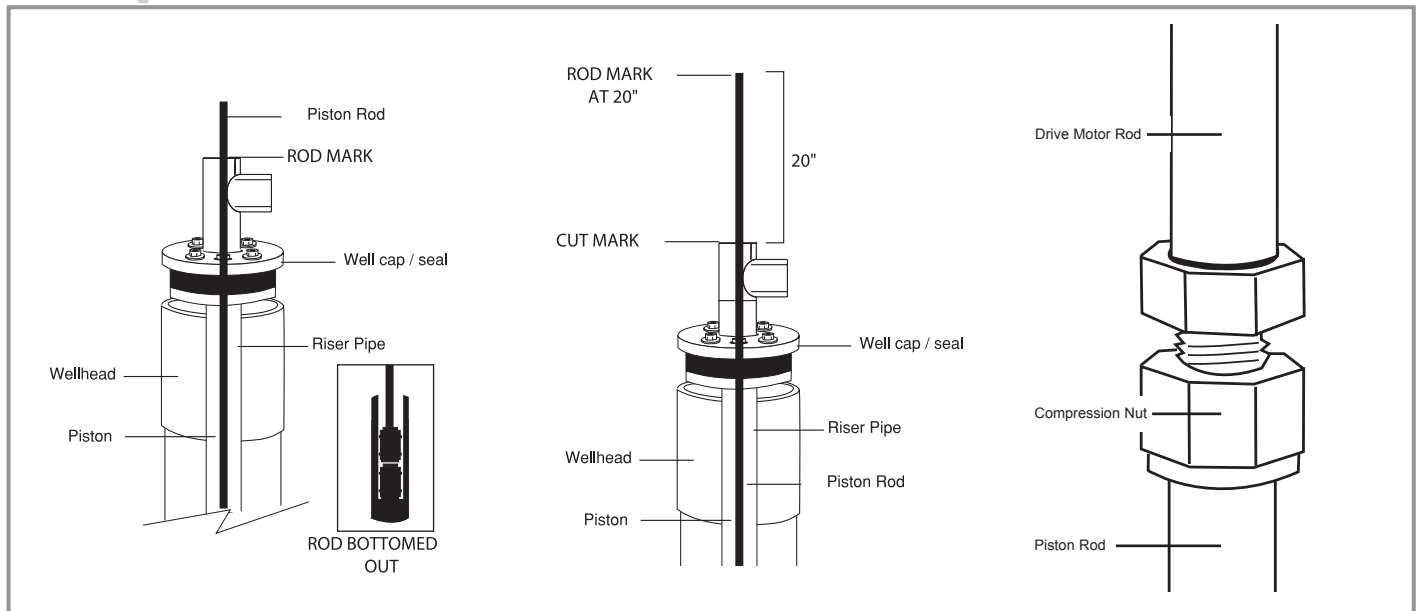
- B. Slide drive piston down riser pipe to bottom. The minimum radius of curvature of the piston rod when retrieved is 2.5 feet, which equals 760 mm. Use rag during drive-rod installation to prevent damage from flange edge.

Note: Piston will have much more resistance for the final 2-3 ft. of install.



CONNECTION OF ROD TO TOP HEAD DRIVE MOTOR

Step 5



- A. Rod bottomed out – mark rod.

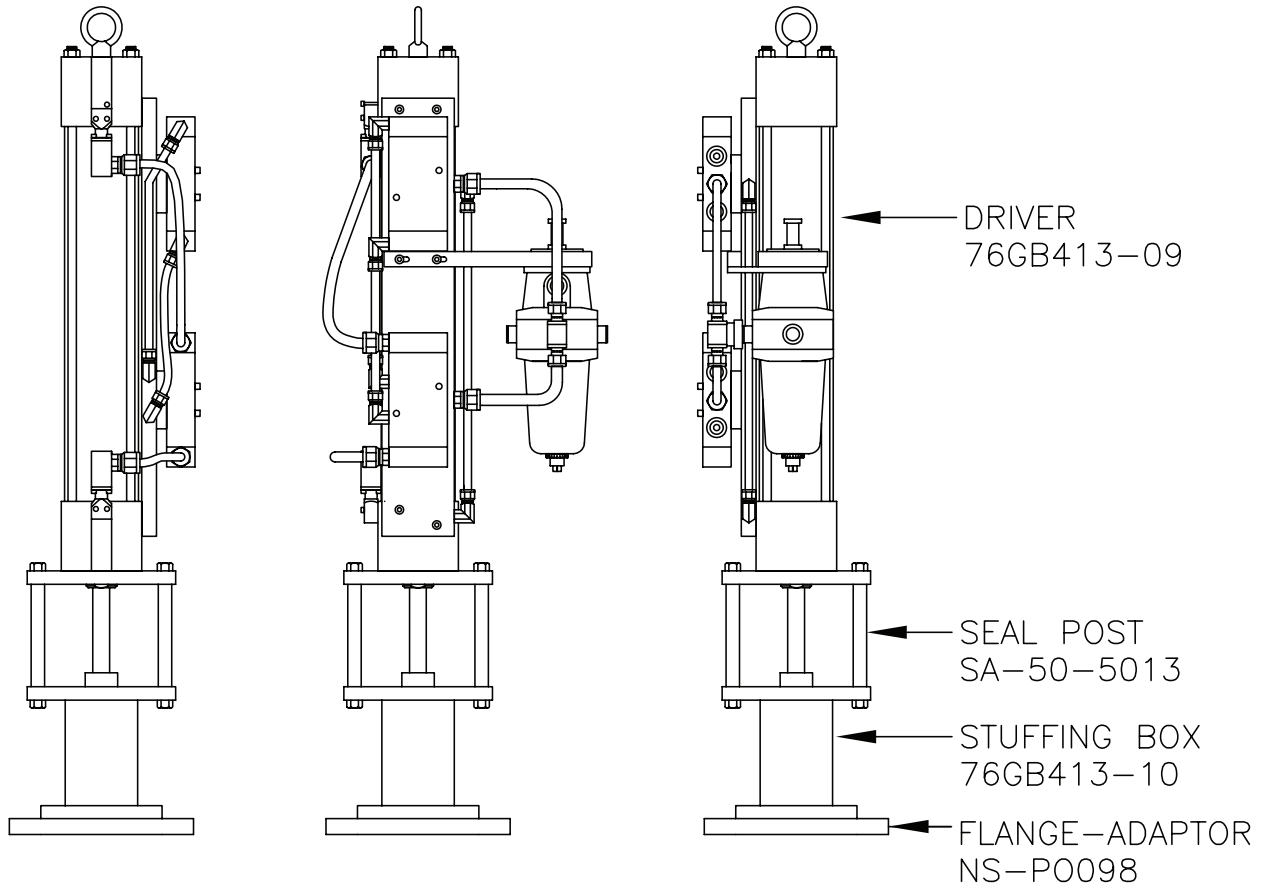
- B. Lift rod up and cut 20" below mark.

- C. Attach compression fitting to the cut end of rod, and screw into drive motor rod.

NEPTUNE TOP HEAD DRIVE MOTOR ASSEMBLY

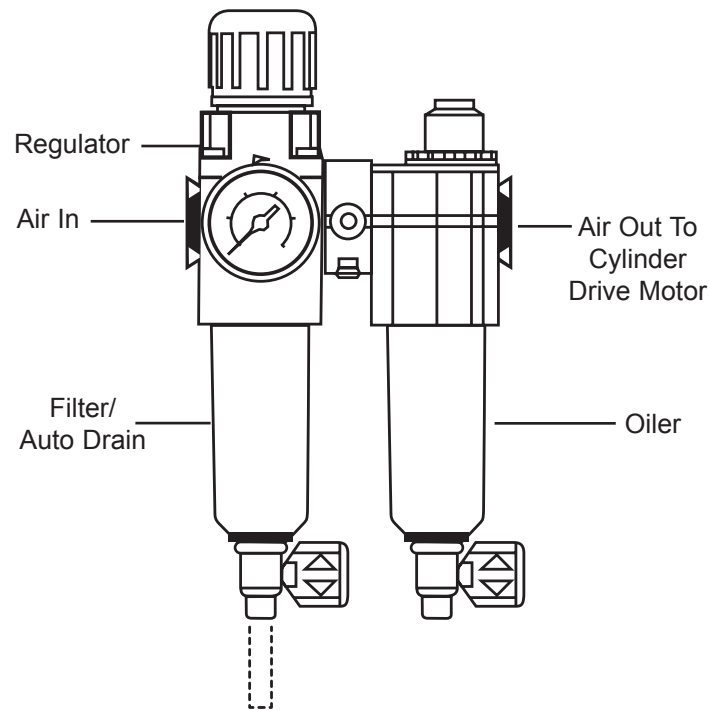
Step 6

- A. Install top head drive motor assembly onto caisson top.
- B. Attach Power supply/control panel.



SECTION 4

Supply Air Inlet Controls

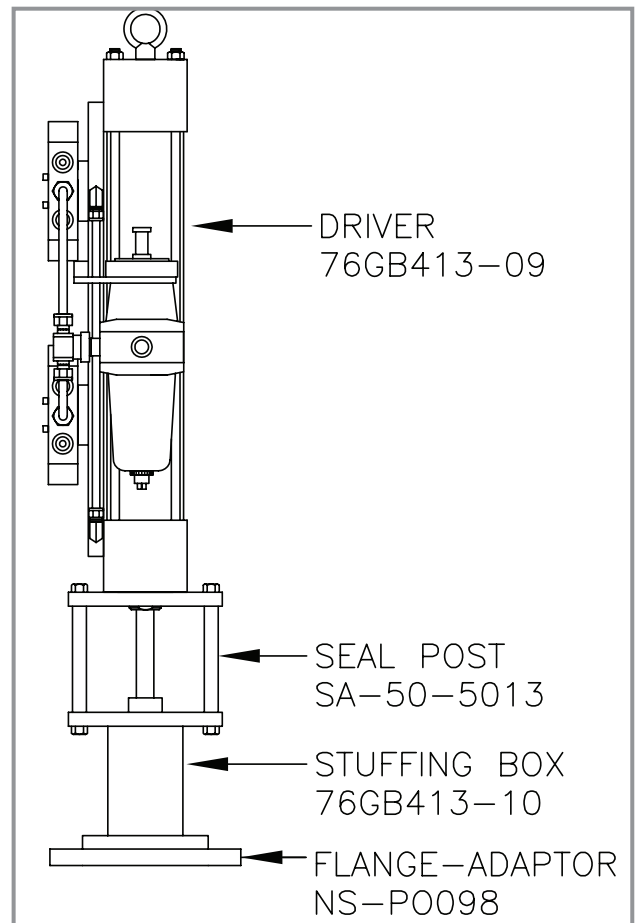
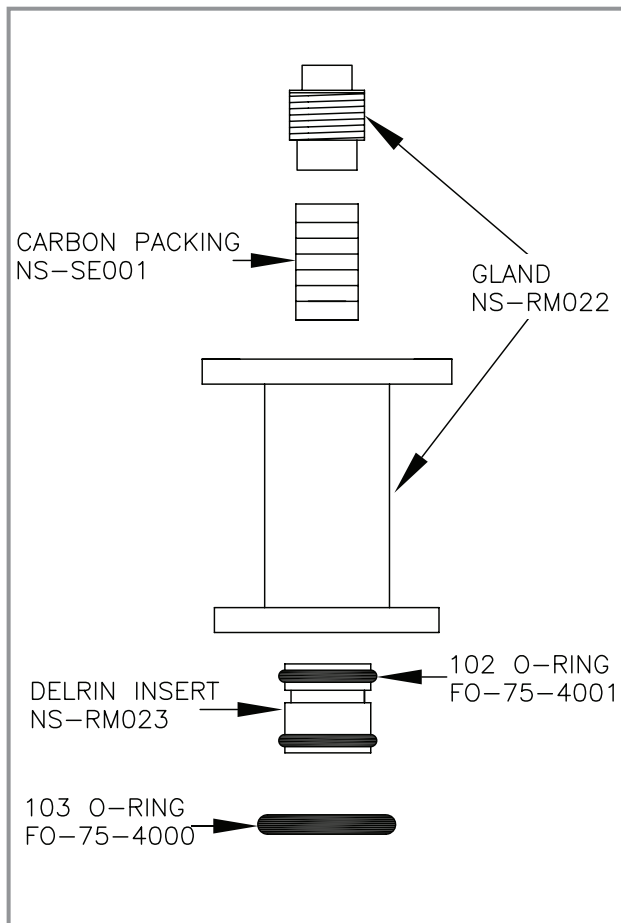


SECTION 5



After pump has been set into caisson, the following procedures should be performed.

- A.** Attach a temporary horizontal hose to the discharge tee.
- B.** If required, make provisions to capture discharge fluids for proper disposal
- C.** Adjust flow to 1/4 of maximum flow rate for the pump. The flow rate is 2.5 cubic meters per hour.
- D.** Start the pump and let it operate until water runs clear of sand silt.
- E.** As fluid clears, slowly adjust the flow to desired rate. The pump should not be operated beyond its maximum flow rate and not be stopped until fluid runs clear.
- F.** Disconnect the temporary discharge hose arrangement and complete final piping connections.
- G.** Under no circumstances should the pump be operated for any prolonged period of time with the discharge valve closed or the discharge pipe clogged.
- H.** Start the Neptune. Check stroke rate and flow rate.

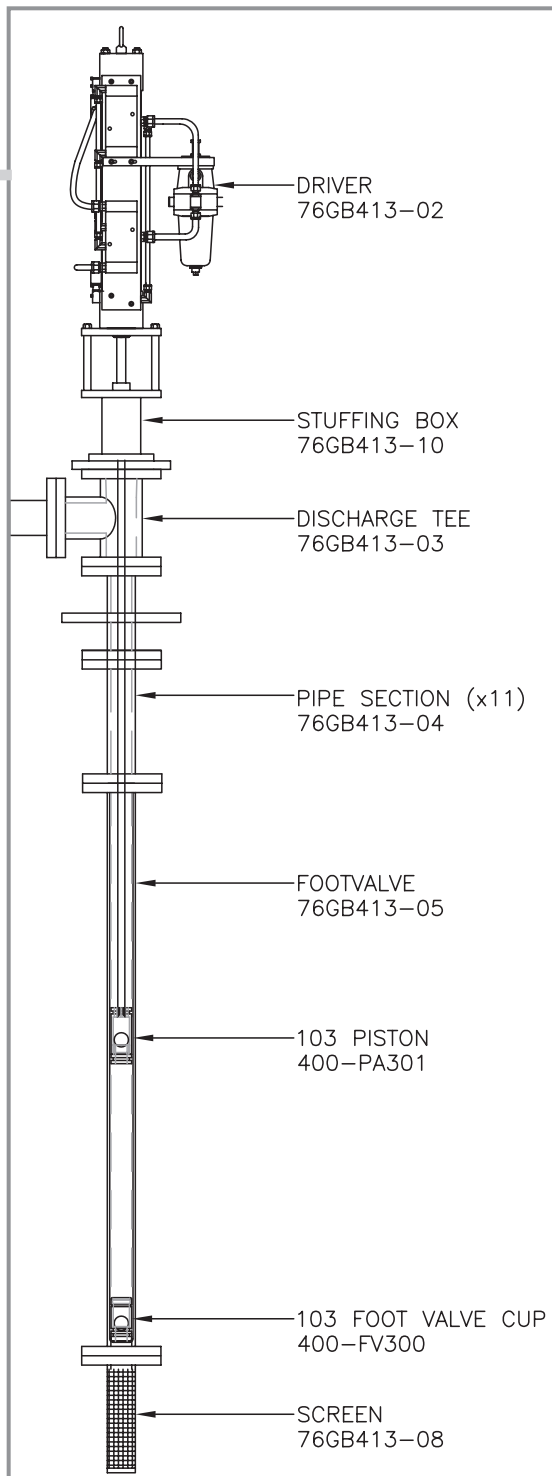


SECTION 6

OPERATION

The Neptune Pump and system should be periodically checked for fluid quality, pressure, drawdown, cycle rate, and performance of the stuffing box. Volume, conditions and age of equipment determine how frequently the pump needs to be checked. Blackhawk recommends

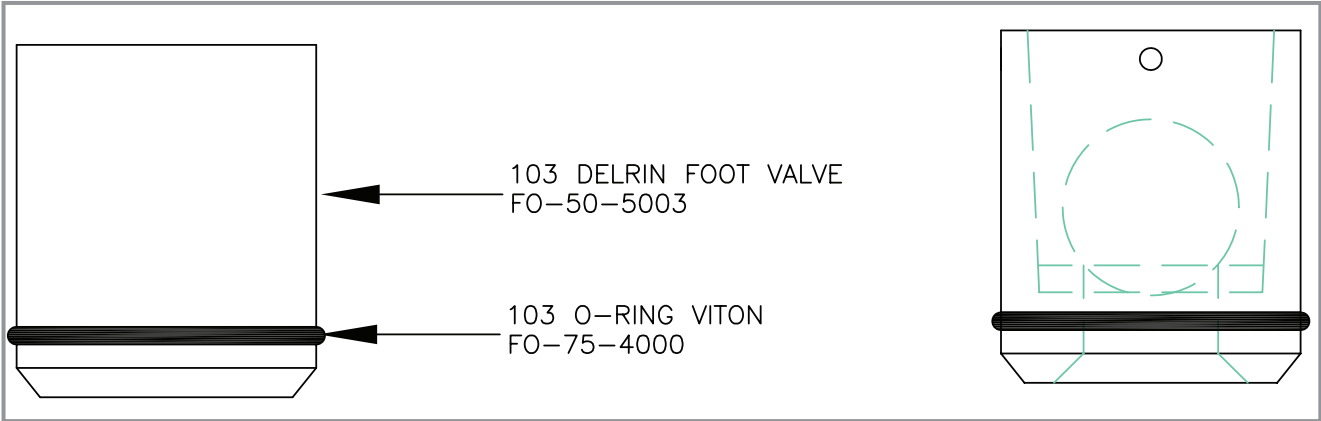
that once the pump is fully operational, it be checked at least quarterly. It is also recommended that the stuffing box be greased on a quarterly basis. Equipment may need to be checked more frequently, depending on operating conditions and environmental factors. The end user will need to make the final determination



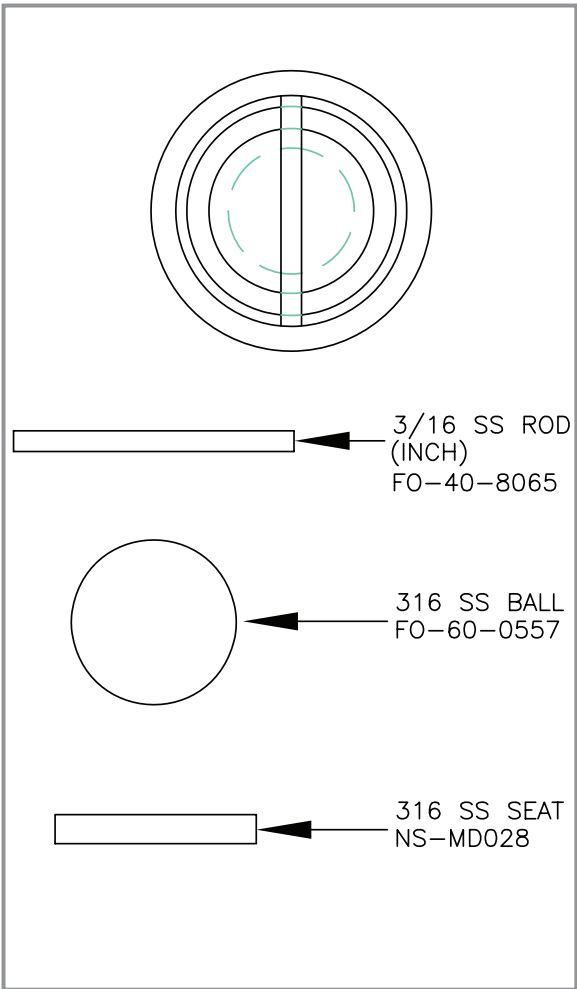
1. Visually inspect Neptune Pump operation.
2. Check liquid discharge.
3. Check power connections.
4. Check seal plate relief ports.
5. Check piston seal.
 - Turn off power.
 - Remove power line from drive motor.
 - Disconnect pump driver from caisson cap.
 - Disconnect pump driver from drive rod.
 - Extract piston rod from caisson riser pipe.
 - Inspect piston seal and, if worn replace.
 - Reinstall.

SECTION 7

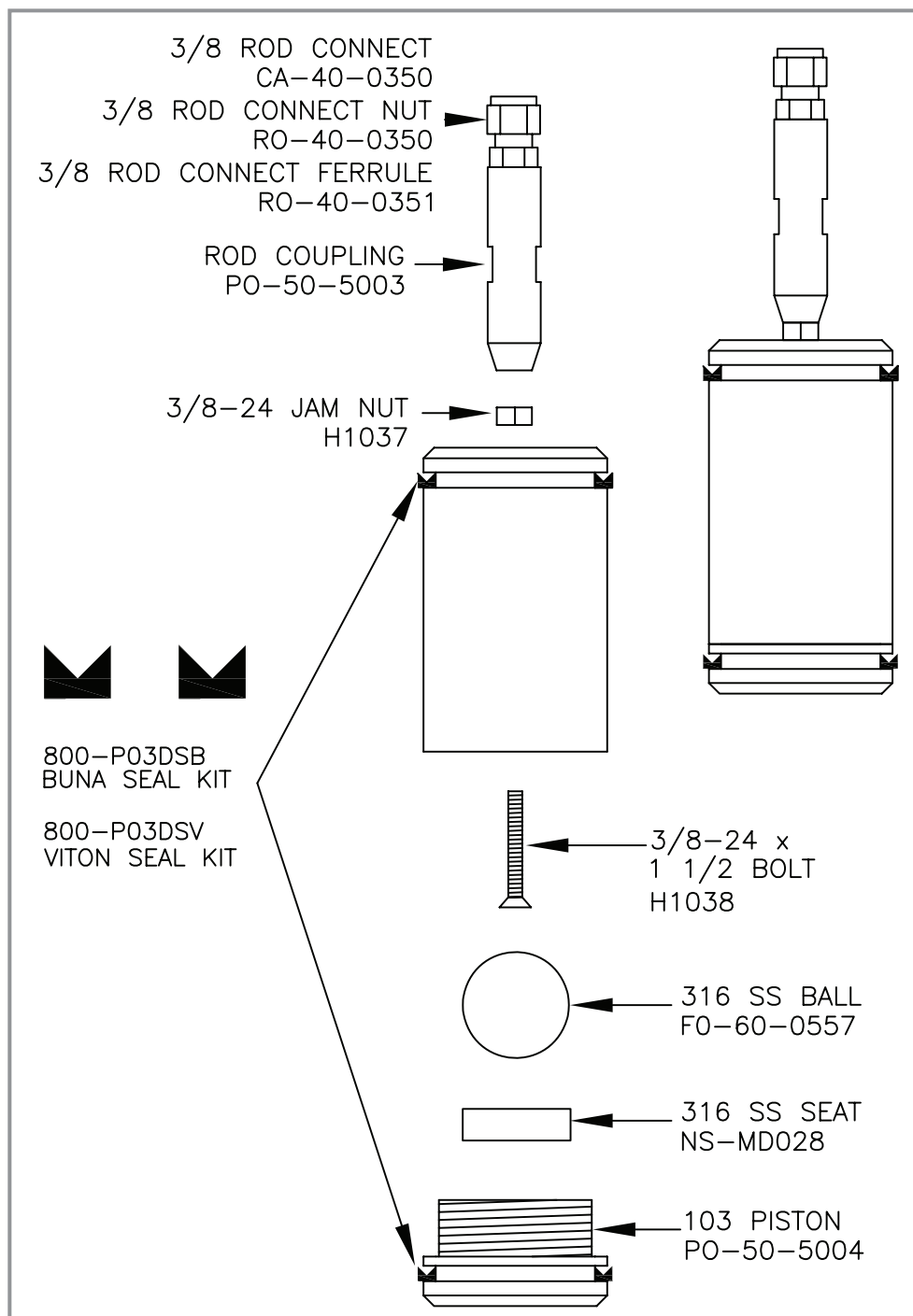
Foot Valve Assembly and Parts



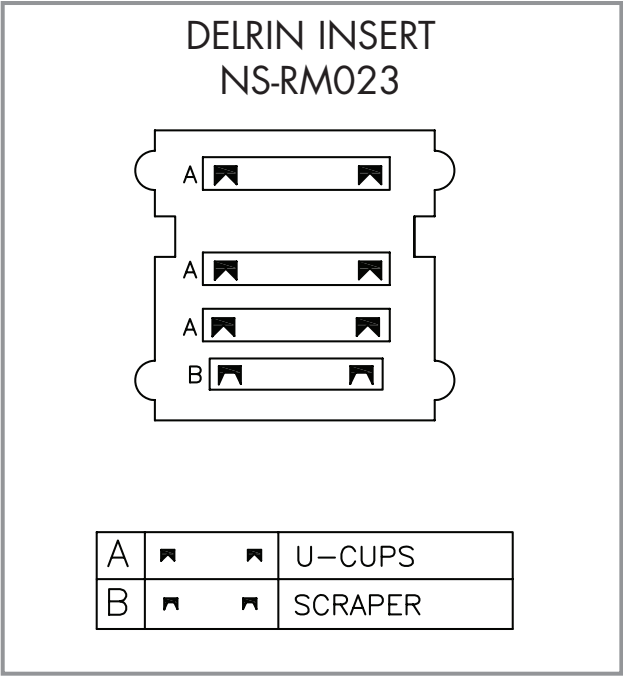
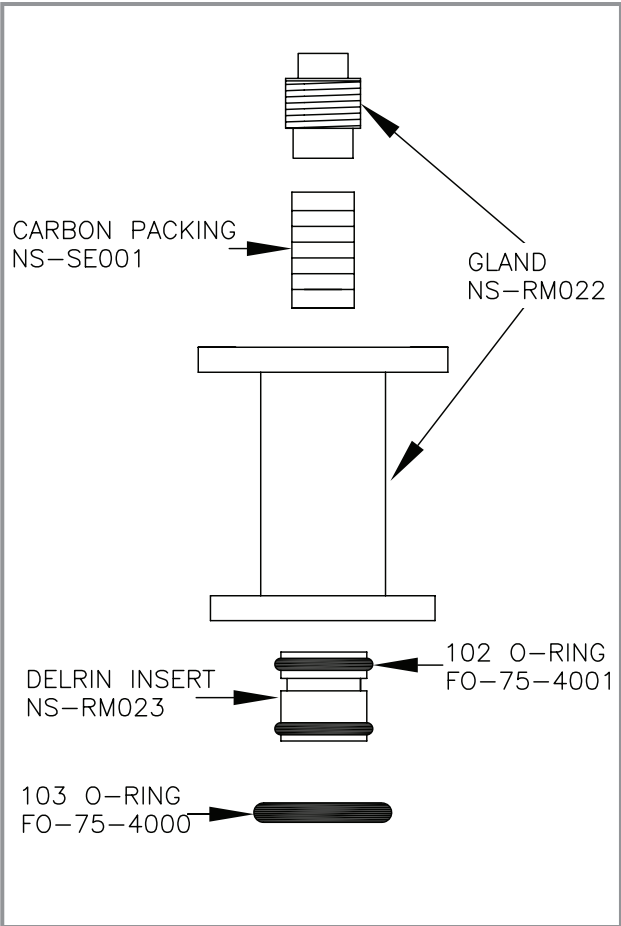
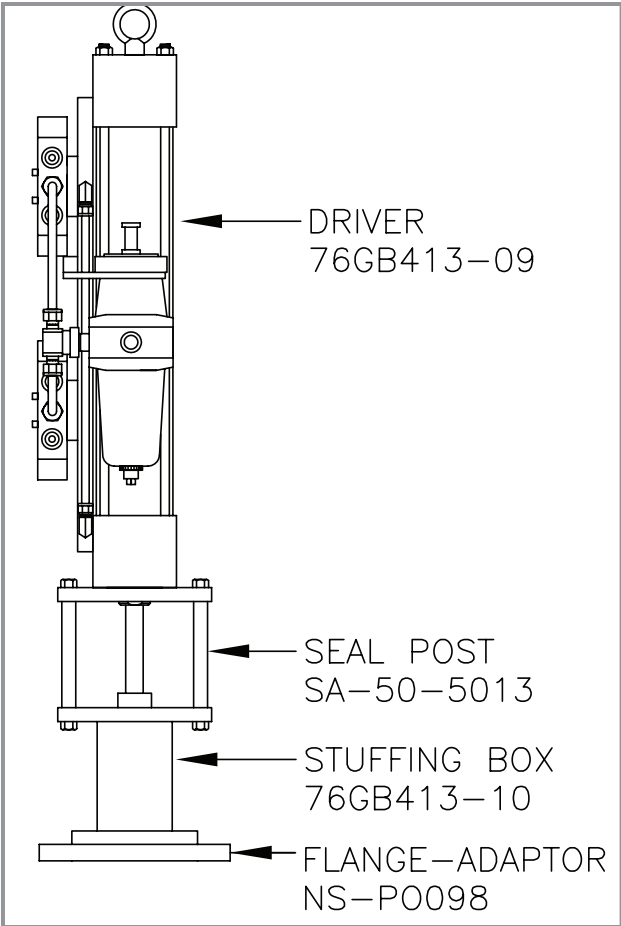
Foot Valve Assembly and



Drive Piston Assembly and Parts



Stuffing Box Assembly and Parts



SECTION 8

Neptune Pump Troubleshooting Guide

OBSERVATION	CAUSE	SOLUTION
- Pump not operating	- No power	- Check to see that power air supply is on, and that all connections are sound.
- Drive motor not cycling properly	- Flow control settings incorrect	- Remove driver from discharge tee (or caisson top). Disconnect down hole drive rod. Lay driver in dry flat space with room for rod to cycle in and out. Run system. If not cycling properly, check the flow controls and air pressure and adjust if necessary. If still not cycling properly, call Blackhawk for additional assistance.
- Pump driver operating (cycling), but not pumping liquid	- Restricted liquid discharge - Piston drive disconnected	- Check for closed valve, clogged discharge, or any other obstruction. Remove obstruction and restart pump. - Reconnect down hole drive rod to drive rod. If separated at compression fitting, a replacement drive rod ferrule will be required. (Ferrules cannot be re-crimped.)
- Surface pump driver cycles properly but pump not pumping liquid		- Perform inflation (glove) test. Disconnect liquid discharge hose/pipe from pumps discharge tee. Hold latex glove (or other inflatable object) over discharge tee mouth. Seal with a tight grip. Allow pump to operate.
- Glove does not inflate or deflate as pump cycles	- Down hole drive rod may have been cut incorrectly - Riser pipe string may have a leak	- Remove and re-cut or adjust rod length as per installation instructions. - Check pipe connections and check for cracks or leaks. Repair or replace compromised pipe or fittings.
- Glove inflates more and more as pump cycles	- No liquid at pump intake (down hole) to pump	- Check to make sure that there is liquid to pump.
- Glove inflates on up stroke and deflates on down stroke, and does not inflate more and more with every stroke	- Drive piston seals/drive piston assembly worn	- Remove drive rod / drive piston from riser pipe. Inspect, repair, and or replace drive piston seals or drive piston.

Neptune Pump Troubleshooting Guide Continued

OBSERVATION	CAUSE	SOLUTION
- With drive rod and drive piston out of riser pipe, fill riser pipe with water. Water drains out quickly	- Foot valve assembly/pipe string not water tight	- Remove riser pipe and foot valve assembly and inspect, replace, and/or repair.
- Water stays in riser pipe (and drive rod and drive piston have been deemed OK)	- Foot valve assembly/pump intake may be clogged	- Use drive rod extension poker to displace foot valve check ball and thus back flush foot valve and intake area. - If back flushing does not work, then remove riser pipe and foot valve assembly and inspect, replace, and/or repair.
- Drive rod/drive piston assembly tough to remove from foot valve assembly/riser pipe.	- Pump intake may be clogged	- Follow directions for clogged intake foot valve.
- Pump driver moving erratically when operating.	- Loose connections - Down hole drive rod length incorrect	- Check all connections to be sure they are tight. - Check rod length and adjust as per installation instructions.
- Pumped liquid in driver	- Pump driver exposed (submersed) to water	- Call Blackhawk to discuss.
- Stuffing box drain port leakage.	- Stuffing box seals worn	- Replace stuffing box seals. Call Blackhawk to discuss.
- Leakage around stuffing box.	- Stuffing box drain ports clogged	- Unclog stuffing box drain ports. Call Blackhawk to discuss.

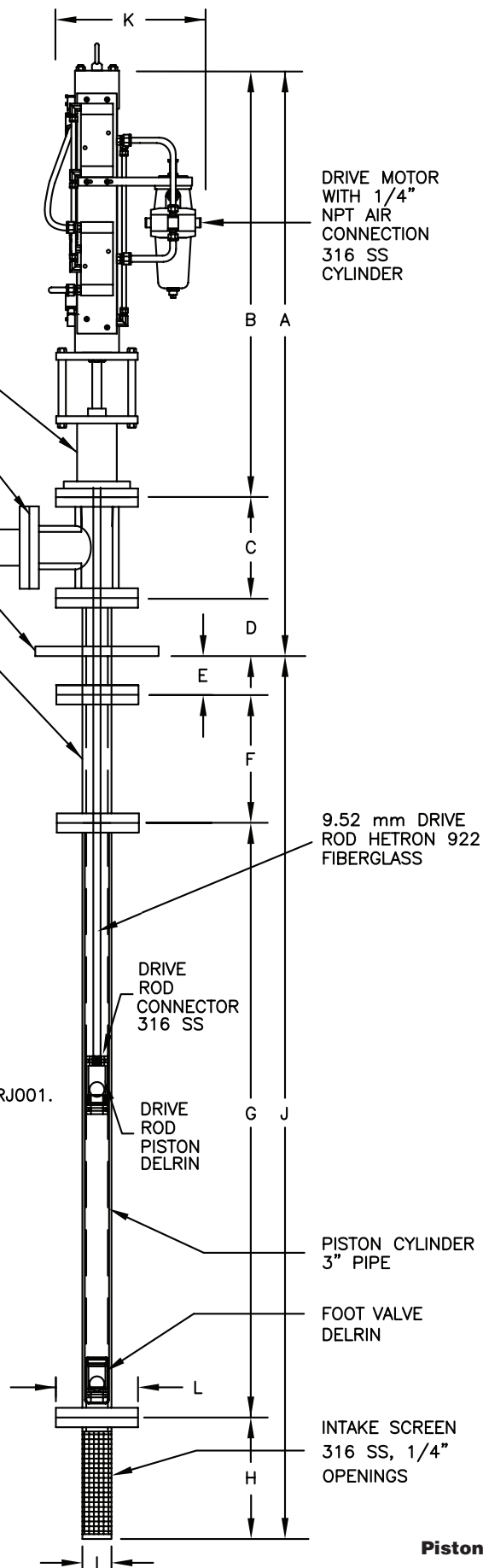
Completed Assembly

A-ABOVE WELL HEIGHT =	1.171 m
B-PUMP DRIVER HEIGHT =	0.749 m
C-DISCHARGE TEE HEIGHT =	0.316 m
D-CAISSON ADAPTER TOP =	0.106 m
E-CAISSON ADAPTER BOT =	0.068 m
F-PIPE (11 SPOOLS) =	22.666 m
G-FOOT VALVE =	0.906 m
H-INTAKE SCREEN =	0.307 m
I- INTAKE SCREEN OD =	0.096 m
J-BELOW WELL DEPTH =	23.947 m
K-PUMP DRIVER OD =	0.214 m
L-3" FLANGE OD =	0.191 m

THE COMPRESSED GASKET THICKNESS OF 0.003 IS INCLUDED IN ALL THE LENGTHS AT THE TOP OF EACH FLANGE

NOTES:

1. ALL SEALS ARE VITON COMPOUND 9846.
2. NPT THREADS ARE IN ACCORDANCE WITH W9000RJ001.
3. CYLINDER ROD IS CHROMED 316 SS
4. ALL OTHER WETTED METAL PARTS ARE 316 SS



Piston Assembly

Blackhawk Technology Company – Warranty

Terms and Conditions: Final delivery date will be determined at time of order. All prices are in U.S. dollars, F.O.B. Glen Ellyn, IL USA. A copy of Buyers Purchase Order is required at time of order. "Delivery time on all specials will be determined after receipt of order." Terms are Net 30 days. Total quoted price does not include freight charges. Freight will be prepaid and added to Seller's final invoice to Buyer. A service charge of 1.5% per month will be applied to all past-due invoices. Pricing is valid for 30 days. Notwithstanding anything contained herein to the contrary, the parties agree that the terms and conditions set forth in the Limited Warranty of Blackhawk Technology Company shall supersede any of the terms and conditions otherwise set forth.

Blackhawk Pumps manufactured by Blackhawk Technology Company (Blackhawk) are warranted to the original user only to be free of defects in material and workmanship for a period of 12 months from date of manufacture.

Blackhawk's liability under this warranty shall be limited to repairing or replacing at Blackhawk's option, without charge, F.O.B. Blackhawk's factory, any product that Blackhawk manufactures. Blackhawk will not be liable for any costs of removal, installation, transportation or any other changes that arise in connection with a warranty claim. Products that are sold but not manufactured by Blackhawk are subject to the warranty provided by manufacturer of said products and not by Blackhawk's warranty. Blackhawk will not be liable for damage or wear to said products by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with Blackhawk's printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to Blackhawk together with proof of purchase and installation date, failure date, and supporting installation data. Unless otherwise provided, contact will be made to Blackhawk for instructions prior to return of defective product. Any defective product to be returned to Blackhawk must be sent freight prepaid; documentation supporting the warranty claim/or a return Material Authorization must be included if so instructed.

Blackhawk will not be liable for any incidental or consequential damages, losses, or expenses arising from installation, use, or any other causes. There are not expressed or implied warranties, including mechanical ability of fitness for a particular purpose, that 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 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 that vary from jurisdiction to jurisdiction.



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