PENGUIN

Installation & Maintenance

SERIES HD PUMPS

MODELS	STAGES
HD-1 1/2	2 - 2 stage
HD-2	3 - 3 stage
HD-3	

INTRODUCTION

Penguin multi-stage horizontal diffuser pumps are designed for higher pressure applications. Constructed of CPVC, a 316SS shaft, and a metalless diplo seal, Series HD pumps are designed to handle a large range of semi-corrosive chemicals without difficulty. An optional titanium shaft can be supplied for more corrosive solutions with an upper working temperature of 200º F. All pumps have been tested for proper operation before leaving the factory. To obtain optimum service life, please follow all installation and operation instructions.

RECOMMENDATIONS

Always make sure there is enough liquid in the reservoir and the level is high enough, considering the capacity of the pump unit. Inadequate liquid will cause vortex in the reservoir. A vortex occurs when air mixes from the surface into the fluid. This can disturb the flow and also prevent the pump from priming. Never run the pump for more than 5-10 minutes against a closed discharge valve. This will cause overheating of the fluid in the pump and will damage all the CPVC parts. Temperature in this case will increase up to 220 degrees. If the pump is being run against a closed discharge valve for any duration of time, install a small bleed line back into the reservoir before the discharge valve of the pump. If the line is small, there is minimum pressure loss. This prevents overheating by recirculating the fluid.

Install the pump as close as possible to the liquid reservoir from which the liquid is being pumped. As more energy is necessary to prime the liquid than to discharge the fluid, make the suction as short as possible.

ELECTRICAL

Model HD-1 1/2-2 is available with either a single or three-phase motor. All other pumps are available in three phase only. The single-phase motor is dual voltage, 115/230V, 60c. When changing from 115V wiring to 230V wiring, follow the motor manufacturer's wiring instructions, which are found in the junction box. Be sure to wire the motor for counterclockwise rotation as viewed from the suction entrance of the pump. Many options are available on the HD Series motors, including single phase-50c, explosion-proof, and 575V motors. If any of these options are required, please check the motors carefully or consult the factory. The three-phase motor is dual voltage, 230/460V, 50/60c, which is not wired at the factory. The direction of rotation must be determined by operating the pump. The system, including the pump, has to be completely filled with fluid only (no air). Entrapped air can also cause damage to the pump. Just bump start the motor while checking the rotation of the fan through the fan cover. Do not reverse the pump unit for any duration of time. On all Penguin pumps, the rotation is clockwise facing the fan cover of the motor. Arrows are provided on the motor for proper rotation. In case of reverse rotation, interchange any two phases and check rotation again.

PLUMBING

It is recommended to enlarge the suction line to a minimum of one size larger than the suction entrance. Never reduce plumbing on the suction Avoid 90-degree elbows and never use a 180-degree elbow. Make sure that every suction coupling/connection is airtight. Always use a valve on the discharge of the pump. In case of a flooded suction, in which the liquid level is higher than the center of the suction entrance, provide a T-connection with a small valve after the discharge valve to assist in letting the air out during flooding. In case of a non-flooded suction, in which the liquid level is lower than the center of the suction entrance, provide a foot valve on the end of the submerged suction line. All plumbing and accessories must be supported other than by the pump, in order to prevent possible distortion of the pump case. The use of some hose in the discharge plumbing close to the discharge nozzle of the pump will absorb any movement of the solid plumbing, if vibration exists.

PRIMING

Under flooded conditions, open all valves in the suction and discharge lines. If a T-connection with valve is provided, wait until the fluid is escaping with no air bubbles. Close all valves in the discharge line. Always leave suction valves wide open. A closed suction valve will cause severe damage to the impeller and the seal. Under non-flooded conditions, fill up the pump and suction line slowly from the discharge in order to let entrapped air out. Then close all valves in the discharge line. Give the pump a couple of seconds to build up pressure, then slowly open the discharge valve until the desired flow is achieved. Make sure the piping on both the inlet and outlet is secure and then start up the pump. During the first few minutes, there will be air trapped in the piping. This air must purge itself before the full-rated performance of the pump will be achieved. If the air does not purge itself, then check for air leakage in the various pipe connections. The longer the length of the inlet pipe, the longer it will take to purge the air. Liquids that have water-like characteristics will function as described above. Liquids with higher specific gravities and viscous liquids may not give satisfactory results. Consult factory if necessary.

Installation & Operation Instructions

MAINTENANCE INSTRUCTIONS

ASSEMBLY

1. Place the motor with the shaft facing upward. Take the motor/pump bracket and place the flange with the 8 bolt holes facing upward. Lubricate the elastomer of the ceramic section (white colored) of the seal assembly slightly. Press this ceramic section into the matching cavity in the motor/pump bracket until it bottoms out. Place the motor/pump bracket, with the ceramic facing upward, carefully over the shaft until it bottoms out on the C-face of the motor. Line up the motor/pump bracket with the 1/8" FPT threaded hole vertically in the center. Take four 3/8" bolts, lockwashers, and washers and place them in the four matching holes of the motor/pump bracket. Tighten these bolts diagonally until the motor/pump bracket bottoms out on the C-face of the motor.

2. Lubricate the shaft slightly with only water for easy assembly of the carbon section (black colored) of the seal assembly. Slide this carbon section, with the carbon facing downward, over the shaft until it bottoms out on the ceramic. Take one of the flat washers (ID 3/4") and place it on top of the carbon section. Use one of the retainer circlips and slide it over the shaft, using a pair of needle nose pliers, until it bottoms out on the flat washer. Use any kind of pipe with an approximate ID of 3/4" and place it over the shaft. Press down with this pipe on the retainer circlip until it is locked in the matching groove of the shaft.

3. Use another flat washer (ID 3/4") and place it on top of the retainer circlip. Take one of the flat keys and slide it in the matching slot in the shaft. Leave both ends of the key sticking out evenly. Slide the impeller with rear vanes over the shaft. Line up the slots in the impeller, with the ends of the key in the shaft, and press impeller down until it bottoms out.

4. Use another flat washer and place it on top of the impeller. Take one of the little O-rings (ID 3/4") and let it rest on top of the flat washer. Use another retainer circlip and press it down against the O-ring until it is all the way seated in the matching groove of the shaft. Again use needle nose pliers. Place the third retainer circlip in the next groove in the shaft.

5. Press two O-rings with the largest diameter in the matching grooves in both ends of the pump housing. Place the pump housing in the matching groove in the motor/pump bracket with the discharge nozzle pointing vertically to the right and with the closest distance to the motor/pump bracket. Take one of the smaller O-rings and push it down until it bottoms out on the shoulder inside the pump housing. This O-ring fits tight in the pump housing, so make sure it sits evenly all around on the shoulder.

6. Take the diffuser and place it with the hole (ID approx. 1 1/2") facing downward over the shaft. Press this diffuser down tightly against the O-ring in the pump housing. Place the other flat washer on top of the already installed retainer circlip. Proceed with all the steps as described before, to install the second key, impeller without rear vanes, flat washer, and O-ring, and push it down until it bottoms out on the diffuser inside of the pump housing. Again make sure this O-ring sits evenly all around on the diffuser.

7. Install the 1/8" MPT elbow with coupling and 1/4" tubing for the pressure relief line on the motor/pump bracket.

2 - STAGE ASSEMBLY

8. Install the second elbow 1/8" FPT and coupling on the pump housing cover. Place pump housing cover on top of pump housing and align the pressure relief line and elbows. [If pressure relief line is aligned, the bolt holes in the pump housing cover are automatically aligned with the bolt holes in the motor/pump bracket (Symmetric Pattern).] Install the 8 bolts, washers, lockwashers, and nuts, and tighten diagonally. Tighten the couplings and tubing for the pressure relief line (make sure all connections are leakproof).

3 - STAGE ASSEMBLY

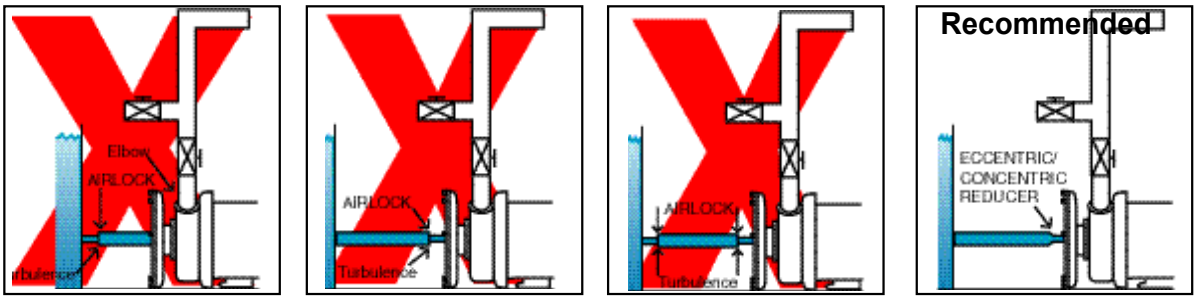
8. Take the adaptor plate and place it with the wide groove and narrow groove facing upward. Take the one and only thin O-ring and press it in the matching narrow groove. Place the adaptor plate on top of the pump housing with the eye bolt aligned with the relief tubing. Place all other retainer circlips in the next groove in the shaft.

9. Take the second diffuser (all diffusers are interchangeable) and place it with the hole (ID approx. 1 1/2") facing upward on the top of the already installed retainer circlip. Proceed with all steps as described before, to install the last key, impeller without rear vanes, flat washer, O-ring, and retainer circlip. Press the last two O-rings with the largest diameter in the matching grooves in both ends of the pump case/bearing bracket. Take the last one of the smaller O-rings and push it down until it bottoms out on the shoulder inside the pump case (not in the bearing bracket compartment). Again make sure the O-ring sits evenly all around on the shoulder. Place the pump case/bearing bracket, with this O-ring facing downward and the bearing bracket facing upward, carefully over the shaft until it bottoms out in the matching groove in the adaptor plate. Do this operation carefully, otherwise you might chip a piece off of the very brittle ryton bearing.

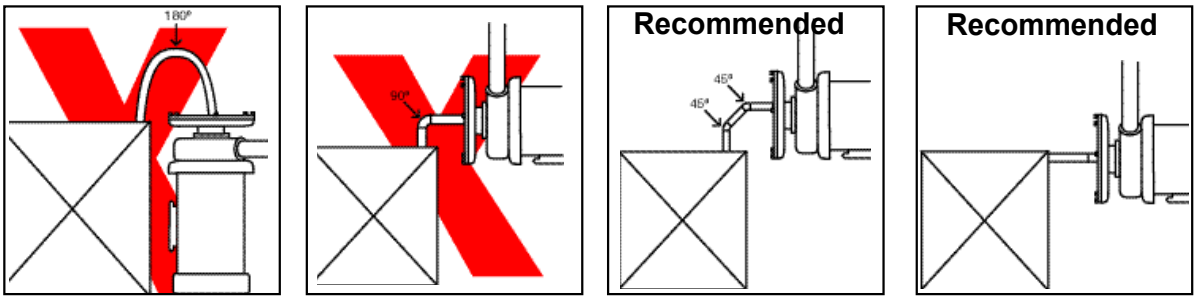
10. Install a second 1/8" MPT elbow with coupling on the pump housing cover. Place pump housing cover on top of the pump case and align the pressure relief line and elbows. If the pressure relief line is aligned, you will see that the bolt holes in the pump housing cover are automatically aligned with the bolt holes in the adaptor plate and motor/pump bracket. Apply the 8 long rods, washers, lockwashers, and nuts, and tighten diagonally. Tighten these rods with equal turns, meanwhile, looking through the suction entrance and checking if the shaft is as much in the center of the bearing as possible. Tighten the couplings and tubing for the pressure relief line, making sure all connections are leakproof.

RECOMMENDED INSTALLATION

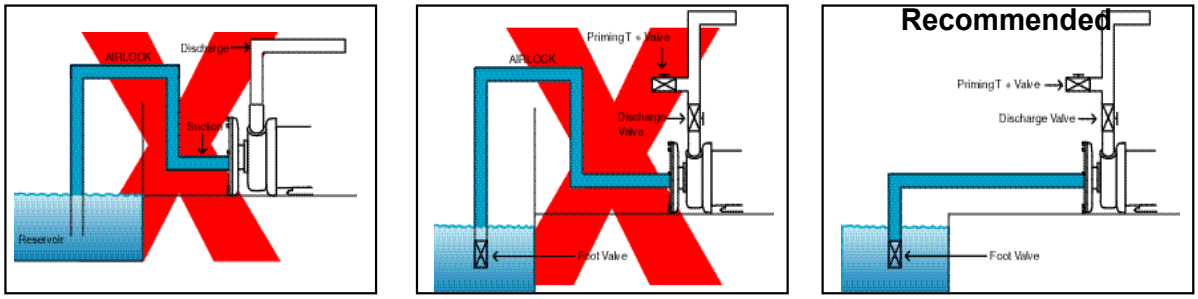
SUCTION PLUMBING



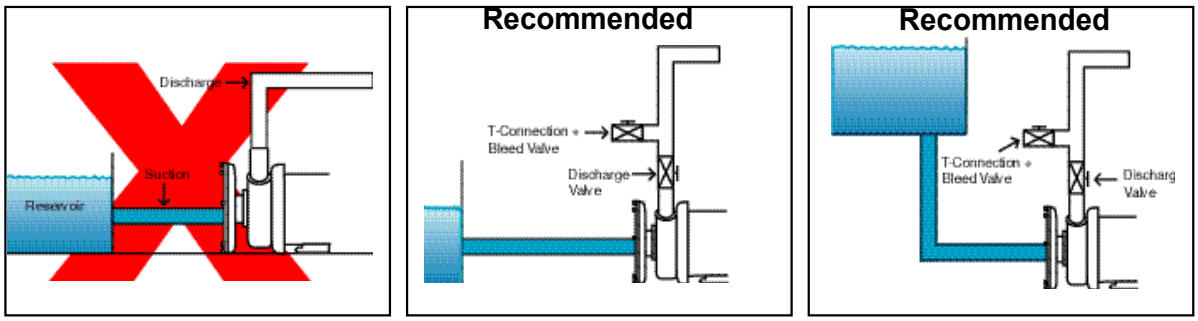
SUCTION TOP VIEW



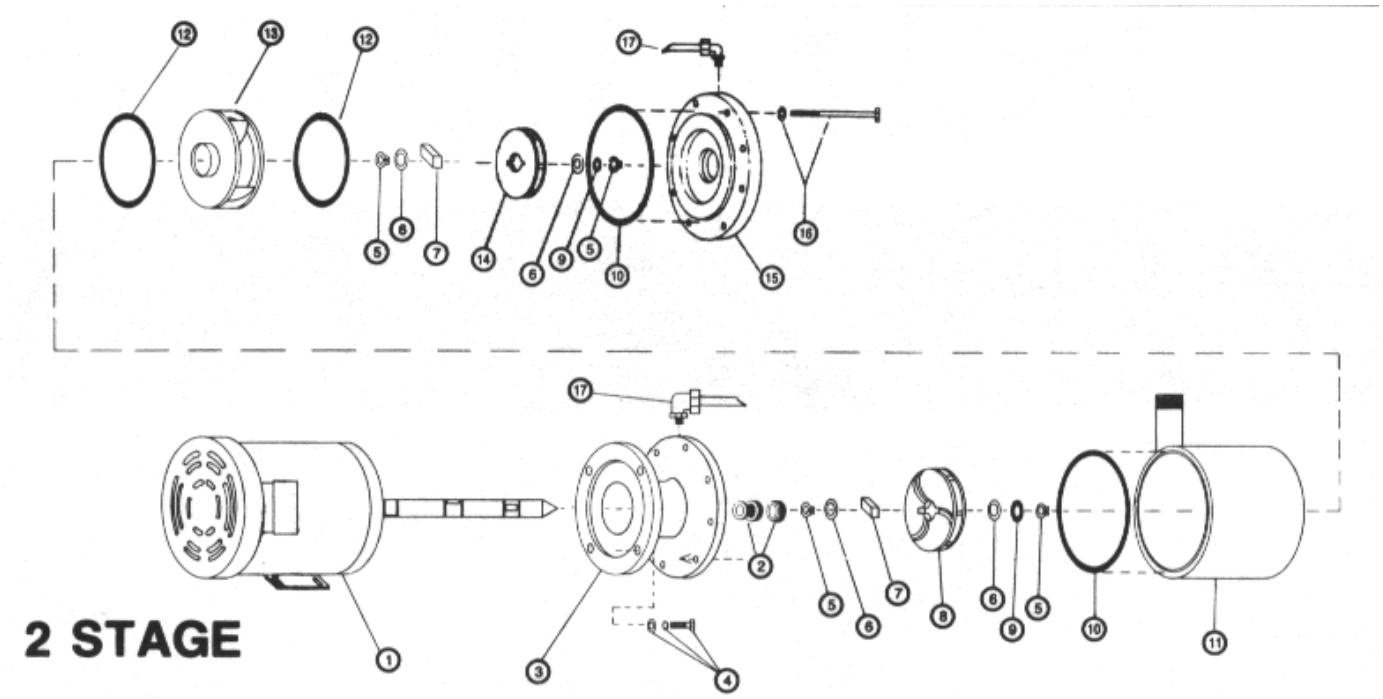
SUCTION LIFT



SUCTION HEAD



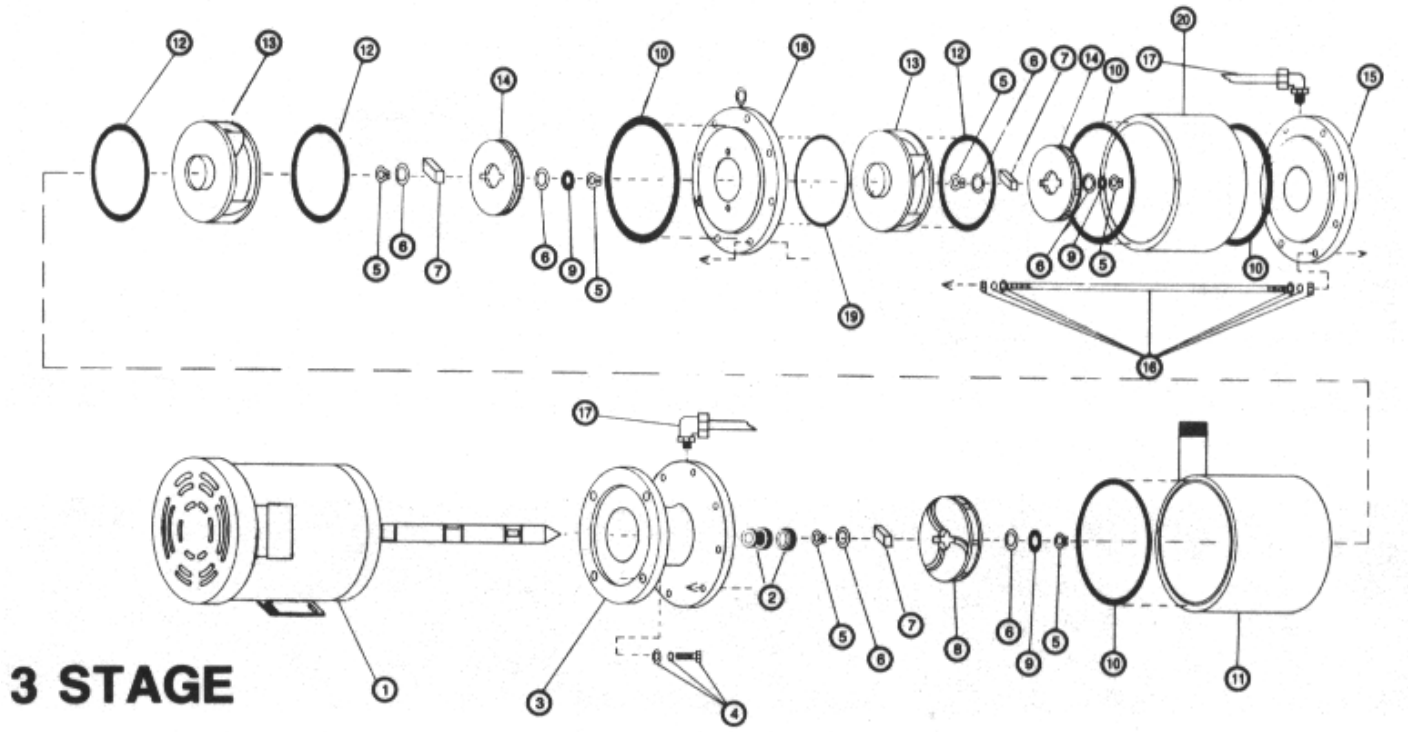
SERIES HD SPARE PARTS LIST-2 STAGE



SERIES HD SPARE PARTS LIST			
		HD-1-1/2-2	HD-2-2
ITEM	DESCRIPTION	PART NO.	PART NO.
1S	MOTOR/316SS SHAFT ASS'Y		
	PHASE--VOLTAGE--CYCLE		
	1 115/230 50/60	HD-112-0103S	
	3 230/460 50/60	HD-112-3103S	HD-200-3103S
1T	MOTOR/TITANIUM SHAFT ASS'Y		
	PHASE--VOLTAGE--CYCLE		
	1 115/230 50/60	HD-112-0103T	
	3 230/460 50/60	HD-112-3103T	HD-200-3103T
1BS	BEARING SET	HD-112-01BS	HD-112-01BS
1EF	EXTERNAL FAN	HD-112-01EF	HD-112-01EF
1FC	FAN COVER	HD-112-01FC	HD-112-01FC
2-01V	SINGLE SEAL ASS'Y - DIPLO VITON/CARBON/CERAMIC	HV-130-0603V	HV-130-0603V
2-02V	SINGLE SEAL ASS'Y - DIPLO VITON/SILICON, CARBIDE/SILICON CARBIDE	HV-130-0604V	HV-130-0604V
3A	MOTOR/PUMP BRACKET	HD-112-04A	HD-112-04A
4	MOTOR BOLT/FLAT WASHER/ LOCKWASHER-SS	HD-112-05 (4)	HD-112-05 (4)
5S	SHAFT RETAINER CIRDIP-SS	HD-112-06S (4)	HD-112-06S (4)
5T	SHAFT RETAINER CIRDIP-TITANIUM	HD-112-06T (4)	HD-112-06T (4)

SERIES HD SPARE PARTS LIST			
		HD-1-1/2-2	HD-2-2
ITEM	DESCRIPTION	PART NO.	PART NO.
6S	FLAT WASHER-SS	HD-112-07S (4)	HD-112-07S (4)
6T	FLAT WASHER-TITANIUM	HD-112-07T (4)	HD-112-07T (4)
7S	KEY-SS	HD-112-08S (2)	HD-112-08S (2)
7T	KEY-TITANIUM	HD-112-08T (2)	HD-112-08T (2)
8A	IMPELLER W/REAR VANES	HD-112-09A	HD-112-09A
9V	SHASFT O-RING - VITON	HD-112-10V (2)	HD-112-10V (2)
10V	PUMP HOUSING/CASING O-RING - VITON	HD-112-11V (2)	HD-112-11V (2)
11A	PUMP HOUSING	HD-112-12A	HD-112-12A
12V	DIFFUSER O-RING - VITON	P-100-09V (2)	P-100-09V (2)
13A	DIFFUSER	HD-112-14A	HD-112-14A
14A	IMPELLER W/O REAR VANES	HD-112-15A	HD-112-15A
15A	PUMP HOUSING COVER	HD-112-16A	HD-112-16A
16	HOUSING COVER BOLT / FLAT WASHER / LOCKWASHER / HEX NUT - SS		
		HD-112-17 (8)	HD-112-17 (8)
17	PRESSURE RELIEF LINE W/FITTINGS ASS'Y	HD-112-18	HD-112-18
21	PUMP HEAD ASS'Y	HD-112-22	HD-112-22

SERIES HD SPARE PARTS LIST-3 STAGE



SERIES HD SPARE PARTS LIST			
		HD-2-3	HD-3-3
ITEM	DESCRIPTION	PART NO.	PART NO.
1S	MOTOR/316SS SHAFT ASS'Y		
	PHASE--VOLTAGE--CYCLE		
	1 115/230 50/60		
	3 230/460 50/60	HD-200-3133S	HD-300-3103S
1T	MOTOR/TITANIUM SHAFT ASS'Y		
	PHASE--VOLTAGE--CYCLE		
	1 115/230 50/60		
	3 230/460 50/60	HD-200-3133T	HD-300-3103T
1BS	BEARING SET	HD-112-01BS	HD-112-01BS
1EF	EXTERNAL FAN	HD-112-01EF	HD-112-01EF
1FC	FAN COVER	HD-112-01FC	HD-112-01FC
2-01V	SINGLE SEAL ASS'Y - DIPLO		
	VITON/CARBON/CERAMIC	HV-130-0603V	HV-130-0603V
2-02V	SINGLE SEAL ASS'Y - DIPLO VITON/SILICON, CARBIDE/SILICON CARBIDE	HV-130-0604V	HV-130-0604V
3A	MOTOR/PUMP BRACKET	HD-112-04A	HD-112-04A
4	MOTOR BOLT/FLAT WASHER/ LOCKWASHER-SS	HD-112-05 (4)	HD-112-05 (4)
5S	SHAFT RETAINER CIRDIP-SS	HD-112-06S (4)	HD-112-06S (4)
5T	SHAFT RETAINER CIRDIP-TITANIUM	HD-112-06T (6)	HD-112-06T (6)

SERIES HD SPARE PARTS LIST			
		HD-2-3	HD-3-3
ITEM	DESCRIPTION	PART NO.	PART NO.
6S	FLAT WASHER-SS	HD-112-07S (6)	HD-112-07S (6)
6T	FLAT WASHER-TITANIUM	HD-112-07T (6)	HD-112-07T (6)
7S	KEY-SS	HD-112-08S (3)	HD-112-08S (3)
7T	KEY-TITANIUM	HD-112-08T (3)	HD-112-08T (3)
8A	IMPELLER W/REAR VANES	HD-112-09A	HD-112-09A
9V	SHASFT O-RING - VITON	HD-112-10V (3)	HD-112-10V (3)
10V	PUMP HOUSING/CASING O-RING - VITON	HD-112-11V (4)	HD-112-11V (4)
11A	PUMP HOUSING	HD-112-12A	HD-112-12A
12V	DIFFUSER O-RING - VITON	P-100-09V (3)	P-100-09V (3)
13A	DIFFUSER	HD-112-14A (2)	HD-112-14A (2)
14A	IMPELLER W/O REAR VANES	HD-112-15A (2)	HD-112-15A (2)
15A	PUMP HOUSING COVER	HD-112-16A	HD-112-16A
16	HOUSING COVER BOLT / FLAT WASHER / LOCKWASHER / HEX NUT - SS		
		HD-200-17 (8)	HD-200-17 (8)
17	PRESSURE RELIEF LINE W/FITTINGS ASS'Y	HD-200-18	HD-200-18
18A	ADAPTOR PLATE	HD-200-19A	HD-200-19A
19V	ADAPTOR PLATE-O-RING-VITON	HD-200-20V	HD-200-20V
20A	PUMP CASING W/ RYTON BEARING ASS'Y	HD-200-21A	HD-200-21A
21	PUMP HEAD ASS'Y	HD-200-22	HD-200-22

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