

# PENGUIN

Installation & Maintenance

## SERIES HSC PUMPS



MODELS	SEALS
HSC-1/4	S - Single
HSC-1/2	D - Double
HSC-3/4	M - Single/Multi-Stage
HSC-1	
HSC-2	
HSC-3	

### INTRODUCTION

Penguin 316 stainless steel centrifugal pumps are designed to handle those applications where plastics are less compatible with the solution to be pumped, such as cleaners, chlorinated solvents, caustics, as well as general corrosion resistant usage, to 250°F. Standard single mechanical seals are EPR/Carbon/ceramic. Optional seals include viton/carbon/ceramic and viton/silicon carbide/silicon carbide. A double mechanical seal is available in the same materials with water flush, this is Suction pressures should not exceed 80psi. To obtain optimum service life, please follow all installation and operation instructions.

# Installation & Operation Instructions

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

Series HSC pumps are available with either a single or three phase motor. The single phase motor is dual voltage, 115/230V, 60c, which is wired at the factory for proper rotation. The factory wires all dual voltage motors, up to 1hp, for the lower voltage (115V) unless otherwise requested. When changing from 115V wiring to 230V wiring, follow the motor manufacturer's wiring instructions, which are found in the motor junction box. Be sure to wire the motor for counterclockwise rotation as viewed from the suction entrance of the pump. A power cord and plug are supplied for immediate plug-in operation on motors wired for 230V. Many options are available on the HSC 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 factory. The three-phase motor is dual voltage, 230/460V, 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

The housing of the Series HSC can be rotated to any angular position possible, depending on the number of housing bolts. To rotate the casing, remove the casing bolts and nuts and rotate to the position desired.

**For proper suction piping** install an eccentric reducer at the pump suction opening and make all suction pipe at least one pipe size larger than the diameter of the suction opening. The suction line should be short and direct with as few elbows as possible. Submerge the suction line at least three feet below the minimum level of the liquid being pumped. The static lift, including all friction losses, must not exceed the NPSH requirements of the pump. If necessary, install a strainer at the open end of the suction line to prevent foreign matter from entering the pump. The net area of the strainer should be 2 to 3 times larger than the inside area of the suction pipe.

To maintain prime for pump operation under suction lift, a foot valve must be installed at the opening of the suction line. If quick-closing valves are installed in the discharge piping system, protection **MUST** be provided to ensure that no surge or water-hammer is transmitted to the pump.

**Double Seal Pumps** – The seal fluid must be connected to the seal chamber with a valve on the discharge side of the seal chamber, so that the flow and pressure in the chamber can be regulated. Flow of the seal coolant and lubrication can be in either direction.

## 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 the suction valves wide open. A closed suction valve will cause severe damage to the impeller and seal. Under non-flooded conditions, fill up the pump and suction line very 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. During the first few minutes there will be air trapped in the piping. This air must purge itself before full rated performance of the pump will be achieved. If the air does not purge itself, then check for air leakage at 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. The acceptability of a specific piping situation must be determined. Consult factory if necessary.

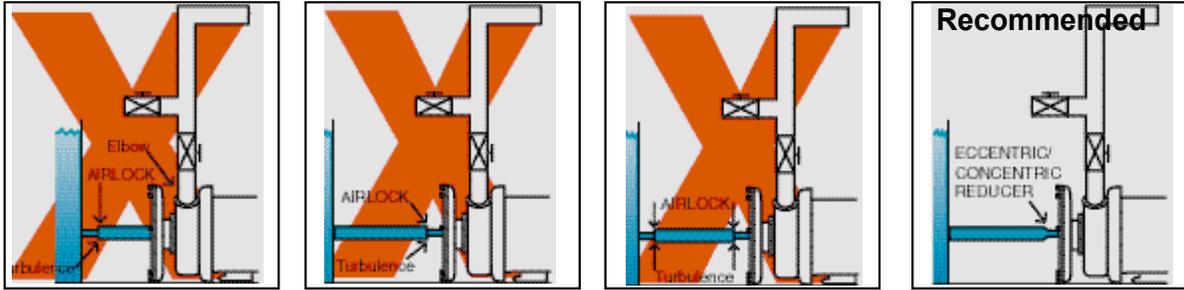
**Double Seal Pumps** – The pressure in the seal chamber should be 20 psi higher than the pump discharge pressure. The volume of coolant circulating through the seal chamber should be adjusted so that the temperature of the effluent does not exceed 160° F. When the pump is started, the seal chamber must be full of fluid in order to lubricate and cool seal faces. If this condition is not met, the seal will be damaged because of excessive wear and heat build-up due to friction.

## RECOMMENDATIONS

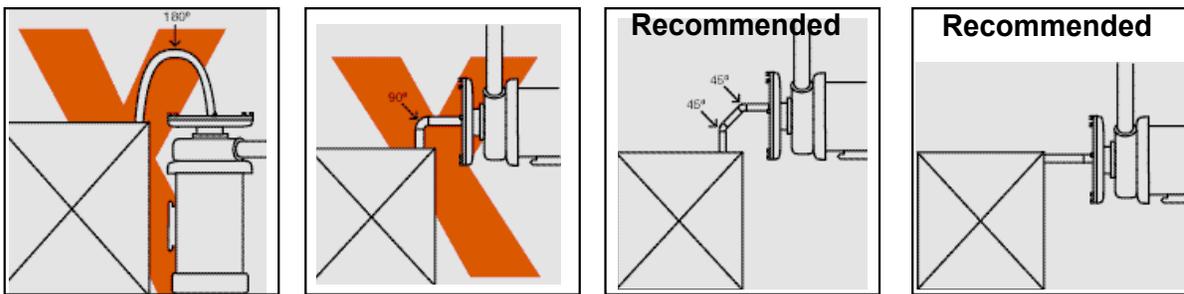
Always make sure there is enough liquid in the reservoir and the level is high enough, considering the capacity of the pump unit. Inadequate liquid will cause vortex in the reservoir. A vortex occurs when air mixes from the surface into the fluid. This can disturb the flow and also prevent the pump from priming. Never run the pump for more than 5-10 minutes against a closed discharge valve. If the pump is being run against a closed discharge valve for a long 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 a minimum pressure loss. This prevents overheating by recirculating the fluid.

# RECOMMENDED INSTALLATION

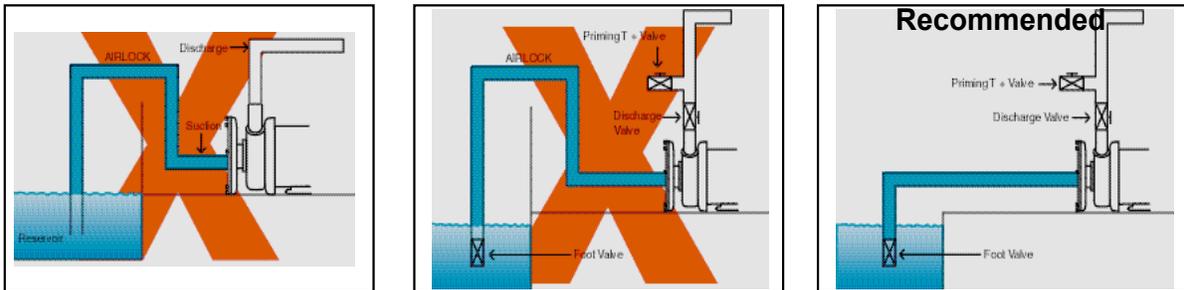
## SUCTION PLUMBING



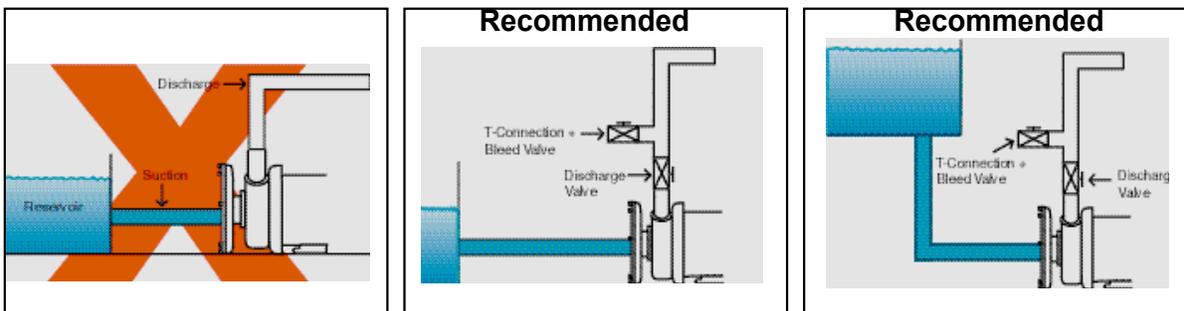
## SUCTION TOP VIEW



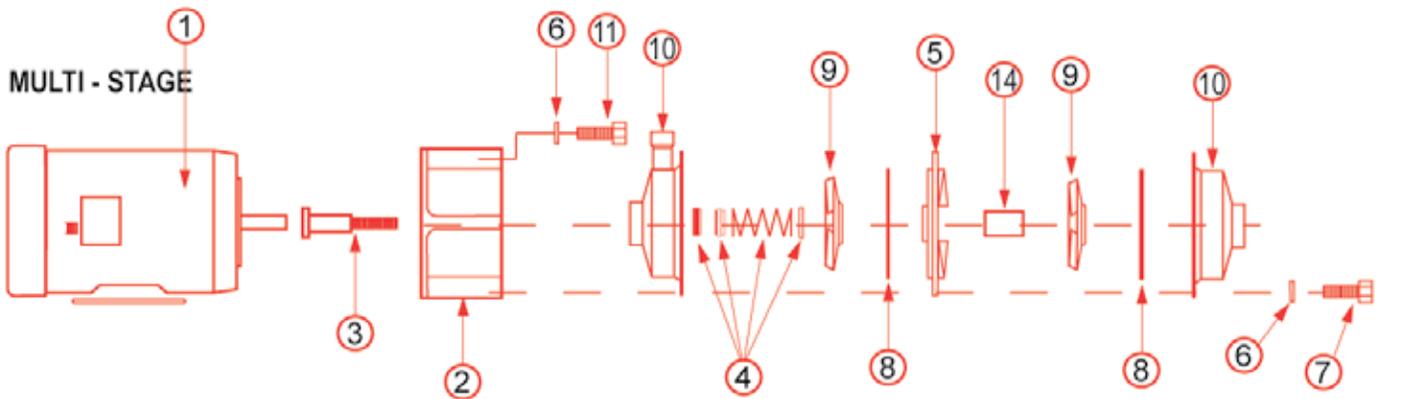
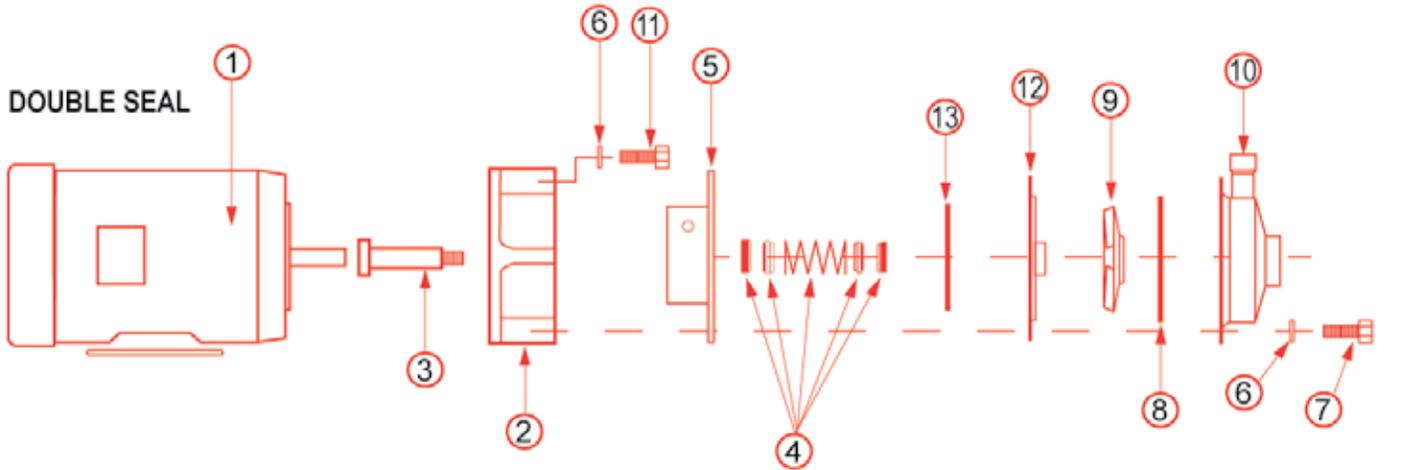
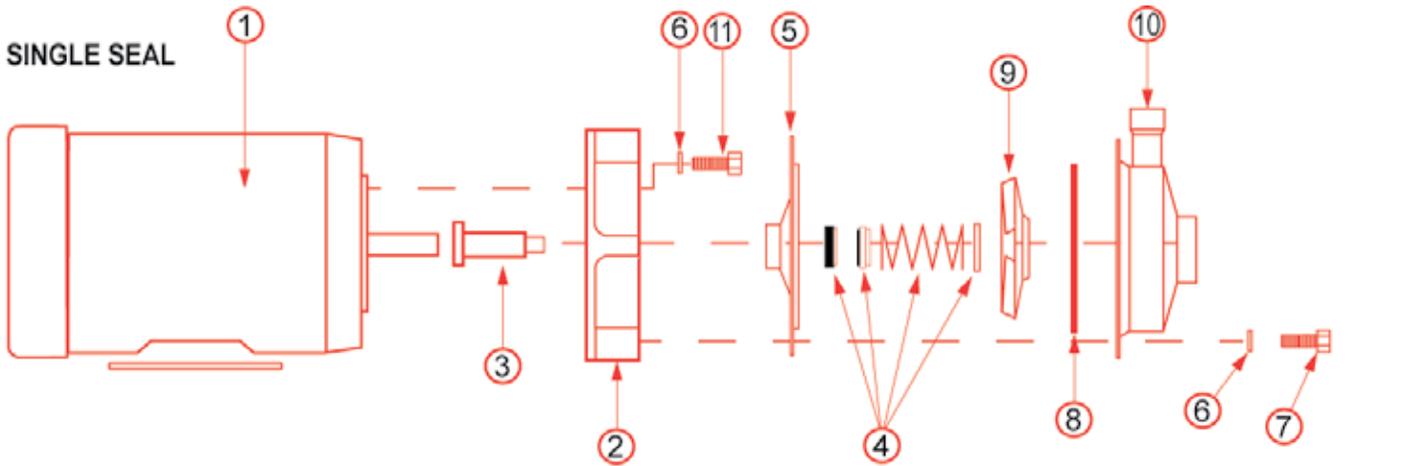
## SUCTION LIFT



## SUCTION HEAD



# EXPLODED VIEWS



# SERIES HSC SPARE PARTS LIST

Item	Description	HSC-1/4 Part No.	HSC-1/2 Part No.	HSC-3/4 Part No.	HSC-1 Part No.	HSC-2 Part No.	HSC-3 Part No.
1	Motor Phase - Voltage - Cycle						
	1 115/230 60	HSC-120-0103	HSC-120-0103	HSC-340-0103	HSC-100-0103		
	1 115/230 50/60	HSC-120-2103	HSC-120-2103	HSC-340-2103	HSC-100-2103		
	3 230/460 50/60	HSC-120-3103	HSC-120-3103	HSC-340-3103	HSC-100-3103	HSC-200-3103	HSC-300-3103
1BS	Bearing Set*	HSC-140-01BS	HSC-140-01BS	HSC-140-01BS	HSC-140-01BS	HSC-140-01BS	HSC-140-01BS
1EF	External Fan*	HSC-140-01EF	HSC-140-01EF	HSC-140-01EF	HSC-140-01EF	HSC-140-01EF	HSC-140-01EF
1FC	Fan Cover*	HSC-140-01FC	HSC-140-01FC	HSC-140-01FC	HSC-140-01FC	HSC-140-01FC	HSC-140-01FC
2-02	Extender Casting - single seal	HSC-140-0201	HSC-140-0201	HSC-140-0201	HSC-140-0201	HSC-140-0201	HSC-140-0201
2-03	Extender Casting - double seal	HSC-140-0202	HSC-140-0202	HSC-140-0202	HSC-140-0202	HSC-140-0202	HSC-140-0202
2-04	Extender Casting - multi-stage	HSC-140-0203	HSC-140-0203	HSC-140-0203	HSC-140-0203	HSC-140-0203	
3-02	Shaft Extension w/ Set Screws -single seal	HSC-140-0301	HSC-140-0301	HSC-140-0301	HSC-140-0301	HSC-140-0301	HSC-140-0301
3-03	Shaft Extension w/ Set Screws - double seal	HSC-140-0302	HSC-140-0302	HSC-140-0302	HSC-140-0302	HSC-140-0302	HSC-140-0302
3-04	Shaft Extension w/ Set Screws - multi-stage	HSC-140-0303	HSC-140-0303	HSC-140-0303	HSC-140-0303	HSC-140-0303	
4-01SE	Seal Assembly - EPDM/Carbon/Ceramic single seal/multi-stage	HV-120-0601SE	HV-120-0601SE	HV-120-0601SE	HV-120-0601SE	HV-120-0601SE	HV-120-0601SE
4-01DE	Seal Assembly - EPDM/Carbon/Ceramic double seal	HV-120-0601DE	HV-120-0601DE	HV-120-0601DE	HV-120-0601DE	HV-120-0601DE	HV-120-0601DE
4-01SV	Seal Assembly - Viton/Carbon/Ceramic single seal/multi-stage	HV-120-0601SV	HV-120-0601SV	HV-120-0601SV	HV-120-0601SV	HV-120-0601SV	HV-120-0601SV
4-01DV	Seal Assembly - Viton/Carbon/Ceramic double seal	HV-120-0601DV	HV-120-0601DV	HV-120-0601DV	HV-120-0601DV	HV-120-0601DV	HV-120-0601DV
4-02SV	Seal Assembly -Viton/Silicon Carbide/Silicon Carbide single seal/multi-stage	HV-120-0602SV	HV-120-0602SV	HV-120-0602SV	HV-120-0602SV	HV-120-0602SV	HV-120-0602SV
4-02DV	Seal Assembly -Viton/Silicon Carbide/Silicon Carbide double seal	HV-120-0602DV	HV-120-0602DV	HV-120-0602DV	HV-120-0602DV	HV-120-0602DV	HV-120-0602DV
5-02	Adaptor - single seal	HSC-140-0501	HSC-140-0501	HSC-140-0501	HSC-140-0501	HSC-140-0501	HSC-140-0501
5-03	Adaptor - double seal	HSC-140-0502	HSC-140-0502	HSC-140-0502	HSC-140-0502	HSC-140-0502	HSC-140-0502
5-04	Adaptor w/ Diffuser - multi-stage	HSC-140-0503	HSC-140-0503	HSC-140-0503	HSC-140-0503	HSC-140-0503	
6	Lockwasher	HSC-140-06 (8)	HSC-140-06 (8)	HSC-140-06 (8)	HSC-140-06 (8)	HSC-140-06 (8)	HSC-140-06 (8)
7	Housing Hex Head Cap Screw	HSC-140-07 (4)	HSC-140-07 (4)	HSC-140-07 (4)	HSC-140-07 (4)	HSC-140-07 (4)	HSC-140-07 (4)
8E	Housing Gasket - EPR	HSC-140-08E	HSC-140-08E	HSC-140-08E	HSC-140-08E	HSC-140-08E	HSC-140-08E
8V	Housing Gasket - Viton	HSC-140-08V	HSC-140-08V	HSC-140-08V	HSC-140-08V	HSC-140-08V	HSC-140-08V
9	Impeller	HSC-140-09	HSC-120-09	HSC-120-09	HSC-100-09	HSC-200-09	HSC-200-09
10	Housing - single/double seal	HSC-140-10	HSC-140-10	HSC-140-10	HSC-140-10	HSC-140-10	HSC-140-10
10-02	Housing - 1st stage- multi-stage	HSC-140-1001	HSC-140-1001	HSC-140-1001	HSC-140-1001	HSC-140-1001	
10-03	Housing - 2nd stage-multi-stage	HSC-140-1002	HSC-140-1002	HSC-140-1002	HSC-140-1002	HSC-140-1002	
11	Motor Adaptor Hex Head Cap Screw	HSC-140-11 (4)	HSC-140-11 (4)	HSC-140-11 (4)	HSC-140-11 (4)	HSC-140-11 (4)	HSC-140-11 (4)
12	Seal Chamber - double seal	HSC-140-12	HSC-140-12	HSC-140-12	HSC-140-12	HSC-140-12	HSC-140-12
13E	Chamber Gasket - double seal - EPDM	P-100-09E	P-100-09E	P-100-09E	P-100-09E	P-100-09E	P-100-09E
13V	Chamber Gasket - double seal - Viton	P-100-09V	P-100-09V	P-100-09V	P-100-09V	P-100-09V	P-100-09V
14	Spacer - multi-stage	HSC-140-14	HSC-140-14	HSC-140-14	HSC-140-14	HSC-140-14	
	Pump Head Ass'y - All wetted parts						
01SE	single - Carbon/Ceramic/EPR	HSC-140-15SE	HSC-120-15SE	HSC-340-15SE	HSC-100-15SE	HSC-200-15SE	HSC-300-15SE
01SV	single - Carbon/Ceramic/Viton	HSC-140-15SV	HSC-120-15SV	HSC-340-15SV	HSC-100-15SV	HSC-200-15SV	HSC-300-15SV
01DE	double - Carbon/Ceramic/EPR	HSC-140-15DE	HSC-120-15DE	HSC-340-15DE	HSC-100-15DE	HSC-200-15DE	HSC-300-15DE
01DV	double - Carbon/Ceramic/Viton	HSC-140-15DV	HSC-120-15DV	HSC-340-15DV	HSC-100-15DV	HSC-200-15DV	HSC-300-15DV
01ME	multi - Carbon/Ceramic/EPR	HSC-140-15ME	HSC-120-15ME	HSC-340-15ME	HSC-100-15ME	HSC-200-15ME	HSC-300-15ME
01MV	multi - Carbon/Ceramic/Viton	HSC-140-15MV	HSC-120-15MV	HSC-340-15MV	HSC-100-15MV	HSC-200-15MV	HSC-300-15MV

\* Specify motor manufacturer

() Indicates quantity required other than one (1)

# ASSEMBLY INSTRUCTIONS

## SINGLE SEAL ASSEMBLY

1. Press the seal cup gasket and seal seat into the adaptor cavity.
2. Slide on the shaft sleeve and tighten the set screws.
3. Slide the adaptor on the seal on the shaft sleeve into place on the extender casting.
4. Slide the rotating parts of the seal on the shaft sleeve. Set operating length to shoulder of shaft sleeve at base of threaded extension.
5. Restrain the external fan and screw on the impeller.
6. Replace the housing gasket.
7. Put the housing on the extender casting and secure with the four housing bolts.

## DOUBLE SEAL ASSEMBLY

1. Mount casting and secure with the four bolts.
2. Slide on shaft sleeve and tighten the set screws.
3. Press the seal seat and cup gasket into adaptor and into adaptor cavity of seal chamber.
4. Mount the seal chamber into casting.
5. Lubricate outside of shaft sleeve and slide on the rotating parts of the seal.
6. Replace the chamber gasket.
7. Replace adaptor.
8. Replace housing gasket.
9. Restrain the external fan and screw on the impeller.
10. Put the housing on assembly and secure with the four bolts.
11. Check impeller clearance inside the housing. Adjustments can be made by sliding the sleeve and securing the set screws.

## MULTI-STAGE ASSEMBLY

1. Slide on shaft extension and secure with two (2) set screws.
2. Place extender casting on motor bracket and "finger tighten" with 4 (four) cap screws and lock washers.
3. Lubricate seal seat cavity (oil for viton or bun a-N; only soap-based lubricant for EPT) on 2<sup>nd</sup> stage housing and firmly, with the thumbs, install the stationary seal seat. Snap the 2<sup>nd</sup> stage housing into step on extender casting. (Standard ceramic seal seat can easily be chipped; avoid impact between ceramic seal seat and shaft extension.)
4. Lubricate shaft extension as above and slide on rotating section of the mechanical seal assembly, without the spring, by holding the seal on the rubber part, which rides on the shaft, and pushing downward. Do not push seal into place by holding the metal retainer ring; it will not seat properly. Install seal spring.
5. Screw on 2<sup>nd</sup> stage impeller.
6. Place housing gasket on 2<sup>nd</sup> stage housing. Place adaptor/diffuser with diffuser blades up on housing gasket.
7. Slide the impeller spacer. Screw on 1<sup>st</sup> stage impeller. NOTE: Both impellers are identical.
8. Place second housing gasket and 1<sup>st</sup> stage housing on adaptor. Secure with four (4) cap screws and lock washers.
9. Tighten all fasteners, including those holding extender casting, to motor.



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