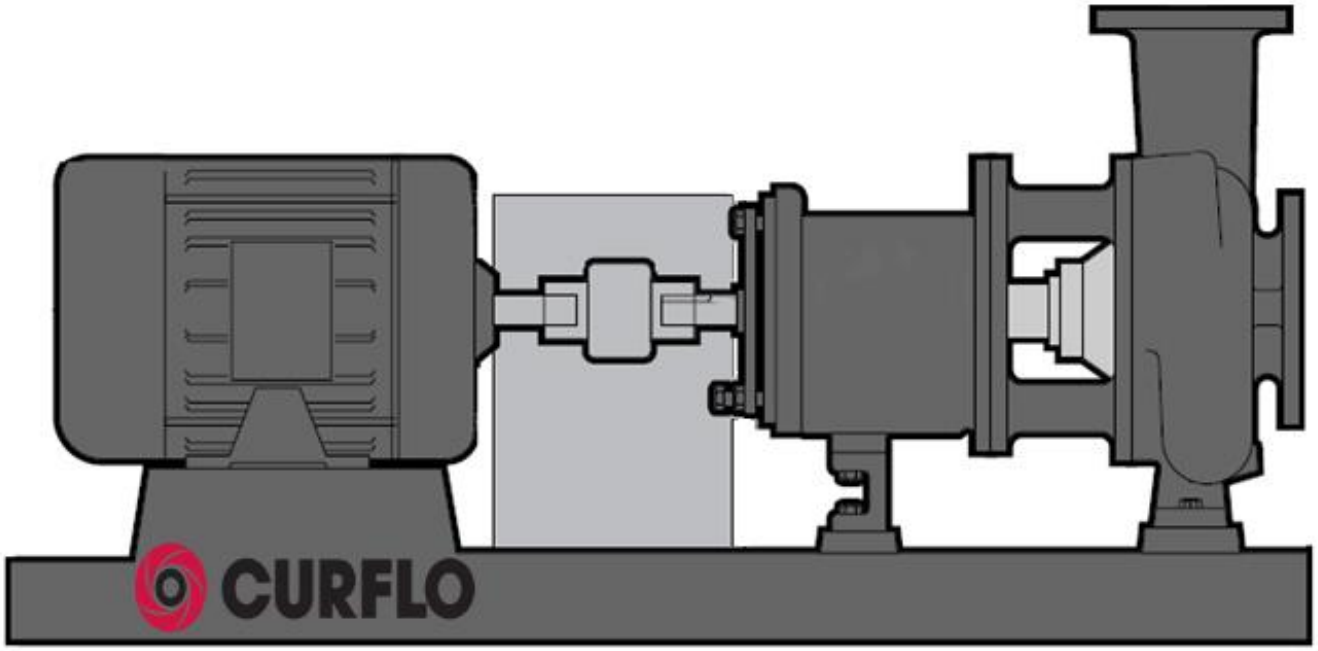
CURFLO ANSI PUMP D-LINE SERIES DIII

Instructions, Operations and Maintenance

MANUAL



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SECTION 1

1.1 Introduction

Foreword

This manual is only to be used for the **ANSI Pump D-Line Series DIII** and is not intended for any other type of manufactured pump.

The **ANSI Pump D-Line Series DIII IOM** manual is intended to assist **CURFLO, INC.** customers involved in the installation, operation and maintenance of the **ANSI Pump D-Line Series DIII**. Upon receiving the pump, all personnel involved should review this manual in its entirety and should thoroughly understand all procedures prior to installation, operation and maintenance of the **ANSI Pump D-Line Series DIII**. Any questions concerning the information provided in this manual should be addressed to **CURFLO, INC.**

WARNING!!!

Failure to read and comply with these instructions will void all warranty expressed or written, will void the responsibility of the manufacturer and may result in bodily harm or equipment damage.

This manual is to be kept as a part of the permanent records for the pump assembly and needs to be readily accessible as a reference to all personnel working on the pump assembly. Referenced item numbers can be found on the Sectional Drawings located in Section 7 of this manual.

ANSI Pumps D-Line Series DIII are designed and manufactured for years of safe and reliable operation and performance ONLY when properly used and maintained in accordance with the written instructions contained in this IOM. As a pressure containing device with rotating parts, it should be considered **HAZARDOUS**. All plant personnel must adhere to all safety measures and follow all in-plant instructions when operating and/or maintaining this type of equipment. **CURFLO, INC.** shall not be liable for any physical injury or delays caused by failure to adhere to the instructions of this manual.

DEFINITIONS

Throughout the **ANSI Pump D-Line Series DIII IOM** manual the words **WARNING**, **CAUTION** and **NOTE** are indicators of procedures and/or situations where special attention is required.

WARNING!!!

Operating practice, procedure or operation can result in personnel injury, loss of life and damage of equipment if not followed correctly.

CAUTION!!!

Operating practice, procedure or operation can result in equipment destruction and damage if not followed.

NOTE:

Operating condition, practice and/or procedure is essential to observe around equipment.

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1.2 Pump Receiving and Inspection

WARNING!!!

Serious damage and injury to equipment and personnel can result unless proper lifting and equipment support procedure is followed.

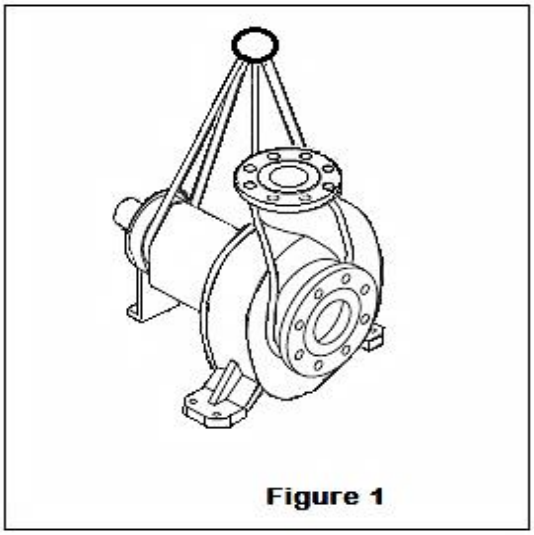

Figure 1

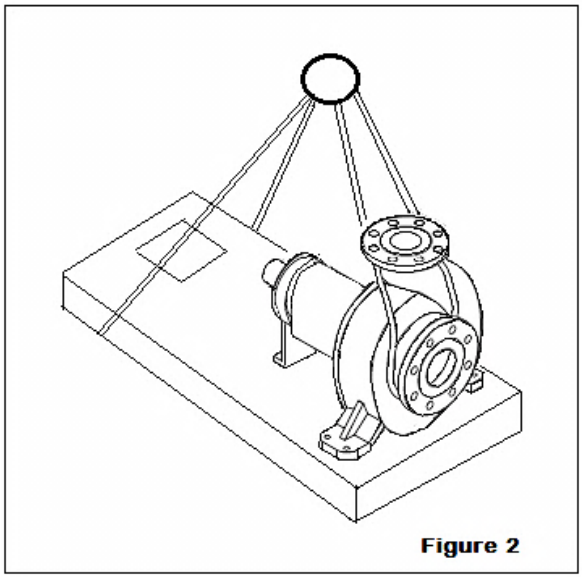

Figure 2

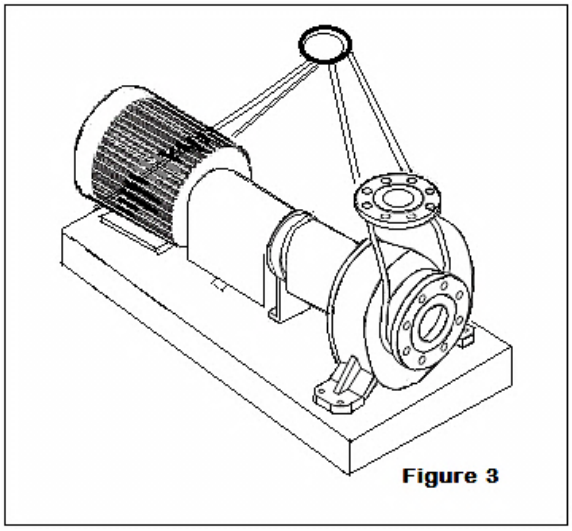

Figure 3

Never use eyebolts for lifting.

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1.2 Pump Receiving and Inspection

See Figures 1, 2 and 3 for proper lifting options, as the pump units and assemblies are heavy, and use adequate lifting equipment.

STORAGE OF EQUIPMENT

Proper storage of your **ANSI Pump D-Line Series DIII** will ensure it is ready for service when needed.

For pumps in Chemical Process, you will need to check with your hazardous safety personnel to properly dispose of the residue when it is drained and flushed. Also check for the best rust preventative that is compatible with the chemicals that were last used in your **ANSI Pump D-Line Series DIII** before applying. A rust preventative needs to be applied to pumps that are idle in high humid environments.

SHORT TERM STORAGE: For pumps stored for six (6) months or less, no special steps are required as long as the bearings are well lubricated and the pump is rotated 2-3 times per month. This will ensure the seals will not flatten from the weight of the rotating element.

LONG TERM STORAGE: For pumps stored in excess of six (6) months, all machined surfaces need to be treated with a rust preventative and the bearings need to be well lubricated. Rotating the shaft of the pump is required at least 3 times monthly. The coupling and driver manufacturers should be contacted to comply with their requirements for long term storage. Your **ANSI Pump D-Line Series DIII** must be covered and kept in a dry location.

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SECTION 2

2.1 Foundation Design and Baseplate Alignment

Installation

The **ANSI Pump D-Line Series DIII** should always be located as close to the liquid supply as possible and have adequate space to operate, for maintenance and inspection.

Foundation

The foundation is the key to proper alignment and long-life operation of the pump. The foundation should have adequate sized gravel and cement to ensure the foundation will support the **ANSI Pump D-Line Series DIII** assembly. In addition to strength, the foundation needs to be level or else proper alignment will never be achieved.

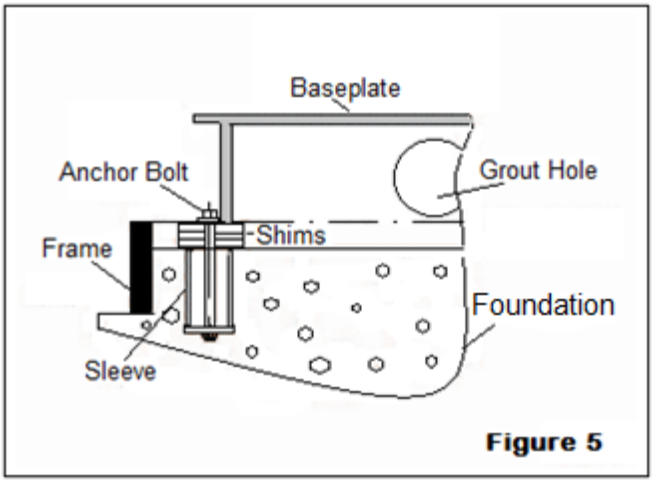

Figure 5

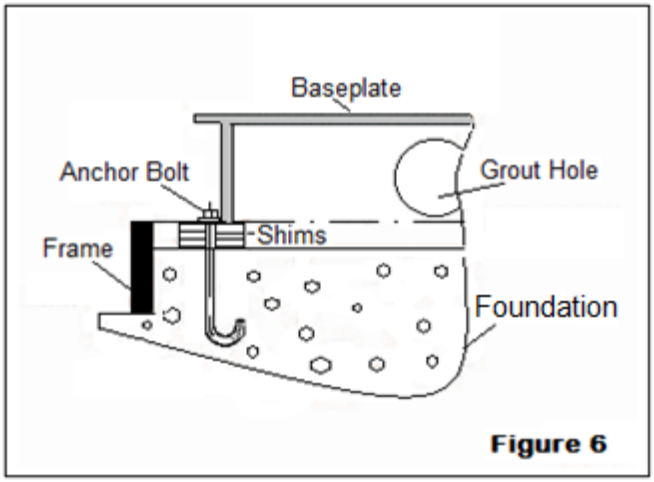

Figure 6

Pump Installation

The installation of the pump assembly to the foundation is straight forward. Lifting procedures have to be followed with safety first. Once the pump assembly is on the foundation it has to be level before it can be permanently mounted to the foundation.

Leveling the pump assembly can be done by using shims or wedges and a level. Once the assembly is level, the Anchor Bolts can be installed. If the Straight Bolt and Sleeve, or the “J” type Anchor Bolt were used, these should have been located and installed into the foundation when pouring, and allowed to dry for a least 2 days.

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Leveling the Baseplate

1. To allow for adequate grouting, place shims or wedges on each side of the foundation Anchor Bolts. The wedges should extend between ¾" and 1-1/2" above the foundation.

2. Check the Anchor Bolts to make sure they are firmly in place on the foundation before going any further. If not secure, **DO NOT** continue the installation. **Wait until the Anchor Bolts are set or the installation will not work correctly.**

3. Using proper lifting procedures, lower the pump assembly onto the foundation. Once the assembly is in place, hand tighten the anchor bolt nuts. Cross torque the anchor bolts until tight.

4. Rough align the motor to the pump and prepare the grout mixture. Pour the grout mixture into the grout hole at the center of the baseplate and allow to set up until dry.

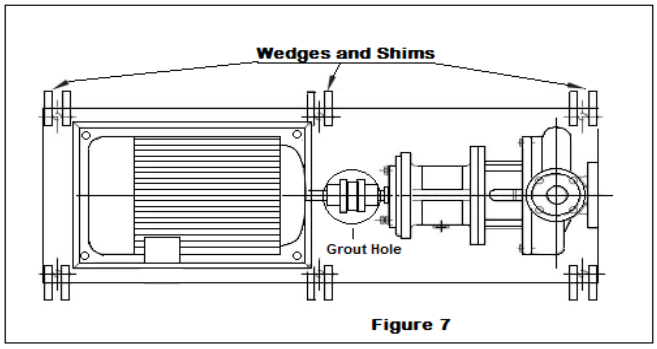

Figure 7

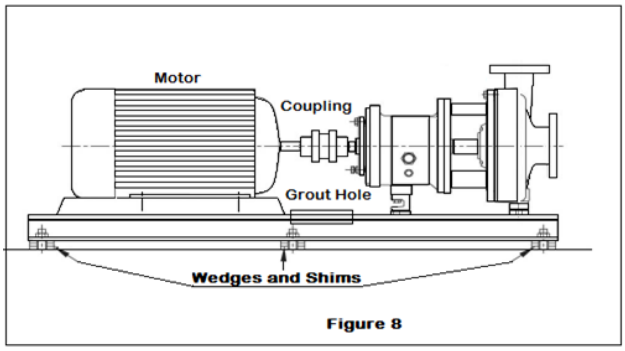

Figure 8

5. Suction piping is very important to avoid suction and NPSH problems. Suction pipe sizes have to be the same size as the suction inlet, i.e. ; 4" suction, use a 4" suction pipe. 8" suction, use an 8" suction pipe. ***NEVER use pipe or fittings that are smaller than the diameter of the suction inlet.***
6. Figure 9 shows the proper piping configuration with a minimum of **"d-10"** or pipe diameter x 10 between the inlet source and the pump suction. The same is true for the pump discharge, as this provides a straight run that will help smooth out the flow of the liquid allowing the liquid to enter the eye of the impeller under ideal conditions.
7. Figure 10 shows the correct way to install an "Eccentric Reducer". Notice that the straight line of the reducer is on the top. This prevents air build up in the pump suction, which would prevent all the liquid from entering the impeller and causing cavitation.

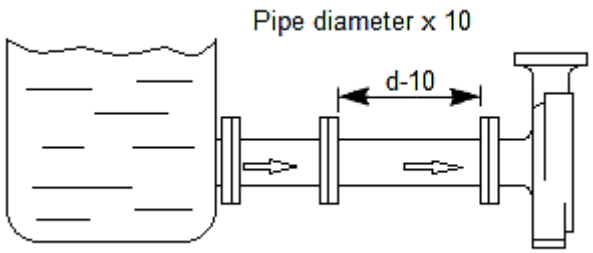

Figure 9

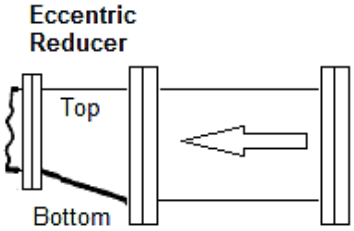

Figure 10

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2.2 Pump Alignment

1. After the grout has set, the pump can now be connected to a power source and the final alignment can begin. Before final alignment, check the anchor bolts, pump, driver mounting bolts and coupling bolt to ensure all are tight.

2. Use filler gauges, straight edge or laser alignment techniques to achieve a reading of 0.002 or less.

3. After the first month of normal operation, it is advisable to recheck the alignment of 0.002 or less to ensure good operating reliability.

Cold Setting of Vertical Alignment			
Pumped Liquid Temperature	**Set Driver Shaft In. (mm)**		
50°F (10°C)	.002	(.05)	low
150°F (65°C)	.001	(.03)	high
250°F (120°C)	.005	(.12)	high
350°F (175°C)	.009	(.23)	high
450°F (218°C)	.013	(.33)	high
550°F (228°C)	.017	(.43)	high
650°F (343°C)	.021	(.53)	high
700°F (371°C)	.023	(.58)	high

ALIGNMENT TROUBLESHOOTING		
Problem	**Cause**	**Solution**
Cannot obtain horizontal alignment (side to side) parallel.	Baseplate not leveled properly. Could be twisted.	Determine which of the corners of the baseplate are low or high. Remove and/or adjust wedges or shims at the corners until correct alignment is reached.
	Driver feet bolts are bound.	Loosen hold down bolts using jack screws. Slide the pump and driver until horizontal alignment is correct.

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SECTION 3

3.1 Checking Rotation

WARNING!!!

Before checking rotation make sure that the driver is LOCKED OUT and the power is turned off.

Jog the pump just enough to check for the correct rotation. Check the arrow on the bearing housing for the correct rotation.

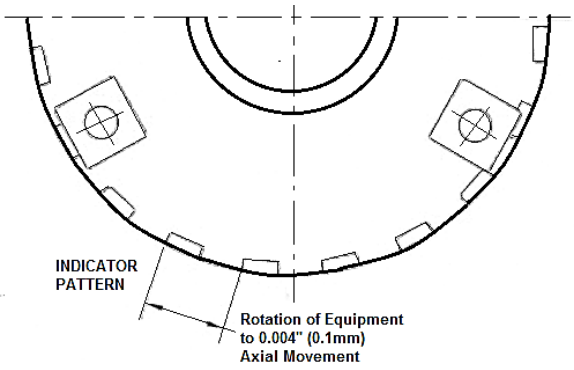
3.2 Impeller Clearances

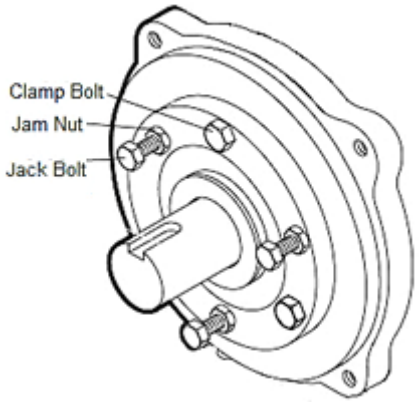
The impeller clearances are important because it directly affects the operation of the pump unit. With the correct clearance, the pump will run at the optimal efficiency which helps it to run in the horsepower range it was designed for.

The impeller clearance setting should not exceed more than 0.006 or 0.13mm above the valves in the chart below or severe performance problems can occur. For temperatures above 200 deg. F, please refer to the below chart to ensure the proper settings are made. Thermal expansion can affect the setting causing the impeller to rub against the casing causing damage to both the impeller and pump case.

For sizes 3 x 1.5-13 and 3 x 2-13 at 3600 RPM add 0.003 in. (0.08mm). The rotation of the bearing carrier from the center of one lug to the center of the next, results in Axial Movement of 0.004 in. (0.1mm). RV impellers are set to cover and Open Vane are set to casing.

TEMPERATURE °F (°C)		CLEARANCE to COVER -inch (mm)
< 200°F	(93 °C)	0.015" (0.38mm)
250°F	(121 °C)	0.017" (0.43mm)
300°F	(144 °C)	0.019" (0.48mm)
350°F	(177 °C)	0.021" (0.53mm)
400°F	(204 °C)	0.023" (0.58mm)
>400°F	(204 +°C)	0.025" (0.64mm)





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SECTION 4

4.1 Pump Start-up Procedure

1. Check over the whole **ANSI Pump D-Line Series DIII** assembly to ensure all the nuts and bolts are tightened and lubrication has been applied to the coupling, pump and motor. Install the coupling guard.
2. Ensure that the suction valve, any recirculation lines, seal cooling fluid lines and any other cooling lines are open.
3. Close the discharge line valve and crack open no more than a quarter turn. **NEVER OPEN THE DISCHARGE VALVE MORE THAN 25% AT START-UP.**
4. Bump the driver and check for proper rotation again. Start the driver and check all gauges **(if the discharge pressure is not attained, turn the driver off immediately. Re-prime and restart again).**
5. Once the discharge pressure begins to build, open the discharge valve slowly until fully open. **NEVER USE THE VALVE TO THROTTLE THE PUMP DISCHARGE PRESSURE.**
6. Check for acceptable vibration levels, bearing noises (pump and motor), bearing temperature and seal leakage, as well as the general appearance of the assembly.
7. Secure the site and remove any debris that might have been over looked.

4.2 ANSI Pump D-Line Series DIII Minimum Flow Operation

WARNING!!!

Do not operate the ANSI Pump D-Line Series below minimum rated flows or with suction and/or discharge valves closed. This will cause the liquid to heat up, resulting in vaporization in the casing. This will lead to pump failure and possible physical harm of personnel.

When operating at minimum flows, always use caution to prevent damage to the pump and motor. If there is a constant requirement for minimum flow operation, a Variable Frequency Drive (VFD) should be considered.

Refer to the **ANSI Pump D-Line Series DIII Minimum Flow Chart** below to confirm the low flow operating ranges.

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ANSI Pump D-Line Series DIII Minimum Flow Chart

PUMP SIZE	60 Hz RPM	60 Hz Minimum Flow (% of BEP)	50 Hz RPM	50 Hz Minimum Flow (% of BEP)
3 x 2-6	3500	25	2900	21
3 x 3-8	3500	25	2900	21
4 x 3-8	3500	25	2900	21
3 x 2-10	3500	33	2900	28
4 x 3-10	3500	33	2900	28
6 x 4-10	3500	50	2900	42
3 x 2-13	3500	50	2900	42
4 x 3-13	3500	50	2900	42
6 x 4-13	1750	50	1450	42
All Grp 3	1750	50	1450	42
All other sizes	all	10	all	10

NOTE:
Minimum intermittent flow value of 50% of the minimum continous flow is okay as long as that flow is greater than the minimum "Thermal Flow."
"Thermal Flow is defined as the minimum flow that will not cause excessive temperature rise and is application dependent.

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SECTION 5

5.1 Spare Parts Recommendations

Refer. # 111 …. Impeller
114…. Shaft Sleeve
105…. Shaft
317…. Thrust (Outboard) Bearing
316….. Radial (Inboard) Bearing
321….. Inboard Labyrinth Seal
322..... Outboard Labyrinth Seal
213..... Gland Stud Nut
315….. Bearing Lockwasher
314….. Bearing Locknut
116….. Case Gasket
333..... Bearing Housing O-Ring
323….. Frame-to-Adapter O-Ring
210….. Mechanical Seal
112….. Impeller O-Ring
212..... Gland Gasket

5.2 TOOL REQUIREMENTS

- Wrenches: 7/16”, ½”, 9/16”, ¾”, 7/8” and 15/16”
- Screwdrivers-Flathead
- Mallet-Rubber
- Pliers
- Allen Wrenches
- Bearing Puller
- Torque Wrench
- Micrometer
- Dial Indicators- 2 to 3
- Drift Punch-Brass
- Induction Bearing Heater
- Lift Slings
- Feeler Gauges
- Strong Workbench
- Shaft Wrench

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5.3 ANSI Pump D-Line Series DIII Disassembly

1. Drain all liquid from the pump and flush. Contact your Hazardous Safety personnel if you are not familiar with the fluid you are working with to avoid injury.
2. Disconnect all auxiliary piping and tubing. Cap if necessary.
3. Remove coupling guard. Disconnect coupling, drain oil if necessary, and replace drain plug. Make sure you have a container to place all of your nuts and bolt in.
4. Remove Casing Stud Hexnuts (122) and Frame Foot Capscrew (312). Put into container.
5. Remove Back Pull-Out Assembly. This will require assistance.
6. Remove Bearing Carrier Set Screw (334). Save in container.
7. Secure the Frame Adapter (121) to workbench.
8. Remove Pump half Coupling Hub. Place in container.
9. Slide shaft wrench over Shaft (113) and Key (318).
10. Looking at the impeller end of the Back Pull-Out Assembly, rotate the Impeller (111) clockwise, raising the shaft wrench off the workbench surface.
11. Quickly turn the Impeller counter clockwise, landing the shaft wrench on the workbench surface until the Impeller (111) comes loose.
12. Remove the Casing Gasket (116) and discard (always use a new gasket in reassembly).
13. Loosen the Seal Gland (211) and remove the Rear Cover Plate (115). Save nuts in container.
14. Remove the Shaft Sleeve (114) with the Mechanical Seal (210) or Packing (Optional) /Lantern Ring attached.
15. Remove Seal/Packing Gland (210/Optional).
16. Remove Frame Adapter (121) and Bolts (334). Place in container and discard Gasket (323).
17. Remove Inboard Labyrinth Seal (321).
18. Disassemble Power End by removing three Set Screws (334). The face of the bearing carrier has 3 square lugs that protrude from the surface. The Bearing Carrier is turned by using an open wrench on one of the square lugs, as shown in Figure11.

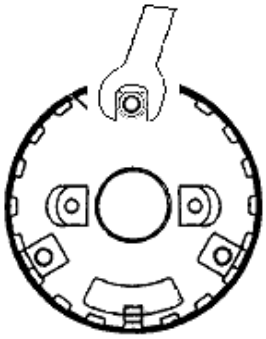

Figure 11

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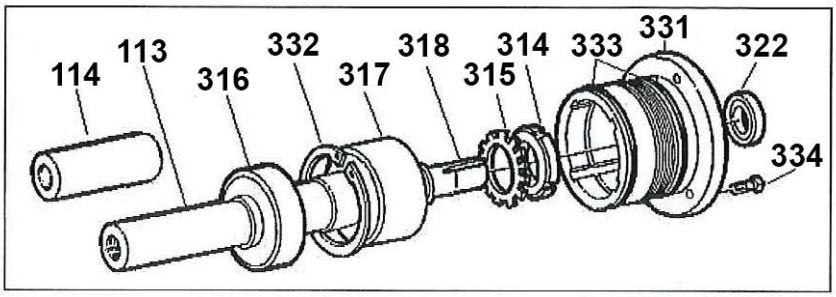
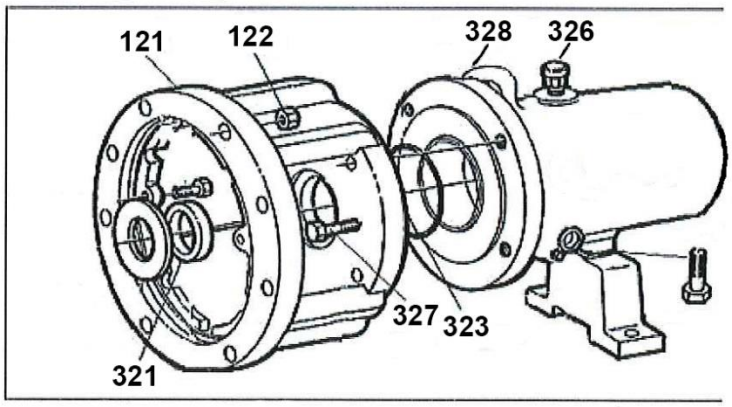
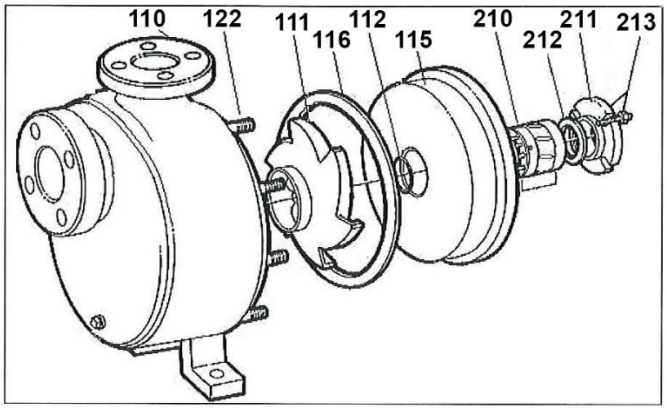
19. Remove the Snap Ring (333) (Grp 1 & 2) or Bearing Retainer (332) on Grp 3.
20. Slide shaft assembly out of the Bearing Housing (328).
21. Remove Capscrews (334). Save in container.
22. Remove the Bearing Housing O-Ring (333).
23. Remove Bearing Housing (328) from Shaft (113) and remove Outboard Labyrinth Seal (322).
24. Remove Bearing Locknut (314), Bearing Lockwasher (315), Inboard Bearing (316) and Outboard bearing (317) from Shaft (113).
25. Remove all plugs from Bearing Housing (328).







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SECTION 6

6.1 ANSI Pump D-Line Series DIII Bearing Frame Assembly

WARNING!!!

Welders' gloves must be worn when installing new bearings onto the pump. Otherwise, physical injury may occur.

1. Inspect all parts before assembly begins. Clean and lubricate as required and replace worn or damaged parts; especially gaskets, mechanical seals, shaft sleeves, etc.
2. Re-install all plugs into the Bearing Housing (328), Sight Glass (324), cooling connections, etc. using Teflon pipe thread material to ensure positive sealing.
3. Install the Bearing Housing Foot (311) with Bolt (312) and hand tighten.

6.2 ANSI Pump D-Line Series DIII Power End Assembly

1. After heating the thrust (Outboard) Bearing (317) slide it onto Shaft (113). After the bearing has cooled, lubricate with the same oil that will be used for operating the pump.
2. Place the Lockwasher (315) with tang in the keyway, then thread the Locknut (314) onto the Shaft. Tighten and bend the tang of the Lockwasher into the slot on the Locknut.
3. When installing the Retaining Ring (332), make sure the ***FLAT*** side faces toward the Thrust (Outboard) Bearing (317).
4. Install the Inboard (Radial) Bearing onto the shaft with the ***SHIELD*** away from the Impeller (111) and lubricate it with the same oil for operating the pump. On the Group 3 Model, a Bearing Clamp Ring (337) will go over the shaft.
5. Install a new O-Ring (333) on the Bearing Carrier (331) and coat inside of Bearing Carrier (331) with oil.
6. Install the shaft assembly into the Bearing Carrier (331), secure the Retaining Ring (332) in the Groove and make sure the groove in the Bearing is not blocked by the Retaining Ring (332).
7. Check that the Shaft (113) moves freely.
8. Check the grooves on the Pump Shaft (113) prior to installing the Outboard Laby Seal (322). Install the Outboard Laby Seal (322) with the oil drainage groove downward.
9. Lubricate the inner race of the Bearing Carrier (331).
10. Install the Bearing Frame (331) into the Bearing Housing (328) and hand tighten the nuts and Bolts (334).
11. Once the rotating element is installed into the Bearing Housing (328), place a Dial Indicator at the end of the shaft. Move it back and forth to check the axial movement.

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12. Check the Shaft with Sleeve (113) run out. Install sleeve and hand tighten the Impeller (111). Rotate 360 degrees. If total run out exceeds 0.002 in., disassemble and determine the cause.
13. Check the face run out by rotating the shaft so that the indicator rides along the fit for 360 degrees. The total indicator reading should not be more than 0.001 in. (0.025mm). If it is, then you must disassemble and troubleshoot the problem.
14. Install Housing Frame O-Ring (323) and Frame Adapter (121) onto the Housing Assembly using Bolts (334).
15. Check the Adapter (121) to determine if the TIR is within tolerance.
16. Install the Inboard Laby Seal (321) into the Adapter (121) in the 6 o'clock position. Use Bolts (327) in the assembly of Rear Cover (115) to Adapter (121).
17. Install the Seal Gland (211), Gland Gasket (212), and Rear Cover Plate (115), complete with Seal Gland Studs (213), Nuts (213) and Mechanical Seal (210).
18. Install the Impeller with the Teflon O-ring (112) onto the Shaft (113). Tighten with the reverse procedure for disassembly with just a couple of taps on the shaft.
19. Install the Casing Gasket (116) and install Case Nuts (122).
20. Rotate the shaft to ensure it moves smoothly.

ANSI Pump D-Line Series DIII Shaft End Play Inches (mm)				
		Group 1	Group 2	Group 3
Double row	min	0.0011(.028)	0.0013(.033)	0.0014(.036)
	max	0.0019(.047)	0.0021(.054)	0.0023(.058)
Duplex	min	*0.0007(.012)	*0.0009(.022)	*0.0010(.026)
	max	0.0010(.026)	0.0012(.030)	0.0015(.038)

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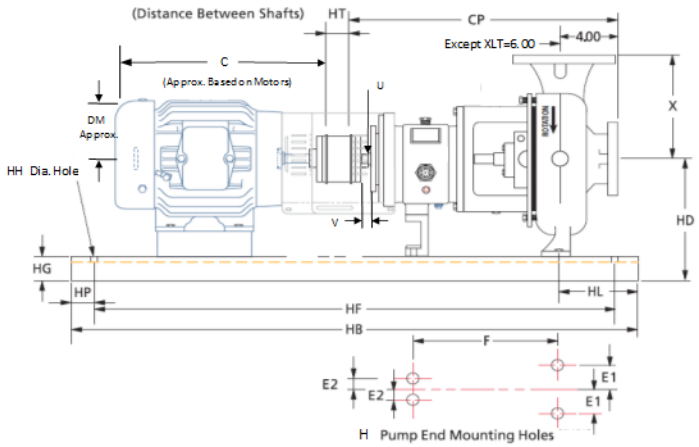
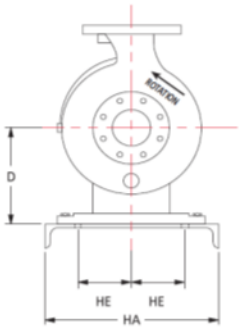
SECTION 7

7.1 ANSI Pump D-Line Series DIII Group 1 Dimensional Outline Drawing

GROUP 1





PUMP END DIMENSIONS													
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)
GROUP 1	1.5 x 1-62	1	1.5	5 1/4	6 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	97
	1.5 x 1-82	1	1.5	5 1/4	6 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	103
	3 x 1.5-62	1.5	3	5 1/4	6 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	112
	3 x 2-62	2	3	5 1/4	6 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	116
	3 x 1.5-82	1.5	3	7	7 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	124

BASEPLATE DIMENSIONS													
Max NEMA FRAME	BASEPLATE NUMBER	HA	HB	HT Min.	If Pump D=5.25 **HD**	If Pump D=7 **HD**	HE	HF	HG	HH	HL	HP	H	WEIGHT (lbs)
182T	139	12	35	3 3/4	9	10 3/4	4	32 1/2	3 3/4	3/4	4 1/2	1 1/4	5/8	100
184T	139	12	39	3 3/4	9	10 3/4	4 1/4	36 1/2	3 3/4	3/4	4 1/2	1 1/4	5/8	111
215T	148	13	39	3 3/4	9 1/4	11	4 1/2	36 1/2	4	3/4	4 1/2	1 1/4	5/8	116
256T	148	17	44	3 3/4	9 1/4	11	6	41 1/2	4	3/4	4 1/2	1 1/4	5/8	140
286T	153	20	53	3 3/4	9 3/4	11 3/4	7 1/2	50 1/2	4 3/4	3/4	4 1/2	1 1/4	5/8	212
326TS	153	20	58	3 3/4	9 3/4	11 3/4	7 1/2	50 1/2	4 3/4	3/4	4 1/2	1 1/4	5/8	226

*HD dimensions may vary due to motor size and manufacturer.

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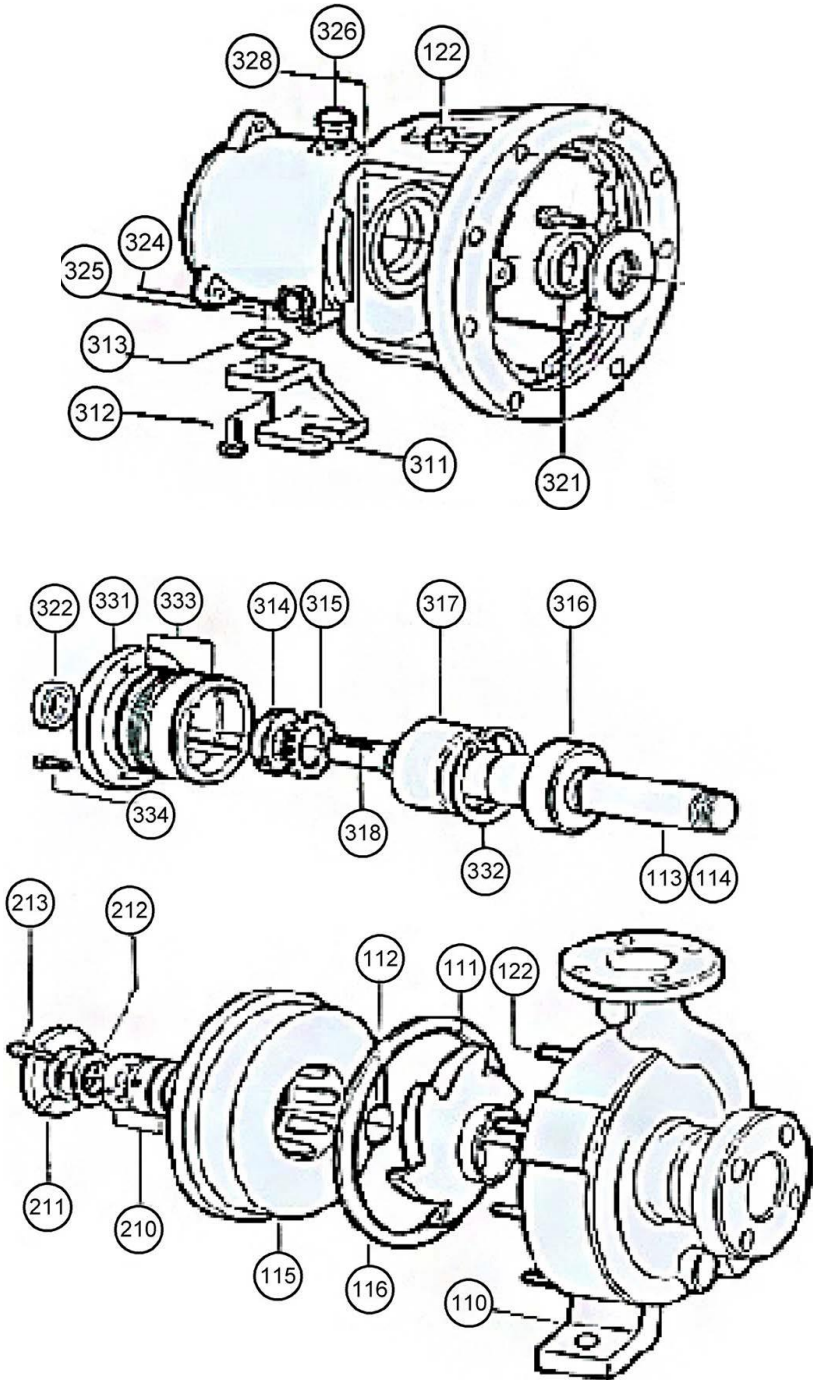
7.2 ANSI Pump D-Line Series DIII Group 1 Sectional Drawing

GROUP 1



ITEM	DESCRIPTION
110	CASING
111	IMPELLER
112	GASKET, IMPELLER
113	SHAFT
114	SLEEVE, SHAFT
115	PLATE, REAR COVER
116	GASKET, REAR COVER
122	STUD AND NUT, CASING
210	SEAL, MECHANICAL
211	GLAND, MECHANICAL SEAL
212	GASKET, GLAND
213	STUD, GLAND
311	FOOT, BEARING HOUSING
314	LOCKNUT, BEARING
315	LOCKWASHER, BEARING
316	BEARING, INBOARD
317	BEARING, OUTBOARD
318	KEY, SHAFT/COUPLING
312	CAPSCREW, FOOT
313	SHIM
321	OIL SEAL, INBOARD
322	OIL SEAL, OUTBOARD
324	SIGHT GAUGE, BEARING HOUSING
325	DRAIN PLUG, BEARING HOUSING
326	VENT PLUG, BEARING HOUSING
328	HOUSING, BEARING
331	CARRIER, BEARING
333	O-RING, BEARING CARRIER
332	RETAINER, BEARING CARRIER
334	SET SCREW, BEARING CARRIER
OPTIONAL	GLAND, PACKING
OPTIONAL	CAGE HALVES, PACKING SEAL
OPTIONAL	PACKING
OPTIONAL	DEFLECTOR, INBOARD
OPTIONAL	SLINGER, OIL
N/A	O-RING, ADAPTER
N/A	CAPSCREW, BEARING HOUSING
OPTIONAL	SLEEVE, HOOK
OPTIONAL	CAPSCREW, CLAMP

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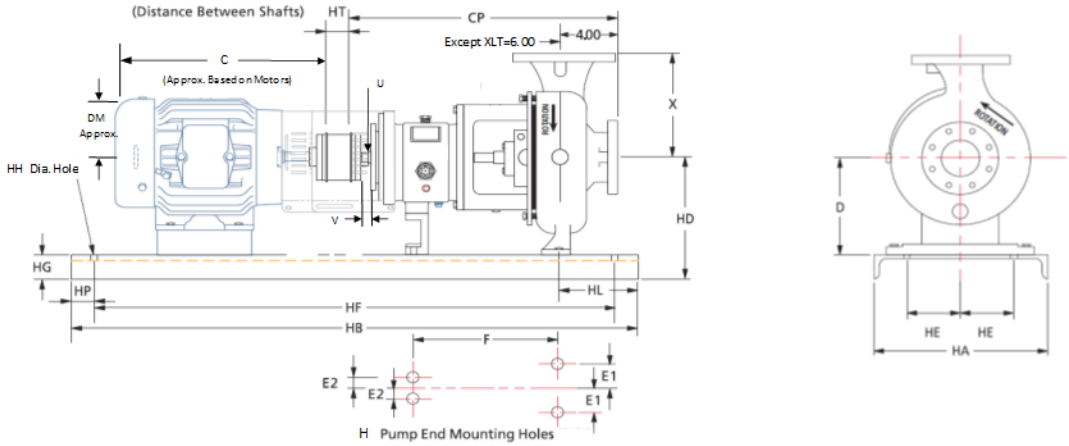
7.3 ANSI Pump D-Line Series DIII Group 2 Dimensional Drawing

GROUP 2



PUMP END DIMENSIONS													
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)
GROUP 2	3 x 2-82	2	3	8 1/4	9 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	200
	4 x 3-82	3	4	8 1/4	11	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	227
	2 x 1-10A	1	2	8 1/4	8 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	210
	3 x 1.5-10A	1.5	3	8 1/4	8 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	220
	3 x 2-10A	2	3	8 1/4	9 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	226
	4 x 3-10	3	4	8 1/4	11	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	225
	4 x 3-10H	3	4	8 1/4	12 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	249
	6 x 4-10	4	6	10	13 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/2	3/8 x 3/16	2 5/8	290
	6 x 4-10A	4	6	10	13 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	310
	6 x 4-10H	4	6	10	13 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	328
	3 x 1.5-13	1.5	3	10	10 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	250
	3 x 2-13	2	3	10	11 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	258
	4 x 3-13	3	4	10	12 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	281
	6 x 4-13A	4	6	10	13 1/2	23 1/2	4 7/8	3 5/8	12 1/2	1 1/8	1/4 x 1/8	2 5/8	324

BASEPLATE DIMENSIONS													
Max NEMA FRAME	BASEPLATE NUMBER	HA	HB	HT Min.	If Pump D=8.25 **HD**	If Pump D=10 **HD**	HE	HF	HG	HH	HL	HP	H	WEIGHT (lbs)
184T	245	15	45	3 3/4	12	13 3/4	4 1/2	42 1/2	3 3/4	3/4	4 1/2	1 1/4	5/8	129
215T	252	15	45	3 3/4	12 1/4	14	4 1/2	42 1/2	4	3/4	4 1/2	1 1/4	5/8	177
284T	258	17	52	3 3/4	12 1/4	14	6	49 1/2	4	3/4	4 1/2	1 1/4	5/8	174
326T	264	20	58	3 3/4	13	14 3/4	7 1/2	55 1/2	4 3/4	1	4 1/2	1 1/4	5/8	226
365T	264A	20	58	3 3/4	13	14 3/4	7 1/2	55 1/2	4 3/4	1	4 1/2	1 1/4	5/8	226
404T	268	22	60	3 3/4	13	14 3/4	7 1/2	57 1/2	4 3/4	1	4 1/2	1 1/4	5/8	310
405TS	268	22	60	3 3/4	13	14 3/4	7 1/2	57 1/2	4 3/4	1	4 1/2	1 1/4	5/8	310
444TS	280	22	60	3 3/4	13	14 3/4	7 1/2	57 1/2	4 3/4	1	4 1/2	1 1/4	5/8	310
405T	280	24	61 3/4	3 3/4	13	14 3/4	7 1/2	59 1/8	4 3/4	1	4 1/2	1 1/4	5/8	312
445T	280	24	61 3/4	3 3/4	13	14 3/4	7 1/2	59 1/8	4 3/4	1	4 1/2	1 1/4	5/8	312

*HD dimensions may vary due to motor size and manufacturer.

HD1 dimension applies to: 3 x 2-8, 4 x 3-8, 4 x 3-8, 2 x 1-10A, 3 x 1.5-10A, 3 x 2-10A, 4 x 3-10.

HD2 dimension applies to: 4 x 3-10H, 6 x 4-10, 6 x 4-10H, 3 x 1.5-13, 3 x 2-13, 4 x 3-13, 6 x 4-13A.

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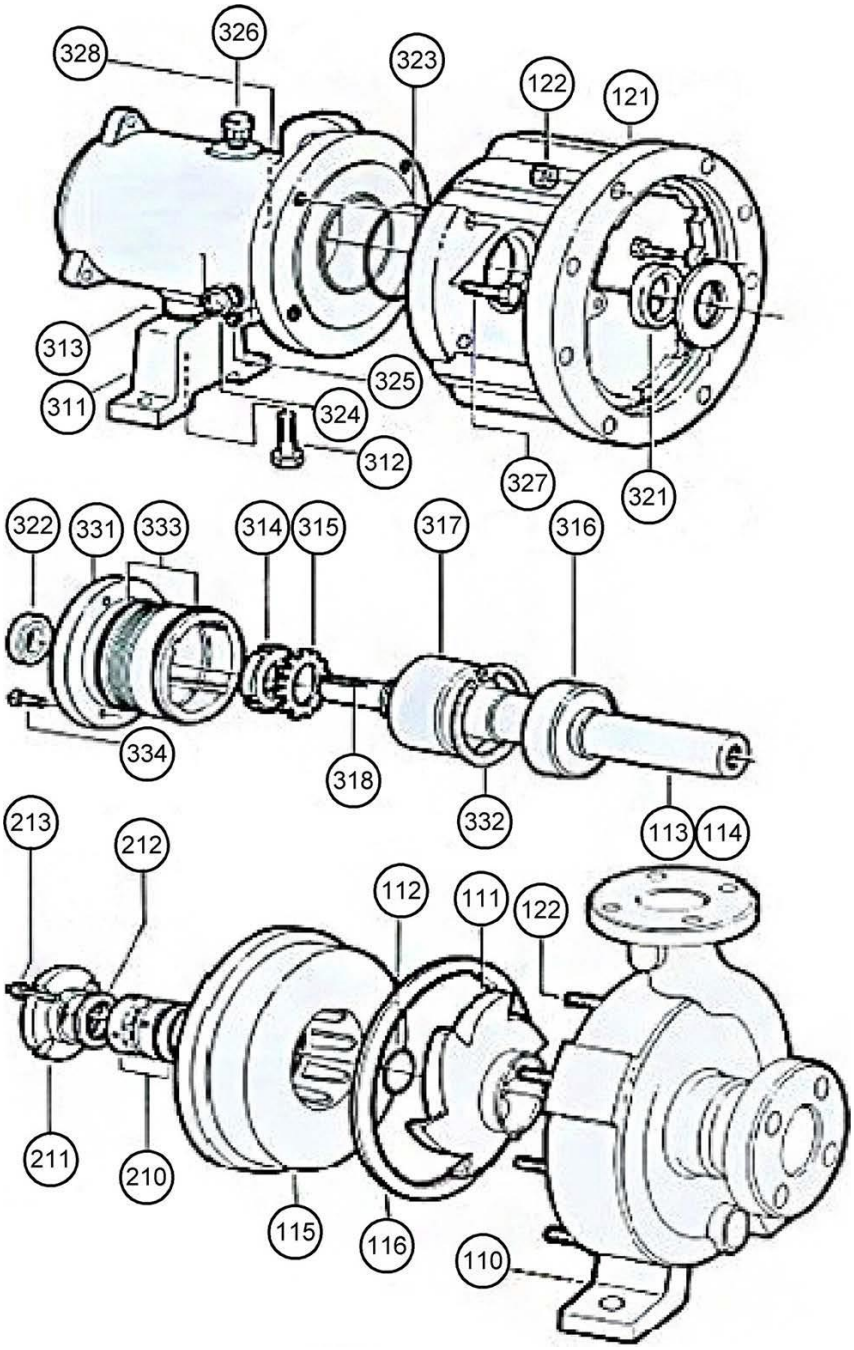
7.4 ANSI Pump D-Line Series DIII Group 2 Sectional Drawing



ITEM	DESCRIPTION
110	CASING
111	IMPELLER
112	GASKET, IMPELLER
113	SHAFT
114	SLEEVE, SHAFT
115	PLATE, REAR COVER
116	GASKET, REAR COVER
121	ADAPTER, BEARING HOUSING
122	STUD AND NUT, CASING
210	SEAL, MECHANICAL
211	GLAND, MECHANICAL SEAL
212	GASKET, GLAND
213	STUD, GLAND
311	FOOT, BEARING HOUSING
312	CAPSCREW, FOOT
313	SHIM
314	LOCKNUT, BEARING
315	LOCKWASHER, BEARING
316	BEARING, INBOARD
317	BEARING, OUTBOARD
318	KEY, SHAFT/COUPLING
321	OIL SEAL, INBOARD
322	OIL SEAL, OUTBOARD
323	O-RING, ADAPTER
324	SIGHT GAUGE, BEARING HOUSING
325	DRAIN PLUG, BEARING HOUSING
326	VENT PLUG, BEARING HOUSING
327	CAPSCREW, COVER/ADAPTER
328	HOUSING, BEARING
331	CARRIER, BEARING
332	RETAINER, BEARING CARRIER
333	O-RING, BEARING CARRIER
334	SET SCREW, BEARING CARRIER
OPTIONAL	GLAND, PACKING
OPTIONAL	CAGE HALVES, PACKING SEAL
OPTIONAL	PACKING
OPTIONAL	DEFLECTOR, INBOARD
OPTIONAL	SLINGER, OIL
OPTIONAL	SLEEVE, HOOK
OPTIONAL	CAPSCREW, CLAMP

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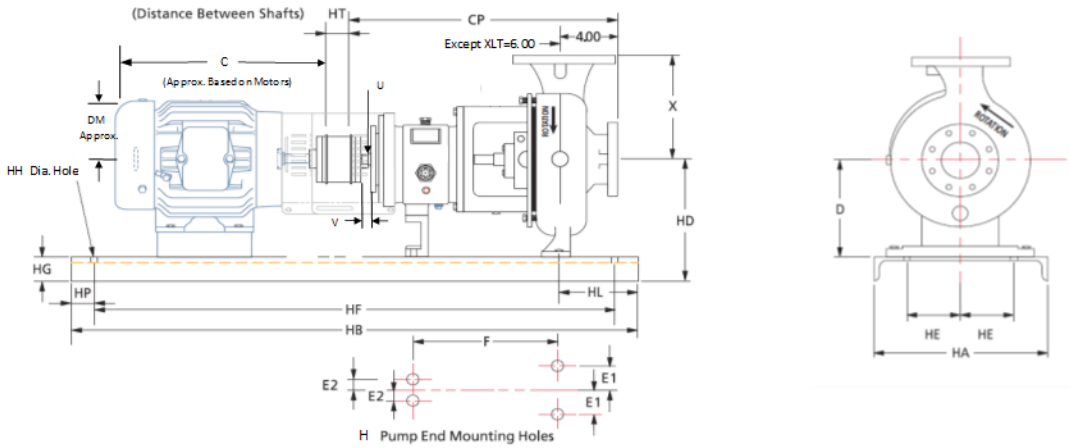
7.5 ANSI Pump D-Line Series DIII Group 3 Dimensional Drawing

GROUP 3



PUMP END DIMENSIONS													
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)
GROUP 3	8 x 6-14A	6	8	14 1/2	16	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	680
	10 x 8-14	8	10	14 1/2	18	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	900
	6 x 4-16	4	6	14 1/2	16	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	641
	8 x 6-16	6	8	14 1/2	18	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	800
	8 x 6-16A	6	8	14 1/2	18	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	832
	10 x 8-16	8	10	14 1/2	19	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	917
	10 x 8-16H	8	10	14 1/2	19	33 7/8	8	4 1/2	18 3/4	2 3/8	5/8 x 5/16	4	992

BASEPLATE DIMENSIONS												
Max NEMA FRAME	BASEPLATE NUMBER	HA	HB	HT Min.	HD	HE	HF	HG	HH	HL	HP	H	WEIGHT (lbs)
365T	368	20	68	3 3/4	19 1/4	8 1/2	65 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	412
365TS	368	20	68	3 3/4	19 1/4	8 1/2	65 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	412
445T	380	22	80	3 3/4	19 1/4	9 1/2	77 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	494
447TS	380	22	80	3 3/4	19 1/4	9 1/2	77 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	494
447TS	398	25	84	3 3/4	19 1/4	11	81 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	604
449TS	398	25	84	3 3/4	19 1/4	11	81 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	604
449TS	398	25	88	3 3/4	19 1/4	11	85 1/2	4 3/4	1 1/8	6 1/2	1 1/4	7/8	633

*HD dimensions may vary due to motor size and manufacturer.

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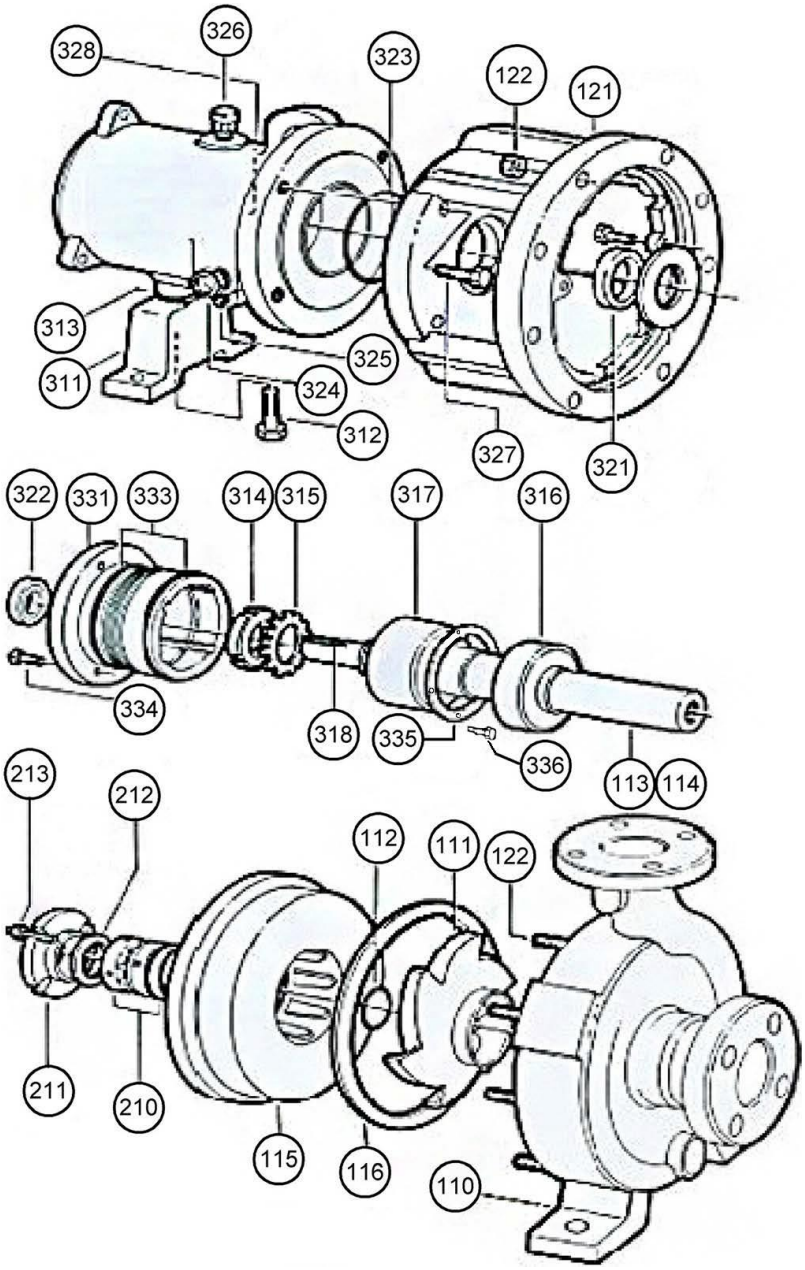
7.6 ANSI Pump D-Line Series DIII Group 3 Sectional Drawing



ITEM	DESCRIPTION
110	CASING
111	IMPELLER
112	GASKET, IMPELLER
113	SHAFT
114	SLEEVE, SHAFT
115	PLATE, REAR COVER
116	GASKET, REAR COVER
121	ADAPTER, BEARING HOUSING
122	STUD AND NUT, CASING
210	SEAL, MECHANICAL
211	GLAND, MECHANICAL SEAL
212	GASKET, GLAND
213	STUD, GLAND
311	FOOT, BEARING HOUSING
312	CAPSCREW, FOOT
313	SHIM
314	LOCKNUT, BEARING
315	LOCKWASHER, BEARING
316	BEARING, INBOARD
317	BEARING, OUTBOARD
318	KEY, SHAFT/COUPLING
321	OIL SEAL, INBOARD
322	OIL SEAL, OUTBOARD
323	O-RING, ADAPTER
324	SIGHT GAUGE, BEARING HOUSING
325	DRAIN PLUG, BEARING HOUSING
326	VENT PLUG, BEARING HOUSING
327	CAPSCREW, COVER/ADAPTER
328	HOUSING, BEARING
331	CARRIER, BEARING
333	O-RING, BEARING CARRIER
334	SET SCREW, BEARING CARRIER
335	RETAINER, BEARING CARRIER
336	CAPSCREW, CLAMP
337	CLAMP RING, BEARING HOUSING
OPTIONAL	GLAND, PACKING
OPTIONAL	CAGE HALVES, PACKING SEAL
OPTIONAL	PACKING
OPTIONAL	DEFLECTOR, INBOARD
OPTIONAL	SLINGER, OIL
OPTIONAL	SLEEVE, HOOK

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7.7 ANSI Pump D-Line Series DIII Group 1, 2 & 3 Motor Mounting Dimensions

(Group 1)

NEMA FRAME SIZES				
NEMA FRAME	ANSI Base No.	* C	* DM	* Weight Including Coupling
143T	139	13	4	40
145T	139	14	4	45
182T	139	15	5	65
184T	139	16	5	75
213T	148	18	6	150
215T	148	20	6	160
254T	148	23	7	255
256T	148	24	7	280
284T	153	26	8	375
284TS	153	25	8	345
286T	153	27	8	430
286TS	153	26	8	380
326T	153	31	8	640

* Approximate dimensions and weights.

(Group 2)

NEMA FRAME SIZES				
NEMA FRAME	ANSI Base No.	* C	* DM	Weight Including Coupling
143T	245	13	4	40
145T	245	14	4	45
182T	245	15	6	65
184T	245	16	6	76
213T	252	18	6	150
215T	252	20	6	160
254T	258	25	7	266
256T	258	24	7	280
284T	258	26	7	375
284TS	258	25	7	345
286T	258	28	7	430
286TS	258	27	7	380
324T	264	29	8	575
324TS	264	28	8	485
326T	264	31	8	640
326TS	264	29	8	570
364T	264A	32	9	810
364TS	264A	30	9	755
365T	264A	34	9	950
365TS	264A	31	9	865
404T	268	36	10	1105
404TS	268	36	10	1080
405T	268	38	10	1215
405TS	268	36	10	1110
444TS	280	38	11	1500
445T	280	44	11	1710
445TS	280	40	11	1675
447T	280	48	11	2320
447TS	280	44	11	2320
449T	280	55	11	2850
449TS	280	51	11	2850

* Approximate dimensions and weights.

(Group 3)

NEMA FRAME SIZES				
NEMA FRAME	ANSI Base No.	* C	* DM	* Weight Including Coupling
284T	368	26	7	375
284TS	368	25	7	345
286T	368	28	7	430
286TS	368	27	7	380
324T	380	29	8	575
324TS	380	28	8	485
326T	380	31	8	640
326TS	380	29	8	570
364T	380	32	9	810
364TS	380	30	9	755
365T	380	34	9	950
365TS	380	31	9	865
404T	380	36	10	1105
404TS	380	36	10	1080
405T	380	38	10	1215
405TS	380	36	10	1110
444T	398	42	11	1500
444TS	398	38	11	1500
445T	398	44	11	1710
445TS	398	40	11	1675
447T	398	48	11	2320
447TS	398	44	11	2320
449T	398	55	11	2850
449TS	398	51	11	2850

* Approximate dimensions and weights.

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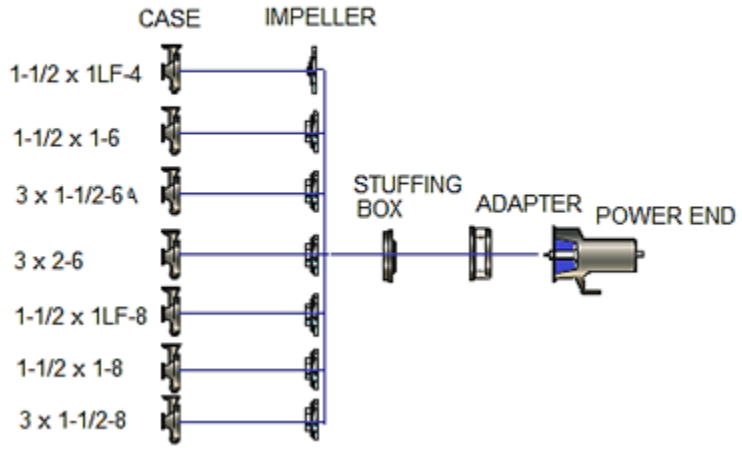
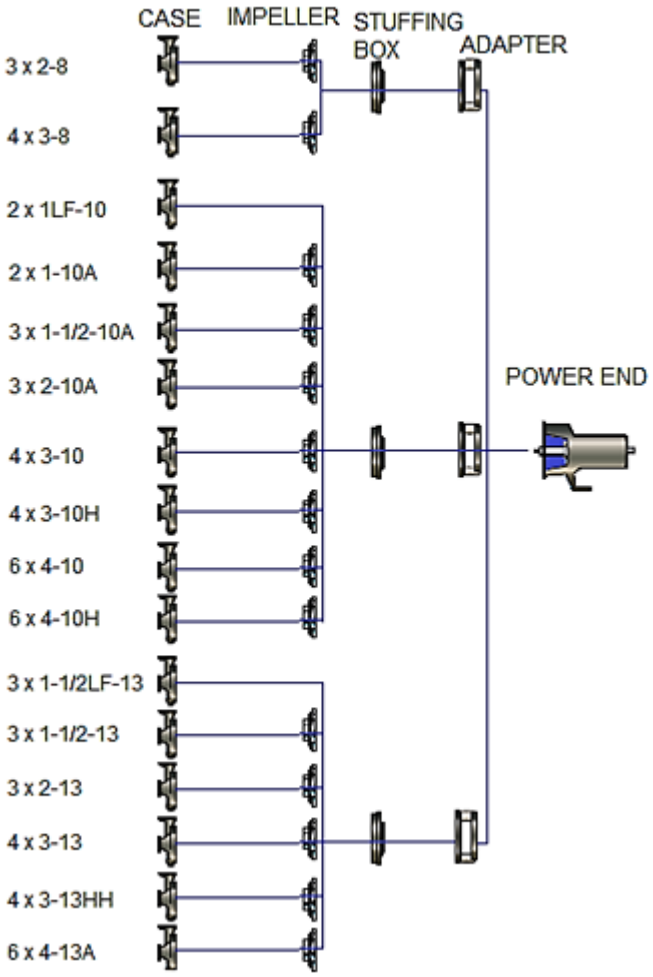
SECTION 8

8.1 ANSI Pump D-Line Series DIII Component Interchangeability

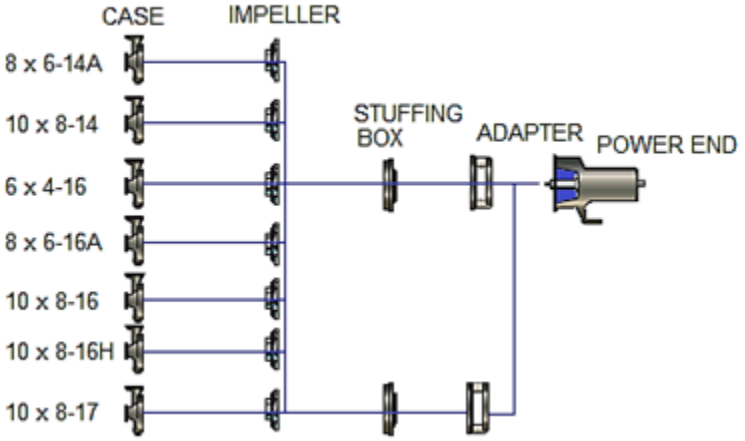
ANSI Pump D-Line Series DIII Group 1



ANSI Pump D-Line Series DIII Group 2



ANSI Pump D-Line Series DIII Group 3



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8.2 ANSI Pump D-Line Series DIII Materials of Construction

CURFLO ANSI Pump D-Line Series DIII

MATERIALS OF CONSTRUCTION

Item No.	Part Description	Material				
		Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
110	Casing	Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
111	Impeller	Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
112	Impeller Gasket	Teflon	GTB			
113	Shaft (less Hook Sleeve)	SAE 4140	316 SS	Alloy 20		
113	Shaft (less Hook Sleeve)	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13				
115	Shaft (w/ Hook Sleeve)	SAE 4140	316 SS	Alloy 20		
116	Shaft (w/ Hook Sleeve)	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13				
115	Rear Cover Plate	Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
116	Rear Cover Plate Gasket	Teflon	GMF			
121	Bearing Housing Adapter	Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
311	Bearing Housing Foot	Cast Iron				
313	Shim	SS				
311	Bearing Housing Foot - 3 x 1.5-8Z	OPTION - Cast Iron				
211	Gland - Packing Optional	Ductile Iron	316 SS	Alloy 20	Monel	Specials
213	Gland - Studs	Grade 8	316 SS	Alloy 20	Monel	Specials
214	Gland - Hex Nuts	Grade 8	316 SS	Alloy 20	Monel	Specials
N/A	Lantern Ring - 2 Pcs Optional	Teflon				
N/A	Packing 5 Ring Set Optional	GFO				
N/A	Deflector - Inboard	Teflon				
122	Casing - Studs	Grade 8	316 SS			Specials
123	Casing - Hex Nuts	Grade 8	316 SS			Specials
321	Oil Seal - Inboard	Brz				
321	Oil Seal - Inboard	CSS				
321	Oil Seal - Inboard	Brz	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13			
321	Bearing Isolator	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13				
N/A	Bearing Housing Assb.- 4-1/4" CL	Bearing housing drilled and tapped both sizes for optional sight glass, oiler and drain				
N/A	Bearing Housing Assb.- 4-1/4" CL	D.I.				
N/A	Bearing Housing Assb.- 7.0" CL	D.I.				
N/A	Bearing Housing Assb.- 7.0" CL	D.I.				
328	Bearing Housing - Only	D.I.				
316	Bearing - Inboard	C.S.				
317	Bearing - Outboard	C.S.				
317	Bearing - O.B. Duplex	C.S.				
N/A	Oil Slinger - Optional	C.S.				
314	Locknut - Bearing	C.S.				
315	Lockwasher - Bearing	C.S.				
322	Oil Seal - Outboard	C.S.				
N/A	Oil Seal - Outboard	Brz				
N/A	Oil Seal - Outboard	Brz	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13			
318	Key - Shaft/Coupling	C.S.				
N/A	Key - Shaft/Coupling	C.S.	For: 6 x 4-10, 4 x 3R-13, and 6 x 4R-13			
323	O-Ring - Adapter	NBR				
N/A	Oiler -Option	G.C.S.				
325	Drain Plug - Housing		C.S.		316 SS	
326	Filler Plug - Housing		C.S.		316 SS	
N/A	Side Plug Housing		C.S.		316 SS	
312	Fastener - Foot Bearing Housing		C.S.		316 SS	
327	Fastener - Adapter/Housing		C.S.		316 SS	
N/A	Nipple - Oiler	C.S.				
114	Hook Sleeve	Ductile Iron	316 SS	CD4MCuN	Alloy 20	Specials
324	Sight Gauge 1" NPT	C.S.				
324	Sight Gauge w/ Dome 1" NPT	C.S.				
N/A	Tag - Oil Level	S.S.				
331	Bearing Carrier	D.I.				
331	Bearing Carrier - Duplex	D.I.				
334	Set Screw - Bearing Carrier	C.S.				
333	O-Ring - Bearing Carrier	NBR				
332	Retainer - Bearing Carrier	C.S.				
337	Clamp - Bearing Carrier Duplex	C.S.				
336	Fastener -Bearing Carrier Duplex	C.S.				
N/A	*Bearing housing drilled and tapped both sides for optional sight glass, oiler, and drain 7" CL*					

Note:

1. For materials not listed please contact factory

2. Durco Reference numbers are for reference ONLY.

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SECTION 9

9.1 ANSI Pump D-Line Series DIII Operational Checklist

LUBRICATION

Recommended lubricants:

Oils: Between 120 deg. F (50 deg.C) and 180 deg. F (82 deg.C) use at least ISO Viscosity Grade 68 high quality turbine oil

For 180 deg. F (82 deg.C) use ISO Viscosity Grade 100 with bearing cooling. Above 350 deg. F (177 deg.C) use a high quality synthetic oil.

ANSI Pump D-Line Series DIII GROUP OIL REQUIREMENT		
GROUP	Oz.	ml.
1	8.5	251
2	32	946
3	48	1419

ANSI Pump D-Line Series DIII LUBRICATION INTERVALS-OIL			
Power End Type	Mineral Oil	Synthetic Oil	Regreaseable
Standard	3mo.	6mo.	3mo.
Sealed	3mo.	24mo.	N/A

ANSI Pump D-Line Series DIII Operating Temperatures

ANSI Pump D-Line Series DIII Recommended Maximum Operating Temperatures						
Lubrication	Mineral Oil			Synthetic Oil		
	Without Cooling	With Finned Tube Oil Cooler	With High Temp. Option	Without Cooling	With Finned Tube Oil Cooler	With High Temp. Option
Flood Oil	350°F (177°C)	500°F (260°C)	700°F (371°C)	450°F (232°C)	500°F (260°C)	700°F (371°C)
Oil Mist	350°F (177°C)	500°F (260°C)	700°F (371°C)	450°F (232°C)	500°F (260°C)	700°F (371°C)
Grease	Up to 350°F (177°C)		Standard Pump With No Modifications			
	350°F to 500°F (177°C to 260°C)		High temperature Grease and Stuffing Box Cooling.			

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9.2 ANSI Pump D-Line Series DIII Impeller Clearances

TEMPERATURE °F (°C)		CLEARANCE to COVER -inch (mm)
< 200°F	(93 °C)	0.015" (0.38mm)
250°F	(121 °C)	0.017" (0.43mm)
300°F	(144 °C)	0.019" (0.48mm)
350°F	(177 °C)	0.021" (0.53mm)
400°F	(204 °C)	0.023" (0.58mm)
>400°F	(204 +°C)	0.025" (0.64mm)

9.3 ANSI Pump D-Line Series DIII Torque Value and Bearing Fit Chart

RECOMMENDED TORQUE VALUES (US METRIC)

Item	Description	US STD. Group 1 Non-lubricated	METRIC Group 1 Non-lubricated	US STD. Group 2 Non-lubricated	METRIC Group 2 Non-lubricated	US STD. Group 3 Non-lubricated	METRIC Group 3 Non-lubricated
336	Bearing retainer capscrews - standard bearings	N/A	N/A	N/A	N/A	5/16 in - 6 ft•lbf	5/16 in - 8 N•m
336	Bearing retainer capscrews - duplex bearings	3/16 in - 2 ft•lbf	3/16 in - 3 N•m	3/16 in - 2 ft•lbf	3/16 in - 3 N•m	5/16 in - 6 ft•lbf	5/16 in - 8 N•m
327	Bearing housing/adapter capscrews and nuts	N/A	N/A	1/2 in - 27 ft•lbf	1/2 in - 37 N•m	5/8 in - 53 ft•lbf	5/8 in - 72 N•m
211	Mechanical seal gland studs/nuts, with gasket	3/8 in - 10 ft•lbf	3/8 in - 13 N•m	3/8 in - 10 ft•lbf	3/8 in - 13 N•m	1/2 in - 25 ft•lbf	1/2 in - 34 N•m
211	Mechanical seal gland studs/nuts, with O-ring	3/8 in - 40 ft•lbf	3/8 in - 54 N•m	3/8 in - 40 ft•lbf	3/8 in - 54 N•m	1/2 in - 97 ft•lbf	1/2 in - 130 N•m
122	Casing studs/nuts	1/2 in - 25 ft•lbf	1/2 in - 34 N•m	1/2 in - 25 ft•lbf 5/8 in - 45 ft•lbf	1/2 in - 34 N•m 5/8 in - 61 N•m	3/4 in - 75 ft•lbf	3/4 in - 102 N•m
N/A	Capscrew cover/adapter (token bolts)	3/8 in - 11 ft•lbf	3/8 in - 15 N•m	3/8 in - 11 ft•lbf	3/8 in - 15 N•m	1/2 in - 27 ft•lbf	1/2 in - 37 N•m
334	Bearing carrier set screws	3/8 in - 11 ft•lbf	3/8 in - 15 N•m	1/2 in - 27 ft•lbf	1/2 in - 37 N•m	1/2 in - 27 ft•lbf	1/2 in - 37 N•m
312	Capscrew foot	1/2 in - 27 ft•lbf	1/2 in - 37 N•m	3/4 in - 94 ft•lbf	3/4 in - 130 N•m	1 in - 228 ft•lbf	1 in - 300 N•m
N/A	Capscrews - repeller cover to cover	N/A	N/A	3/8 in - 10 ft•lbf	3/8 in - 13 N•m	1/2 in - 25 ft•lbf	1/2 in - 34 N•m

NOTE:

For PTFE coated or Lubricated threads use only 75% of the values shown above.

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D-Line Series Mark 2, Group 2

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