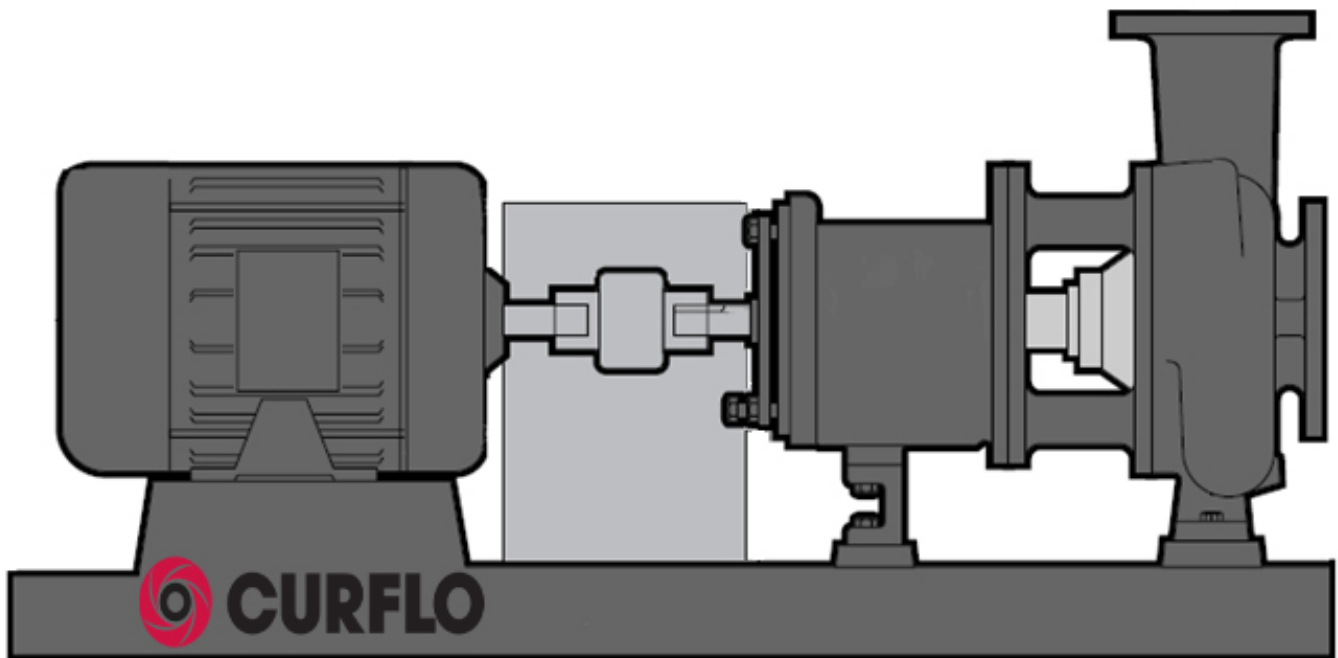




# **CURFLO ANSI PUMP G-LINE SERIES G196**

## **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 G-Line Series G196** and is not intended for any other type of manufactured pump.

The **ANSI Pump G-Line Series G196 IOM** manual is intended to assist **CURFLO** customers involved in the installation, operation and maintenance of the **ANSI Pump G-Line Series G196**. Upon receiving the pump, all personnel involved should review this manual in its entirety and should thoroughly understand all procedures prior to installation, maintenance and operation of the **ANSI Pump G-Line Series G196**. 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 G-Line Series G196** 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 G-Line Series G196 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.***

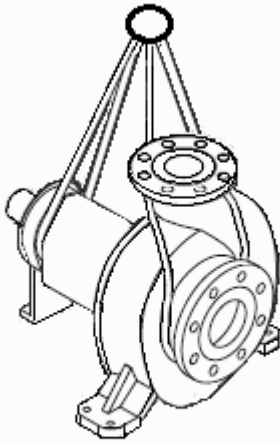


# CURFLO

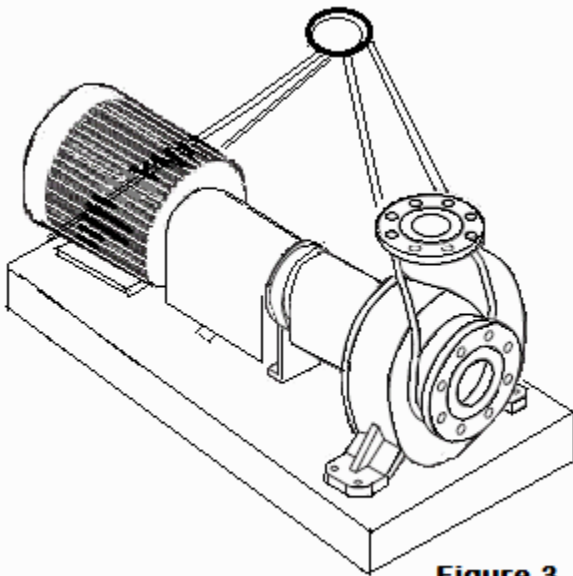
## 1.2 Pump Receiving and Inspection

### **WARNING!!!**

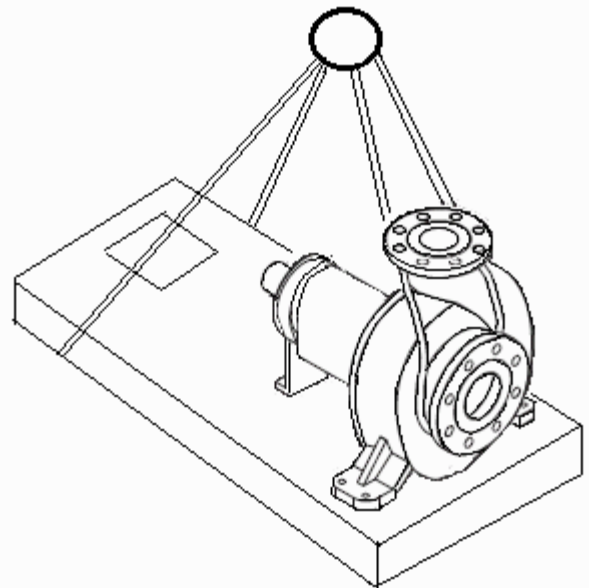
*Serious damage and injury to equipment and personnel can result unless proper lifting and equipment support procedure is followed.*



**Figure 1**



**Figure 3**



**Figure 2**

**Never use eyebolts for lifting.**



## **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 G-Line Series G196** 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 G-Line Series G196** 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 G-Line Series G196** must be covered and kept in a dry location.



## **SECTION 2**

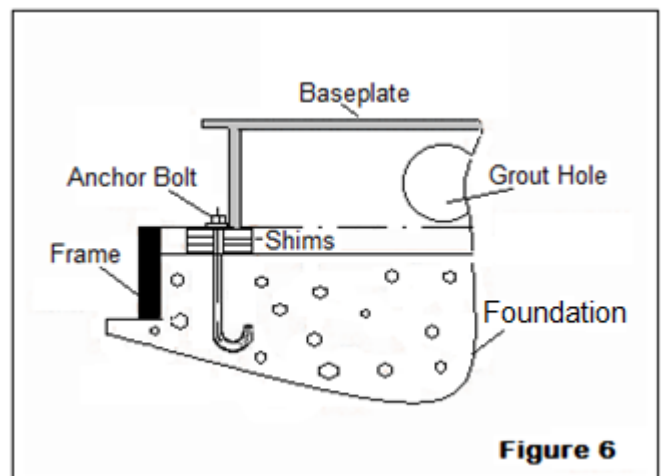
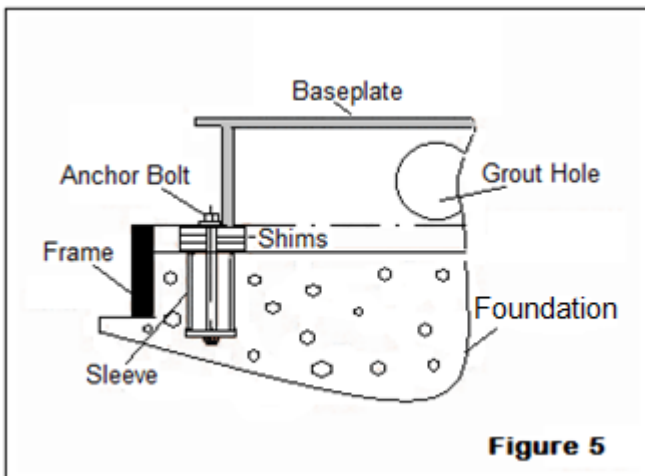
### **2.1 Foundation Design and Baseplate Alignment**

#### **Installation**

The **ANSI Pump G-Line Series G196** 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 G-Line Series G196** pump assembly. In addition to strength, the foundation needs to be level or else proper alignment will never be achieved.



#### **Pump Installation**

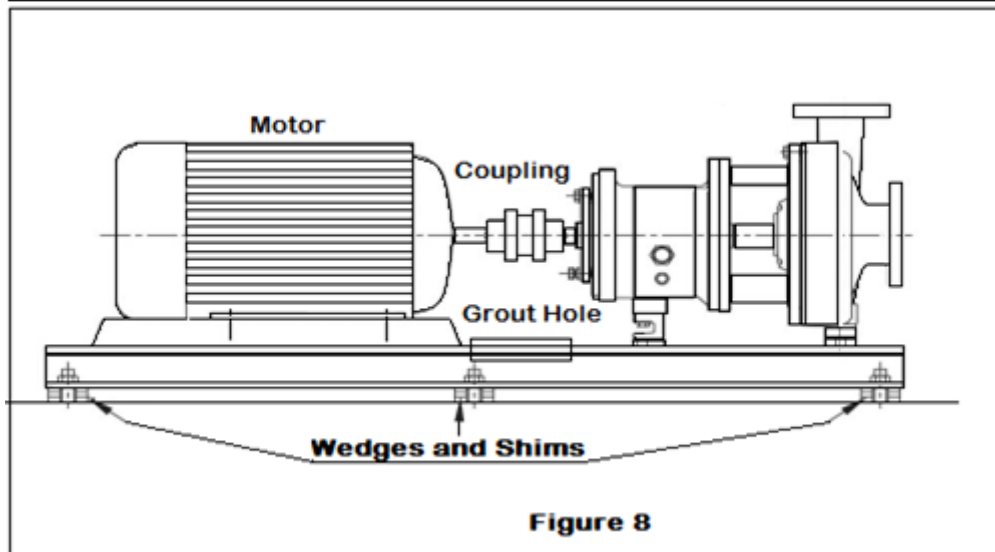
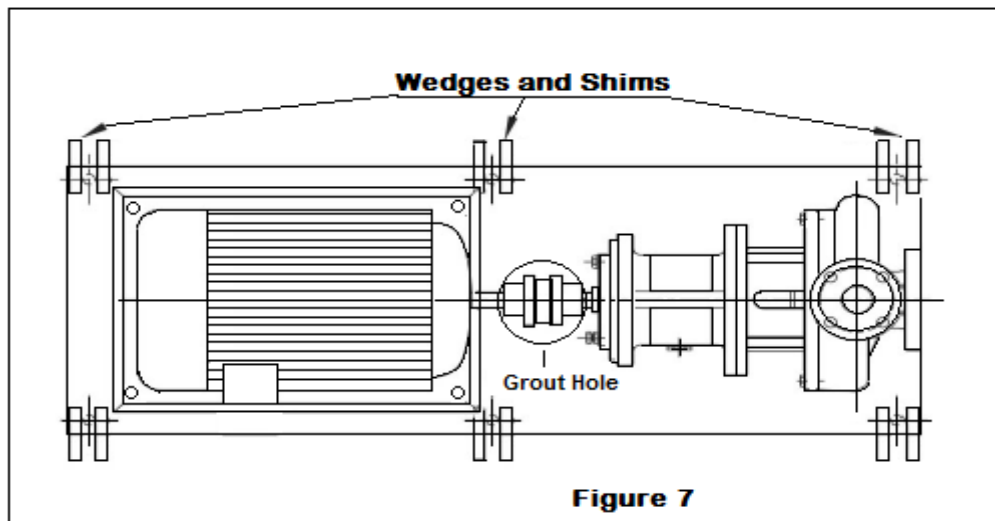
The installation of the pump assembly to the foundation is straight forward. Lifting procedures have to be followed with safety first. Once the pump assembly is on the foundation it has to be level before it can be permanently mounted to the foundation.

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.



## 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  $\frac{3}{4}$ " 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.







## **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.

<b>Cold Setting of Vertical Alignment</b>		
<b>Pumped Liquid Temperature</b>	<b>Set Driver Shaft In. (mm)</b>	
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

<b>ALIGNMENT TROUBLESHOOTING</b>		
<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
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.



## SECTION 3

### 3.1 Checking Rotation

#### **WARNING!!!**

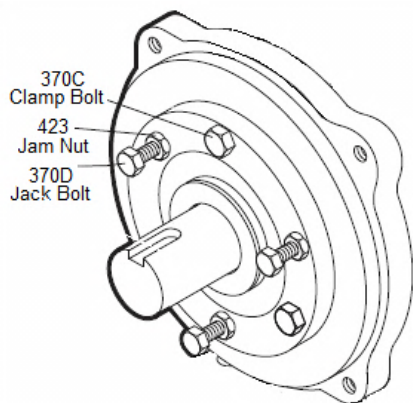
***Before checking rotation, make sure that the driver is LOCKED OUT and the power is turned off.***

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 and causing damage to both the impeller and pump case.



<b>CURFLO ANSI PUMP G-LINE SERIES G196</b>						
<b>Impeller Clearances</b>						
<b>Various Service Temperatures for Cold Temperature Clearances</b>						
<b>Service Temperature</b>	<b>STX</b>		<b>MTX</b>		<b>XLT</b>	
	inches	mm	inches	mm	inches	mm
Up to 200°F (93°C)	0.005	0.13	0.008	0.20	0.015	0.38
Up to 250°F (121°C)	0.006	0.16	0.009	0.23	0.016	0.41
Up to 300°F (149°C)	0.007	0.19	0.010	0.26	0.017	0.44
Up to 350°F (177°C)	0.009	0.22	0.012	0.29	0.019	0.47



## **SECTION 4**

### **4.1 Pump Start-up Procedure**

1. Check over the whole **ANSI Pump G-Line Series G196** pump 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 overlooked.

### **4.2 ANSI Pump G-Line Series G196 Minimum Flow Operation**

#### **WARNING!!!**

***Do not operate the ANSI Pump G-Line Series G196 below minimum rated flows or with suction and/or discharge valves closed. This will cause the liquid to heat, 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 G-Line Series G196 Minimum Flow Chart** below to confirm the low flow operating ranges.



# MINIMUM RECOMMENDED FLOWS FOR CURFLO ANSI PUMP G-LINE SERIES G196

**GPM (m3/h)      Max. Impeller Diameter**

SIZES	MODEL	3560 RPM 60 Hz		1780 RPM 60 Hz		1180 RPM 60 Hz		2900 RPM 50 Hz		1450 RPM 50 Hz		960 RPM 50 Hz	
1 x 1-1/2 - 6	STX	10	2.3	3	0.66			5	1.1	1	0.24		
1-1/2 x 3 - 6		20	4.6	5	1.1			9	2.1	2	0.48		
2 x 3 - 6		40	9.1	9	2.1			25	5.9	3	0.66		
1 x 1-1/2 - 8		20	4.6	5	1.1			13	2.9	2	0.48		
1-1/2 x 3 - 8	MTX	40	9.1	6	1.3			23	5.2	2	0.48		
3 x 4 - 7		125	28.4	13	2.9			76	17.7	4	0.96		
2 x 3 - 8		60	13.6	9	2.1			35	7.9	4	0.96		
3 x 4 - 8				100	22.7	17	3.8	180	41.1	31	7.1		
3 x 4 - 8G		190	43.1	26	5.9			104	23.6	11	2.5		
1 x 2 - 10		40	9.1	5	1.1	3	0.66	22	4.9	3	0.66		
1-1/2 x 3 - 10		80	18.2	14	3.2	5	1.1	56	12.7	6	1.3		
2 x 3 - 10		200	45.4	19	4.3	3	0.66	73	16.6	6	1.3		
3 x 4 - 10		200	45.4	50	11.3	12	2.7	181	41.1	20	4.6		
3 x 4 - 10H				150	34.1	30	6.8			76	17.3	6	1.4
4 x 6 - 10				450	27.1	79	17.9			117	26.6	24	5.5
4 x 6 - 10H				400	90.8	85	19.3			153	34.7	46	10.4
1-1/2 x 3 - 13		180	40.9	45	10.2	11	2.5	401	91.1	23	5.2		
2 x 3 - 13		240	54.5	63	14.3	18	4.1	647	146.9	37	8.4		
3 x 4 - 13		400	90.8	168	38.2	67	15.2	333	75.6	104	23.6	31	7.1
4 x 6 - 13				370	84.1	150	34.1			297	67.4	89	20.2
6 x 8 - 13	XLT			850	193.1	375	85.1			480	109.1	197	44.8
8 x 10 - 13				1200	272.5	570	129.4			975	221.4	383	87.1
6 x 8 - 15				1000	227.1	462	104.9			726	164.9	277	62.9
8 x 10 - 15						1000	227.1			1400	317.9	769	174.8
8 x 10 - 15G				1400	317.9	847	192.4			1375	312.2	603	137.2



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## **SECTION 5**

### **5.1 Spare Parts Recommendations**

Refer. # 101..... Impeller  
# 126.... Shaft Sleeve  
# 122.... Shaft  
# 112... Thrust (Outboard) Bearing  
# 168A... Radial (Inboard) Bearing  
# 333A... Inboard Labyrinth Seal  
# 332A... Outboard Labyrinth Seal  
# 353..... Gland Stud Nut  
# 382..... Bearing Lockwasher  
# 136..... Bearing Locknut  
# 351..... Case Gasket  
# 496..... Bearing Housing O-Ring  
# 360D... Frame-to-Adapter Gasket  
# 383..... Mechanical Seal  
# 412A....Impeller O-Ring  
# 360Q... Gland Gasket

### **5.2 Tool Requirements**

- Wrenches: 7/16", 1/2", 9/16", 3/4", 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



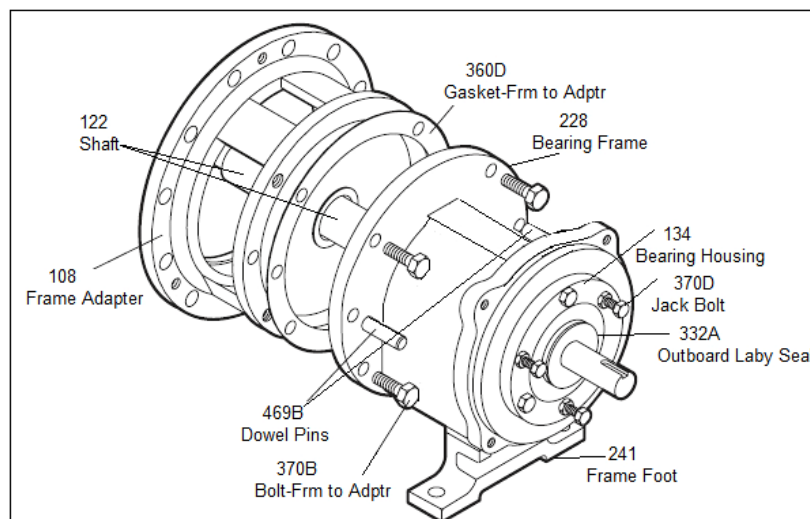
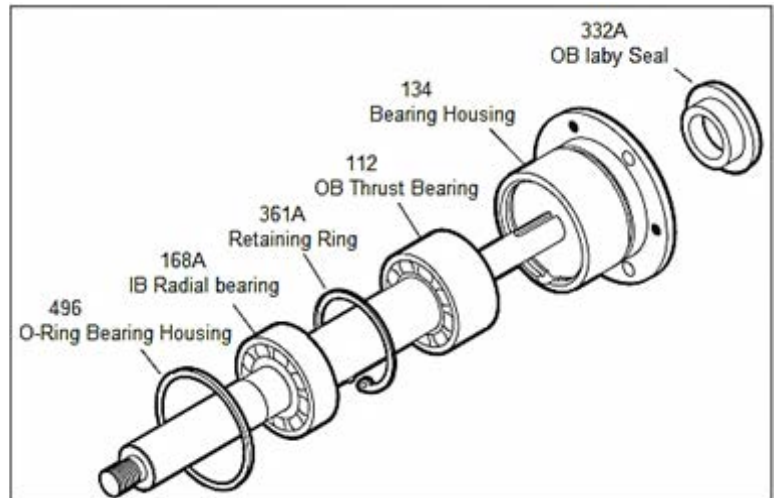
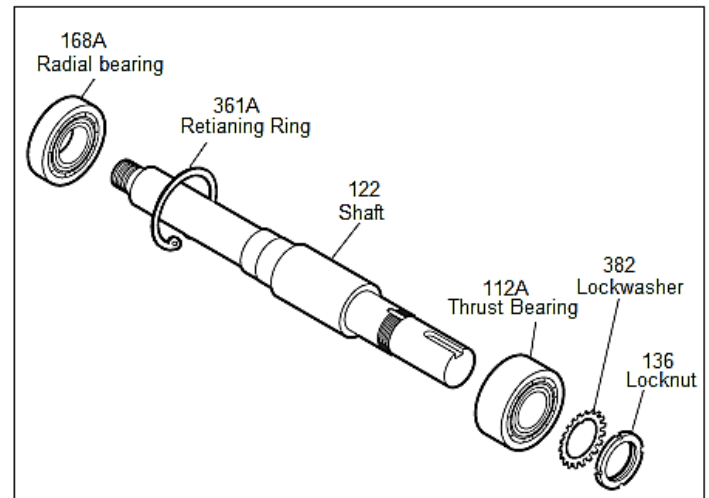
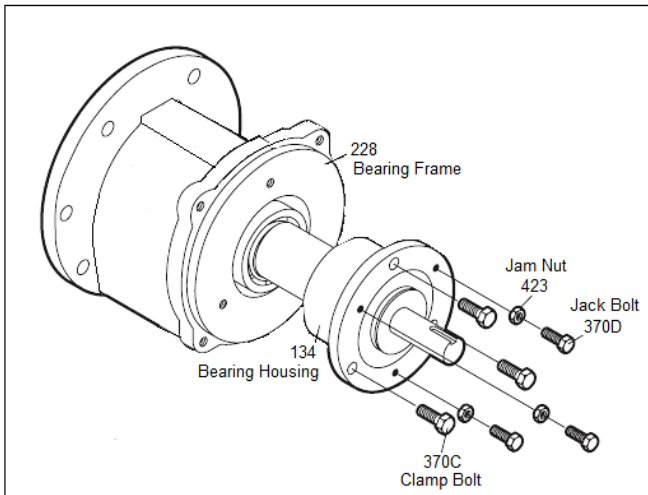
### **5.3 ANSI Pump G-Line Series G196 Disassembly**

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 bolts in.
4. Remove Casing Bolts (370) and Frame Foot Bolts (370F). Put into container.
5. Remove Back Pull-Out Assembly, this will require assistance.
6. Remove Jack Screws (418). Save in container.
7. Secure the Frame Adapter (108) to workbench.
8. Remove Pump Half Coupling Hub. Place in container.
9. Slide shaft wrench over Shaft (122) and Key (400).
10. Looking at the impeller end of the Back Pull-Out Assembly, rotate the Impeller (101) 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 (101) comes loose.
12. Remove the Casing Gasket (351) and discard (always use a new gasket in reassembly).
13. Loosen the Seal Gland (250) and remove the Stuffing Box Cover (184). Save nuts in container.
14. Remove the Shaft Sleeve (126) with the Mechanical Seal (383) or Packing (106)/Lantern Ring (105) attached.
15. Remove Seal/Packing Gland (250/107).
16. Remove Frame Adapter (108) and Dowel Pins (469B) and Bolts (370B). Place in container and discard Gasket (360D).
17. Remove Inboard Labyrinth Seal (333A).
18. Disassemble Power End by removing Clamp Bolts (370C) and tightening Jack Bolts (370D) to loosen Bearing Housing (134) from Bearing Frame (228).
19. Slide Shaft assembly out of the Bearing Housing (134)
20. Remove Jack Bolts and Nuts (370D). Save in container.
21. Remove the Bearing Housing O-Ring (496) and the Retaining Ring (361A).
22. Remove Bearing Housing (134) from Shaft (122) and remove Outboard Labyrinth Seal (332A)
23. Remove Bearing Locknut (136), Bearing Lockwasher (382), Inboard Bearing (168A) and Outboard bearing (112) from Shaft (122).
24. Remove all plugs from Bearing Housing (134).





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## **SECTION 6**

### **6.1 ANSI Pump G-Line Series G196 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 Frame (228), Sight Glass (319), cooling connections, etc. using Teflon pipe thread material to ensure positive sealing.
3. Install the Bearing Frame Foot (241) with Bolts (370F) and hand tighten.

### **6.2 ANSI Pump G-Line Series G196 Power End Assembly**

1. After heating the Thrust (Outboard) Bearing (112), slide it onto Shaft (122). After the bearing has cooled, lubricate with the same oil that will be used for operating the pump.
2. Place the Lockwasher (382) with tang in the keyway, then thread the Locknut (136) onto the Shaft. Tighten and bend the tang of the Lockwasher into the slot on the Locknut.
3. When installing the Retaining Ring (361A), make sure the **FLAT** side faces toward the Thrust (Outboard) Bearing (112).
4. Install the Inboard (Radial) Bearing onto the shaft with the **SHIELD** away from the Impeller (101) and lubricate it with the same oil for operating the pump. On the XLT model, a Bearing Clamp Ring (253B) will go over the shaft.
5. Install a new O-Ring (496) on the Bearing Housing (134) and coat inside of Bearing Housing (134) with oil.
6. Install the shaft assembly into the Bearing Housing (134), secure the Retaining Ring (361A) in the groove and make sure the groove in the Bearing Frame (228) is not blocked by the Retaining Ring (361A).
7. Check that the shaft moves freely.
8. Check the grooves on the Pump Shaft (122) prior to installing the Outboard Laby Seal (332A). Install the Outboard Laby Seal (332A) with the oil drainage groove downward.
9. Lubricate the inner race of the Bearing Frame (228) and install the pump shaft assembly into the frame making sure the shaft moves freely.
10. Install the Bearing Frame (228) into the Bearing Housing (134) and hand tighten the nuts and bolts (370C, 370D and 423).
11. Once the rotating element is installed into the Bearing Frame (228), place a Dial Indicator at the end of the shaft. Move it back and forth to check out the axial movement.





12. Check the shaft with Sleeve (122) run out. Install sleeve and hand tighten the Impeller (101). 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 Frame Gasket (360D) and Frame Adapter (108) onto the Frame Assembly using the Dowel Pins (469B) to locate the Bolt holes for Bolts (370B).
15. Check the Adapter (108) to determine if the TIR is within tolerance.
16. Install the Inboard Laby Seal (333A) into the Adapter (108) in the 6 o'clock position.
17. Install the Seal Gland (250), Gland Gasket (360Q), and Stuffing Box Cover (184), complete with Seal Gland Studs (353), Nuts (355) and Mechanical Seal (383).
18. Install the Impeller with the Teflon O-ring (101) onto the Shaft (122). Tighten with the reverse procedure for disassembly with just a couple of taps on the shaft.
19. Install the Casing Gasket (351) and install Case Bolts (370)
20. Rotate the shaft to ensure it moves smoothly.

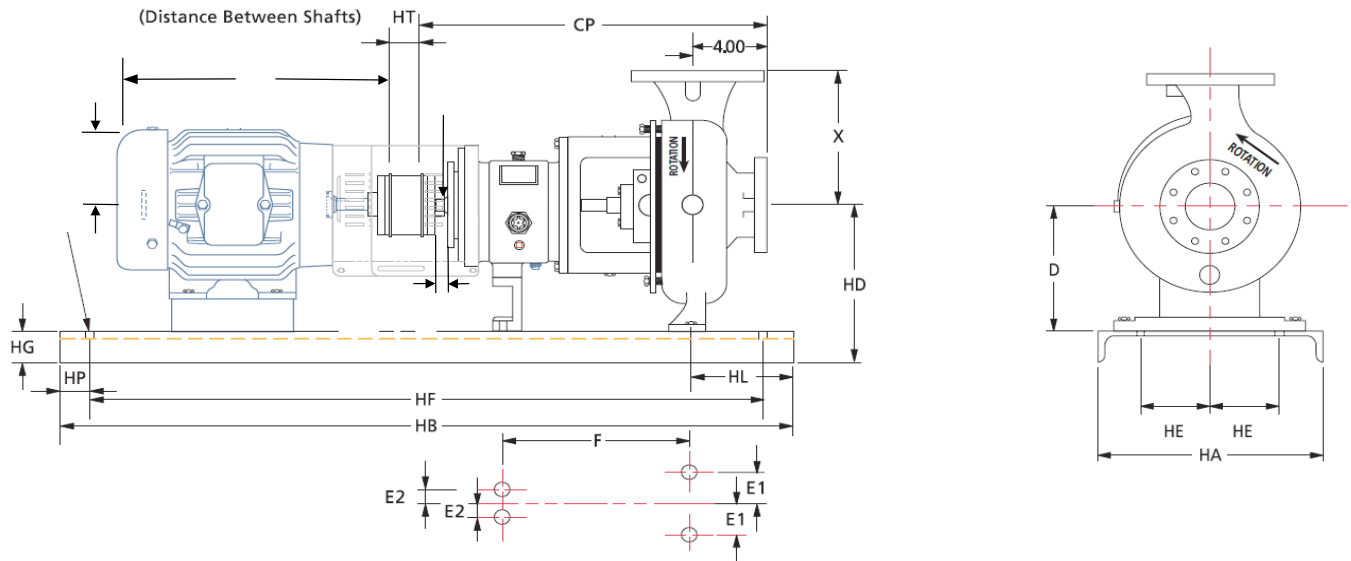
<b>CURFLO ANSI PUMP G-LINE SERIES G196 SHAFT END PLAY-INCHES(MM)</b>				
		<b>STX</b>	<b>MTX</b>	<b>XLT</b>
<b>Double row</b>	<b>min</b>	<b>0.0011(.028)</b>	<b>0.0013(.033)</b>	<b>0.0014(.036)</b>
	<b>max</b>	<b>0.0019(.047)</b>	<b>0.0021(.054)</b>	<b>0.0023(.058)</b>
<b>Duplex</b>	<b>min</b>	<b>*0.0007(.012)</b>	<b>*0.0009(.022)</b>	<b>*0.0010(.026)</b>
	<b>max</b>	<b>0.0010(.026)</b>	<b>0.0012(.030)</b>	<b>0.0015(.038)</b>



## SECTION 7

### 7.1 ANSI Pump G-Line Series G196 STX Dimensional Outline Drawing

#### STX



PUMP END DIMENSIONS													
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)
STX	1x1.5-6	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	84
	1.5x3-6	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	92
	2x3-6	2	3	5 1/4	6 1/2	17 1/2	3	0	7 1/4	7/8	3/16 x 3/32	2	95
	1x1.5-8	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	100
	1.5x3-8	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	108
BASEPLATE DIMENSIONS													
Max NEMA FRAME	BASEPLATE NUMBER	HA **	HB	HT Min.	HD	HE	HF	HG	HH	HL	HP	H	WEIGHT (lbs)
184T	139	15	39	3 3/4	9	4 1/2	36 1/2	3 3/4	3/4	4 1/2	1 1/4	5/8	90
256T	148	18	48	3 3/4	9 1/4	6	45 1/2	4	3/4	4 1/2	1 1/4	5/8	105
326T	153	21	53	3 3/4	10	7 1/2	50 1/2	4 3/4	3/4	4 1/2	1 1/4	5/8	160

Install foundation bolts in pipe sleeves. Allow from 3/4" to 1 1/2" for grouting. See IOM manual Section 2 for instructions.

\* Flange drilling is standard ANSI 150lb, flat face.

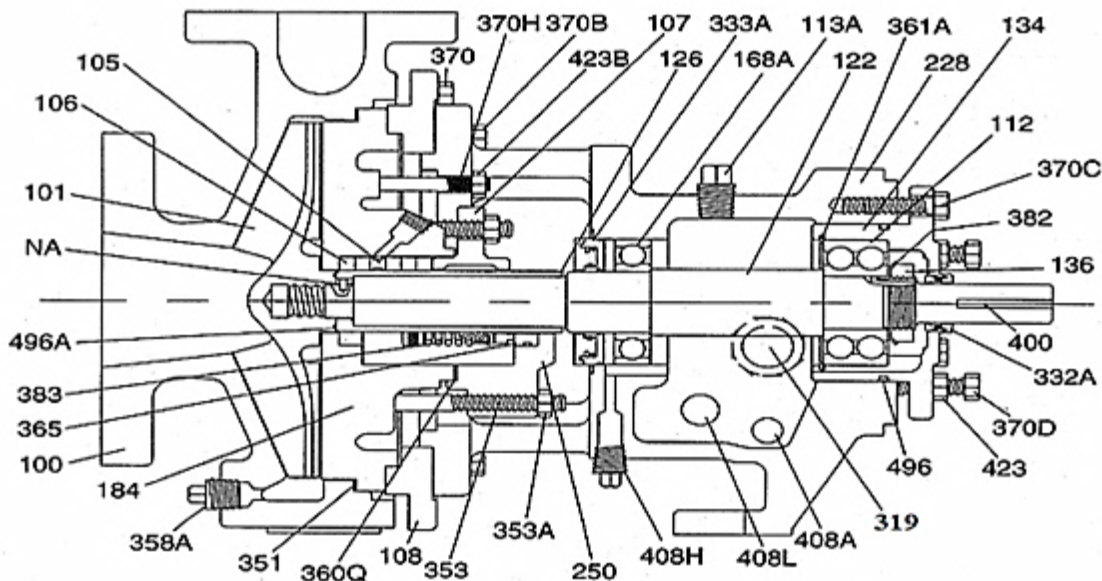
\*\* HA dimensions represent CURFLO's standard construction/ANSI maximum width, respectively.



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## 7.2 ANSI Pump G-Line Series G196 STX Sectional Drawing

### CURFLO ANSI PUMP G-LINE SERIES G196 STX



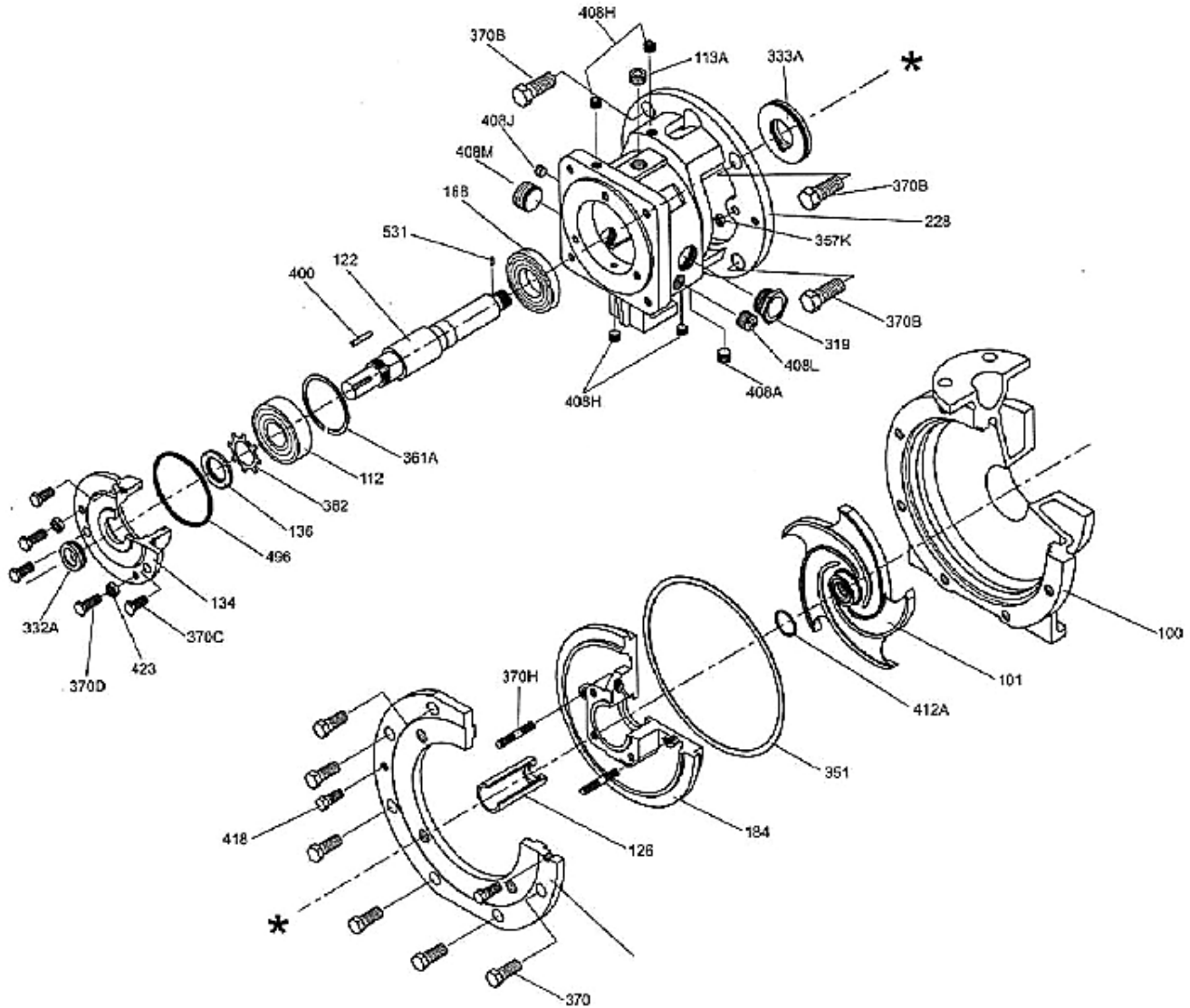
Parts List

Item Number	Quantity	Description	Item Number	Quantity	Description
100	1	Casing	353A	2	Nut, Gland Stud (Packed)
101	1	Impeller	358A	1	Plug, Casing Drain
105	1	Ring, Lantern	360Q	1	Gasket, Gland, Mechanical Seal
106	5	Packing	361A	1	Snap Ring, Bearing
107	1	Gland, Packing	365	1	Seal, Mechanical Stationary Element
108	1	Adapter 8 Inch Pumps Only	370	4	Bolt, Casing 6 Inch Pumps
112	1	Bearing, Outboard	370	8	Bolt, Casing 8 Inch Pumps
113A	1	Plug, Oil Fill	370B	4	Bolt, Frame/Adapter
122	1	Shaft	370C	3	Bolt, Bearing Housing
126	1	Sleeve, Shaft	370D	3	Jack Bolt, Bearing Housing
134	1	Housing, Bearing, Outboard	370H	2	Box Cover/Adapter Stud
136	1	Locknut, Bearing	382	1	Lock Washer, Bearing
168A	1	Bearing, Inboard	383	1	Seal, Mechanical Rotating Element
184	1	Cover, Stuffing Box	400	1	Key, Coupling
228	1	Frame	408A	1	Plug, Frame Drain
250	1	Gland, Mechanical Seal	408H	4	Plug, Frame Lubrication Port
319	1	Sight Glass	408L	1	Plug, Oil Cooler Inlet
332A	1	Labyrinth, Outboard Frame	408M	1	Plug, Oil Cooler Outlet (Not Shown)
333A	1	Labyrinth, Inboard Frame	423	3	Jam Nut, Bearing Housing Jack Bolt
351	1	Gasket, Case	423B	2	Nut, Box Cover/Adapter Stud
353	4	Stud, Gland (Mechanical Seal)	496	1	"O"Ring, Bearing Housing/Frame
353	2	Stud, Gland (Packed)	496A	1	"O"Ring, Shaft Sleeve
353A	4	Nut, Gland Stud (Mechanical Seal)			



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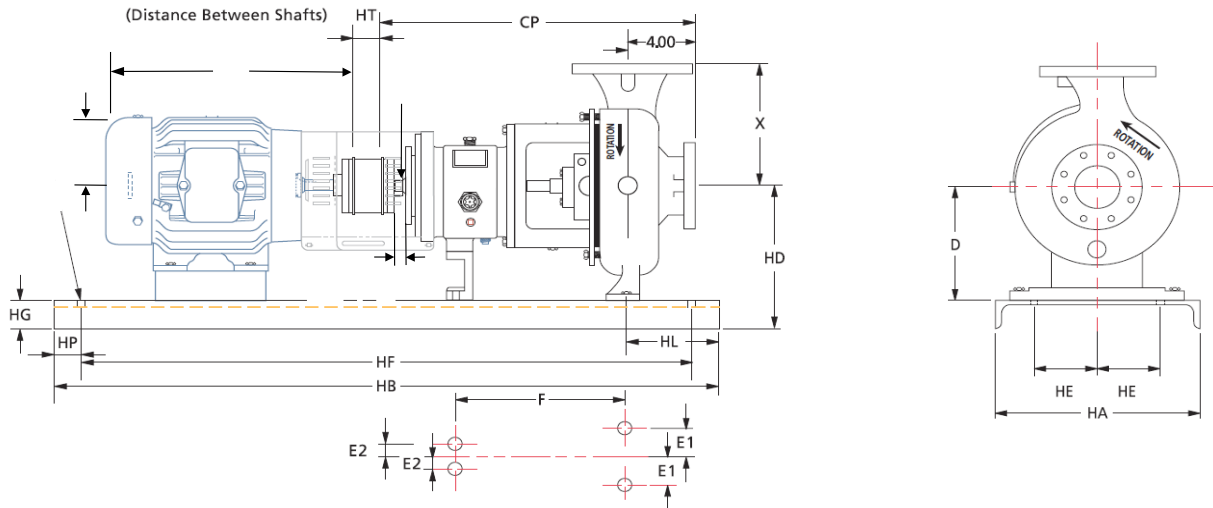
## 7.3 ANSI Pump G-Line Series G196 STX Parts Breakdown





## 7.4 ANSI Pump G-Line Series G196 MTX Dimensional Outline Drawing

### MTX



PUMP END DIMENSIONS														
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)	
MTX	2x3-8	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	220	
	3x4-8	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	240	
	3x4-8G	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	240	
	1x2-10	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	220	
	1.5x3-10	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	240	
	2x3-10	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	250	
	3x4-10	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	285	
	3x4-10H	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	295	
	4x6-10G	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	325	
	4x6-10H	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	336	
	1.5x3-13	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	265	
	2x3-13	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	295	
	3x4-13	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	350	
	4x6-13	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	425	
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	12	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	150
215T	252	15	52	3 3/4	12 1/4	14 1/4	6	49 1/2	4	3/4	4 1/2	1 1/4	5/8	190
286T	258	18	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	303
365T	264	21	64	3 3/4	13	14 3/4	7	61 1/2	4 3/4	1	4 1/2	1 1/4	5/8	301
405TS	268	24	68	3 3/4	13	14 3/4	9 1/2	63 1/2	4 3/4	1	4 1/2	1 1/4	5/8	355
449TS	280	26	80	3 3/4	13	14 3/4	9 1/2	77 1/2	4 3/4	1	4 1/2	1 1/4	5/8	522

Install foundation bolts in pipe sleeves. Allow from 3/4" to 1 1/2" for grouting. See IOM manual Section 2 for instructions.

\* Flange drilling is standard ANSI 150lb, flat face.

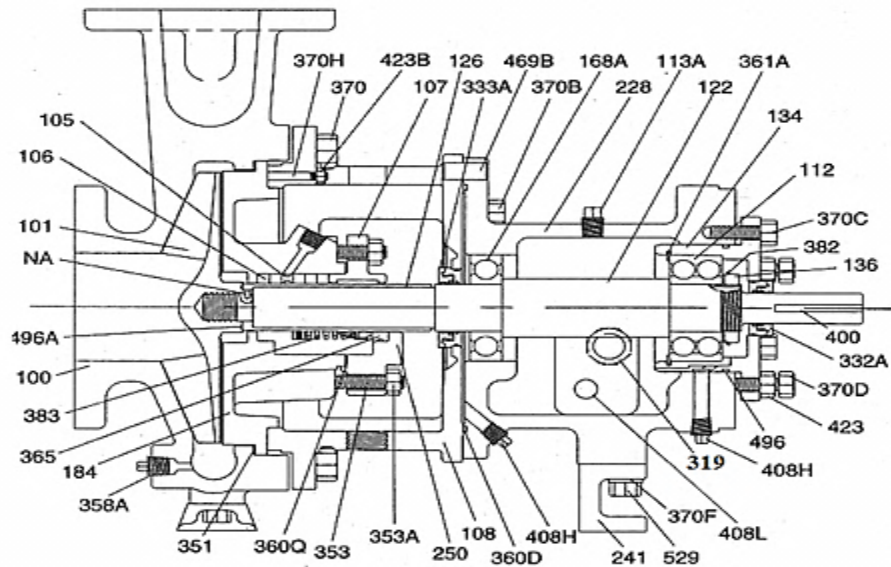
\*\* HA dimensions represent CURFLO's standard construction/ANSI maximum width, respectively.





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## 7.5 ANSI Pump G-Line Series G196 MTX Sectional Drawing

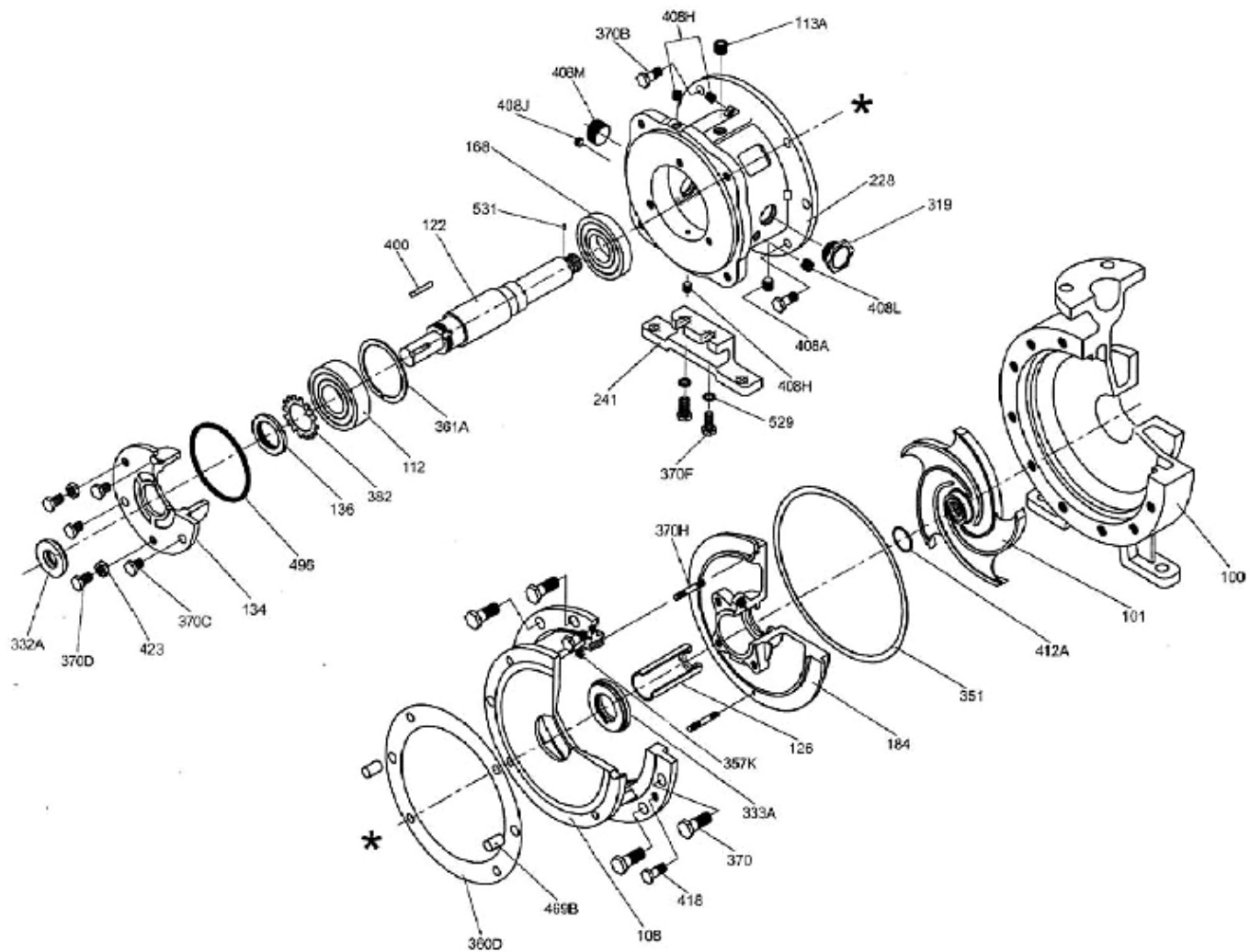


**Parts List**

Item Number	Quantity	Description	Item Number	Quantity	Description
100	1	Casing	361A	1	Snap Ring, Bearing
101	1	Impeller	365	1	Seal, Mechanical Stationary Element
105	1	Ring, Lantern	370	4	Bolt, Casing 6 Inch Pumps
106	5	Packing	370	8	Bolt, Casing 8 Inch Pumps
107	1	Gland, Packing	370	12	Bolt, Casing 10 Inch Pumps
108	1	Adapter	370	16	Bolt, Casing 13 Inch Pumps
112	1	Bearing, Outboard	370B	4	Bolt, Frame/Adapter
113A	1	Plug, Oil Fill	370C	3	Bolt, Bearing Housing
122	1	Shaft	370D	3	Jack Bolt, Bearing Housing
126	1	Sleeve, Shaft	370F	1	Washer, Frame Foot
134	1	Housing, Bearing, Outboard	370H	2	Box Cover/Adapter Stud
136	1	Locknut, Bearing	382	1	Lock Washer, Bearing
168A	1	Bearing, Inboard	383	1	Seal, Mechanical Rotating Element
184	1	Cover, Stuffing, Box	400	1	Key, Coupling
228	1	Frame	408A	1	Plug, Frame Drain (Not Shown)
241	1	Foot, Frame	408H	4	Plug, Frame Lubrication Port
250	1	Gland, Mechanical Seal	408L	1	Plug, Oil Cooler Inlet
332A	1	Labyrinth, Outboard Frame	408M	1	Plug, Oil Cooler Outlet (Not Shown)
333A	1	Labyrinth, Inboard Frame	423	3	Jam Nut, Bearing Housing Jack Bolt
351	1	Gasket, Case	423B	2	Nut, Box Cover/Adapter Stud
353	4	Stud, Gland (Mechanical Seal)	469B	2	Dowel Pin, Frame/Adapter
353	2	Stud, Gland (Packing)	496	1	"O" Ring, Bearing Housing/Frame
353A	4	Nut, Gland Stud (Mechanical Seal)	496A	1	"O" Ring, Shaft Sleeve
353A	2	Nut, Gland Stud (Packing)	529	2	Bolt, Frame Foot to Frame
358A	1	Plug, Casing Drain			
360D	1	Gasket, Frame/Adapter			
360Q	1	Gasket, Gland, Mechanical Seal			



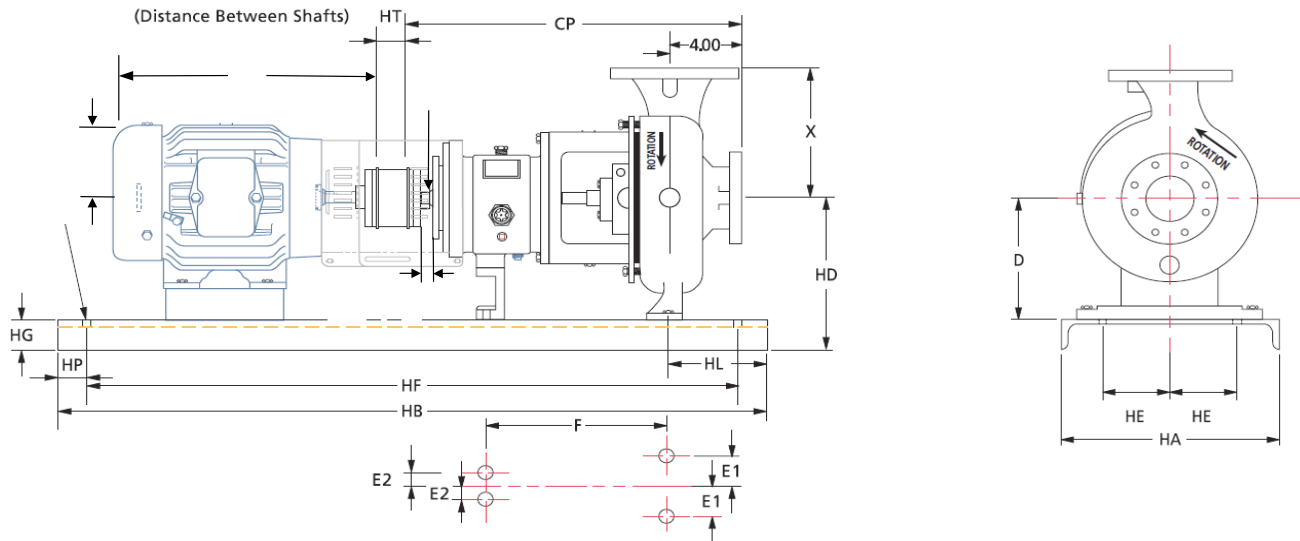
## 7.6 ANSI Pump G-Line Series G196 MTX Parts Breakdown





## 7.7 ANSI Pump G-Line Series G196 XLT Dimensional Outline Drawing

### XLT



PUMP END DIMENSIONS													
	PUMP SIZE & DESIGNATION	DISCHARGE	SUCTION	D	X	CP	E1	E2	F	U	KEYWAY	V	WEIGHT (lbs)
<b>XLT</b>	6x8-13	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	560
	8x10-13	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	670
	6x8-15	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	610
	8x10-15	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	740
	8x10-15G	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	710
BASEPLATE DIMENSIONS													
Max NEMA FRAME	BASEPLATE NUMBER	HA **	HB	HT Min.	HD	HE	HF	HG	HH	HL	HP	H	WEIGHT (lbs)
286T	368	26	68	5 1/4	19 1/4	9 1/2	65 1/2	4 3/4	1	6 1/2	1 1/4	7/8	395
405T	380	26	80	5 1/4	19 1/4	9 1/2	77 1/2	4 3/4	1	6 1/2	1 1/4	7/8	500
449T	398	26	98	5 1/4	19 1/4	9 1/2	95 1/2	4 3/4	1	6 1/2	1 1/4	7/8	590

Install foundation bolts in pipe sleeves. Allow from 3/4" to 1 1/2" for grouting. See IOM manual Section 2 for instructions.

\* Flange drilling is standard ANSI 150lb, flat face.

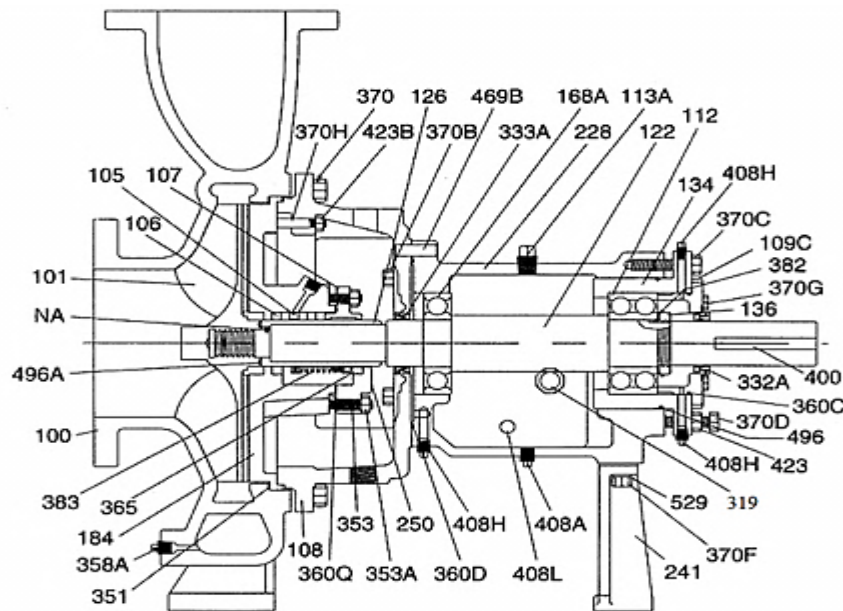
\*\* HA dimensions represent CURFLO's standard construction/ANSI maximum width, respectively.





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## 7.8 ANSI Pump G-Line Series G196 XLT Sectional Drawing



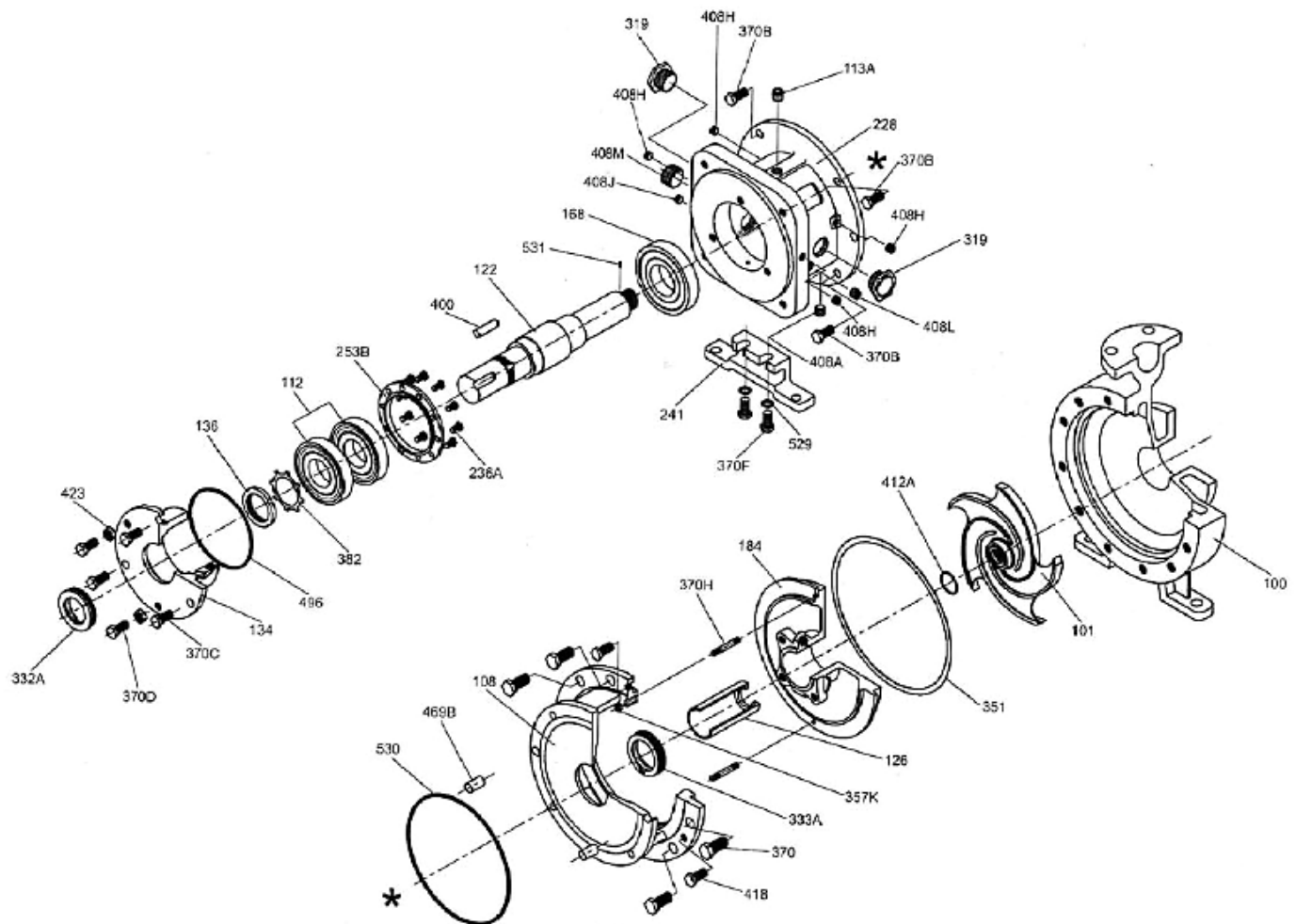
Part List

Item Number	Quantity	Description	Item Number	Quantity	Description
100	1	Casing	360C	1	"O" Ring; Bearing Cover
101	1	Impeller	360D	11	Gasket; Frame/Adapter
105	1	Ring, Lantern	360Q	11	Gasket; Gland, Mechanical Seal
106	5	Packing	370	16	Bolt, Casing 13 Inch Pumps
107	1	Gland, Packing	370	24	Bolt, Casing 15 Inch Pumps
108	1	Adapter	370B	4	Bolt, Frame/Adapter
109C	1	Cover; Bearing, Outboard	370C	3	Bolt, Bearing Housing
112	1	Bearing, Outboard	370D	3	Jack Bolt, Bearing Housing
122	1	Shaft	370F	2	Bolt, Frame Foot to Frame
126	1	Sleeve, Shaft	370G	6	Bolt, Bearing Cover
134	1	Housing; Bearing, Outboard	370H	2	Box Cover/Adapter Stud
136	1	Locknut, Bearing	382	1	Lock Washer, Bearing
319	1	Gauge, Sight Oil	383	1	Seal, Mechanical Rotating Element
168A	1	Bearing, Inboard	400	1	Key, Coupling
184	1	Cover, Stuffing Box	408A	1	Plug, Frame Drain
228	1	Frame	408H	4	Plug, Frame Lubrication Port
241	1	Foot, Frame	408H	2	Plug, Bearing Housing Lubrication
250	1	Gland, Mechanical Seal	408L	1	Plug, Oil Cooler Inlet
332A	1	Labyrinth, Outboard Frame	408M	4	Plug, Oil Cooler Outlet (Not Shown)
333A	1	Labyrinth, Inboard Frame	423	3	Jam Nut, Bearing Housing Jack Bolt
351	1	Gasket, Case	423B	2	Nut, Box Cover/Adapter Stud
353	4	Stud, Gland (Mechanical Seal)	469B	2	Dowel Pin, Frame/Adapter
353	2	Stud, Gland (Packing)	496	1	"O" Ring, Bearing Housing/Frame
353A	4	Nut, Gland Stud (Mechanical Seal)	496A	1	"O" Ring, Shaft Sleeve
353A	2	Nut, Gland Stud (Packing)			
358A	1	Plug, Casing Drain			

Subject to change without notice



## 7.9 ANSI Pump G-Line Series G196 XLT Parts Breakdown





## 7.10 ANSI Pump G-Line Series G196 Motor Mounting Dimensions

**(STX)**

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.

**(MTX)**

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.

**(XLT)**

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.

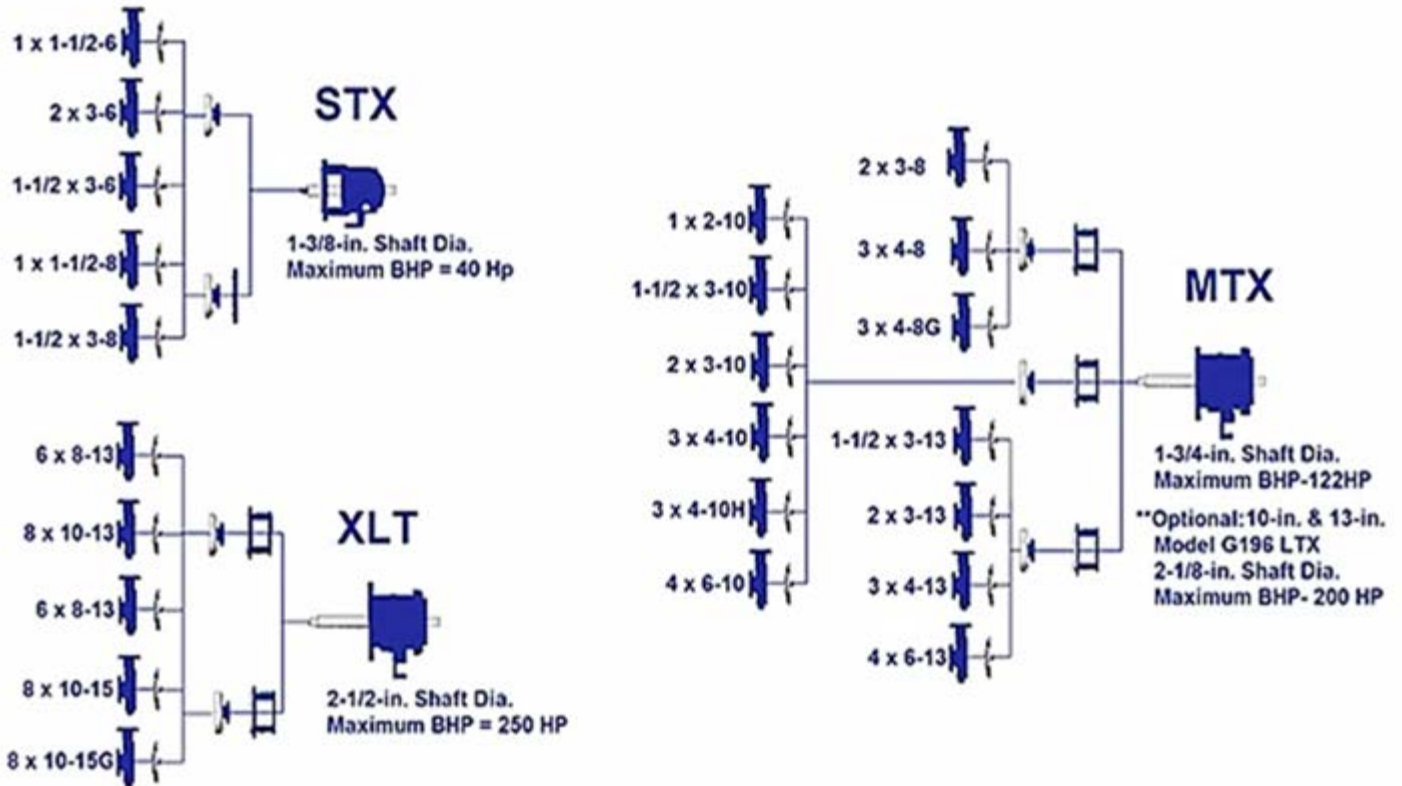


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## SECTION 8

### 8.1 ANSI Pump G-Line Series G196 Component Interchangeability

#### CURFLO ANSI PUMP G-LINE SERIES G196 Interchangeability Chart







## 8.2 ANSI Pump G-Line Series G196 Materials of Construction

Item	Qty per Pump	Part Name	Ductile Iron	DI/316SS	316 SS	CD4MCuN	Alloy 20
100	1	Casing	Ductile Iron				
101	1	Impeller	Ductile Iron				
105	1	Lantern Ring			Teflon		
106	1 Set	Stuffing Box Packing			GoreTex		
107	1	Gland—Packed Box		316 SS		CD4	A-20
108	1	Frame Adapter			Ductile Iron		
109C	1 X	Outboard Bearing End Cover			Ductile Iron		
112A	1	Outboard Bearing			Double Row Angular Contact		
113	2	Plug—Grease Relief			Carbon Steel		
113B	1	Plug—Oil Fill			Carbon Steel		
122	1	Shaft—Less Sleeve			316 SS		A-20
122	1	Shaft—With Sleeve			SAE 4140		
126	1	Shaft Sleeve		316 SS			A-20
134	1	Bearing Housing			Ductile Iron		
136	1	Bearing Locknut			Steel		
168A	1	Radial Bearing			Single Row Ball		
184	1	Seal Chamber/Stuffing Box Cover	Ductile Iron	Ductile Iron	316 SS	CD4	A-20
193	2	Grease Fitting			Steel		
228	1	Bearing Frame			Ductile Iron		
236A	10	Cap Screw—Bearing Clamp Ring			Carbon Steel		
241	1	Frame Foot			Ductile Iron		
248	1	Oil Thrower			Carbon Steel		
250	1	Gland—Mechanical Seal			Material Varies		
253B	1	Bearing Clamp Ring			Carbon Steel		
319	1	Sight Glass			Glass/Steel		
332A	1	Outboard Labyrinth Seal w/O-rings			Bronze w/Viton O-rings		
333A	1	Inboard Labyrinth Seal w/O-rings			Bronze w/Viton O-rings		
351	1	Casing Gasket			Teflon		
353	4	Gland Stud			Grade 8		
355	4	Gland Stud Nut			Grade 8		
358	1	Plug—Casing Drain	Carbon Steel		316 SS		304 SS
358Y	1 X	Plug, Impeller			316 SS		304 SS
360C	1 X	Gasket—Thrust End Cover			Vellumoid		
360D	1	Gasket—Frame-to-Adapter			Vellumoid		
360Q	1	Gasket—Gland-to-Stuffing Box Cover			Material Varies		
361A	1	Retaining Ring			Steel		
370	★	Bolt—Adapter to Case	Carbon Steel				304 SS
370B	4	Bolt—Frame-to-Adapter			Carbon Steel		
370C	★	Clamp Bolt—Bearing Housing			Carbon Steel		
370D	★	Jack Bolt—Bearing Housing			Carbon Steel		
370F	2	Bolt—Frame Foot to Frame			Carbon Steel		
370H	2	Stud—Stuffing Box Cover-to-Adapter			Grade 8		
371C	6 X	Cap Screw—End Cover to Bearing Housing			Carbon Steel		
382	1	Bearing Lockwasher			Steel		
383	1	Mechanical Seal			Material Varies		
400	1	Coupling Key			Carbon Steel		
408A	1	Plug—Oil Drane			Carbon Steel		
408H	4	Plug—Oil Mist Connection			Carbon Steel		
408J	1	Plug—Oiler			Carbon Steel		
408L	1	Plug—Oil Cooler Inlet			Carbon Steel		
408M	1	Plug—Oil Cooler Outlet			Carbon Steel		
408N	1	Plug—Sight Glass			Carbon Steel		
418	3	Jack Bolt—Adapter-to-Case			304 SS		
423	3	Jam Nut—Bearing Housing Jack Bolt			Carbon Steel		
423B	2	Hex Nut—Stuffing Box Cover to Adapter			Grade 8		
428	1	Gasket, Plug			Teflon		
458Y	1 X	Plug, Impeller		316 SS			A-20
469B	2	Dowel Pin—Frame-to-Adapter			Steel		
496	1	O-Ring Bearing Housing			Buna N		
412A	1	O-Ring—Impeller			Teflon		
497F	1	O-Ring—Outboard Labyrinth Rotor			Viton		
497G	1	O-Ring—Outboard Labyrinth Stator			Viton		
497H	1	O-Ring—Inboard Labyrinth Rotor			Viton		
497J	1	O-Ring—Inboard Labyrinth Stator			Viton		
497L	1	O-Ring Internal (inboard)			Viton		
497N	1	O-Ring Internal (outboard)			Viton		
503	1 #	Adapter Ring			Steel		
529	1	Lockwasher—Frame Foot-to-Bearing Frame			Ductile Iron		



## SECTION 9

### 9.1 ANSI Pump G-Line Series G196 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.

CURFLO ANSI PUMP G-LINE SERIES G-196 OIL SUMP CAPACITY		
Model	Oz.	MI.
STX	16	400
MTX	42	1250
XLT	96	3000

CURFLO ANSI PUMP G-LINE SERIES G196 LUBRICATION INTERVALS-OIL			
Power End Type	Mineral Oil	Synthetic Oil	Regreaseable
Standard	3mo.	6mo.	3mo.
Sealed	3mo.	24mo.	N/A

#### CURFLO ANSI PUMP G-LINE SERIES G196 OPERATING TEMPERATURES

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.		



## 9.2 ANSI Pump G-Line Series G196 Impeller Clearances

<b>CURFLO ANSI PUMP G-LINE SERIES G196</b>						
<b>Impeller Clearances</b>						
<b>Various Service Temperatures for Cold Temperature Clearances</b>						
<b>Service Temperature</b>	<b>STX</b>		<b>MTX</b>		<b>XLT</b>	
	inches	mm	inches	mm	inches	mm
Up to 200°F (93°C)	0.005	0.13	0.008	0.20	0.015	0.38
Up to 250°F (121°C)	0.006	0.16	0.009	0.23	0.016	0.41
Up to 300°F (149°C)	0.007	0.19	0.010	0.26	0.017	0.44
Up to 350°F (177°C)	0.009	0.22	0.012	0.29	0.019	0.47

## 9.3 ANSI Pump G-Line Series G196 Torque Value and Bearing Fit Chart

<b>CURFLO ANSI PUMP G-LINE SERIES G196 BOLT TORQUE - FT/LBS (NM)</b>						
<b>Location</b>		<b>Frame</b>	<b>Ductile Iron Case</b>		<b>Alloy Case</b>	
			<b>Lube</b>	<b>Dry</b>	<b>Lube</b>	<b>Dry</b>
CASE BOLTS (370)	5/8"	6" STX	39(53)	59(80)	71(96)	107(145)
	1/2"	8" STX	20(27)	30(41)	35(47)	54(73)
CASE NUTS (425)	5/8"	MTX	39(53)	59(80)	71(96)	107(145)
	5/8"	XLT	39(53)	59(80)	71(96)	107(145)
FRAME -to-ADAPTER		ALL	20 (27)	30 (40)		
BRG CLAMP RING BOLTS (236A)		STX, MTX	10" (1.1)	17" (1.9)		
DUPLEX BEARINGS ONLY		XI T	55" (6.2)	83" (9.4)		
BEARING END COVER BOLTS (371C)		XLT	9 (12)	12 (16)		



### **CURFLO ANSI PUMP G-LINE SERIES G196 BEARING FIT CHART**

Bearing Frame	Radial (Inboard)	Thrust (Outboard)	
		Double Row	Duplex
STX	6207	5306	7306
MTX	6309	5309	7309
XLT	6313	5313	7313

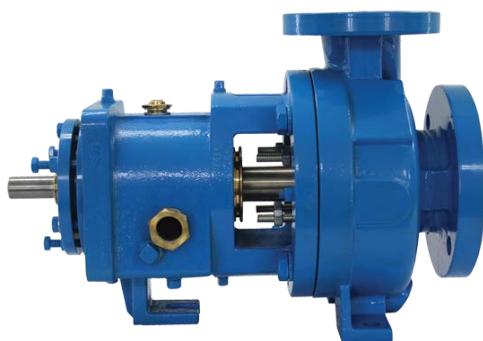
### **CURFLO ANSI PUMP G-LINE SERIES G196 SHAFT RUNOUT TOLERANCES**

	Sleeve Fit	Coupling Fit
Less Sleeve Design	0.002 in. (0.051mm)	0.001 in. (0.026mm)
With Sleeve Design	0.001 in. (0.026mm)	0.001 in. (0.026mm)





**G-Line Series MTX**



**G-Line Series STX**