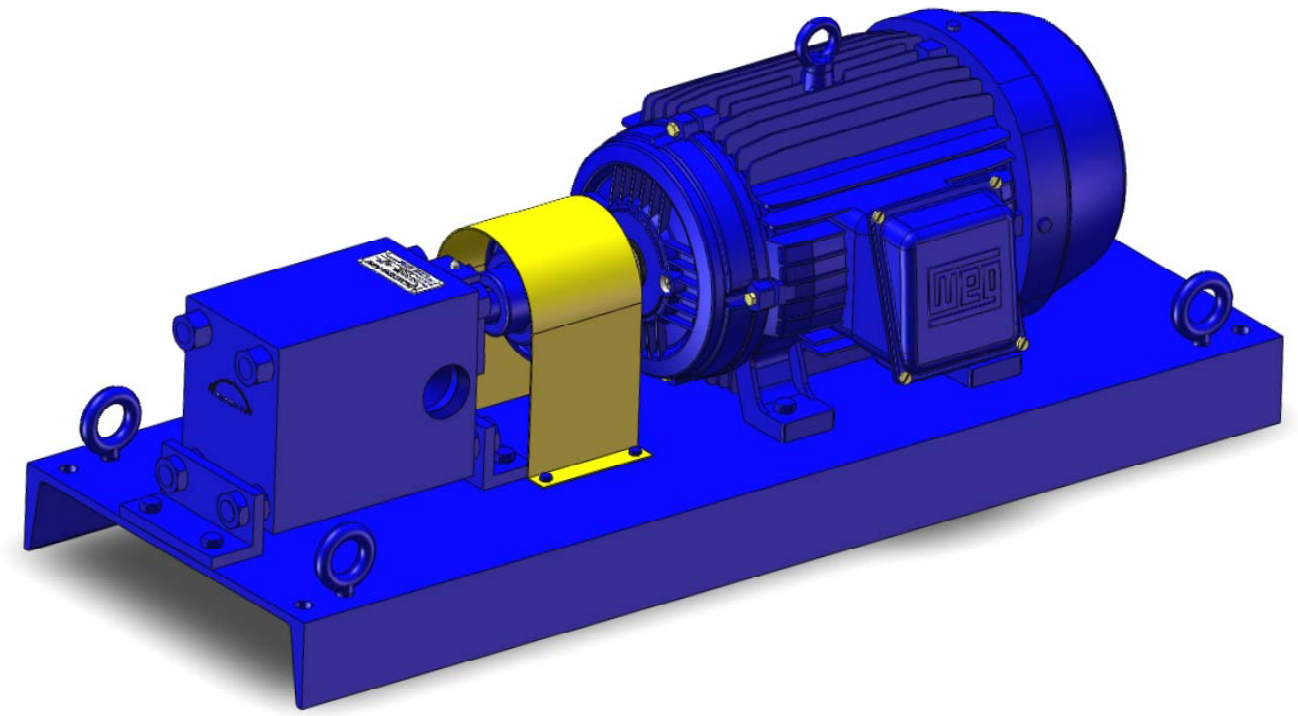
Operation and Maintenance Manual

Northern® 4800-15-D1776



Northern® Pump

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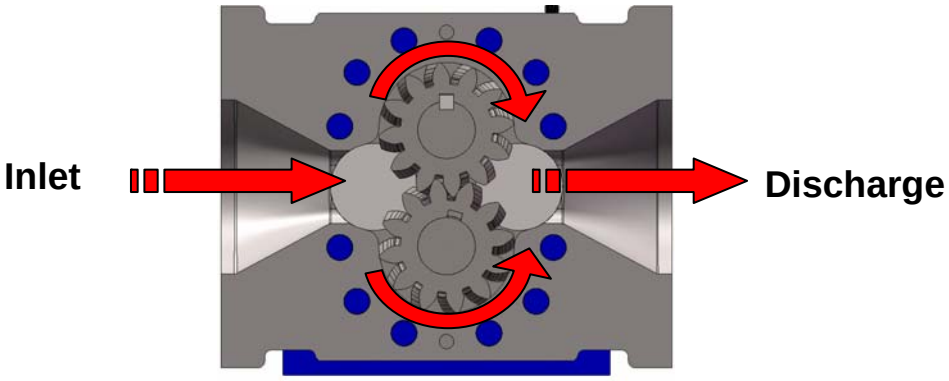
Table of Contents

Introduction

The 4800 gear pump is a positive displacement, rotary pump with two gears of equal size. The pump has a constant discharge when running at a constant rotational speed. The inlet port of the pump is on the side where the gears are coming out of mesh. The discharge port is on the side of the pump where the gears are coming in to mesh. The pump transfers fluid trapped in the spaces between adjacent gear teeth and the cylinder from the inlet to the discharge side of the pump.



Cautionary Statements

Failure to heed these cautionary statements may result in personal injury and/or damage to equipment.

1. Disable and lock-out the drive system before any work is done to install, maintain, or remove the pump.
2. Fully depressurize the entire system.
3. Close and lockout the valves closest to the pump in both the suction and discharge pipe.
4. Wear protective eyewear and any other required face protection.
5. When handling corrosive, caustic, toxic, or hazardous liquids, wear protective clothing to prevent contact with skin.
6. Wear protective footwear such as safety shoes.
7. When handling liquids with toxic vapors, wear a properly rated breathing mask.
8. Work area must be properly ventilated.
9. Work area must be properly grounded.
10. Do not work alone.
11. Clean up any spilled liquid immediately.

Pump Installation

1. Turn off and lock out the drive mechanism.

3. Fully depressurize both the suction and discharge lines to the pump.

4. Close the valve in the suction and discharge lines closest to the pump.

5. Place a pan or other liquid collecting device under the pump to collect the liquid that may drain from the pump and the suction and discharge lines when connected to the pump.

6. Level and properly align pump.

7. Line pipes up naturally. Forcing pipes into place with flange bolts can draw pump out of alignment. Support pipes independently to eliminate strain on pump casing. Check alignment again and correct if necessary.

8. Pressure test inlet pipe lines for leaks and ensure that they are completely airtight. The inlet piping must have a diameter equal to, or larger than, the pump inlet port.

9. Test rotation of the motor to ensure that the pump rotates in the direction indicated by arrow on pump casing.

10. Do not subject pumps to thermal shock by exposing a cold pump to a hot liquid supply or vice versa.

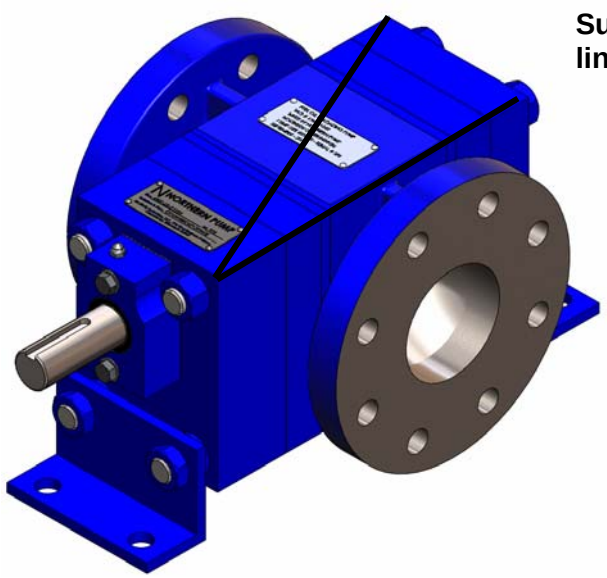
Removal from Installation

1. Turn off and lock out the drive mechanism.
2. Fully depressurize both the suction and discharge lines to the pump.
3. Close the valve in the suction and discharge lines closest to the pump.
4. Place a pan or other liquid collecting device under the pump to collect any liquid that may drain from the pump or the suction and base plate when assembly is disconnected.
5. Remove the coupling hub and key from the drive shaft. Clean any residue from the drive shaft. Remove any burrs or upset metal from the surface of the drive shaft.

Disassembly

The pump body is a series of plates held together with 4 studs (2x *12*, 2x *13)*. The studs provide the alignment of the pump body and are precision parts. The faying surfaces of the plates are ground flat and sealed with an O-ring. Be prepared to use some force to take the pump apart. However, you are also trying to reuse as much of the pump as possible, so be careful not to damage parts unnecessarily.

Before disassembly, mark the pump housing so that you will know how the parts were arranged before the pump was taken apart. A scribe line or permanent marker line along one edge and a diagonal from corner to corner works quite well.

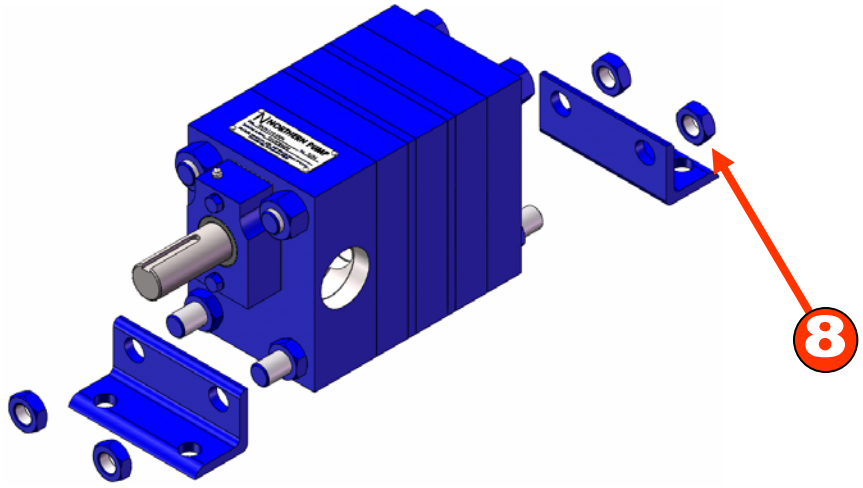


Suggested marker or scribed lines across plates.

Pump Disassembly Steps

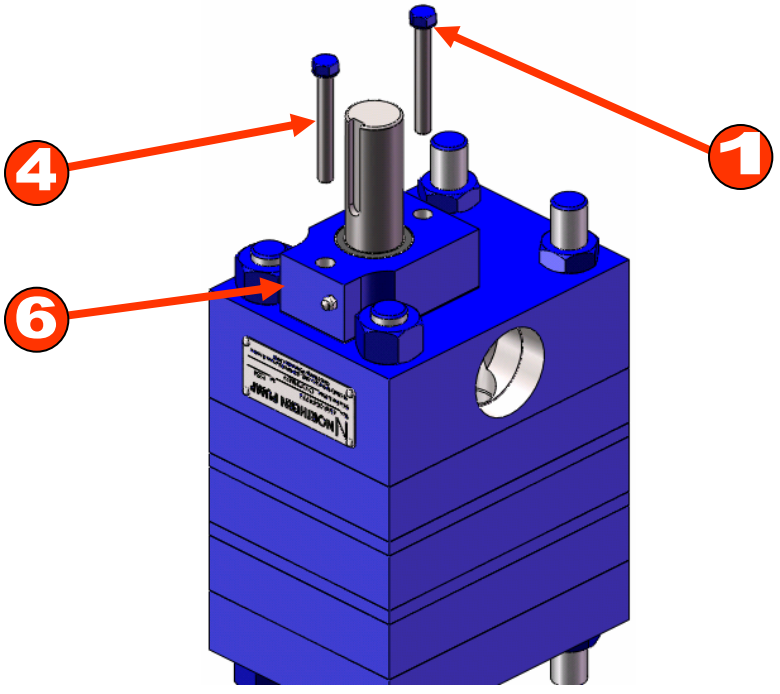
Step 1

Remove the 2x Mounting Brackets and the 4x outer Jam Nuts *(8)* that secure the Mounting Brackets.



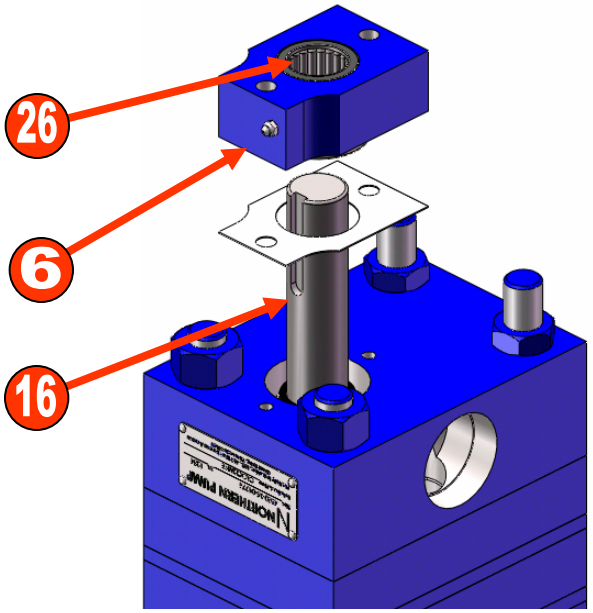
Step 2

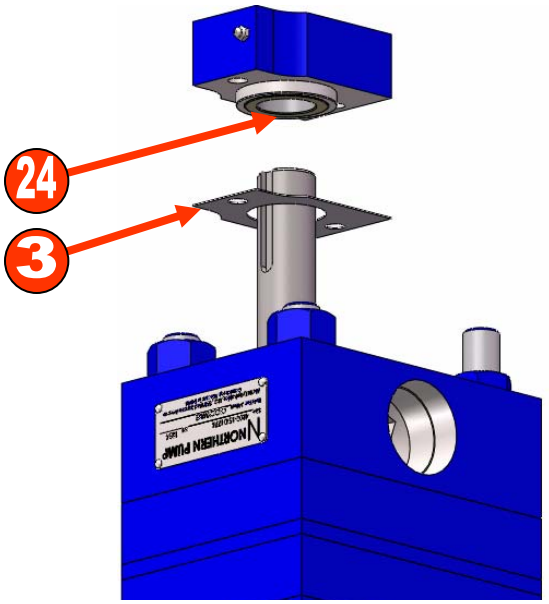
Loosen and remove the 2x Cap Screws *(4)* and 2x Lock Washers *(1)* that retain the Bearing & Seat Housing *(6)*.



Step 3

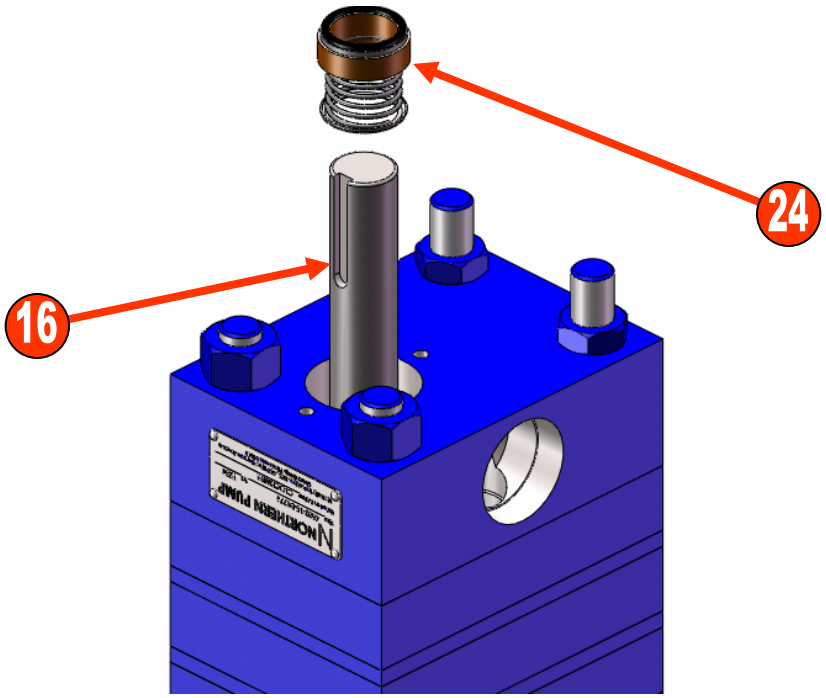
Remove the Bearing & Seat Housing *(6)* and Roller Bearing *(26)* by sliding them up and over the Drive Shaft *(16)*. The Roller Bearing is pressed into the Bearing & Seat Housing. The Gasket *(3)* and Mechanical Seal Seat *(24)* may be retained in the Bearing Housing.



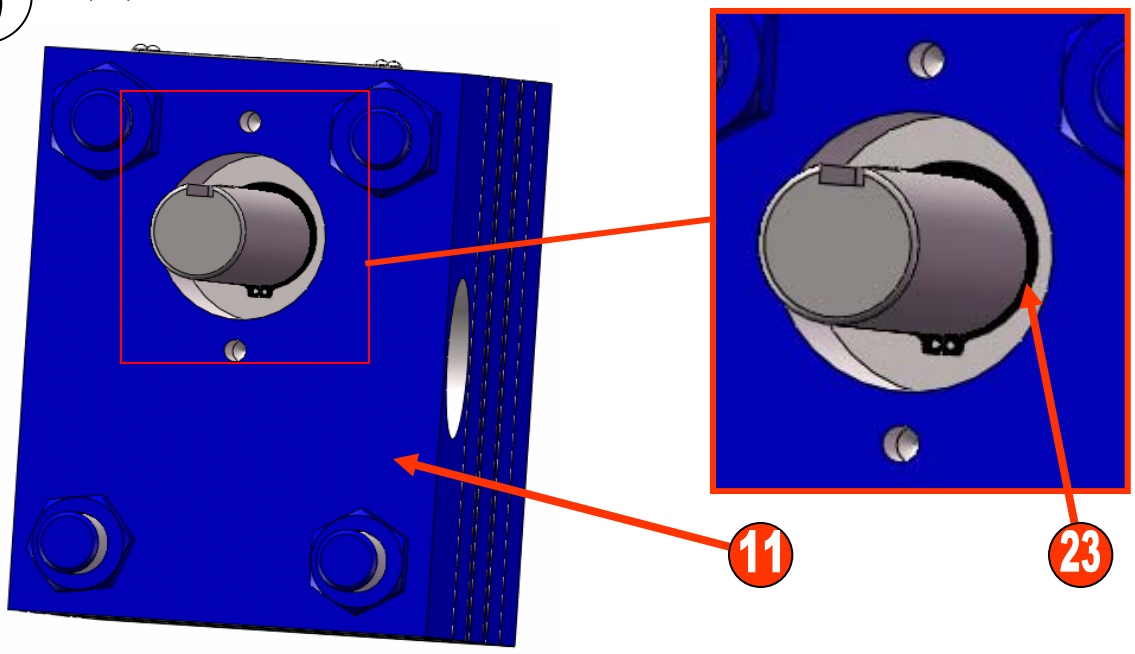


Step 4

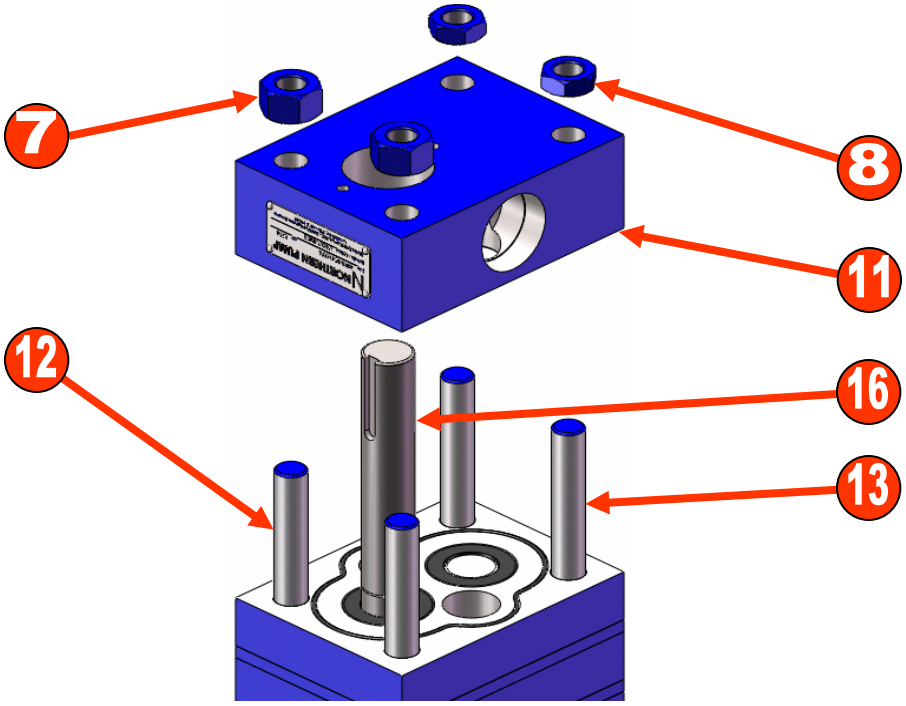
Remove the Mechanical Seal Head *(24)* by sliding it up and over the Drive Shaft *(16)*.



Step 5 **Remove the Retaining Ring *(23)* that is located in the Seal Adapter Plate (*11*) bore on the Drive Shaft.**

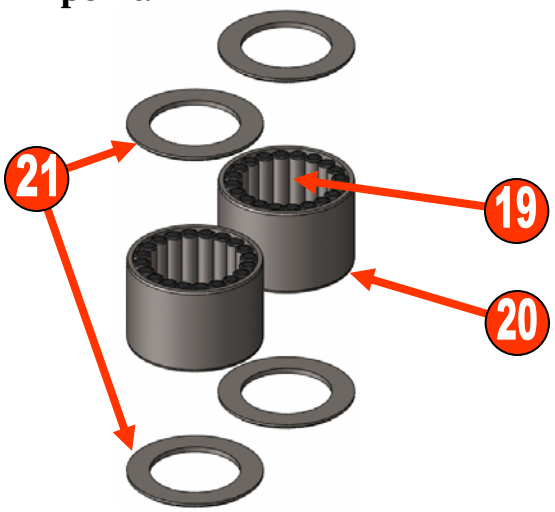


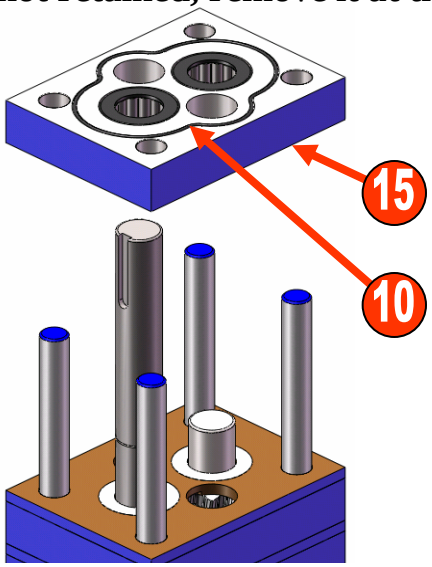
Step 6 **Loosen and remove the 2x Whole Nuts *(7)* and 2x Jam Nuts *(8)* that retain the Seal Adapter Plate *(11)*. Remove the Seal Adapter Plate by sliding it up and over the Drive Shaft *(16)* and Studs *(2x 12 & 2x 13)*.**



Step 7

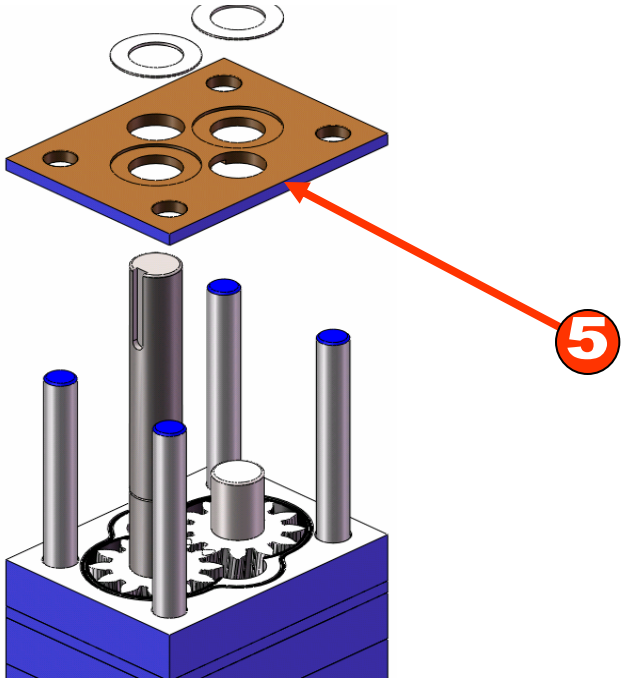
Remove the front Bearing Plate *(15)* and O-rings *(10)*. The 2x Bearing Sleeves *(20)* and 4x Bearing Washers *(21)* will remain installed in the Bearing Plate. The Rollers *(19)* may fall out of the Bearing Plate. This is normal. The O-Ring on the underside of the Bearing Plate may or may not remain in the O-Ring Groove. If it is not retained, remove it at this point.





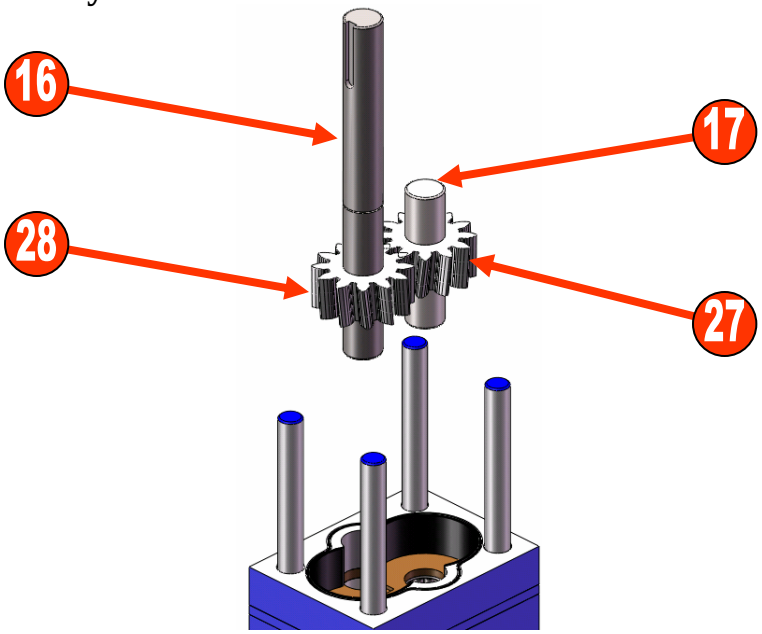
Step 8

Remove the Liner Plate *(5)* from the assembly by sliding it up and over the Drive Shaft and Studs. Note the orientation.



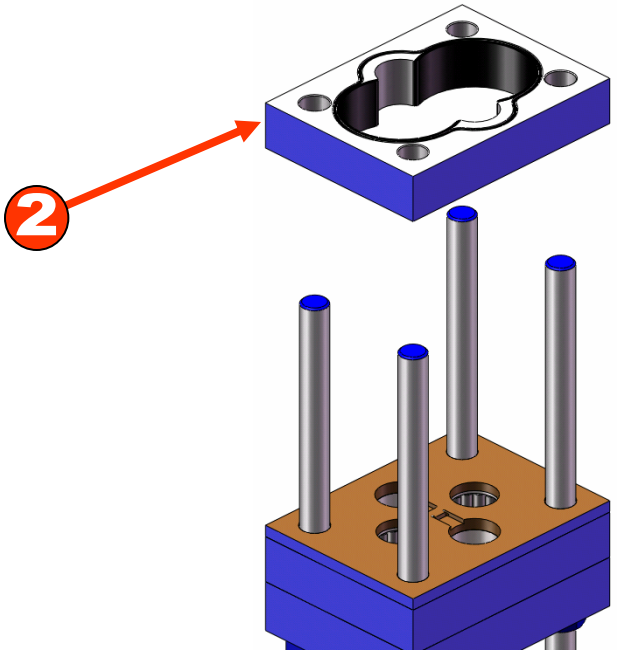
Step 9

Remove the Drive Shaft *(16)* and Drive Gear *(28)* and remove the Driven *(17)* Shaft and Driven Gear *(27)*. The shaft and gear are pressed together as one assembly.



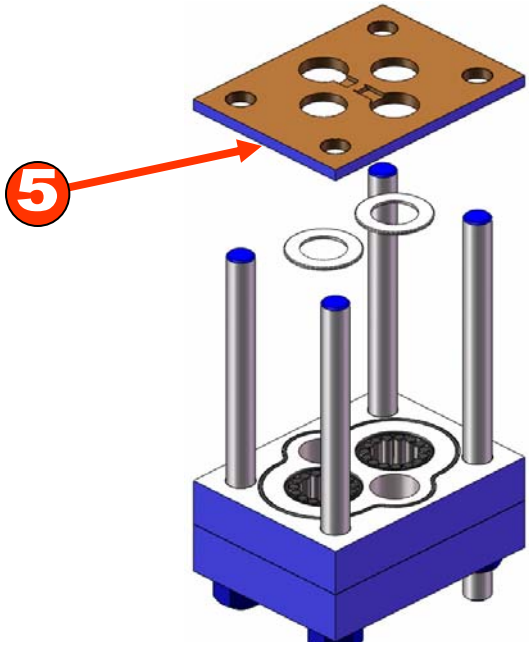
Step 10

Remove the Cylinder *(2)* from the assembly. At this point, the Studs may be removed. The O-Ring on the underside of the Cylinder may or may not remain in the O-Ring Groove. If it is not retained, remove it at this point.



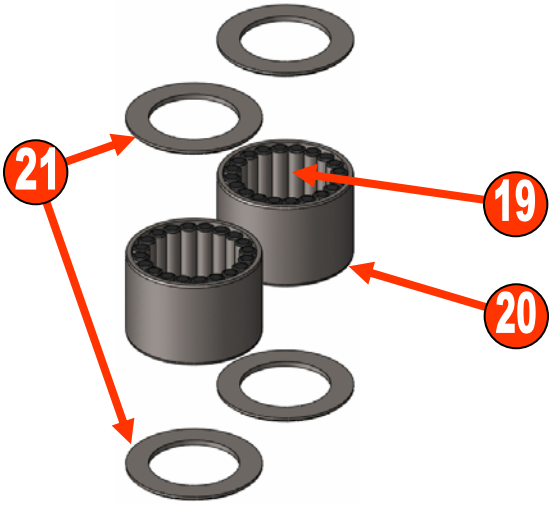
Step 11

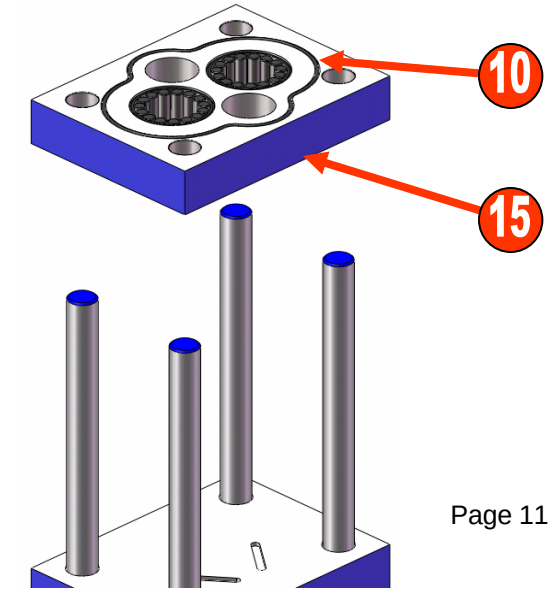
Remove the rear Liner Plate *(5)*. Note the orientation.



Step 12

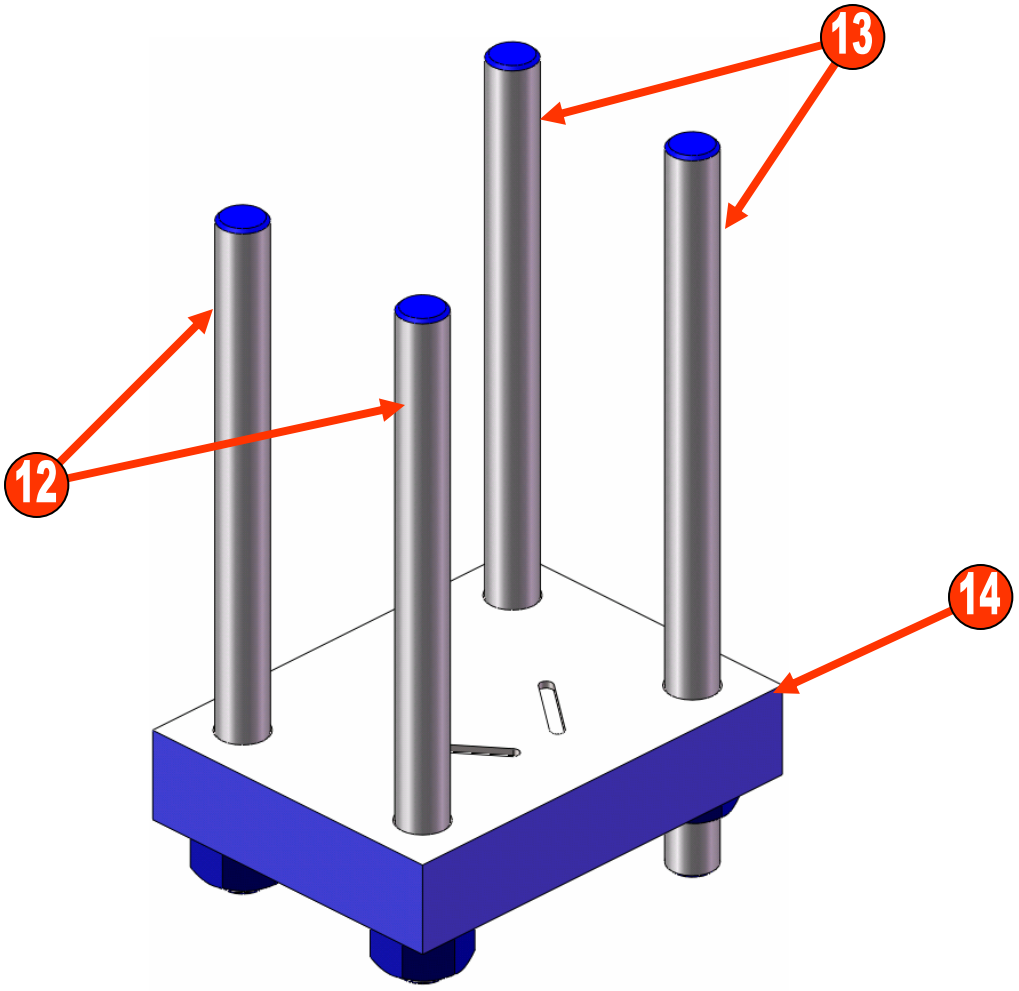
Remove the Rear Bearing Plate *(15)* and O-rings *(10)*. The 2x Bearing Sleeves *(20)* and 4x Bearing Washers *(21)* will remain installed in the Bearing Plate. The Rollers *(19)* may fall out of the Bearing Plate. This is normal. The O-Ring on the underside of the Bearing plate may or may not remain in the O-Ring Groove. If it is not retained, remove it at this point. Remove the Studs and Dowels if you have not already.





Step 13

Separate the Studs *(12 &13)* from the End Plate *(14)*, if not removed already. Disassembly is complete.



Clean-up

1. Clean all parts of the pump in accordance with your specified cleaning procedures. Take all appropriate precautions to prevent damage to the parts of the pump during the cleaning process.

2. All pump parts should accept a wide variety of acceptable cleaning methods and chemicals.

3. All parts of the pump may be heated to 320ºF (160 ºC).

4. Clean the flat surfaces of the pump body parts by rubbing them lightly on fine sand paper (240-320 grit) stretched or laid on a flat ground surface. Move the part in either a circular or figure eight pattern so that fine scratches are not produced across the part. Wetting the sand paper with solvent will improve the ability of the sandpaper to clean the parts.

Inspection

1. Visually inspect all parts for obvious problems, scratches on surfaces that mate with seals, cracks, upset metal that will affect how parts mate together, burrs, or other serious wear. Correct problem or replace part as necessary.

2. Inspect the shaft and Bearing Plates for excessive grooves or other signs of severe wear in bearing bores and gear wear surfaces.

   2.1 The bearing bores must be free of major scratches and major scoring.

   2.2 The lubrication groove must be clean.

3. Inspect the Drive Shaft and Gear for wear:

   3.1 No burrs or upset material is allowed on the surface of the Drive Shaft that mates with the coupling.

   3.2 Visually inspect the end surfaces of the gear. Major nicks, scratches, grooves, or other defects could be a sign of imminent gear failure.

   3.3 Visually inspect the outside diameter of the gear. No major nicks, scratches, grooves, or other defects are allowed.

   3.4 Visually inspect the gear teeth. The surfaces of the gear teeth must be smooth and free of obvious wear or damage.

4. Inspect the Driven Shaft and Gear for wear:

   4.1 No burrs or upset material is allowed on the surface of the Driven Shaft that mates with the Coupling.

   4.2 Visually inspect the end surfaces of the gear. Major nicks, scratches, grooves, or other defects could be a sign of imminent Gear failure.

4.3 Visually inspect the outside diameter of the Gear. No major nicks, scratches, grooves, or other defects are allowed.

4.4 Visually inspect the gear teeth. The surfaces of the gear teeth must be smooth and free of obvious wear or damage.

5. Inspect the Cylinder for wear:

5.1 Visually inspect the end surfaces of the Cylinder. No nicks, burrs, or scratches are allowed on the ends of the Cylinder.

5.2 Visually inspect the gear bores for any sign that the gear has contacted the surface of the gear bore. No major nicks, scratches, grooves, or galling is allowed on the gear bore surface. If any of these conditions exist, check the gear outer diameter, shaft bearing diameter, and bearing bore diameter for wear and replace as necessary.

6. Inspect the Seal Adapter Plate:

6.1 Visually inspect the Seal Adapter Plate for nicks, scratches, or burrs on the mating surfaces. No nicks, scratches, or burrs that will affect the mate-up of the parts at assembly or that will affect the ability of the O-ring to properly seal are allowed.

7. Inspect the Bearing & Seat housing:

7.1 Inspect the Bearing and bore. No scoring or other abnormal wear patterns are allowed. If necessary, the Bearing may be pressed out of the Bearing Housing and replaced by pressing in a new one.

8. Inspect the O-rings:

8.1 Visually inspect the O-rings. No nicks, scratches, cuts, tears, or permanent deformation are allowed.

8.2 Inspect the O-rings for aging. The O-rings must be firm and pliable. Replacement of O-rings is recommended whenever the pump is disassembled.

Assembly

1. Visually inspect all parts for obvious problems (i.e. scratches on surfaces that mate with seals, cracks, upset metal that will affect how parts mate together, burrs, or other serious wear). Correct problem or replace part as necessary.

2. Complete disassembly procedures in reverse order.

3. Use a light coat of a stable, pure, synthetic oil on the shafts, gear, and studs to facilitate smooth assembly.

3. Avoid touching the polished faying surfaces of the Mechanical Seal Head *(27a)* and Seat *(27b).*

4. Torque the Whole Nuts *(6)* and Jam Nuts *(7)* to 310 foot-pounds.

5. Drive Shaft & Gear should turn freely after completion of assembly.

Trouble Shooting Guide
(Standard for all 4000 series pumps)

Problem	Solution
Key will not fit into keyway in Drive Shaft	Check for burrs and nicks in the keyway and on the key. Remove as required. Measure width of key and keyway, if an interference fit is found, reduce the width of the key.
Motor shaft turns but pump shaft does not	Verify that the Coupling has been properly installed with the correct key in each hub. Verify that the set screws are properly tightened in each coupling hub.
Pump will not prime	Check for air leaks in the suction line. Check for correct rotation of the pump shaft -- CW when facing the shaft end of the pump. “Wet” the internals of the pump with the liquid to be pumped to provide a liquid hydraulic seal in the pumping chamber. Make sure that all suction and discharge line valves are open. Make sure that the suction and discharge lines are free of obstructions.

Problem	Solution
Pump requires too much torque	Make sure that the viscosity of the liquid being pumped is not abnormally high. Check alignment of pump.
Pumped liquid has entrained air	Check for air leaks in suction line.
Flow rate is too low	Make sure that the viscosity of the liquid being pumped is not abnormally low. Make sure that the discharge pressure is not abnormally high. Make sure that there are no air leaks in the suction line. Verify that the rotational speed is correct. Disassemble pump and verify that the internal clearances are within specification.

Lubrication and Preventative Maintenance

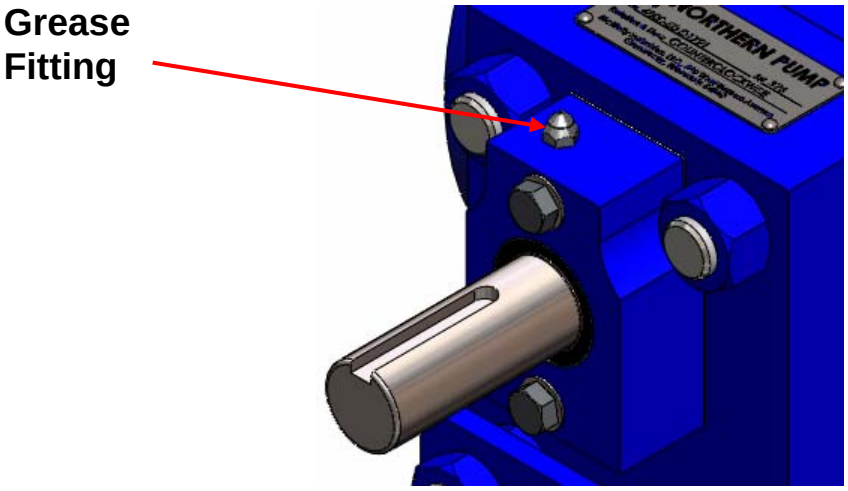
The pump is fully lubricated by the pumped liquid. Dry running must be avoided, as sustained operation will cause internal damage to the pump.

It is recommended that a very small amount of the liquid which you intend to pump be put into the pump at startup. This will lubricate the pump during the startup period and make the pump much easier to prime.

Grease seal housing bearing on pumps with general purpose bearing grease every 6 months or every 500 hours of operation, whichever occurs first (see image below).

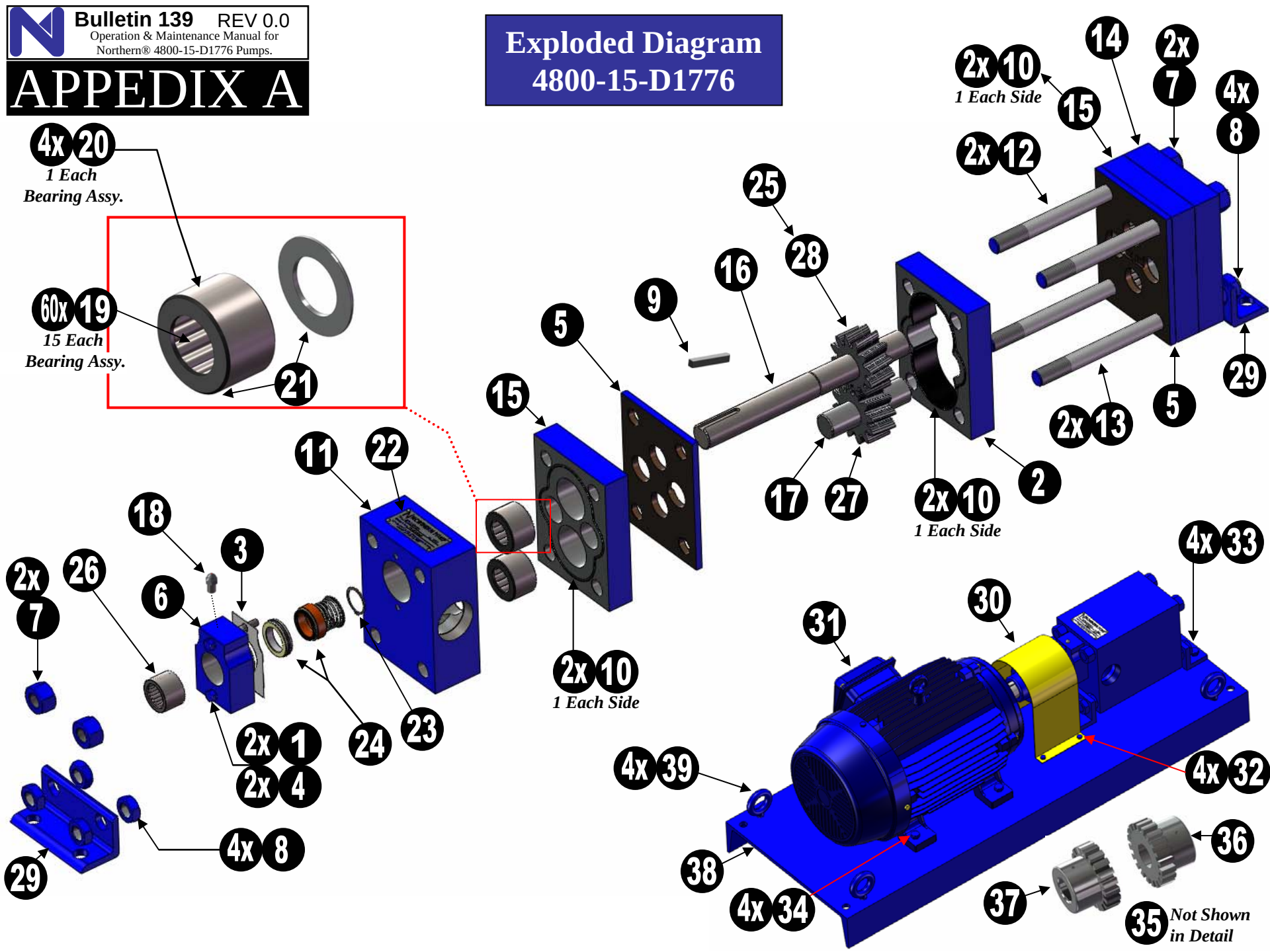
It is required that the coupling be a slip fit on the pump shaft. Do not force the coupling on to the drive shaft.

There is no preventative maintenance routine to follow for this pump since there are no manual adjustments or other actions required for normal operation.



APPEDIX A

Exploded Diagram 4800-15-D1776

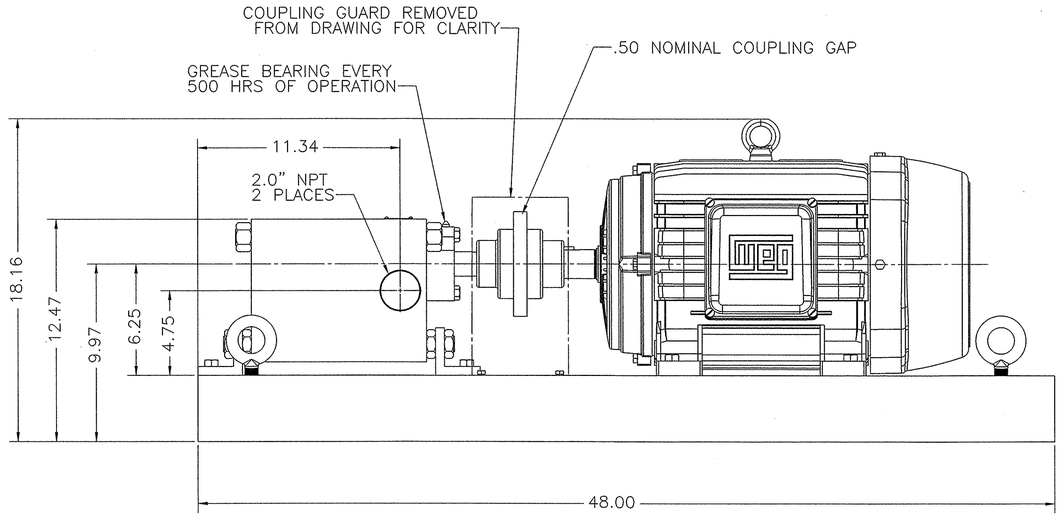


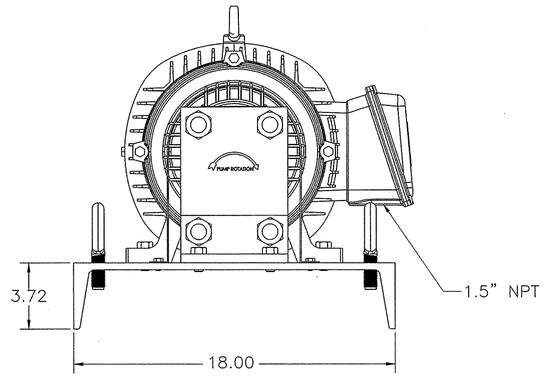
APPEDIX A

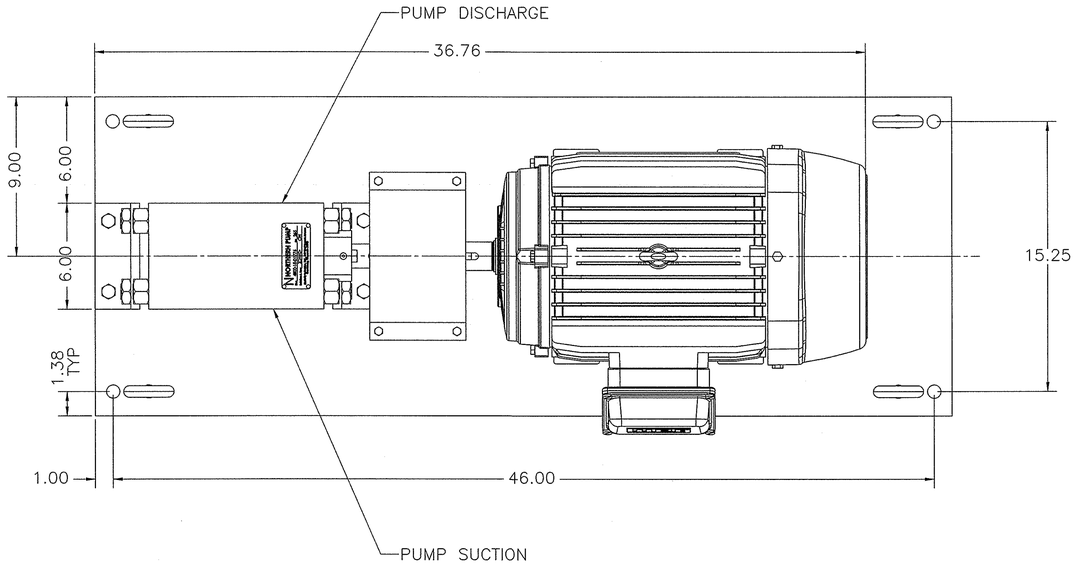
Bill of Material List - 4800-15-D1776

FIND #	ITEM NUMBER	DESCRIPTION	QTY
1	11490007	WASHER, LOCK	2
2	1174-4800-15	CYLINDER	1
3	1282-4800	GASKET	1
4	13430007-36	CAP SCREW, HEX HEAD	2
5	1393-4800	PLATE, LINER	2
6	1519-4800	HOUSING, BEARING & SEAT	1
7	15410014	HEAVY HEX WHOLE NUT	4
8	15420014	HEAVY HEX JAM NUT	8
9	17500006-40	END KEY	1
10	19120163-40	O'RING, ROUND SECTIONAL	6
11	2201-4800	PLATE, PACKING	1
12	28062-11	STUD, PUMP	2
13	28062-12	STUD, PUMP	2
14	3001-4800	PLATE, END	1
15	31342-4800	PLATE, BEARING	2
16	4009-4800-15	SHAFT, DRIVE	1
17	4080-4800-15	SHAFT, DRIVEN	1
18	56732	GREASE FITTING	1
19	5711-4800	ROLLER, BEARING	60
20	5720-4800	SLEEVE, BEARING	4
21	5730-4800	WASHER, BEARING, OUTER	8
22	57455	NAMEPLATE AND PINS (4)	1
23	61902	RETAINING RING	1
24	6914-4800	MECHANICAL SEAL & SEAT,	1
25	70000-03	WOODRUFF KEY	1
26	80848	BEARING, ROLLER - Seal Support	1
27	8669-4800-15	PUMP GEAR, HELICAL, R.H.	1
28	8689-4800-15	PUMP GEAR, HELICAL, L.H.	1
29	7021-4800	BRACKET, MOUNTING	2
30	7784-4000	GUARD, COUPLING, 6.25 DROP	1
31	02018XP3E256T	WEG ELECT. MOTOR, 20 HP	1
32	13430004-08	CAP SCREW, HEX HEAD CG	4
33	13430008-16	CAP SCREW, HEX HEAD PU	4
34	13430008-20	CAP SCREW, HEX HEAD MT	4
35	20520000	COUPLING COVER & GRID ASSY	1
36	20521371-06	COUPLING HUB, 50T20 - PUMP	1
37	20521625-06	COUPLING HUB, FALK 50T20 MOTOR	1
38	G-1600-9-BPL	UNIT BASE (Included 4 x 39)	1
39	19210012-32	EYEBOLT, DROP FORGED	4

REVISIONS			
LTR	DESCRIPTION	DATE	APVD







MOTOR DATA:

MAKE: WEG
MODEL NUMBER: 02018XP3E256T
HORSEPOWER: 20.0
RPM: 1750
FRAME: 256T
POWER SUPPLY: 3 PHASE, 60Hz, 230/460 V
ENCLOSURE: XPFC

COUPLING DATA:

MAKE: FALK
MODEL: 50T20 GRID STYLE W/ VERTICAL SPLIT COVER

Northern® Pump

PUMP DUTY DATA

Technical Information		Materials of Construction	
Pump Model		**Gears:**	HARDENED ALLOY STEEL
Liquid:	CRUDE OIL	**Shafts:**	HARDENED ALLOY STEEL
Pump Flow:	45 GPM	**Bearings:**	52100 STEEL ROLLER TYPE
Pump Speed:	1750 RPM	**Cylinder:**	STEEL W/ IRON INSERT
Inlet Condition:	10–40 PSI	**Bearing / Wear Plates:**	STEEL W/BRONZE WEAR PLATES
Temperature:	40°F–70°F	**End & Seal Plate:**	STEEL
Discharge Pressure:	500 PSI	**Shaft Seal:**	TYPE 21 MECHANICAL SEAL
Viscosity:	3.5 cP		
BHP Required:	16.9	**Suction & Discharge Ports:**	2.0" NPT CONNECTIONS
Drive Equipment:	MOTOR, BASE, COUPLING, GUARD,	**Dowel Studs:**	STEEL
		Mounting Brackets:	STEEL

CLOCKWISE ROTATION PUMP DESIGN

DWN R. ANTONICH 8/31/10
CHK J. HOFFLAND 8/31/10
MET
STD
APVD

McNALLY
McNALLY INDUSTRIES, LLC.
340 WEST BENSON AVE, GRANTSBURG, WI 54840 (715)463-8300

PUMP UNIT ASSEMBLY

CAGE CODE	NORTHERN DWG.	SIZE	FILE NO
96953	4800–15	D	1776
SCALE: 1:4	UNIT WT.	SHEET 1 OF 1	

APPEDIX C

Motor Data And Instruction Manual

WEG 02018XT3E256T

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	Northern Pump	No.:
		Date: 1/12/2012

Customer :

TECHNICAL PROPOSAL

Three-phase induction motor - Squirrel cage rotor

Product line	: Three-Phase : Explosion Proof - NEMA Premium
Catalog Number	: 02018XT3E256T
List Price	: $3,008

Notes:
Three-Phase : Explosion Proof - NEMA Premium

Performed by:	Checked:

	Northern Pump	No.:
		Date: 1/12/2012

DATA SHEET
Three-phase induction motor - Squirrel cage rotor

Customer	:	
Product line	:	Three-Phase : Explosion Proof - NEMA Premium

Frame	:	256T
Output	:	20 HP
Frequency	:	60 Hz
Poles	:	4
Full load speed	:	1770
Slip	:	1.67 %
Voltage	:	208-230/460 V
Rated current	:	55.3-50.0/25.0 A
Locked rotor current	:	375/188 A
Locked rotor current (Il/In)	:	7.5
No-load current	:	23.6/11.8 A
Full load torque	:	58.5 lb.ft
Locked rotor torque	:	300 %
Breakdown torque	:	300 %
Design	:	B
Insulation class	:	F
Temperature rise	:	80 K
Locked rotor time	:	20 s (hot)
Service factor	:	1.15
Duty cycle	:	S1
Ambient temperature	:	-20°C - +40°C
Altitude	:	1000 m
Degree of Protection	:	IP55
Approximate weight	:	364 lb
Moment of inertia	:	2.8889 sq.ft.lb
Noise level	:	69 dB(A)

	D.E.	N.D.E.
Bearings	6309 C3	6209 Z-C3
Regreasing interval	20000 h	20000 h
Grease amount	13 g	9 g

Load	Power factor	Efficiency (%)
100%	0.81	93.0
75%	0.75	92.4
50%	0.63	91.7

Notes:

Performed by:	Checked:

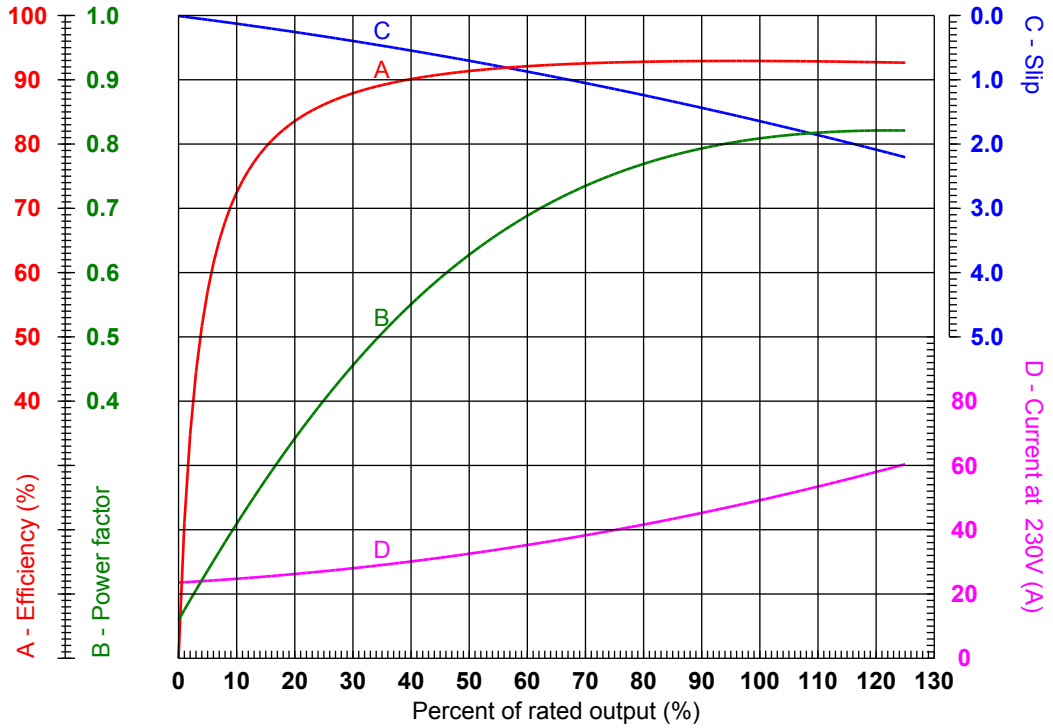
Northern Pump

No.:

Date: 1/12/2012

PERFORMANCE CURVES RELATED TO RATED OUTPUT

Three-phase induction motor - Squirrel cage rotor



Customer	:	
Product line	:	Three-Phase : Explosion Proof - NEMA Premium

Output	: 20 HP	Locked rotor current (Il/In)	: 7.5
Frame	: 256T	Duty cycle	: S1
Full load speed	: 1770	Service factor	: 1.15
Frequency	: 60 Hz	Design	: B
Voltage	: 208-230/460 V	Locked rotor torque	: 300 %
Insulation class	: F	Breakdown torque	: 300 %
Rated current	: 55.3-50.0/25.0 A		

Notes:

Performed by:	Checked:

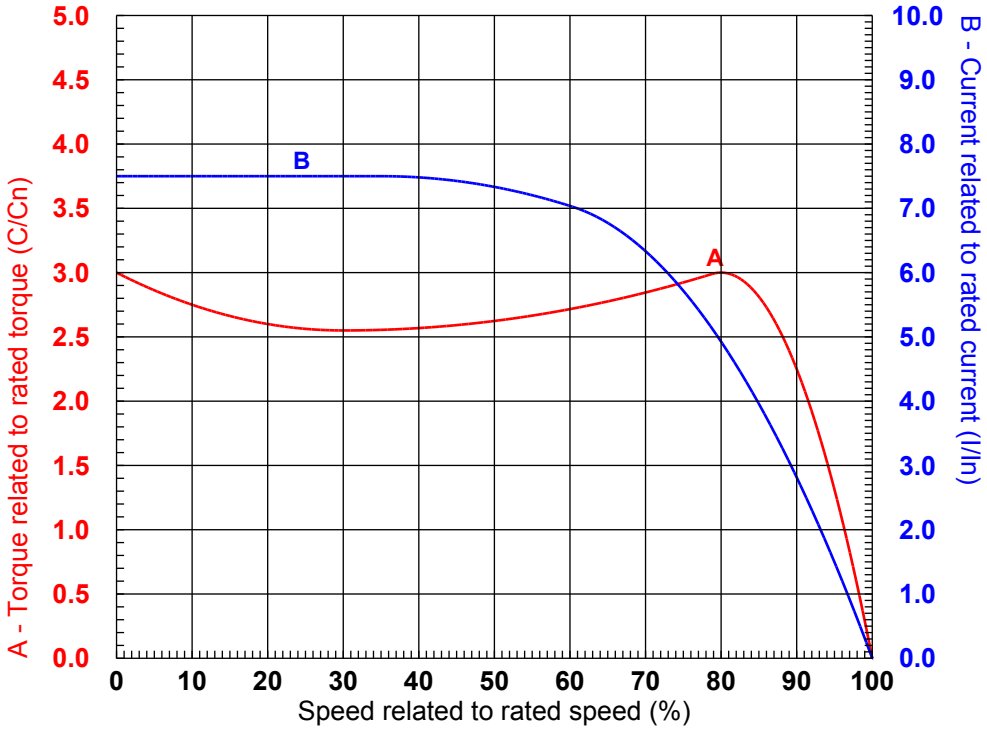
Northern Pump

No.:

Date: 1/12/2012

CHARACTERISTIC CURVES RELATED TO SPEED

Three-phase induction motor - Squirrel cage rotor



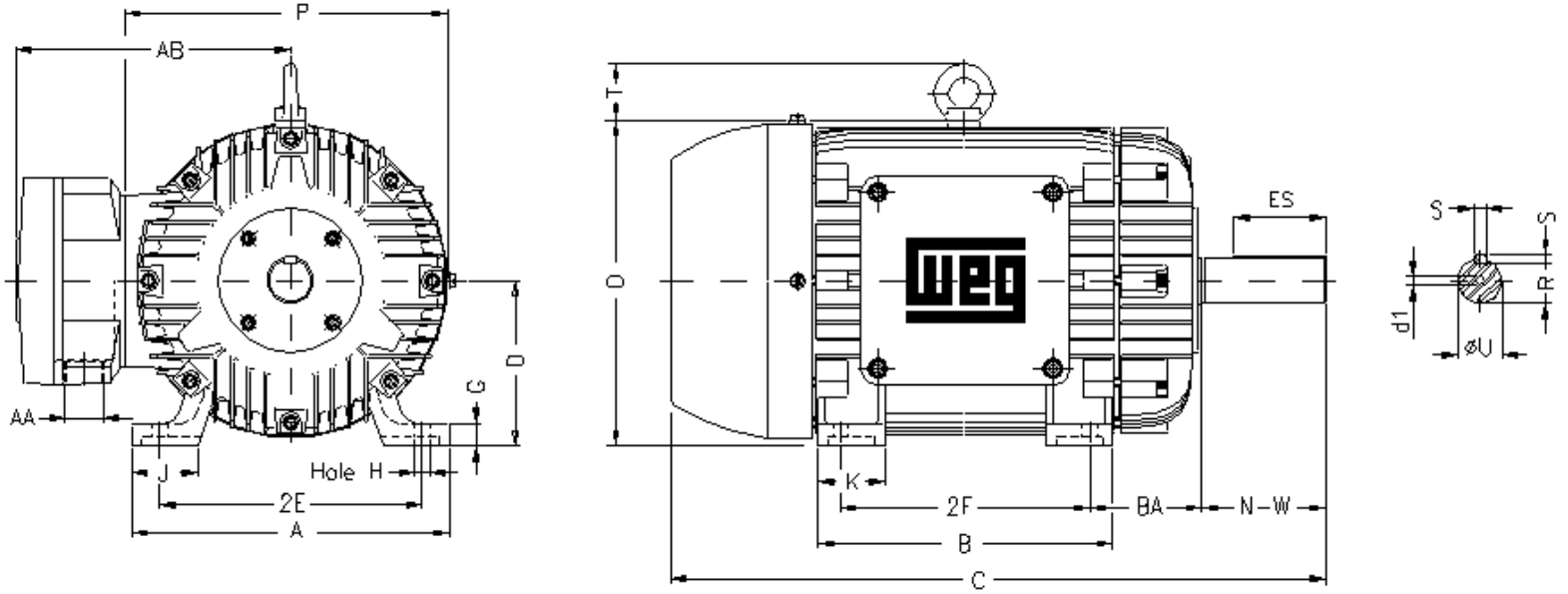
Customer	:		
Product line	:	Three-Phase : Explosion Proof - NEMA Premium	

Output	: 20 HP	Locked rotor current (Il/In)	: 7.5
Frame	: 256T	Duty cycle	: S1
Full load speed	: 1770	Service factor	: 1.15
Frequency	: 60 Hz	Design	: B
Voltage	: 208-230/460 V	Locked rotor torque	: 300 %
Insulation class	: F	Breakdown torque	: 300 %
Rated current	: 55.3-50.0/25.0 A		

Notes:

Performed by:

Checked:



Notes:

Performed by:

Checked:

Customer:

Three-Phase : Explosion Proof - NEMA Premium

2E 10.000	2F 10.000	H 0.531	BA 4.250	A 12.126
B 11.732	C 24.923	D 6.250	G 0.817	J 2.520
K 2.559	O 12.352	P 12.224	ES 2.756	S 0.375
N-W 4.000	U 1.625	R 1.406	AB 11.063	AA NPT 1 1/2"
d1 A 4	Flange FD-317	AJ 12.500	AK 11.000	BD 14.000
BF 0.828	BB 0.203			

Three-phase induction motor
Frame 256T - IP55

1/12/2012

APPEDIX D

Installation & Maintenance Manual

Falk™ Steelflex® T20 Grid Style Coupling

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How To Use This Manual

This manual provides detailed instructions on maintenance, lubrication, installation, and parts identification. Use the table of contents below to locate required information.

Table of Contents

CAREFULLY FOLLOW THE INSTRUCTIONS IN THIS MANUAL FOR OPTIMUM PERFORMANCE AND TROUBLE FREE SERVICE.

Introduction

This manual applies to Sizes 1020T thru 1170T and 20T thru 170T20 Falk Steelflex Tapered Grid Couplings. Unless otherwise stated, information for Sizes 1020T thru 1170T applies to Sizes 20T thru 170T respectively, e.g. 1020T = 20T, 1100T = 100T, etc. These couplings are designed to operate in either the horizontal or vertical position without modification.

CAUTION: Consult applicable local and national safety codes for proper guarding of rotating members. Observe all safety rules when installing or servicing couplings. During assembly, seal keyways of vertical couplings to prevent leakage.

WARNING: Lockout starting switch of prime mover and remove all external loads from drive before installing or servicing couplings.

Lube Fittings

Depending on coupling size, cover halves have $^1/_8$ or $^3/_8$ NPT lube holes. Use a standard grease gun and lube fitting as instructed on Page 4.

Limited End Float

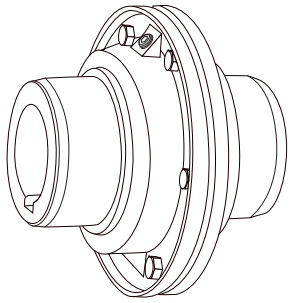
When electric motors, generators, engines, compressors, and other machines are fitted with sleeve or straight roller bearings, limited axial end float kits are recommended for protecting the bearings. Falk Steelflex couplings are easily modified to limit end float; refer to Manual 428-820 for instructions.

Lubrication

Adequate lubrication is essential for satisfactory operation. Page 2 provides a list of typical lubricants and specifications for general purpose and long term greases. Because of its superior lubricating characteristics and low centrifuge properties, Falk Long Term Grease (LTG) is highly recommended. Sizes 1020T to 1090T20 are furnished with a pre-measured amount of grease for each coupling. The grease can be ordered for larger size couplings.

The use of general purpose grease requires re-lubrication of the coupling at least annually.

TYPE T20 STEELFLEX COUPLING



Long Term Grease (LTG)

The high centrifugal forces encountered in couplings separate the base oil and thickener of general purpose greases. Heavy thickener, which has no lubrication qualities, accumulates in the grid-groove area of Steelflex couplings resulting in premature hub or grid failure unless periodic lubrication cycles are maintained.

Falk Long Term Grease (LTG) was developed specifically for couplings. It resists separation of the oil and thickener. The consistency of Falk LTG changes with operating conditions. As manufactured it is an NLGI #1/2 grade. Working of the lubricant under actual service conditions causes it to become semifluid while the grease near the seals will set to a heavier grade, helping to prevent leakage.

LTG is highly resistant to separation, easily out performing all other lubricants tested. The resistance to separation allows the lubricant to be used for relatively long periods of time.

Steelflex couplings initially lubricated with LTG will not require re-lubrication until the connected equipment is stopped for servicing. If a coupling leaks grease, is exposed to extreme temperatures, excessive moisture, or experiences frequent reversals, more frequent lubrication may be required.

Although LTG grease is compatible with most other coupling greases, the mixing of greases may dilute the benefits of LTG.

USDA Approval

LTG has the United States Department of Agriculture Food Safety & Inspection Service approval for applications where there is no possibility of contact with edible products. (H-2 ratings).

CAUTION: Do not use LTG in bearings.

Specifications — Falk LTG

The values shown are typical and slight variations are permissible.

AMBIENT TEMPERATURE RANGE — -20°F (-29°C) to 250°F (121°C). Min. Pump = 20° F (-7° C).

MINIMUM BASE OIL VISCOSITY — 3300SSU (715cST) @ 100°F (38°C).

THICKENER — Lithium & soap/polymer.

CENTRIFUGE SEPARATION CHARACTERISTICS — ASTM #D4425 (Centrifuge Test) — K36 = 2/24 max., very high resistance to centrifuging.

NLGI GRADE (ASTM D-217) — $^1/_2$

CONSISTENCY (ASTM D-217) — 60 stroke worked penetration value in the range of 315 to 360 measured at 77°F (25°C)

MINIMUM DROPPING POINT — 350°F (177°C) minimum

MINIMUM TIMKEN O.K. LOAD — 40 lbs.

ADDITIVES — Rust and oxidation inhibitors that do not corrode steel or swell or deteriorate synthetic seals.

Packaging

14 oz (0,4 kg) CARTRIDGES — Individual or case lots of 10 or 30.

35 lb (16 kg)PAIL, 120 lb (54 kg) KEG & 400 lb (181 kg) DRUMS.

General Purpose Grease

Annual Lubrication — The following specifications and lubricants for general purpose grease apply to Falk Steelflex couplings that are lubricated annually and operate within ambient temperatures of 0°F to 150°F (-18°C to 66°C). For temperatures beyond this range (see Table 1), refer to Falk.

If a coupling leaks grease, is exposed to extreme temperatures, excessive moisture, or experiences frequent reversals, more frequent lubrication may be required.

Specifications — General Purpose Coupling Lubricants

The values shown are typical and slight variations are permissible.

DROPPING POINT — 300°F (149°C) or higher.

CONSISTENCY — NLGI No. 2 with 60 stroke worked penetration value in the range of 250 to 300.

SEPARATION AND RESISTANCE — Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT — Possess good lubricating properties equivalent to a high quality, well refined petroleum oil.

INACTIVE — Must not corrode steel or cause swelling or deterioration of synthetic seals.

CLEAN — Free from foreign inclusions.

General Purpose Greases Meeting Falk Specifications

Lubricants listed below are typical products only and should not be construed as exclusive recommendations.

TABLE 1 — General Purpose Greases ★

Ambient Temperature Range	0°F to 150°F (-18°C to 66°C)	-30°F to 100°F (-34°C to 38°C)
Manufacturer	**Lubricant †**	**Lubricant †**
Amoco Oil Co.	Amolith Grease #2	Amolith Grease #2
BP Oil Co.	Energrease LS-EP2	Energrease LS-EP1
Chevron U.S.A. Inc.	Dura-Lith EP2	Dura-Lith EP1
Citgo Petroleum Corp.	Premium Lithium Grease EP2	Premium Lithium Grease EP1
Conoco Inc.	EP Conolith Grease #2	EP Conolith Grease #2
Exxon Company, USA	Unirex EP2	Unirex EP2
E.F. Houghton & Co.	Cosmolube 2	Cosmolube 1
Imperial Oil Ltd.	Unirex EP2	Unirex EP2
Kendall Refining Co.	Lithium Grease L421	Lithium Grease L421
Keystone Div. (Pennwalt)	81 EP-2	81 EP-1
Lyondell Petrochemical (ARCO)	Litholine H EP 2 Grease	Litholine H EP 2 Grease
Mobil Oil Corp.	Mobilux EP111	Mobilith AW1
Petro-Canada Products	Multipurpose EP2	Multipurpose EP1
Phillips 66 Co.	Philube Blue EP	Philube Blue EP
Shell Oil Co.	Alvania Grease 2	Alvania Grease 2
Shell Canada Ltd.	Alvania Grease 2	Alvania Grease 2
Sun Oil Co.	Ultra Prestige 2EP	Ultra Prestige 2EP
Texaco Lubricants	Starplex HD2	Multifak EP2
Unocal 76 (East & West)	Unoba EP2	Unoba EP2
Valvoline Oil Co.	Multilube Lithium EP Grease	. . .

★ Grease application or re-lubrication should be done at temperatures above 20°F (-7°C). If grease must be applied below 20°F (-7°C), consult the Factory.

† Lubricants listed may not be suitable for use in the food processing industry; check with lube manufacturer for approved lubricants.

Installation Of Type T20 Steelflex Tapered Grid Couplings

Installation

Only standard mechanics tools, wrenches, a straight edge, and feeler gauges are required to install Falk Steelflex couplings. Clean all parts using a non-flammable solvent. Check hubs, shafts and keyways for burrs. Coupling Sizes 1020T thru 1090T are generally furnished for CLEARANCE FIT with setscrew over the keyway. Sizes 1100T and larger are furnished for an INTERFERENCE FIT without a setscrew.

CLEARANCE FIT HUBS — Clean all parts using a non-flammable solvent. Check hubs, shafts, and keyways for burrs. Do not heat clearance fit hubs. Install keys, mount hubs with flange face flush with shaft ends or as otherwise specified and tighten setscrews.

INTERFERENCE FIT HUBS — Furnished without setscrews. Heat hubs to a maximum of 275°F (135°C) using an oven, torch, induction heater, or an oil bath. To prevent seal damage, DO NOT heat hubs beyond a maximum temperature of 400°F (205°C).

When an oxy-acetylene or blow torch is used, use an excess acetylene mixture. Mark hubs near the center of their length in several places on hub body with a temperature sensitive crayon, 275°F (135°C) melt temperature. Direct flame towards hub bore using constant motion to avoid overheating an area.

Rexnord Industries, LLC, Coupling Group
5555 S. Moorland Rd., New Berlin, WI 53151-7953 USA Telephone : 262-796-4060
Fax: 262-796-4064 e-mail: info@rexnord.com web: www.rexnord.com

WARNING: If an oil bath is used, the oil must have a flash point of 350°F (177°C) or higher. Do not rest hubs on the bottom of the container. Do not use an open flame in a combustible atmosphere or near combustible materials.

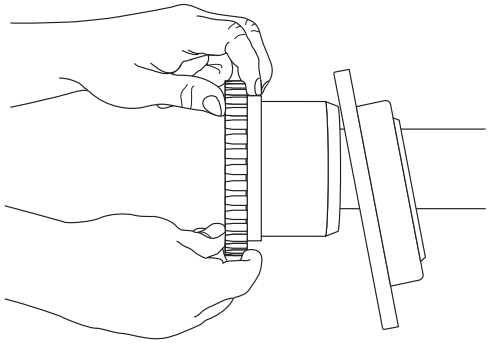
Heat hubs as instructed above. Mount hubs as quickly as possible with hub face flush with shaft end. Allow hubs to cool before proceeding. Insert setscrews (if required) and tighten.

Maximize Performance And Life

The performance and life of couplings depend largely upon how you install and maintain them. Before installing couplings, make certain that foundations of equipment to be connected meet manufacturers' requirements. Check for soft foot. The use of stainless steel shims is recommended. Measuring misalignment and positioning equipment within alignment tolerances is simplified with an alignment computer. These calculations can also be done graphically or mathematically.

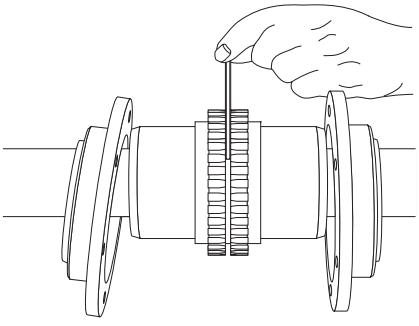
Alignment is shown using spacer bar and straight edge. This practice has proven to be adequate for many industrial applications. However, for superior final alignment, the use of dial indicators (see Manual 458-834 for instructions), lasers, alignment computers, or graphical analysis is recommended.

1— Mount Covers, Seals & Hubs



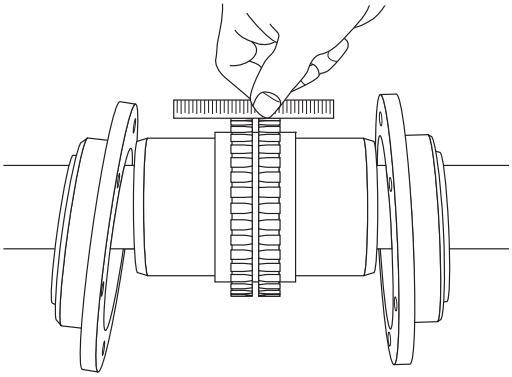
Lock out starting switch of prime mover. Clean all metal parts using a non-flammable solvent. Place seals into each cover half and lightly coat seals with grease. Place covers on shafts BEFORE mounting hubs. Heat interference fit hubs as previously instructed. Seal keyways to prevent leakage. Mount hubs on their respective shafts so the hub face is flush with the end of its shaft unless otherwise indicated. Tighten setscrews when furnished.

2 — Gap & Angular Alignment



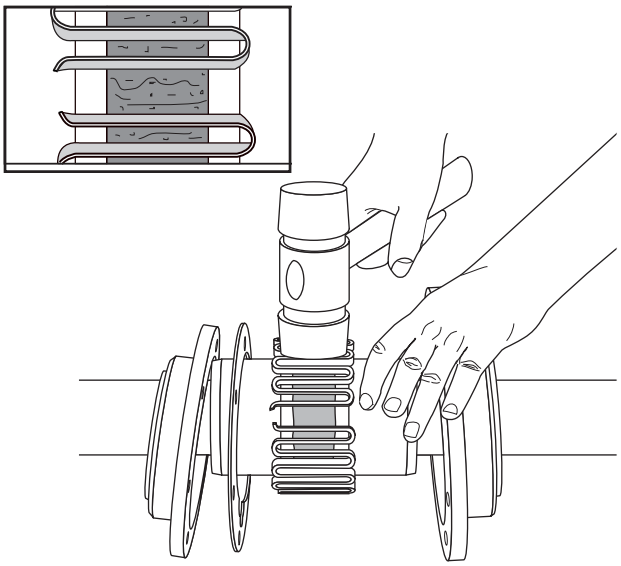
Use a spacer bar equal in thickness to the gap specified in Table 2, Page 5. Insert bar as shown below left, to same depth at 90° intervals and measure clearance between bar and hub face with feelers. The difference in minimum and maximum measurements must not exceed the ANGULAR installation limits specified in Table 2.

3 — Offset Alignment



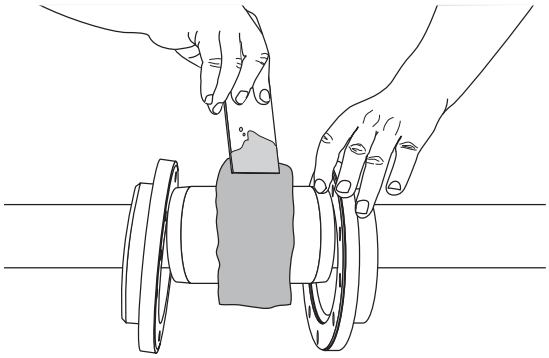
Align so that a straight edge rests squarely (or within the limits specified in Table 2) on both hubs as shown above and also at 90° intervals. Check with feelers. The clearance must not exceed the PARALLEL OFFSET installation limits specified in Table 2. Tighten all foundation bolts and repeat Steps 2 and 3. Realign coupling if necessary.

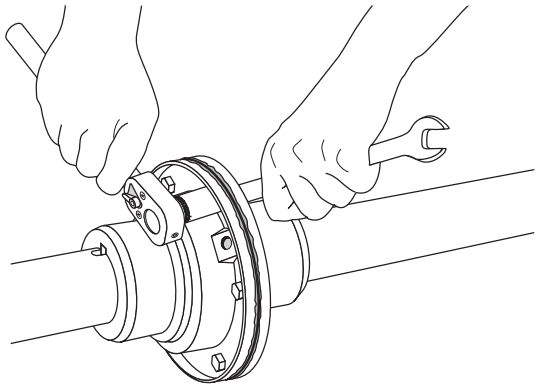
4 — Insert Grid



Insert gasket thru the gap and hang it on either hub. Pack gap and grooves with specified lubricant before inserting grid. When grids are furnished in two or more segments, install them so that all cut ends extend in the same direction (as detailed in the exploded view picture above); this will assure correct grid contact with non-rotating pin in cover halves. Spread the grid slightly to pass over the coupling teeth and seat with a soft mallet.

5 — Pack With Grease & Assemble Covers





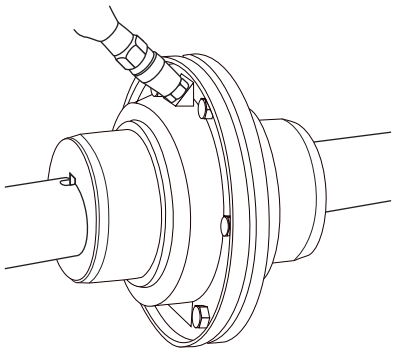
Pack the spaces between and around the grid with as much lubricant as possible and wipe off excess flush with top of grid. Make certain lube plugs are removed to ease in cover assembly. Slide cover halves with seals onto hubs and position with lube holes 180° apart (90° apart for Sizes 1150 thru 1170). Line up cover and gasket bolt holes and secure with fasteners; tighten to torque specified in Table 2. ***CAUTION:*** *Make certain lube plugs are installed before operating.*

Annual Maintenance

For extreme or unusual operating conditions, check coupling more frequently.

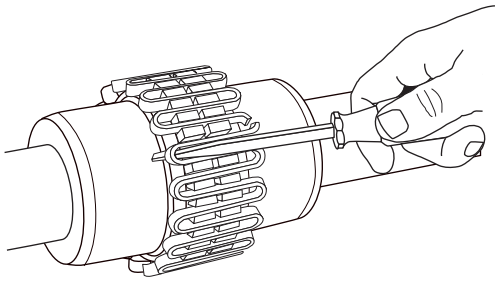
1. Check alignment per steps on Page 3. If the maximum operating misalignment limits are exceeded, realign the coupling to the recommended installation limits. See Table 2 for installation and operating alignment limits.
2. Check tightening torques of all fasteners.
3. Inspect seal ring and gasket to determine if replacement is required. If leaking grease, replace.
4. When connected equipment is serviced, disassemble the coupling and inspect for wear. Replace worn parts. Clean grease from coupling and repack with new grease. Install coupling using new gasket as instructed in this manual.

Periodic Lubrication



The required frequency of lubrication is directly related to the type of lubricant chosen, and the operating conditions. Steelflex couplings lubricated with common industrial lubricants, such as those shown in Table 1, should be relubed annually. The use of Falk Long Term Grease (LTG) will allow relube intervals to be extended to beyond five years. When relubing, remove both lube plugs and insert lube fitting. Fill with recommended lubricant until an excess appears at the opposite hole. ***CAUTION:*** Make certain all plugs have been inserted after lubricating.

Coupling Disassembly & Grid Removal



Whenever it is necessary to disconnect the coupling, remove the cover halves and grid. A round rod or screwdriver that will conveniently fit into the open loop ends of the grid is required. Begin at the open end of the grid section and insert the rod or screwdriver into the loop ends. Use the teeth adjacent to each loop as a fulcrum and pry the grid out radially in even, gradual stages, proceeding alternately from side to side.

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Type T Coupling Installation & Alignment Data

Maximum life and minimum maintenance for the coupling and connected machinery will result if couplings are accurately aligned. Coupling life expectancy between initial alignment and maximum operating limits is a function of load, speed and lubrication. Maximum operating values listed in Table 2 are based on cataloged allowable rpm.

Values listed are based upon the use of the gaps listed, standard coupling components, standard assemblies, and cataloged allowable speeds.

Values may be combined for an installation or operating condition.

Example: 1060T max. operating misalignment is .016" parallel plus .018" angular.

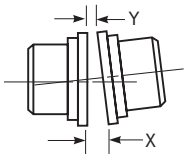
NOTE: For applications requiring greater misalignment, refer application details to the Factory.

Angular misalignment is dimension X minus Y as illustrated below.

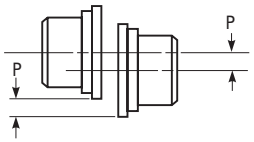
Parallel misalignment is distance P between the hub center lines as illustrated below.

End float (with zero angular and parallel misalignment) is the axial movement of the hubs(s) within the cover(s) measured from "O" gap.

ANGULAR MISALIGNMENT



PARALLEL OFFSET MISALIGNMENT



END FLOAT

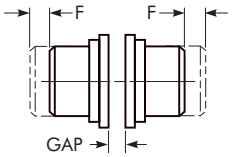


TABLE 2 — Misalignment & End Float

SIZE	Installation Limits						Operating Limits						Cover Fastener Tightening Torque Values		Allow Speed (rpm)	Lube Wt	
	Parallel Offset-P		Angular (x-y)		Hub Gap ± 10%		Parallel Offset-P		Angular (x-y)		End Float Physical Limit (Min) 2 x F						
	Max Inch	Max mm	Max Inch	Max mm	Inch	mm	Max Inch	Max mm	Max Inch	Max mm	Inch	mm	(lb-in)	(Nm)		lb	kg
1020T	.006	0,15	.003	0,08	.125	3	.012	0,30	.010	0,25	.186	4,72	100	11,3	6000	.06	0,03
1030T	.006	0,15	.003	0,08	.125	3	.012	0,30	.012	0,30	.186	4,72	100	11,3	6000	.09	0,04
1040T	.006	0,15	.003	0,08	.125	3	.012	0,30	.013	0,33	.186	4,72	100	11,3	6000	.12	0,05
1050T	.008	0,20	.004	0,10	.125	3	.016	0,41	.016	0,41	.186	4,72	200	23,6	6000	.15	0,07
1060T	.008	0,20	.005	0,13	.125	3	.016	0,41	.018	0,46	.220	5,59	200	22,6	6000	.19	0,09
1070T	.008	0,20	.005	0,13	.125	3	.016	0,41	.020	0,51	.220	5,59	200	22,6	5500	.25	0,11
1080T	.008	0,20	.006	0,15	.125	3	.016	0,41	.024	0,61	.282	7,16	200	22,6	4750	.38	0,17
1090T	.008	0,20	.007	0,18	.125	3	.016	0,41	.028	0,71	.282	7,16	200	22,6	4000	.56	0,25
1100T	.010	0,25	.008	0,20	.188	5	.020	0,51	.033	0,84	.408	10,36	260	29,4	3250	.94	0,43
1110T	.010	0,25	.009	0,23	.188	5	.020	0,51	.036	0,91	.408	10,36	260	29,4	3000	1.1	0,51
1120T	.011	0,28	.010	0,25	.250	6	.022	0,56	.040	1,02	.546	13,87	260	29,4	2700	1.6	0,74
1130T	.011	0,28	.012	0,30	.250	6	.022	0,56	.047	1,19	.548	13,92	650	73,4	2400	2.0	0,91
1140T	.011	0,28	.013	0,33	.250	6	.022	0,56	.053	1,35	.568	14,43	650	73,4	2200	2.5	1,14
1150T	.012	0,30	.016	0,41	.250	6	.024	0,61	.062	1,57	.620	15,75	650	146	2000	4.2	1,91
1160T	.012	0,30	.018	0,46	.250	6	.024	0,61	.070	1,78	.630	16,00	1300	146	1750	6.2	2,81
1170T	.012	0,30	.020	0,51	.250	6	.024	0,61	.079	2,01	.630	16,00	1300	146	1600	7.7	3,49

Parts Identification

All coupling parts have identifying part numbers as shown below. Parts 3 and 4 (Hubs and Grids), are the same for both Type T10 and T20 couplings. All other coupling parts are unique to Type T20. When ordering parts, always SPECIFY SIZE and TYPE shown on the COVER.

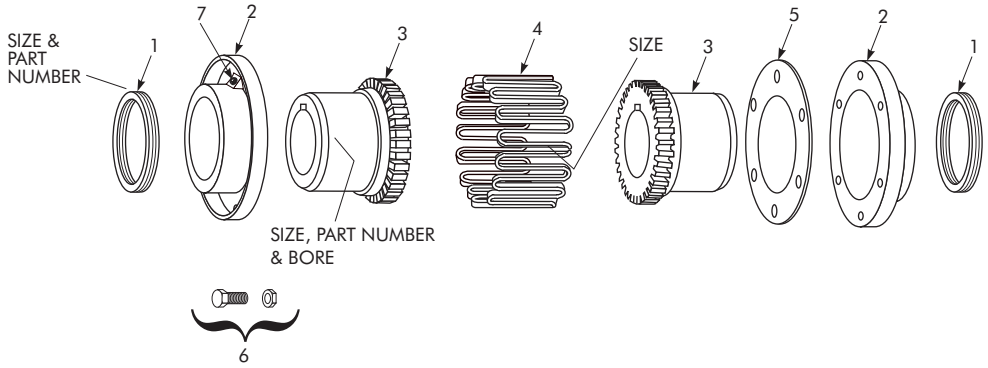
Parts Interchangeability

Parts are interchangeable between Sizes 20T and 1020T, 30T and 1030T, etc. except as noted.

GRIDS — Size 1020T thru 1140T Steelflex couplings use blue grids or non-painted grids. Older models, 20T thru 140T, use orange grids.

CAUTION: *Blue grids may be used in all applications, but DO NOT substitute orange grids for blue.*

PART NUMBER LOCATION



PART DESCRIPTION

1. Seal (T20)
2. Cover (T20)
3. Hub (Specify bore and keyway)
4. Grid
5. Gasket (T20)
6. Fasteners (T20) — Coupling may be supplied with one set each of inch series fasteners and metric fasteners.
7. Lube Plug

ORDER INFORMATION

1. Identify part(s) required by name above.
2. Furnish the following information.

   EXAMPLE:
   Coupling Size: 1030
   Coupling Type: T20
   Model: B
   Bore: 1.375
   Keyway: .375 x .187
3. Price parts from appropriate price list and discount sheet.

Rexnord Industries, LLC, Coupling Group
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