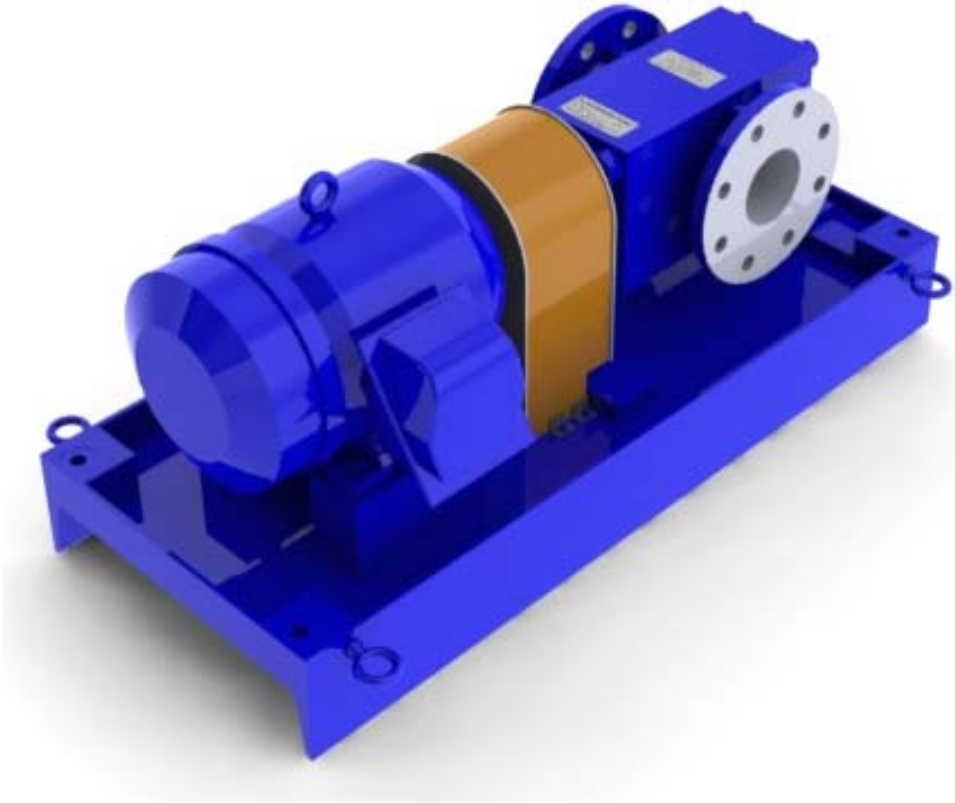
Operation and Maintenance Manual

Northern® 4800-50-D1791



Northern® Pump

A Division of McNally Industries, LLC

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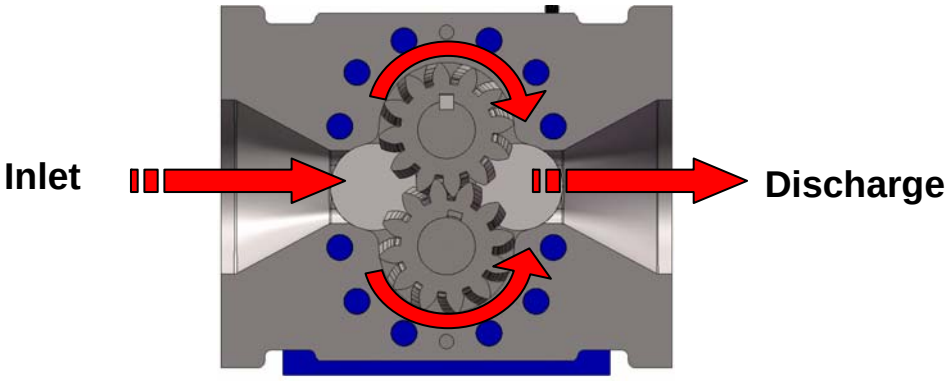
Introduction

The 4800 gear pump is a positive displacement, rotary pump with two gears of equal size. The pump has a constant discharge at 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 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. Test inlet pipe lines with pressure for leaks to 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.

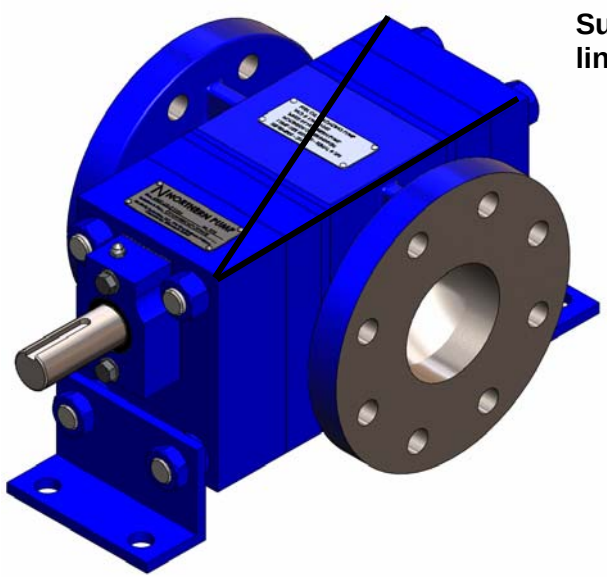
Removal from Installation

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 the 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.

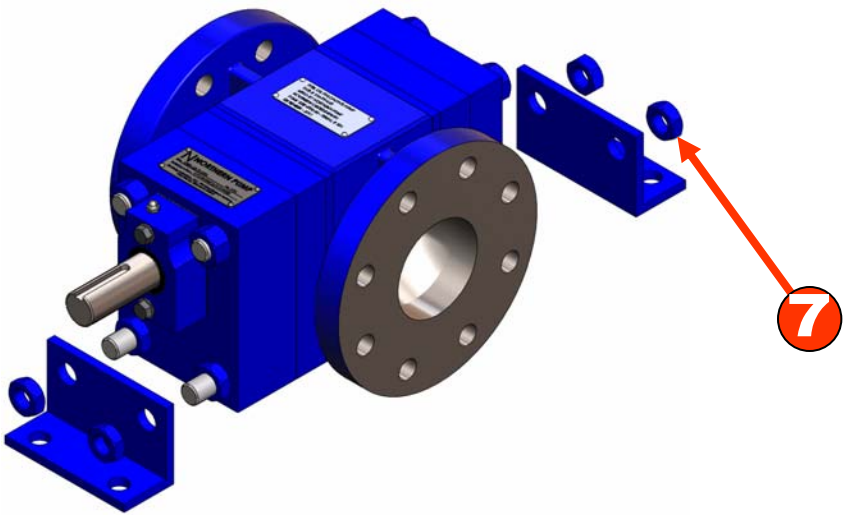


Suggested marker or scribed lines across plates.

Pump Disassembly Steps

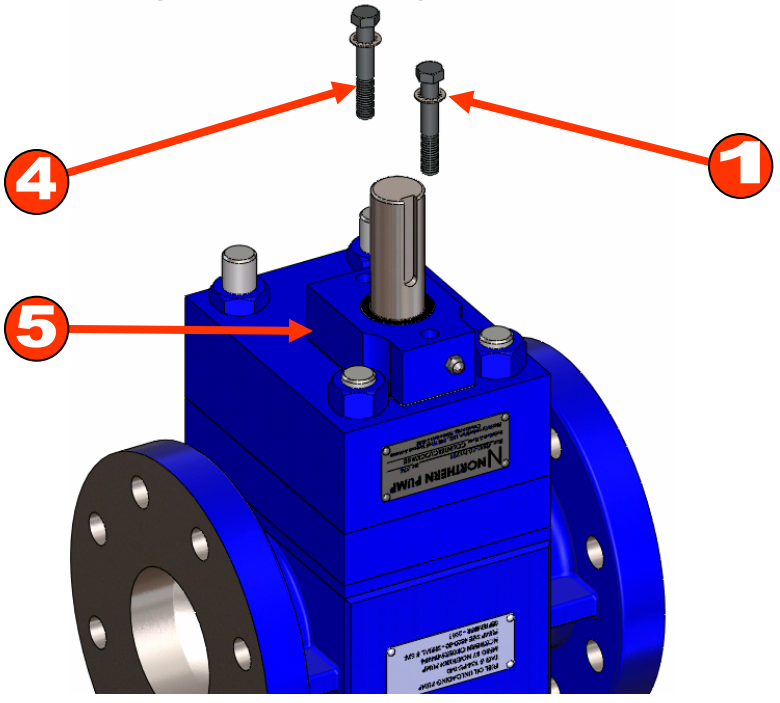
Step 1

Remove the 2x mounting brackets and the 4x outer jam nuts *(7)* that secure the mounting brackets.



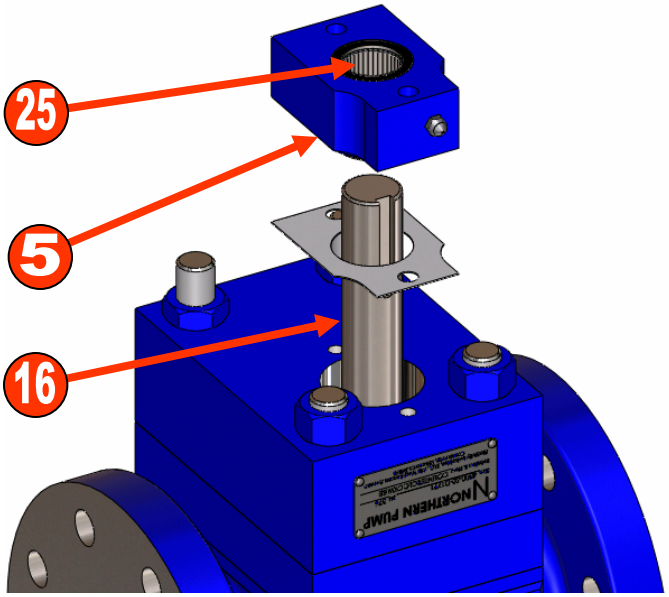
Step 2

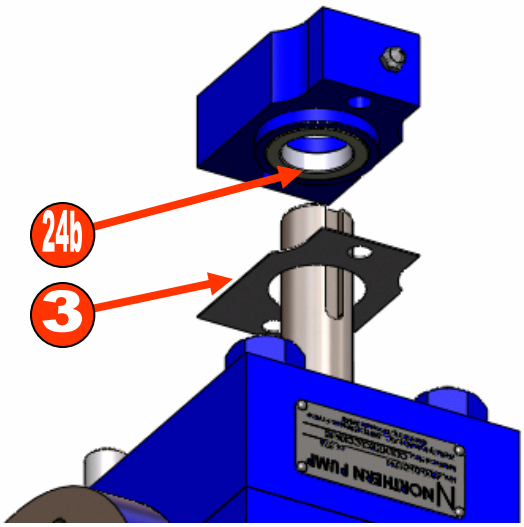
Loosen and remove the 2x Cap Screws *(4)* and 2x Lock Washers *(1)* that retain the Bearing & Seat Housing *(5)*.



Step 3

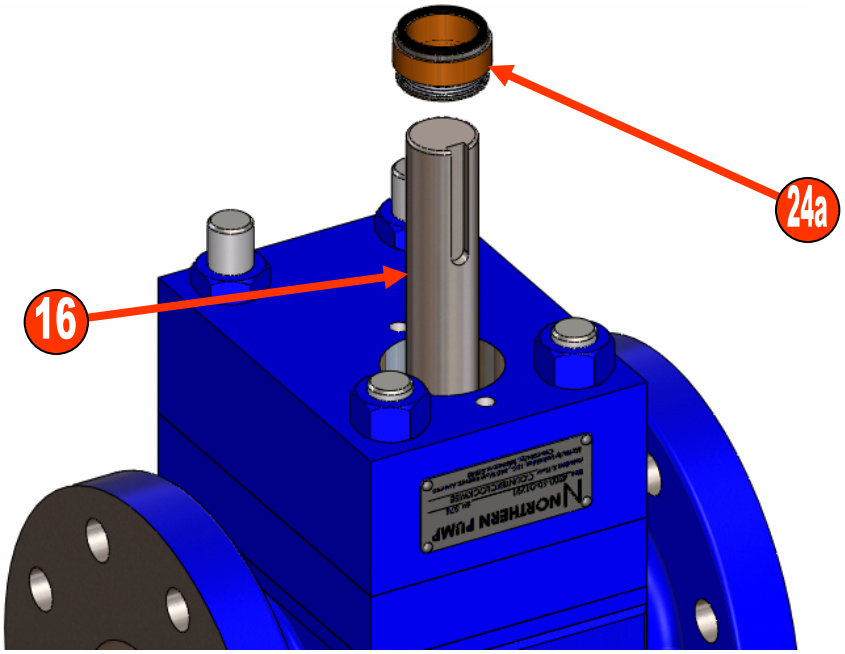
Remove the Bearing & Seat Housing *(5)* and Roller Bearing *(25)* by sliding them up and over the Drive shaft *(16)*. The Roller Bearing is pressed into the Bearing & Seat Housing. The Gasket *(3)* and Mechanical Seal Seat *(24b)* may be retained in the Bearing housing.





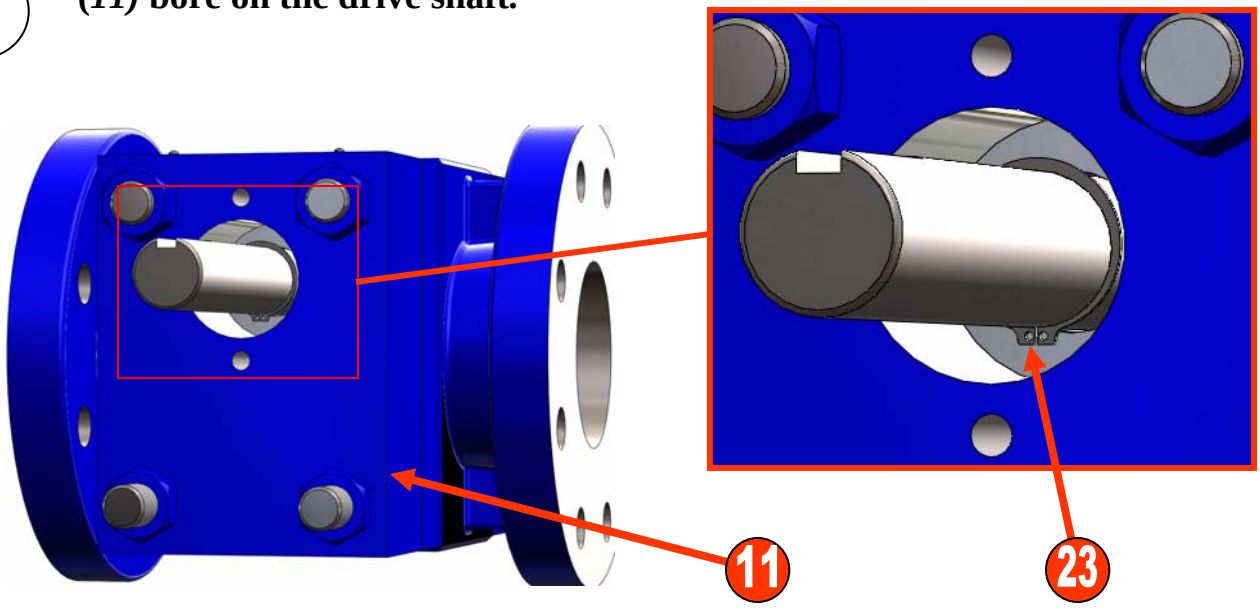
Step 4

Remove the Mechanical Seal Head *(24a)* by sliding it up an over the drive shaft *(16)*.



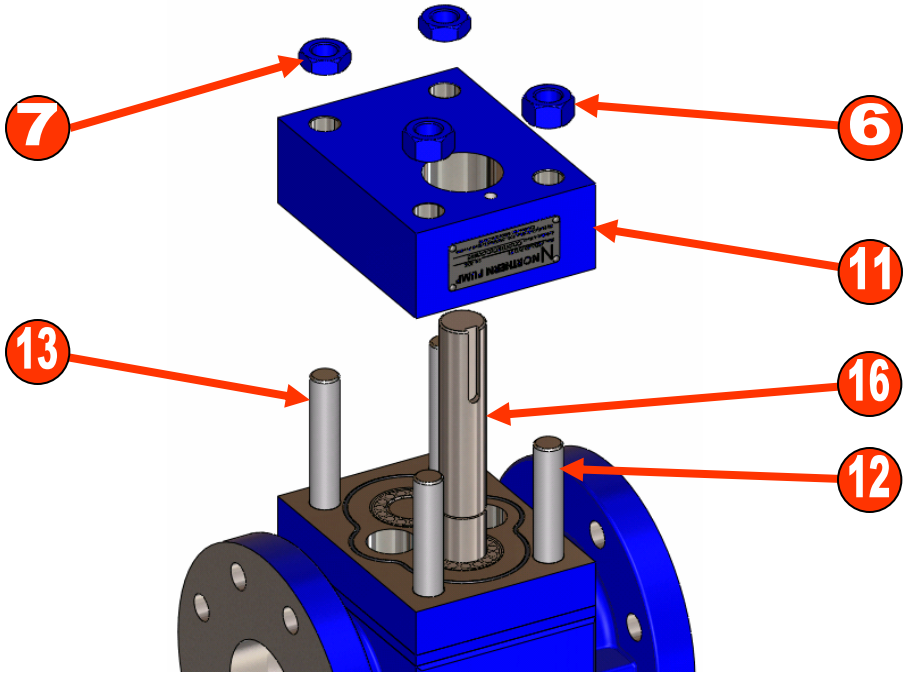
Step 5

Remove the retaining ring *(23)* that is located in the Seal Adapter plate (*11*) bore on the drive shaft.



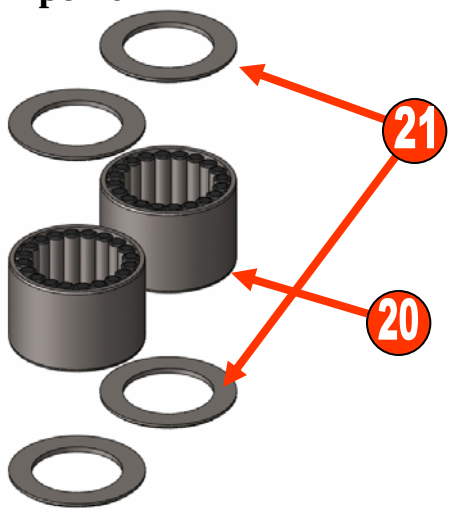
Step 6

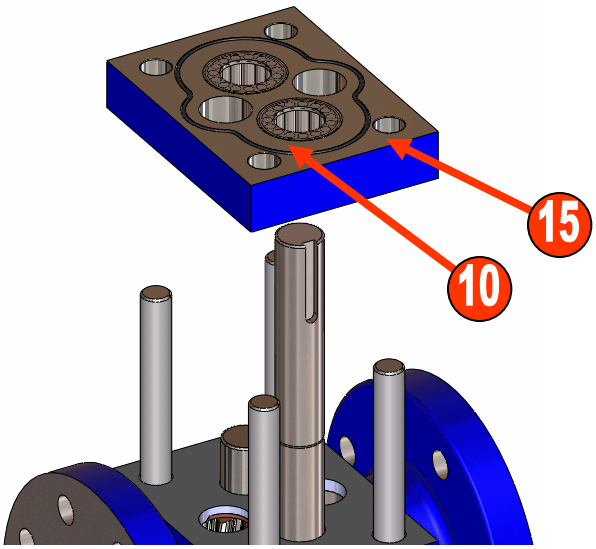
Loosen and remove the 2x whole nuts *(6)* and 2x jam nuts *(7)* that retain the Seal Adapter Plate *(11)*. Remove the Seal Adapter Plate by sliding it up and over the drive shaft *(16)* and studs *(2x 12 & 2x 13)*.



Step 7

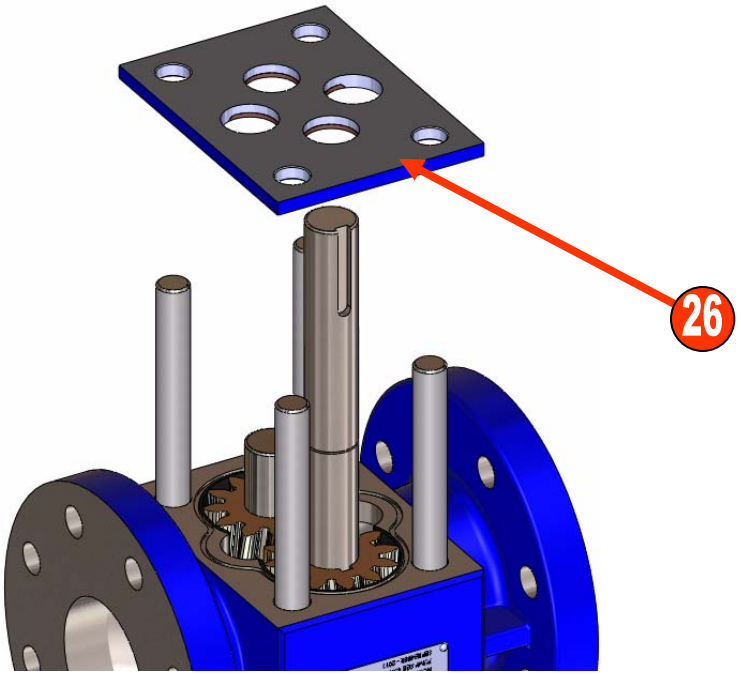
Remove the front Bearing plate *(15)* and O-rings *(10)*. The 4x Bearing Washers *(21)* and 2x Roller Bearings *(20)* will remain installed in the Bearing plate. The Rollers may fall out of the Bearing plate. This is normal. The O-Ring on the underside of the Bearing plate may or may not remain in the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





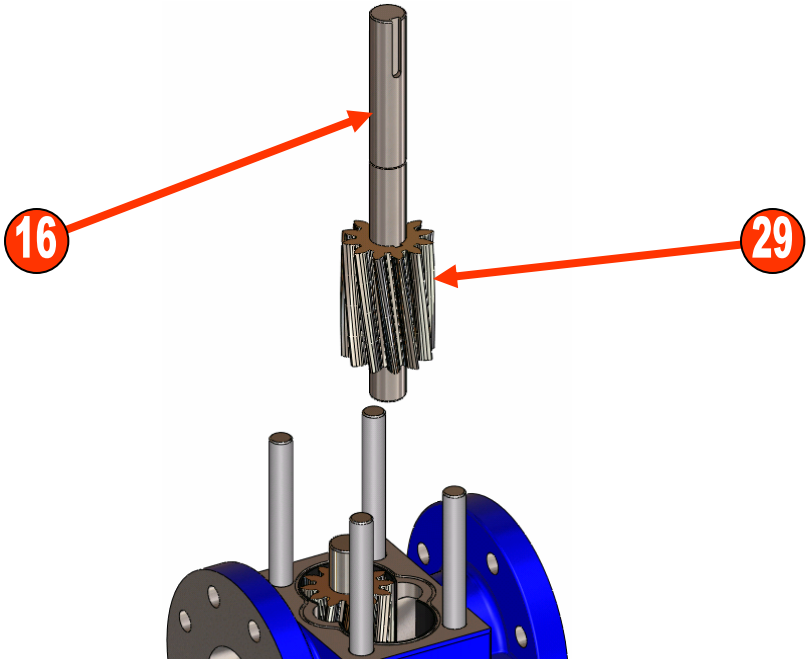
Step 8

Remove the front Liner plate *(26)* from the assembly by sliding it up and over the Drive shaft and studs. Note the orientation.



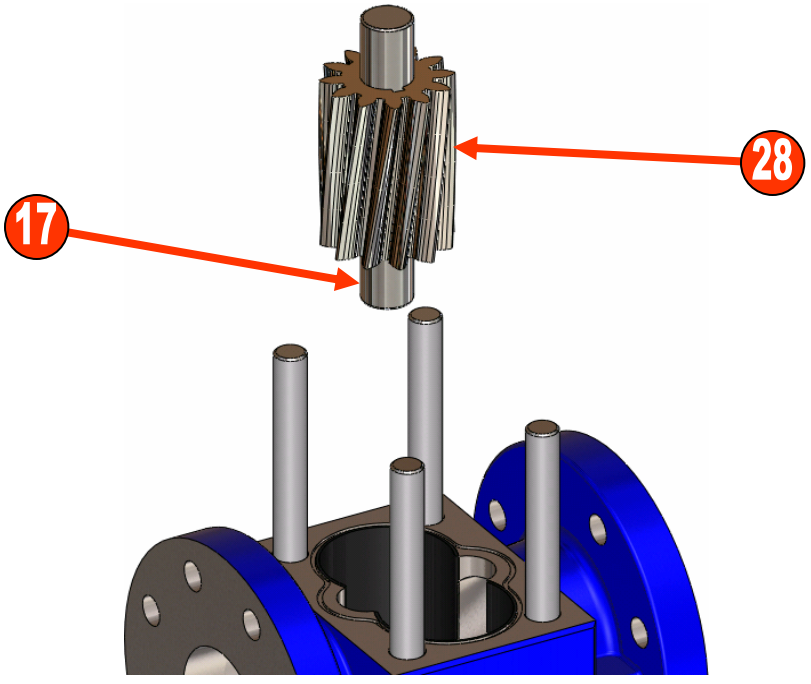
Step 9

Remove the Drive shaft *(16)* and Drive gear *(29)*. The shaft and gear are pressed together as one assembly



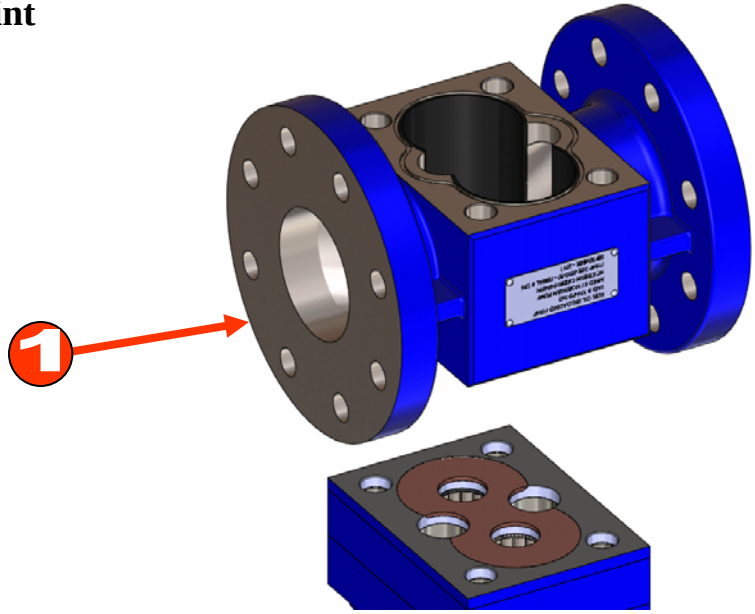
Step 10

Remove the Driven *(17)* shaft and Driven gear *(28)*. The shaft and gear are pressed together as one assembly.



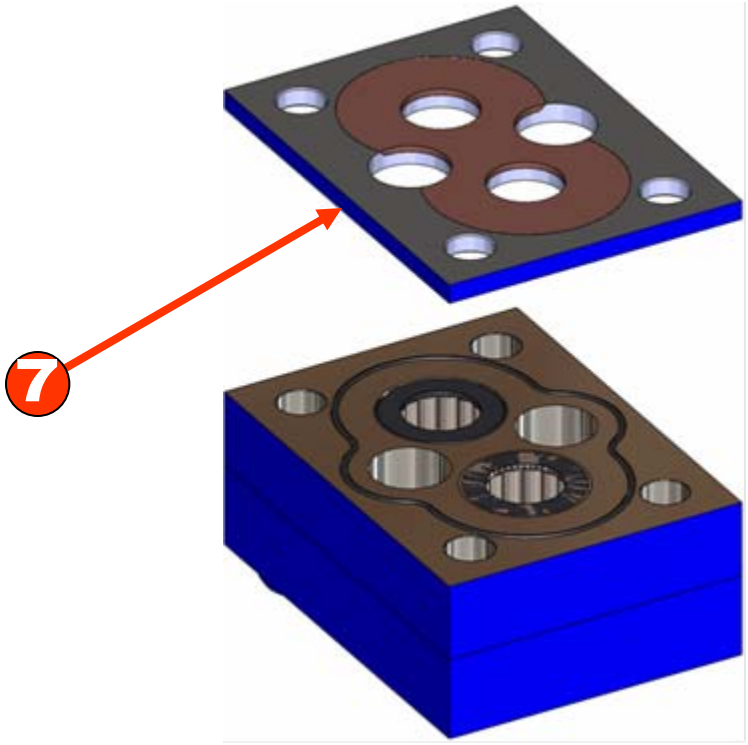
Step 11

Remove the Cylinder *(1)* 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



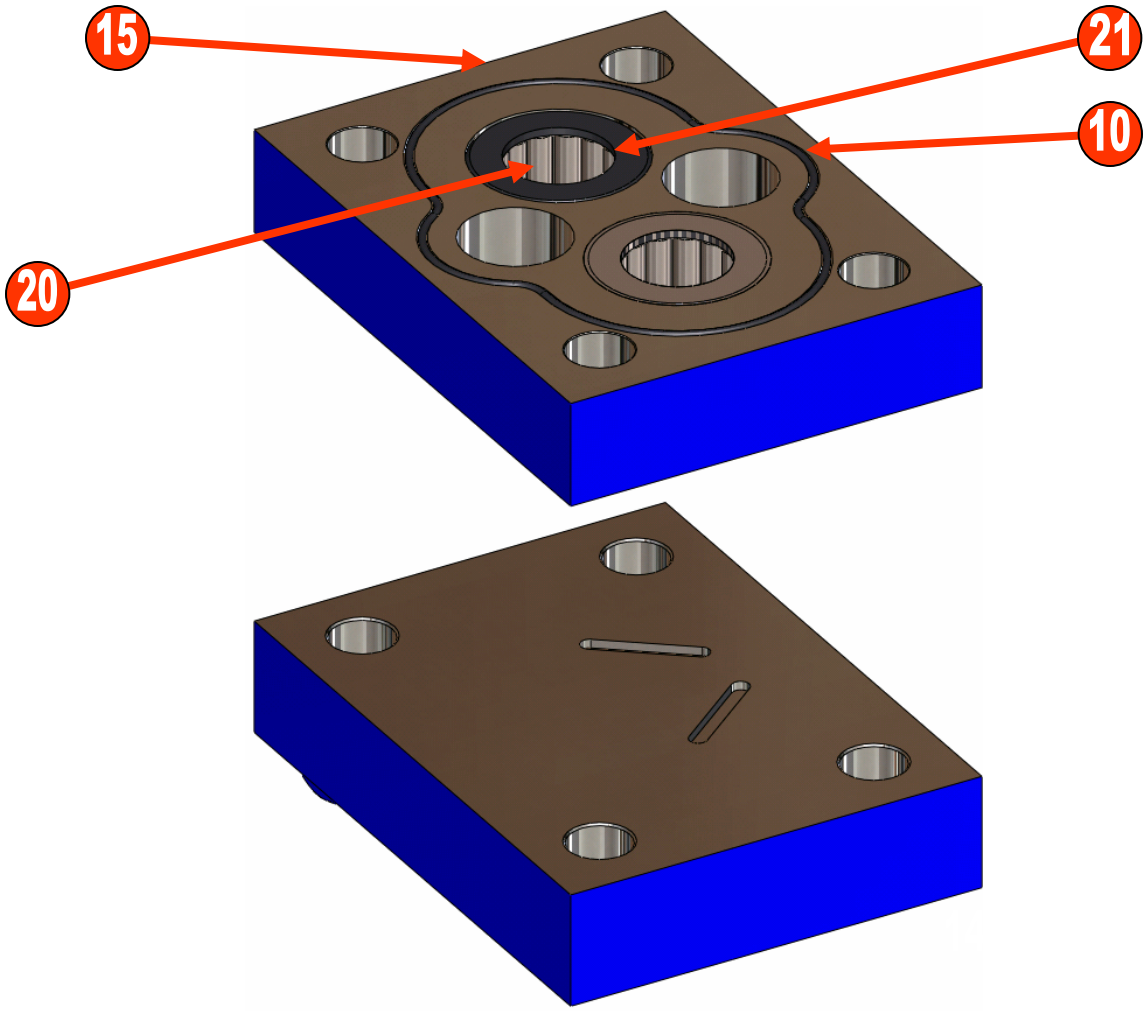
Step 12

Remove the rear Liner plate *(7)*. Note the orientation



Step 13

Remove the rear Bearing plate *(15)* and O-rings *(10)*. The 4x Bearing Washers *(21)* and 2x Roller Bearings *(20)* will remain installed in the Bearing plate. The Rollers 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. 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 or 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 drive 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, 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 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 -- CCW 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 it will cause internal damage to the pump.

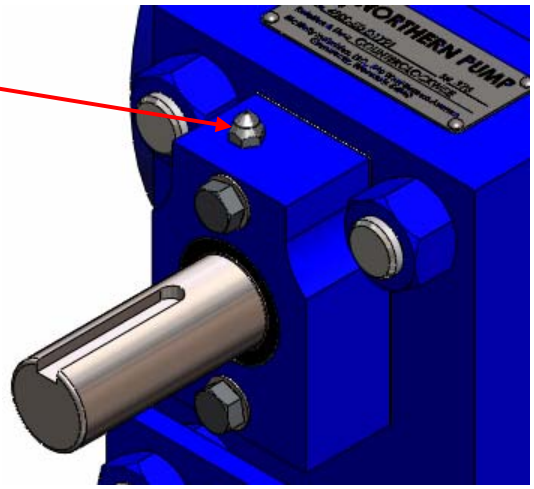
It is recommended that a very small amount of a liquid compatible with the liquid to be pumped be put into the pump at startup. This will lubricate the pump during the startup period and make the pump much easier to prime.

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).

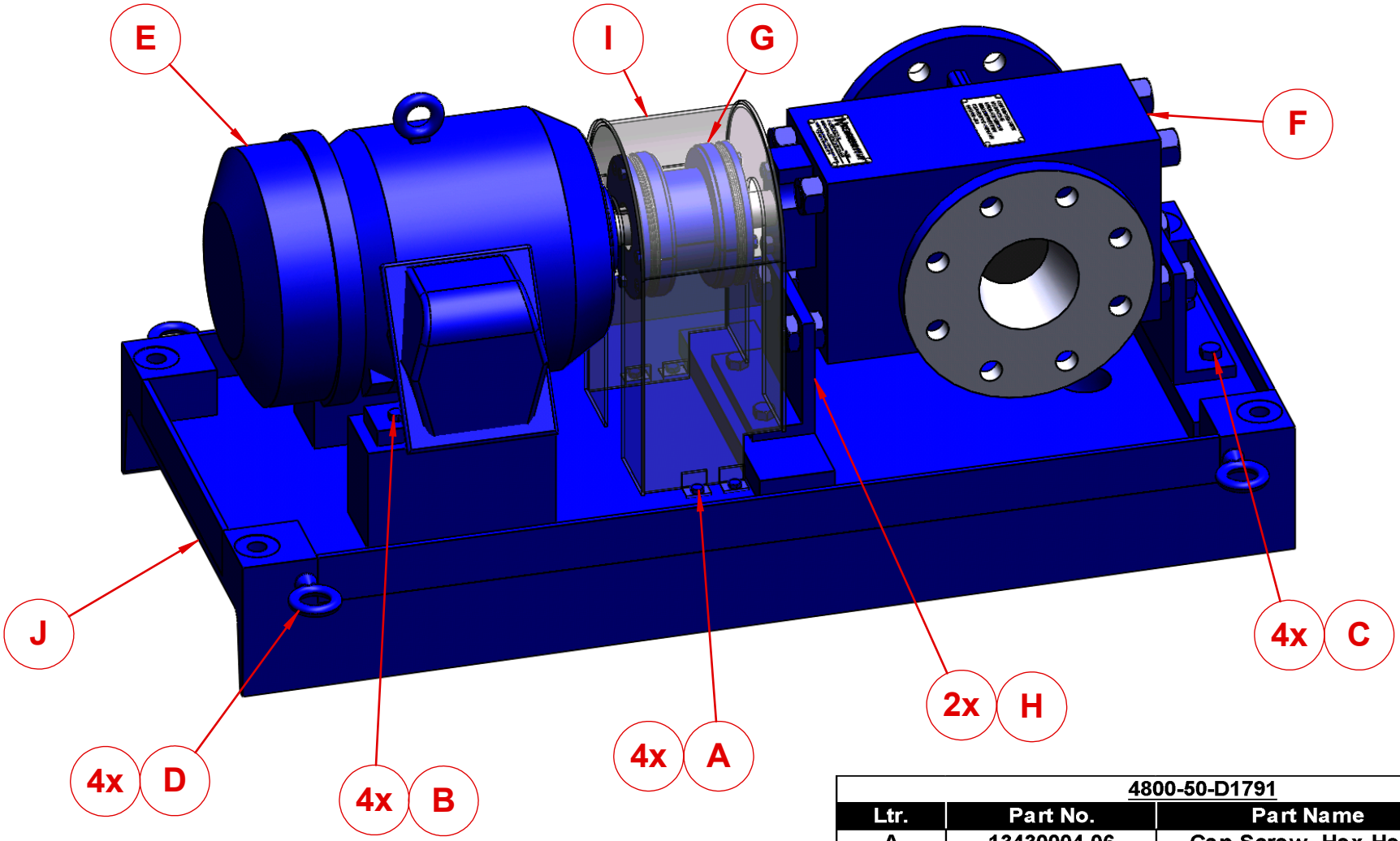
It is required that the coupling be a slip fit on the pump shaft. Do not force the coupling on to the drive shaft.

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

Grease Fitting

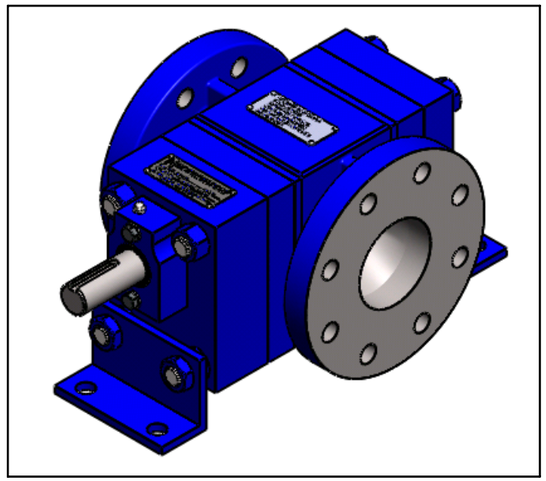


APPEDIX A



4800-50-D1791			
Ltr.	Part No.	Part Name	Qty.
A	13430004-06	Cap Screw, Hex Head	4
B	13430006-20	Cap Screw, Hex Head	4
C	13430008-16	Cap Screw, Hex Head	4
D	19210008-24	Eyebolt	4
E	1LE24212AB112AA	Motor, Electric	1
F	480050D1791	Pump Assembly	1
G	54RDG-200	Coupling	1
H	7069-4800	Bracket, Mounting	2
I	7769-4000	Guard, Coupling	1
J	G-1600-UW1	Base, Unit	1

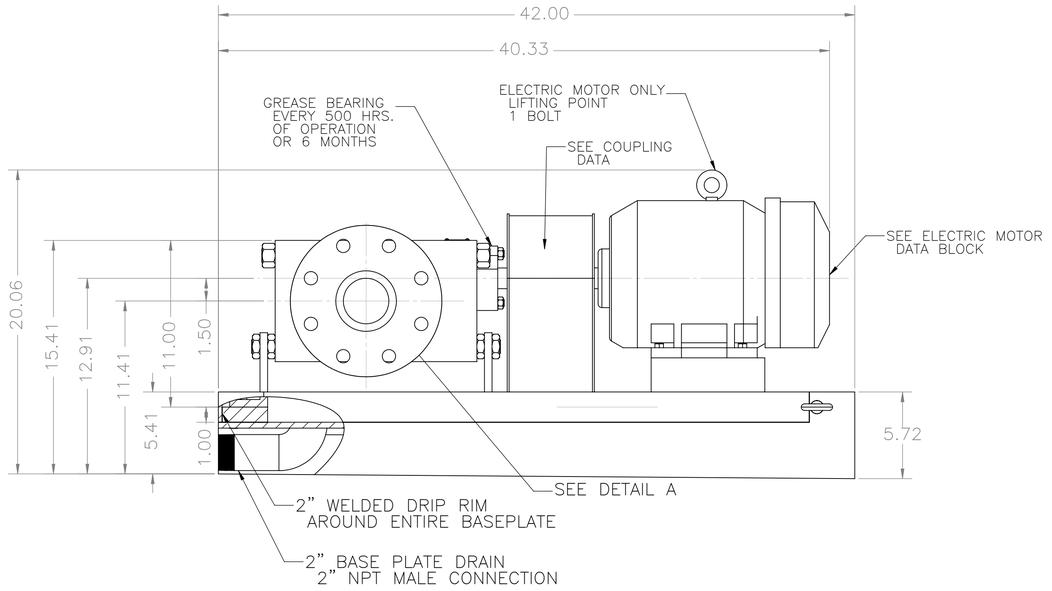
APPEDIX B

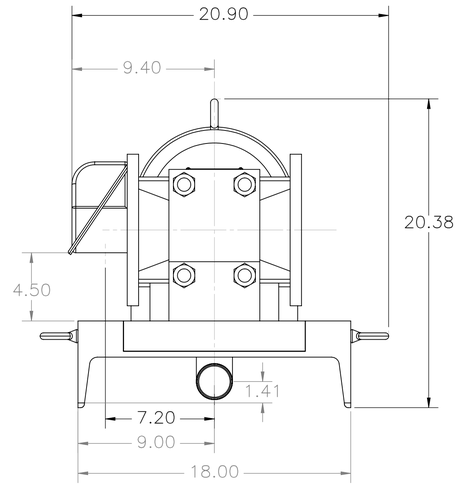


480050D1791

No.	Part No.	Part Name	Qty.
1	11490007	Lock Washer	2
2	1179-4800-50	Cylinder	1
3	1282-4800	Gasket	1
4	13430007-36	Cap Screw	2
5	1519-4800	Bearing & Seat Housing	1
6	15410014	Whole Nut	4
7	15420014	Jam Nut	8
8	17460005-56	Gear Key	1
9	17500006-40	End Key	1
10	19120163-40	O-ring	6
11	2001-4800	Seal Adapter Plate	1
12	28022-15	Stud	2
13	28022-16	Stud	2
14	3001-4800	End Plate	1
15	31342-4800	Bearing Plate	2
16	4009-4800-50	Drive Shaft	1
17	4080-4800-50	Driven Shaft	1
18	56732	Grease Fitting	1
19	5711-4800	Bearing Roller	64
20	5720-4800	Bearing Sleeve	4
21	5730-4800	Outer Bearing Washer	8
22	57455	Nameplate and Pins	2
23	61902	Retaining Ring	1
24a	6914-4800	Mechanical Seal Head	1
24b	6914-4800	Mechanical Seal Seat	1
25	80848	Roller Bearing	1
26	81386-4800-50	Liner Plate, Front	1
27	81387-4800-50	Liner Plate, Rear	1
28	8669-4800-50	Pump Gear, R.H.	1
29	8689-4800-50	Pump Gear, L.H.	1

REVISIONS			
LTR	DESCRIPTION	DATE	APVD





NOTES:

1.0 HYDROSTATIC PRESSURE TEST PUMP HOUSING AT 500 + 10 PSI FOR 1 HOURS MINIMUM WITH NO EXTERNAL LEAKAGE

1.1 THE TESTED HOUSING SHALL INCLUDE ASSEMBLY OF THE FOLLOWING: PUMP CYLINDER, BEARING PLATE(2), LINER PLATE(2), END PLATE, SEAL ADAPTER PLATE, STUDS(4), WHOLE NUT(4) AND JAM NUTS (8)

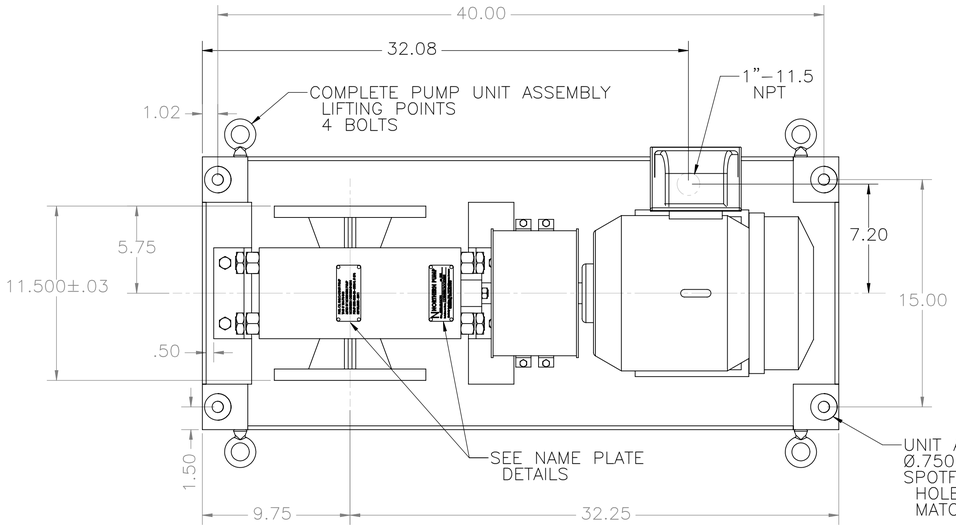
1.2 TEST FLUID– POWER TRANSMISSION FLUID EQUIV. TO MIL–DTL–17111

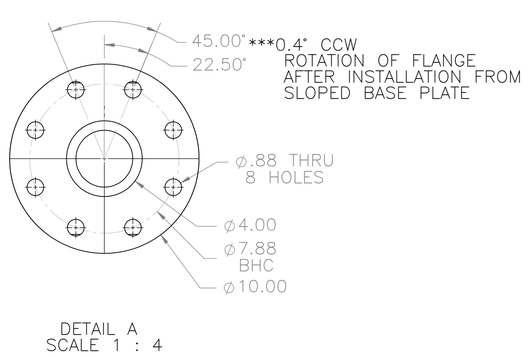
1.3 REMOVE ALL RESIDUAL FLUID FROM UNIT UPON COMPLETION OF HYDROSTATIC TEST.

2.0 PAINT ENTIRE UNIT, EXCEPT COUPLING GUARD PER NORTHERN DRAWING ID–1004.*(APPLICATION OF CUSTOMER SPECIFIED CARBOLINE–CARBOGUARD PAINT SYSTEM FOR NORTHERN PUMPS)*

2.1 COLOR 2713 (GULL GREY)

3.0 PERFORMANCE TEST PUMP ASSEMBLY PER HYDRAULIC INSTITUTE M–100 LEVEL III, INCLUDING NPSH–R TEST. (5% FLOW LOSS)





DETAIL A
SCALE 1 : 4

DRAWING CERTIFIED FOR:
PUMP TECHNOLOGY & SOLUTIONS
4325 SETTINGDOWN CIRCLE
SUITE 104
CUMMING, GA 30028

R. ANTONICH 7–6–2011
NORTHERN SALE ORDER 494696

UPDATED TO COUNTERCLOCKWISE ROTATION 8/15/11

NAMEPLATE DETAIL

SCALE 1:1

FUEL OIL UNLOADING PUMP
TAG # 134-PU-040
MFRD BY NORTHERN PUMP
NORTHERN ORDER#494696
PUMP SIZE 4800-50 - SERIAL # 376
SEPTEMBER - 2011

NORTHERN PUMP
Size 4800-50-D1791 SN 376
Rotation & Flow COUNTERCLOCKWISE
McNally Industries, LLC., 340 West Benson Avenue
Grantsburg, Wisconsin 54840

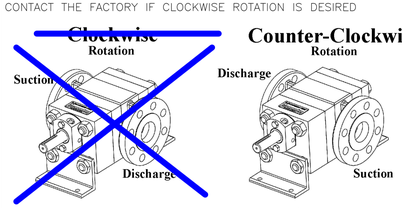
MOTOR DATA:

MAKE: SIEMENS
MODEL NUMBER: 1LE24212AB112AA3
HORSEPOWER: 7.5
RPM: 1800
FRAME: 213T
POWER SUPPLY: 3 PHASE, 60Hz, 460 V
ENCLOSURE: TEFC –IEEE 841

COUPLING DATA:

MAKE: REXNORD
MODEL: 54RDG FLEXIBLE DISC COUPLING
SIZE: 200
HUB MATERIAL: CARBON STEEL
BOLT MATERIAL: ALLOY STEEL
DISC MATERIAL: STAINLESS STEEL

COUNTERCLOCKWISE ROTATION PUMP DESIGN
CONTACT THE FACTORY IF CLOCKWISE ROTATION IS DESIRED



ESTIMATED UNIT WEIGHT 580 LBS.

PUMP DUTY CONDITIONS				PUMP MATERIALS OF CONSTRUCTION				
PUMP SIZE:	4800-50-D1791	Custom		GEARS:	Aircraft Quality 8620 Alloy Steel - Hardened & Surface Ground			
REQUIRED FLOW RATE:	180	Gallons Per Minute (GPM)		SHAFTS:	Aircraft Quality 8620 Alloy Steel - Hardened & Surface Ground			
ACTUAL FLOW RATE:	180.00	Gallons Per Minute (GPM)		BEARING PLATES:	Carbon Steel - ASTM A108 or Equiv.	With Standard Lapped Grooves		
PUMP SPEED:	1750.00	Revolutions Per Minute		LINER PLATES:	Carbon Steel with Tin Bronze Inlay			
LIQUID:	#2 Fuel Oil			CYLINDER:	Carbon Steel with Vacuum Furnace Brazed Iron Wear Insert	Cast Flanges on Cylinder		
VISCOSITY:	1.7	Centipoise (cP)		END PLATE:	Carbon Steel - ASTM A108 or Equiv.			
TEMP:	0	°F		SEAL ADAPTER PLATE:	Carbon Steel - ASTM A108 or Equiv.	No Connections on Seal Adapter Plate		
DISCHARGE PRESSURE:	43.29	Pounds per Square Inch (PSI)		PUMP BEARINGS:	AISI 52100 Roller Bearings - Heat Treated			
SUCTON CONDITION:	7	Pounds per Square Inch (PSI)		DOWEL STUDS:	Carbon Steel			
Δ PRESSURE:	36.29	Pounds per Square Inch (PSI)		MOUNTING BRACKETS:	ASTM A36 Structural Steel			
TORQUE REQUIRED:	182	Inch Pounds		SHAFT SEAL:	John Crane® Type 21 Mechanical Seal	Carbon Face	Viton® Elastomer	
HORSEPOWER REQUIRED:	5.06	Brake Horsepower		SUCTION PORT CONFIGURATION	4" 300 Lb. Flange	DISCHARGE PORT CONFIGURATION	4" 300 Lb. Flange	
SIDE CLEARANCE:	0.0015	BORE CLEARANCE:	STD	PLATE SEALS:	Viton® O-Rings			
HYDRAULIC BALANCED	No			MECHANICAL SEAL SUPPORT BEARING:	Grease Lubricated Sealed Roller Bearing			

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: ± N/A
TWO PLACE DECIMAL ± N/A
THREE PLACE DECIMAL ± .010
DO NOT SCALE THIS PRINT
MATL

DWN R. ANTONICH 6/15/2011
CHK N. SMITH 6/16/2011
MET
STD
APVD

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MCNALLY INDUSTRIES NORTHERN® PUMP
340 WEST BENSON AVE, GRANTSBURG, WI 54840 (715)463-8300

PUMP UNIT ASSEMBLY

CAGE CODE	NORTHERN DWG.	SIZE	FILE NO
96953	4800–50	D	1791
SCALE: 1:5	UNIT WT.	SHEET 1 OF 1	

APPEDIX D

Installation Instructions

Thomas® Series 54 RD Flexible Disc Couplings

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SERIES 54 RD Axially Split Center Member Coupling

Thomas®

Installation Instructions

ATEX: In order for this coupling to meet the ATEX requirements, it is mandatory to precisely follow these installation instructions along with the included supplement form 0005-08-49-01 (on yellow paper). This supplement outlines the ATEX requirements. If the operator does not adhere to these instructions, conformity is immediately invalidated.

WARNING:

- Because of the possible danger to person(s) or property from accidents which may result from improper use or installations of products, it is extremely important to follow the proper selection, installation, maintenance and operational procedures.
- All rotating power transmission products are potentially dangerous and can cause serious injury. They must be properly guarded in compliance with OSHA, ANSI, and any other local standards for the speeds and applications in which they are used. It is the responsibility of the user to provide proper guarding.
- For ATEX requirements the guard must have a minimum of ½ inch (12.7 mm) radial clearance to the coupling major diameter "A" and be of the open mesh design.

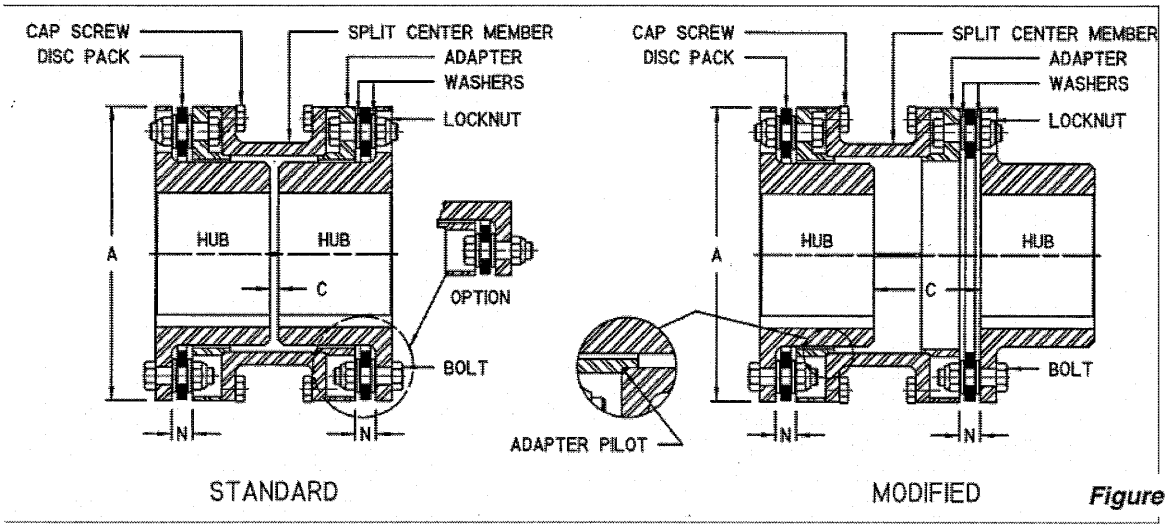

Figure 1

I. **Purpose:** These instructions are intended to help you to install, align, and maintain your THOMAS coupling.

II. **Scope:** Covered here will be general information, hub mounting, alignment, assembly, locknut torque, disc pack replacement, and part numbers.

III. **General Information:**

A. The coupling as received may or may not have the hub attached to the center member assembly. If the hub is attached it is not necessary to disassemble for hub mounting on the shaft. The locknuts are not fully tightened. Examine the assembly to assure there is no visible damage.

B. Remove the cap screws that attach the split center member to the adapter plates and remove the split center member.

IV. **Hub Mounting:**

A. **General.** One of the pieces of equipment (driver or driven) must be moved far enough to allow for hub installation. The hub, adapter, disc pack, and hardware can be mounted on the shaft as one piece. Final locknut tightening is done later. See Section VI. Clean hub bores and shafts. Remove any nicks or burrs. If bore is tapered, check for good contact pattern. If the bore is straight, measure the bore and shaft diameters to assure proper fit. The key(s) should have a snug side-to-side fit with a small clearance over the top.

B. **Straight Bore.**

NOTE: With straight bore only and using the modified arrangement, the shaft can protrude through the hub or hubs to achieve the desired "C" dimension (distance between shaft ends) provided the shaft keyway is long enough to fully engage hub bore. This will not affect the performance of the coupling.

Install key(s) in the shaft. If the hub is an interference fit, heat the hub in oil bath or oven until bore is sufficiently larger than the shaft. 350ºF is usually sufficient. An open flame is not recommended. However, if flame heating is necessary use a very large rose bud tip to give even heat distribution.

A thermal heat stick will help determine hub temperature. **DO NOT SPOT HEAT THE HUB OR DISTORTION MAY OCCUR.** With the hub expanded slide it quickly up the shaft to the desired axial position. A pre-set axial stop device can be helpful.

C. **Straight Bore Slip Fit.** Install key(s) in the shaft. Install the set screw(s) in the hub making sure they do not protrude into the keyway or the bore. Now slide the hub up the shaft to the desired axial position. The set screw(s) which hold the hub in place are tightened using a torque wrench, to the values shown in table 1A.

NOTE: Never use two set screws one on top of the other.

D. **Taper Bore.** Put the hub on the shaft without key(s) in place. Lightly tap hub on the shaft with a soft hammer. This will assure a metal-to-metal fit between shaft and hub. This is the starting point for the axial draw. Record the position between shaft end and hub face with depth micrometer. Mount a dial indicator to read axial hub movement. Set the indicator to "0." Remove hub and install key(s). Remount hub, drawing it up the shaft to the "0" set point. Continue to advance hub up the taper to the desired axial position. Use the indicator as a guide only. A pre-set axial stop device can be helpful. Check the final results with depth micrometer. The hub may have to be heated in order to reach the desired position on the shaft. **DO NOT SPOT HEAT THE HUB OR DISTORTION MAY OCCUR.** Install shaft locknut to hold hub in place.

V. **Shaft Alignment:** Move equipment into place.

A. **Soft Foot.** The equipment must sit flat on its base. Any soft foot must now be corrected.

B. **Axial Spacing.** The axial spacing of the shafts should be positioned so that the disc packs (flexing elements) are flat when the equipment is running under normal operating conditions. This means there is a minimal amount of waviness in the disc pack when viewed from the side. This will result in a flexing element that is centered and parallel to its mating flange faces. Move the connected equipment to accomplish the above.

NOTE: The disc pack is designed to an optimal thickness and is not to be used for axial adjustments by removing or adding individual discs.

As a guide, maximum and minimum values for dimension "N" are given. These dimensions are suggested for initial installation. Additional capacity is available to compensate for thermal and structural movement. Maximum axial capacity values for these couplings are also given. See Table 1 and Figure 1.

C. **Laser Alignment is an Option.** [If not available proceed with dial indicator method.]

D. **Angular Alignment.** Rigidly mount a dial indicator on one hub or shaft, reading the face of the other hub flange, as shown in Figure 2. Rotate both shafts together making sure the shaft axial spacing remains constant. Adjust the equipment by shimming and/or moving so that the indicator reading is within .001 inch per inch of coupling flange diameter. See Chart (A).

E. **Parallel Offset.** Rigidly mount a dial indicator on one hub or shaft, reading the other hub flange outside diameter, as shown in Figure 3. Compensate for indicator set-up sag. Rotate both shafts together. Adjust the equipment by shimming and/or moving so that the indicator reading is within .001 inch per inch of the axial length between flex elements. See Chart (A).

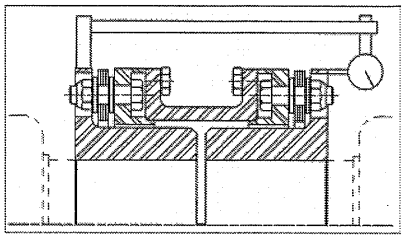

Figure 2

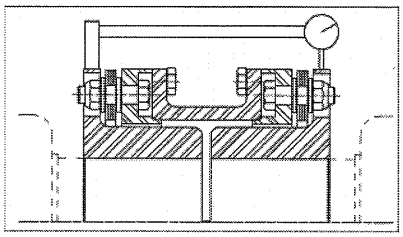

Figure 3

SUGGESTED MAXIMUM ALIGNMENT VALUES

COUPLING SIZE	TOTAL INDICATOR READING (T.I.R.)	
	ANGULAR	PARALLEL
162	.004	.003
200	.005	.004
225	.006	.004
262	.007	.005
312	.008	.005
350	.009	.006
375	.010	.007
425	.011	.008
450	.012	.009
500	.013	.010
550	.014	.011
600	.016	.012
700	.018	.013

CHART A

NOTE: If the driver or driven equipment alignment tolerances are more stringent than our recommendations, the driver or driven equipment tolerances should be used. Also be sure to compensate for thermal movement in the equipment. The coupling is capable of approximately four times above shaft misalignment tolerances. However, close alignment at installation will provide longer service with smoother operation.

VI. **Final Assembly:**

A. If this coupling has been factory balanced, the hub flange will be match marked to the adapter. Recheck to assure the marks line up.

B. If the coupling hubs were mounted without the disc pack/adapter assemblies installed, install as follows. Install the bolts through the hub bolt holes.

NOTE: If there is not enough room axially behind the hub, bolts can be installed from the opposite direction. See Figure 1 option.

Add a washer to each bolt. **The beveled side of the washer should always be against the disc pack.** Now position the disc pack/adapter sub assembly onto the bolts. See Figure 1. Add the remaining beveled washers making sure all the parts pilot on the body ground part of the bolt. Now add the locknuts and slightly tighten the locknuts.

NOTE: All bolt threads should be lubricated. A clean motor oil is recommended.

C. Now fully tighten all the disc pack locknuts using the torgue values shown in Table 1.

D. Slide the equipment back into alignment, setting the axial spacing "C" per table 1. "C" is a reference dimension only. Due to the stack up in axial dimensional tolerances the final axial positioning should be set by the procedure outlined in section V-B.

E. Install the two split center member halves. Position them between the adapters making sure the bolt holes line up with the tapped holes in the adapter and the number stamped on each half of the flange O.D. are the same and line up with each other. If the coupling has been balanced, make sure the match marks all line up. See Figure 1 and Figure 4.

NOTE: With the coupling in good alignment, the cap screws will fit through the holes more easily.

F. Install all the cap screws, leaving them loose. Now hold each center member half, tight against the adapter pilot (see figure 1) and tighten the cap screws. A band or strap type clamp may be used to assist in this operation. **Pilot seating is important.** Using a torque wrench tighten all the cap screws to the values shown in table 1.

It is recommended that all the locknuts be retightened after several hours of initial operation when ever possible.

G. For further help with the installation or alignment, consult Rexnord.

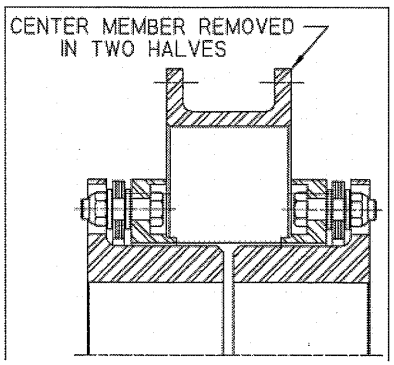

Figure 4

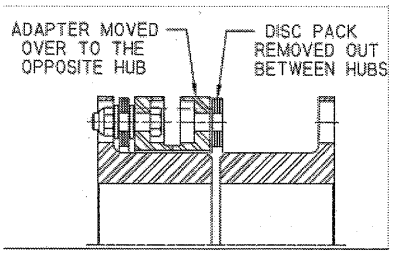

Figure 5

TABLE 1 - Locknut Tightening Torques, Dimension "N" Limits

COUPLING SIZE	"A" Dia. In	"C" Dim. In	"C" Dim. One Hub Out Max In	"C" Dim. Both Hubs Out Max In	Dim. "N" In		Axial Capacity In	Disc Pack Locknut			Center Member Cap Screws		
					Min.	Max.		Thread Size	Torque Ft-Lbs (In-Lbs)	Torque Nm	Thread Size	Torque Ft-Lbs (In-Lbs)	Torque Nm
162	4.34	.12	1.77	3.42	.30	.31	±.036	1/4 - 28	(156)	18	1/4-20	(54)	6
200	5.44	.12	1.97	3.80	.37	.38	±.036	5/16 - 24	25	34	1/4-20	(54)	6
225	5.69	.12	2.03	3.94	.37	.38	±.036	5/16 - 24	25	34	1/4-20	(54)	6
262	6.62	.19	2.42	4.65	.48	.49	±.043	3/8 - 24	30	41	5/16-18	(126)	14
312	7.81	.19	2.62	5.05	.51	.52	±.051	7/16 - 20	40	54	1/4-20	(108)	12
350	8.69	.25	3.06	5.87	.55	.56	±.056	1/2 - 20	95	129	1/4-20	(108)	12
375	9.69	.25	3.27	6.27	.60	.61	±.062	9/16 - 18	130	176	5/16-18	18	24
425	10.50	.25	3.61	6.97	.63	.64	±.067	5/8 - 18	175	237	5/16-18	18	24
450	11.31	.31	4.16	7.99	.72	.74	±.072	11/16-16	150*	203*	3/8-16	33	45
500	12.88	.31	4.27	8.21	.79	.81	±.082	3/4-16	190*	258*	3/8-16	33	45
550	14.44	.38	4.81	9.24	.92	.94	±.092	7/8-14	255*	346*	7/16-14	52	71
600	16.00	.38	5.39	10.42	.99	1.02	±.102	1-14	335*	454*	1/2-13	80	108
700	18.25	.38	6.22	12.06	1.20	1.23	±.115	1 1/8-12	425*	576*	1/2-13	80	108

TABLE 1A SET SCREW TIGHTENING TORQUE

Set Screw Thread Size	Torque In-Lbs	Torque Ft-Lbs	Torque Nm
1/4-20	66	6	7
1/4-28	76	6	9
5/16-18	132	11	15
5/16-24	144	12	16
3/8-16	240	20	27
3/8-24	276	23	31
1/2-13	600	50	68
1/2-20	660	55	75

NOTE:

1. These torque values are approximate for steel bolts with lubricated threads. Modification will be necessary for stainless steel. For stainless steel the tightened torque must be reduced to 60% of the values shown. Bolt and locknut threads must also be liberally coated with molybdenum disulfide grease.
2. **Bolts should be held from rotating while the locknuts are tightened to the values shown.**
3. * These locknuts are cad plated.
4. For zinc plated cap screws and locknuts, torque must be increased by a factor of 1.3.

VII. Disc Pack Replacement: If it becomes necessary to replace the disc pack, it can be done without moving the equipment.

A. Remove the cap screws and then remove the two center member halves from the assembly. See Figure 4.

B. Remove the locknuts, bolts, and washer from one end.

C. Slide the adapter axially out of the way letting it rest on the other end hub. See Figure 5.

D. The disc pack is now free to be removed through the axial gap between the two hubs ("C" dimension spacing), see Figure 5. If there is not enough room between the hubs for the total disc pack, the disc pack may be taken out and replaced one disc at a time provided the orientation is maintained on reassembly.

E. Slide the new disc pack through the hub gap. Install the bolts through the hub bolt holes.

NOTE: If bolts need to be replaced and there is not enough room axially behind the hub, new bolts can be installed from the opposite direction. See Figure 1 option.

Add a washer to each bolt. **The beveled side of the washer should always be against the disc pack.** Now position the disc pack onto the bolts. See Figure 1. Add the remaining beveled washers making sure all the parts pilot on the body ground part of the bolt. Now add the locknuts. Do not tighten at this time.

NOTE: All bolt threads should be lubricated. A clean motor oil is recommended.

F. Slide the adapter back into position. Install the bolts through the adapter bolt holes. Add a washer to each bolt. **The beveled side of the washer should always be against the disc pack.** Now position this assembly so that the bolts go through the disc pack, making sure the match marks, when used, line up. See Figure 1. Add the remaining beveled washers making sure all the parts pilot on the body ground part of the bolt. Now add the locknuts and slighty tighten the locknuts.

G. Using a torque wrench, fully tighten the locknuts to the torque value as shown on Table 1.

NOTE: If there is not enough room axially to torque the locknuts that hold the disc pack to the adapter, it may be necessary to unbolt the disc pack from the hubs and slide the adapter/disc pack assembly axially. Now tighten these locknuts first, then complete the coupling assembly.

H. Rework the other end if required as per sections VII B through G.

I. Install the two split center member halves. Position them between the adapters making sure the bolt holes line up with the tapped holes in the adapter and the number stamped on each half of the flange O.D. are the same and line up with each other. If the coupling has been balanced, make sure the match marks all line up. See Figures 1 and 4.

J. Install the cap screws and, using a torque wrench, tighten them to the value as shown in Table 1A.

K. Recheck the alignment of the coupling correcting as required.

VIII. For replacement parts, see Table 2.

Table 2
Part Numbers and Quantity Required

Coupling Size	Disc Pack		Center Member Assembly Stainless Disc Packs Part No.	Disc Pack Joint Hardware						Center Member Cap Screws	
				Bolts		Locknuts		Washers			
	Part No.	Qty.		Part No.	Qty.	Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
162	310663	2	6788151	916087	12	916504	12	212706	24	009561	16
200	710665	2	6788152	116088	12	316505	12	712610	24	009561	24
225	610984	2	6788153	116088	16	316505	16	712610	32	009561	32
262	210985	2	6788154	316089	16	716506	16	014762	32	008110	32
312	210957	2	6788155	516090	16	116507	16	017142	32	021605	32
350	010952	2	6788156	716091	16	516508	16	019099	32	021605	32
375	610943	2	6788157	916092	16	916509	16	019101	32	021606	32
425	010986	2	6788158	116093	16	316510	16	019102	32	021606	32
450	410987	2	6788159	316094	16	716511*	16	516100	32	021607	32
500	620735	2	6788160	516095	16	116512*	16	711460	32	021607	32
550	310962	2	6788161	716096	16	039125*	16	311750	32	020790	32
600	910959	2	6788162	916097	16	020253*	16	612127	32	021608	32
700	420803	2	6788163	116098	16	020254*	16	511413	32	021608	32

NOTE: Refer to Figure 1 for arrangement drawing.
* These locknuts are cad plated.

APPEDIX E

Motor Data And Instruction Manual

Siemens 1LE24212AB112AA3

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SIEMENS

NEMA Motor Data

Ordering data : **1LE2421-2AB11-2AA3**

Client-order-no. / :
Order-no. / :
Offer-no. / :
Remarks / :

Item-no. / :
Consignment-no. / :
Project / :

Nameplate Data

Type	SD100 IEEE841 - NEMA Premium Efficiency		
HP	7.5	Rating	Cont.
Voltage	460V STD, 60HZ (12)	Ins. Class	Class F (Standard)
Amps	9.7	S.F.	1.15
FL RPM	1765.0	Amb. Temp.	40 deg C
FL Efficiency	91.7 %	Temp. Rise	Class B
FRAME	213T'	kVA Code	J
DE AFBMA	40BC02JP3	NEMA Des	B
ODE AFBMA	40BC02JP3	Mtr WT	206.0
Hertz	60	Ph	3

Bearing Data

DE Bearing Size	6208 Z C3
DE Bearing Type	Ball Bearing
DE AFBMA	40BC02JP3
ODE Bearing Size	6208 Z C3
ODE Bearing Type	Ball Bearing
ODE AFBMA	40BC02JP3

Mechanical Data

SAFE STALL TIME	HOT (s)	25.0			
	COLD (s)	42.0			
Rtr wt (lbs)	0.0	Rtr WK2	0.803		
FLT (ft-lbs)	22.0	LRT	60.0	BDT	100.0

Ext Load Inertia (WK2) Capability 80.0

Typical Performance Data

Load	No Load	1/2	3/4	Full Load	LRC
Efficiency		90.7 %	91.7 %	91.7 %	
Power Factor		60.5 %	72.3 %	78.9 %	
Current (A)	5.0 A			9.7 A	63.0 A

Typical Noise Data

A-weighted Sound	Octave Band Center Frequencies Hertz (Hz)									
Pressure Level	63	125	250	500	1000	2000	4000	8000	SPL	67.0
at 3 feet	0.0	40.0	58.0	62.0	64.0				SPwrL	77.0

Wiring Connection Information

Description 3 PHASE - 3 LEAD - WYE

Voltage	L1	L2	L3	Connected together
-- -- --	-- -- --	-- -- --	-- -- --	-- -- --
HIGH	T1	T2	T3	-- -- --

Lubrication Information

Manufacturer	Mobil Polyrex EM or equal
Type	Polyurea (standard)
DE Capacity (oz.)	0,3
ODEnd Capacity (oz.)	0,3

Relubricate bearings every six months (more frequent if conditions require). See Instruction Manual.

Special configurations :

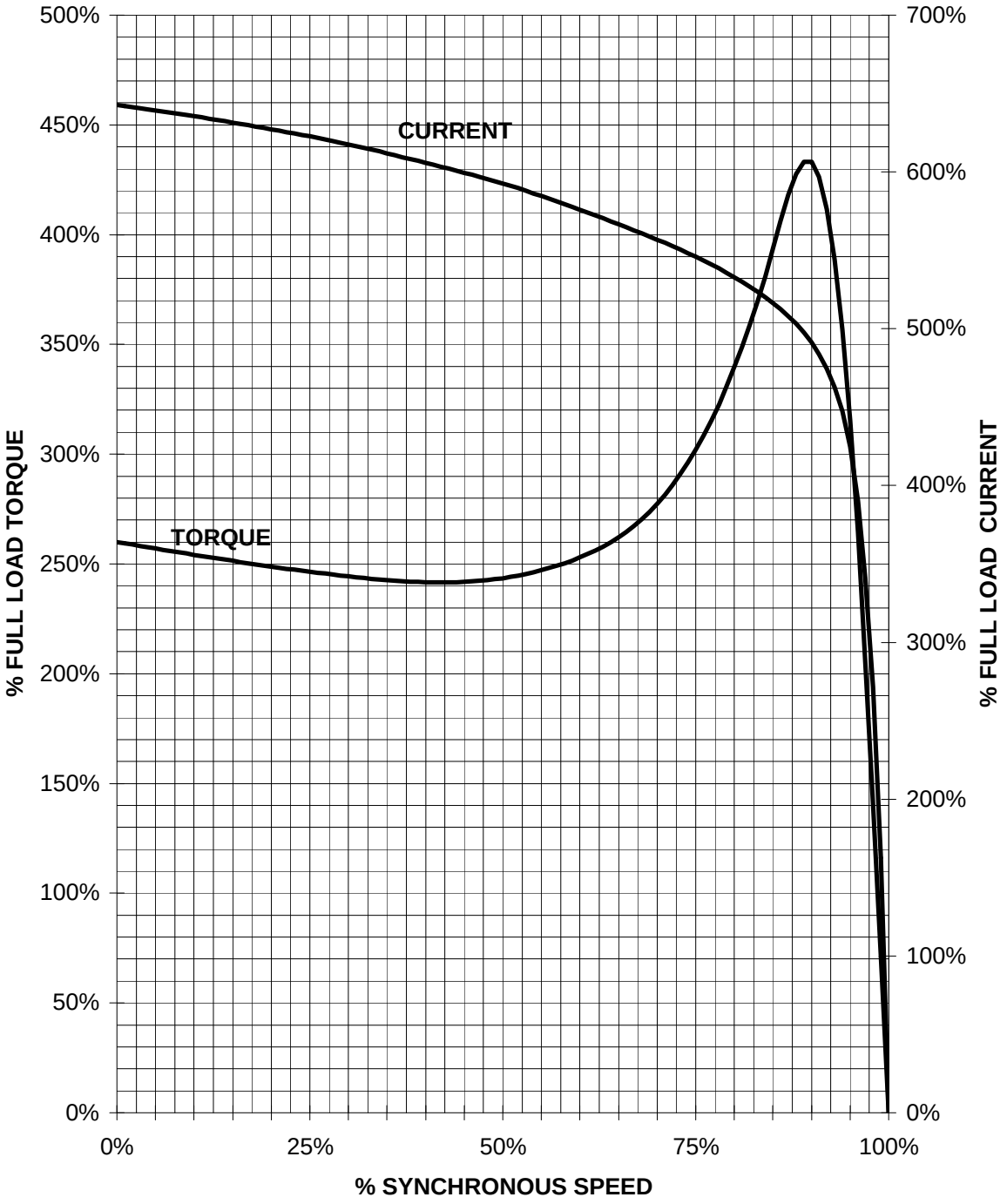
Technical and ordering data are subject to change. There may be discrepancies between calculated and rating plate values.

Version: 2010.05.18
generiert / generated Tue Sep 06 22:55:45

SIEMENS ENERGY & AUTOMATION, INC.

HP	7,5	VOLTS	460	RPM	1800	TYPE	SD100IEEE NP
HZ	60	PHASE	3	FRAME	213T	NEMA	B

TORQUE & CURRENT VS. SPEED



CUSTOMER:_____ PO#:_____ ORDER#:_____

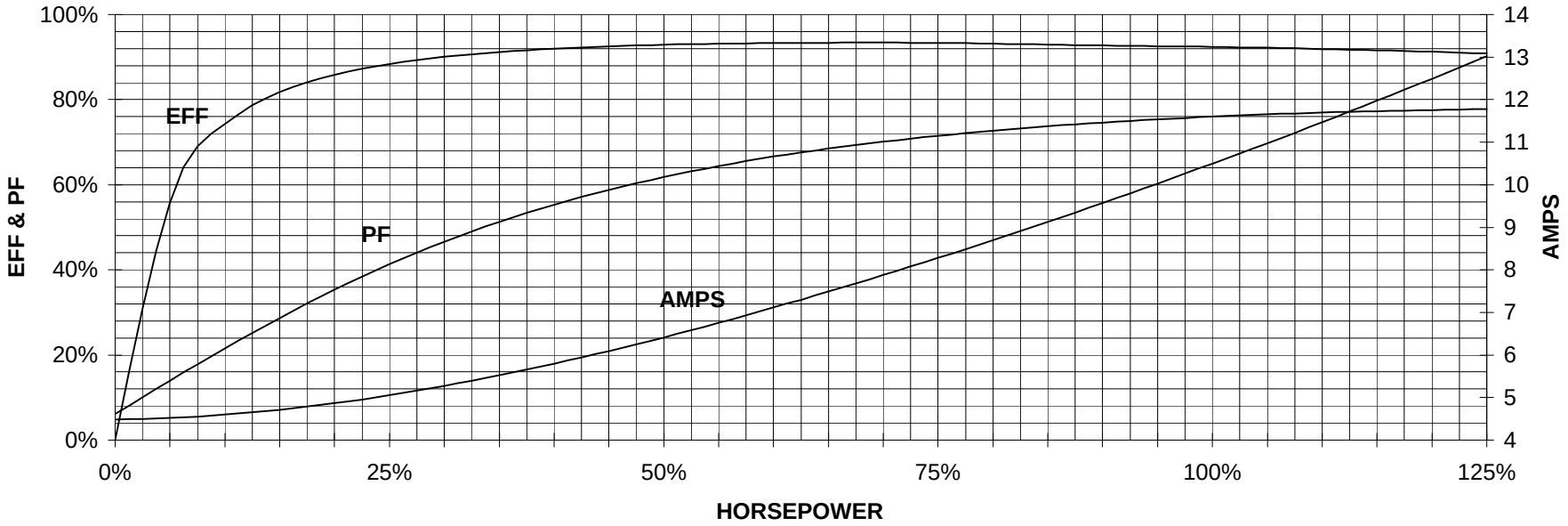
PERFORMANCE BASED ON DESIGN CALCULATIONS. SUBJECT TO CHANGE WITHOUT NOTICE.
REV. 1

7.5 HP 1800 RPM 213 FRAME 460 VOLTS 3 PHASE NEMA DESIGN B

SIEMENS ENERGY & AUTOMATION, INC.

PERFORMANCE CURVE

SD100IEEE NP



CUSTOMER_____ ORDER #_____ PO #_____

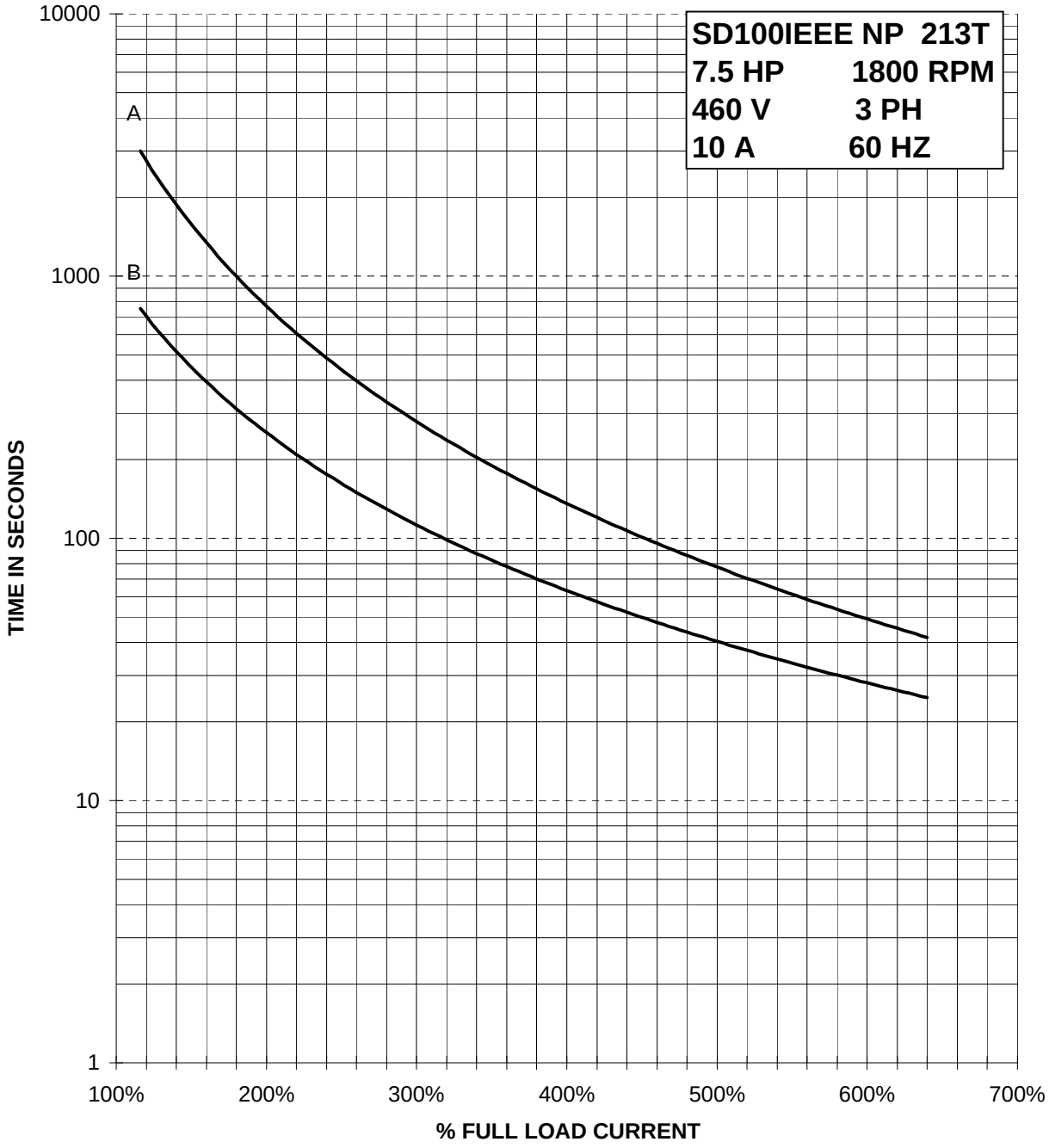
PERFORMANCE BASED ON DESIGN CALCULATIONS. SUBJECT TO CHANGE WITHOUT NOTICE.

REV. 1

SIEMENS ENERGY & AUTOMATION, INC.

CUSTOMER: _____ **PO#:** _____ **ORDER#:** _____

STALL TIME VS. CURRENT CURVE



TIME MOTOR CAN RUN AT ANY GIVEN
AMPS STARTING WITH MOTOR AT:
A-AMBIENT TEMP. OF 40° C
B-FULL LOAD TEMP

PERFORMANCE BASED ON DESIGN CALCULATIONS. SUBJECT TO CHANGE WITHOUT NOTICE.
REV. 1

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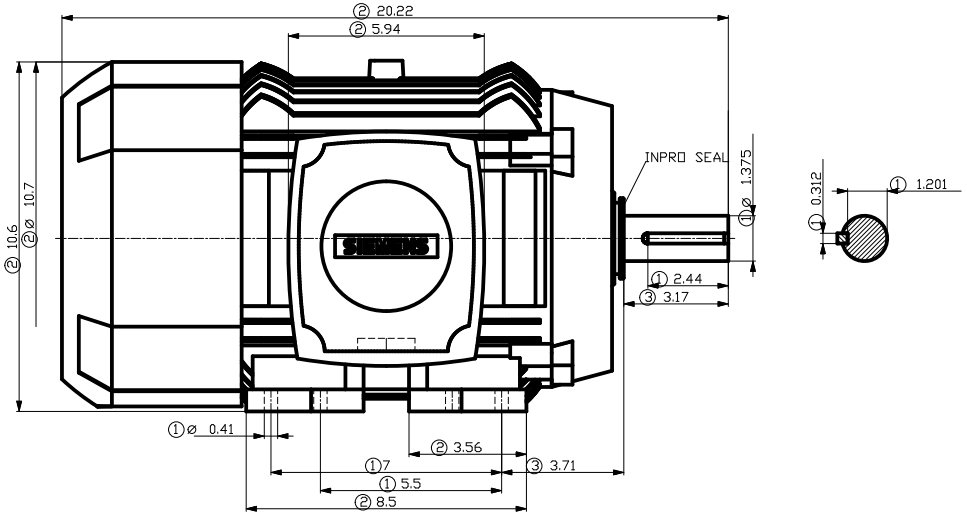

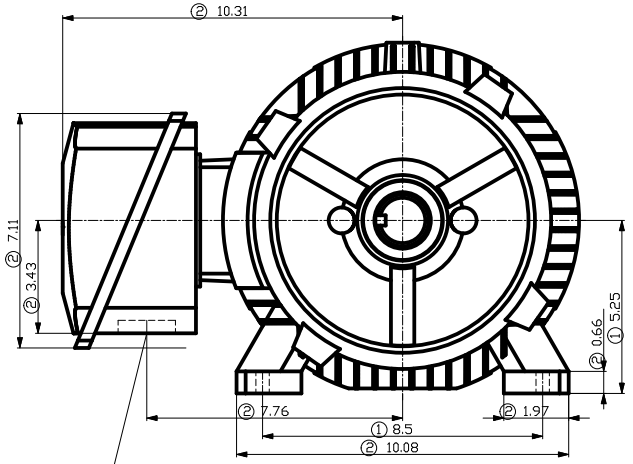

① Tolerances according to NEMA std.

② All these dimensions corresponding to assemblies and castings shall have a tolerance as per DIN standard 1686-GTB 19

③ Not according to NEMA std.

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Unit	?DIMENSION?
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SIEMENS

Installation • Operation • Maintenance

Instructions

Induction Motors
143-449 Frame

NMIM-L1000

SIEMENS

TABLE OF CONTENTS

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

The contents of this instruction manual shall not become part or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

INTRODUCTION

THIS EQUIPMENT CONTAINS HAZARDOUS VOLTAGES, ROTATING PARTS AND HOT SURFACES. SEVERE PERSONAL INJURY OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES, AND MAINTENANCE PROCEDURES CONTAINED HEREIN. THE SUCCESSFUL AND SAFE OPERATION OF THIS EQUIPMENT IS DEPENDENT UPON PROPER HANDLING, INSTALLATION, OPERATION AND MAINTENANCE.

QUALIFIED PERSON

For the purpose or this manual and product labels, a qualified person is one who is familiar with the installation, construction and operation of the equipment, and the hazards involved. In addition, he has the following qualifications:

a) Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.

b) Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

DANGER

For the purpose of this manual and product labels, DANGER indicates death, severe personal injury or substantial property damage will result if proper precautions are not taken.

WARNING

For the purpose of this manual and product labels, WARNING indicates death, severe personal injury or substantial property damage can result if proper precautions are not taken.

CAUTION

For the purpose of this manual and product labels, CAUTION indicates minor personal injury or property damage can result if proper precautions are not taken.

INSPECTION

Care is taken at the factory to assure that the motor arrives at its destination in first class condition. If there is evidence of rough handling or damage in shipping, file a claim at once with the carrier and notify your Siemens Sales Office.

Examine the outside of the motor carefully for damage, with particular attention to conduit box, fans, and covers. Inspect and tighten all hardware and accessories which may have become loosened during shipping and handling. Turn the shaft by hand to be sure that it rotates freely. If the motor has been mishandled sufficiently to break external parts, the end shield should also be removed to check for internal damage unless the motor is explosion-proof. See warning below on explosion proof motors.

WARNING

Explosion-proof motors—these motors are constructed to comply with the U.L. Label Service Procedure Manual. When repairing and reassembling a motor that has an underwriter's label, it is imperative that the unit be reinspected and:

1. All original fits and tolerance be maintained.
2. All plugs and hardware be securely fastened.
3. Any parts replacements, including hardware, be accurate duplicates of the originals.

Repair work on explosion-proof motors can only be done by the original manufacturing or U.L. certified shops. Violations of any of the above items will invalidate the significance of the U.L. Label.

STORAGE

Motors must be stored in a clean, dry, well ventilated location free from vibration and rapid or wide temperature variations. If the unit is to be stored longer than three months, consult factory. Ball bearing motors are shipped from the factory properly lubricated and ready to operate. When in storage, the motor shaft must be turned several rotations every month and the bearing relubricated every year. On non-explosion-proof TEFC motors, a removable plug in the bottom of the frame or housing permits removal of accumulated moisture. Drain regularly if storage atmosphere result in formation of condensation.

INSTALLATION

Installation must be handled by qualified service or maintenance personnel. The motor foundation must rigidly support all four feet in the same plane. Place shims under the motor feet, as required, so they will not be pulled out of plane when mounting bolts are tightened. All wiring to the motor and control must be in accordance with the National Electrical Code and all local regulations. Before drive is connected, momentarily energize motor to check that direction of rotations proper. For direct drive, accurate alignment is 0.004 inch/ft. (radius to dial indicator = one foot.)

Any change in shims requires rechecking alignment. When alignment is within limits, dowel two feet of each unit. When installing flat belt pulley, V-belt sheave, spur or helical pinion or chain drives, be certain that they are within NEMA limitations. Refer to NEMA motor and general standards, MG-1 14.07 and 14.42.

OPERATION

Repeated trial starts can overhead the motor and may result in motor burnout (particularly for across the line starting). If repeated trial starts are made, allow sufficient time between trials to permit heat to dissipate from windings and rotor to prevent overheating. Starting currents are several times running currents, and heating varies as the square of the current.

After installation is completed, but before motor is put in regular service, make an initial start as follows:

1. Check motor starting and control device connections against wiring diagrams.
2. Check voltage, phase, and frequency of line circuit (power supply) against motor nameplate.
3. If possible, remove external load (disconnect drive) and turn shaft by hand to ensure free rotation. This may have been done during installation procedure; if so, and conditions have not changed since, this check may not be necessary.
    a. If drive is disconnected, run motor at no load long enough to be certain that no unusual conditions develop. Listen and feel for excessive noise, vibration, clicking, or pounding. If present, stop motor immediately. Investigate the cause and correct before putting motor in service.
    b. If drive is not disconnected, interrupt the starting cycle after motor has accelerated to low speed. Carefully observe for unusual conditions as motor coasts to a stop.
4. When checks are satisfactory, operate at minimum load and look for unusual condition. Increase load slowly to maximum. Check unit for satisfactory operation.

CAUTION

Guard against overloading. Overloading causes overheating and overheating means shortened insulation life. A motor subjected to a 10°C temperature rise above the maximum limit for the insulation may cause the insulation life to be reduced by 50%. To avoid overloading, be sure motor current does not exceed nameplate current when nameplate voltage is applied.

Electric motors operating under normal conditions become quite warm. Although some places may feel hot to the touch, the unit may be operational within limits. Use a thermocouple to measure winding temperature when there is any concern.

The total temperature, not the temperature rise, is the measure of safe operation. Investigate the operating conditions if the total temperature measured by a thermocouple placed on the winding exceeds:

230°F (110°C) for class “B” insulation

275°F (135°C) for class “F” insulation

302°F (150°C) for class “H” insulation

VOLTAGE REGULATION

Motors will operate successfully under the following conditions of voltage and frequency variation, but not necessarily in accordance with the standards established for operation under rated conditions:

a. When the variation in voltage does not exceed 10% above or below normal, with all phases balanced.

b. When the variation in frequency does not exceed 5% above or blow normal.

c. When the sum of the voltage and frequency does not exceed 10% above or below normal (provided the frequency variation does not exceed 5%).

MAINTENANCE

Failure to properly maintain the equipment can result in severe personal injury and product failure. The instructions contained herein should be carefully reviewed, understood and followed. The following maintenance procedures should be performed regularly:

1. Bearing lubrication
2. Insulation resistance check
3. Cleaning

This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Office.

Dangerous voltages are present in the equipment which can cause severe personal injury and product failure. Always de-energize and ground the equipment before maintenance. Maintenance should be performed only by qualified personnel.

The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or removal or alteration of guards or conduit covers will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

BEARING LUBRICATION

CAUTION

Do not lubricate motor while in operation, since excess grease will be forced through the bearings and into the motor before it will force its way out of the drain plug. Excess grease accumulation on windings reduces insulation life.

Bearing life is assured by maintaining proper alignment, proper belt or chain tension, and good lubrication at all times.

Prior to shipment, motor bearings are lubricated with the proper amount and grade to provide six months of satisfactory service under normal operation and conditions.

For best results, grease should be compounded from a polyurea base and a good grade of petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature range should be from -15°F to +250°F for class B insulation, and to +300°F fir class F and H. Most leading oil companies have special bearing greases that are satisfactory.

Relubricate bearings every six months (more often if conditions require), as follows:

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off pipe plugs and remove from housings.
3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to inlet with hand gun until small amount of new grease is forced out of drain.
5. Remove excess grease from ports, replace inlet plugs, and run motor 1/2 hour before replacing drain plug.
6. Put motor back in operation.

INSULATION RESISTANCE

Check insulation resistance periodically. Any approved method of measuring insulation resistance may be used, provided the voltage across the insulation is at a safe value for the type and condition of the insulation. A hand cranked megger of not over 500 volts is the most convenient and safest method. Standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) recommended that the insulation resistance of stator windings at 75°C, measure at 500 volts DC, after one minute should not be less than:

$$\frac{\text{Rated voltage of machine} + 1000}{1000} = \text{Insulation resistance in Megohms}$$

This formula is satisfactory for most checks. for more information, see IEEE Standard No. 43, “Recommended Practice for Insulation Resistance Testing of AC Rotating Machinery.”

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CLEANING

WARNING

Do not attempt to clean motor while it is operating.. Contact with rotating parts can cause severe personal injury or property damage. Stop the motor and lock out switch before cleaning.

The motor exterior must be kept free of oil, dust, dirt, water, and chemicals. For fan cooled motors, it is particularly important to keep the air intake openings free of foreign material. Do not block air outlet or inlet.

On non-explosion-proof TEFC motors, a removable plug in the bottom center of the motor frame or housing permits removal of accumulated moisture. Drain regularly.

VERTICAL MOTOR THRUST BEARINGS

Top bearings — high external thrust from the driven unit is usually carried by he top bearing or bearings. If replacement is necessary, the new bearing must be the same size and type as the original. Duplex bearings must also be the same type and mounted in an identical manner. When angular contact type bearings are replaced, the new bearing must have the same thrust capacity.

Bottom bearings — grease lubricated lower bearings adequately lubricated at the factory for at least three months operation. The relubrication procedure is the same as outlined above under "Bearing Lubrication." It is important to maintain the lower cavity full of grease at all times.

The correct replacement bearings are given on the nameplate by AFBMA (Anti-Friction Bearing Manufacturers Association) number.

SERVICE

For immediate action on your motor problems call your certified service center or contact your nearest Siemens District Office.

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