

***END TRUCKS
TOP RUNNING
UNDER HUNG
ROTATING & FIXED AXLE***

***PARTS & MAINTENANCE
MANUAL***



10200 JACKSBORO HWY., FORT WORTH, TEXAS 76135

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REGISTERED ISO 9001 COMPANY

It is important that all persons operating or servicing this equipment be familiar with the instructions & information contained in this manual for their own safety & protection as well as for other workers and equipment.

SERVICE & PARTS MANUAL FOR ACE BRIDGE TRUCKS



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INTRODUCTION

GENERAL INFORMATION:

This manual provides information on the **Ace World Companies** products as well as furnishes service and parts information.

The information contained in this manual at time of publishing is correct to the best knowledge of **Ace World Companies**. While every effort has been made to furnish correct and accurate, as well as sufficient information for maintenance, service and parts, this manual and information contained herein is subject to change without notice. Any questions regarding the information in this manual should be directed to **Ace World Companies, Fort Worth**.

Ace World Companies and any and all associated companies can not be held liable for lack of or unintended omissions or errors in this publication or improper safety precautions and/or user training when performing maintenance or repair on **Ace World Companies** products.

WARRANTY:

This warranty that accompanies the **Ace World Companies** products is listed on the back cover of this manual. This warranty is void if **Ace World Companies** products are used under or with any of the following conditions:

- Loadings exceeding maximum rated loadings listed in **Ace World Companies** product catalogs.
- Accessories or other equipment not designed or approved by **Ace World Companies** .
- Modifications which effect the mechanical and structural integrity of the **Ace World Companies** products.
- Unsafe operation and/or inexperienced maintenance personnel.

NOTE:

There is no substitution for experience. Ace World Companies employs trained and experienced design and maintenance personnel ready to help you 24 hours a day. If you have any questions concerning any information contained herein or with Ace World Companies products in general, please call the number on the front cover of this manual.

GENERAL INFORMATION

INSTALLATION:

There are many different ways to install or mount the bridge girders to the endtrucks. Since each crane builder or user has their own preference **Ace World Companies** does not suggest or offer in this manual information on how to mount the bridge girders to the endtrucks. However, **Ace World Companies** has many experienced engineers in the design of overhead bridge cranes and can offer assistance or ideas on designing the girder/endtruck connection.

SHIPMENT/RECEIVING:

Ace World Companies products are sold F.O.B. factory and freight expenses are the responsibility of the purchaser. **Ace World Companies** products can be shipped by most common carriers. While **Ace World Companies** attempts to package the product sufficiently for transportation, damage during transit may and more often than desired, does occur. The responsibility for filing a damage claim against the freight company lies with the purchaser. If damage does occur, contact **Ace World Companies** immediately so we can ship replacement parts and/or help in the repair determination.

STORAGE:

Ace World Companies products are shipped ready for immediate use. If the need arises, **Ace World Companies** products should be stored indoors in a clean, dry atmosphere. The product should be blocked off the floor, away from moisture and covered loosely with a heavy plastic tarp to prevent dust and dirt from accumulating on the equipment. Any bare metal surfaces such as open gears, shafts, axles, wheel treads etc. should be coated with a rust preventing compound. If storage is for an extended period of time, it is also recommended to periodically rotate the wheels manually to insure grease does not settle in the bearings and oil in the gear reducer coats the gears.

PAINTING:

Ace World Companies products are supplied hand cleaned and prime painted with a universal primer, ready for finish coating by the purchaser. Special surface preparation and paint can be supplied if required by purchaser. When finish painting **Ace World Companies** products it is recommended to follow the paint manufacturers instructions as well as carefully mask wheel treads, bumpers and open motor housings. Remember to remove any masking material prior to putting the product into operation.

MAINTENANCE AND REPAIR

ALL MAINTENANCE AND REPAIR SHOULD BE IN ACCORDANCE WITH ANSI B30 SPECIFICATION

This section provides information on the maintenance and repairs for all of the **Ace World Companies** products. This section deals with lubrication, inspection, disassembly and assembly of the products. It is not intended to provide guidance for all situations but deals with everyday, normal maintenance items.

MAINTENANCE:

The following information provides guidelines for periodic inspections of **Ace World Companies** products. It is suggested each user develop their own periodic maintenance schedules consistent with the intended usage of the **Ace World Companies** product.

Periodic inspection of the endtruck and trolley assemblies is suggested to insure proper operation and lubrication. The frequency of the inspections depends on the operating environment. Inspections should include the following but not be limited to:

- 1) Check for loose or missing bolts and repair or replace at once.
- 2) Inspect the wheel flanges and rail for abnormal wear. The wheels are designed to contact the rail head. This is normal. Depending on the operation of the crane and how well the crane was built and squared, the wheels should give years of good service.
- 3) Inspect the wheels for flat spots or any unusual wear patterns or markings.
- 4) Inspect the bumper and rail sweeps for cracked bumpers or bent rail sweeps. Fix or replace at once.
- 5) Inspect the drive pinions on under running and fixed axle trucks for lubrication, wear and alignment with the wheel gear.
- 6) Inspect the wheel for excessive float. The wheels are designed to give adequate clearance between the wheel flanges and the rail head. CMAA specifications contain guidelines for the amount of float a wheel should have on the rail. Under running endtrucks should have between .125 inch to .25 inch float between the wheel flange and runway beam while top running endtrucks should have minimum .75 inch float up to 1.5 inch float depending on the wheel size and crane span.

MAINTENANCE AND REPAIR

- 7) Inspect the drive assembly for leaking oil and excessive noise. Inspect the drive mounting torque arm bolts and bushings for proper operation. Inspect the brake torque and brake disc gap. Refer to the applicable drive assembly in the end section of this manual for more information.

If any of the above conditions exist, fix or replace them or contact **Ace World Companies** for guidance.

LUBRICATION:

Lubrication of **Ace World Companies** products is the most important maintenance item. Lubrication should be performed periodically with the frequency dependent upon the operating environment. However, at a minimum it is suggested complete lubrication be accomplished every three months.

The under running endtrucks require lubrication of the exposed drive pinion and wheel gear. If lubrication is required, it is suggested to completely clean the pinions and gears first with a solvent to remove all the old grease. Inspect the gears for wear and replace if required. Regrease with a spray on or brush on inherent open gear lubricant such as "DEM - KOTE" Gear and Wire Rope Lubricant (AGMA Grade 10 as minimum), which is available from **Ace World Companies** or through your Grainger or similar industrial supply catalog. No greasing of the wheel bearings is required since they are lifetime lubricated and sealed. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

The top running fixed axle endtrucks require similar lubrication of the exposed drive pinion and wheel gear as the above under running endtrucks. The top of the endtruck has an inspection hole directly above the pinion/gear mesh line. If lubrication is required, it is suggested to completely clean the pinion and wheel gear first with a solvent to remove all the old grease. Inspect the gears for wear and and replace if required. Regrease with a spray on or brush on inherent open gear lubricant such as "DEM - KOTE" Gear and Wire Rope Lubricant, which is available from **Ace World Companies** or through your Grainger or similar industrial supply catalog. No greasing of the wheel bearings is required since they are lifetime lubricated and sealed. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

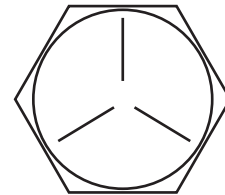
MAINTENANCE AND REPAIR

The top running rotating axle endtrucks and top running double girder package trolleys both have similar lubrication requirements. The only lubrication required is periodic greasing of the spherical roller bearings. Each bearing has a grease Zenk on the bearing capsule. The bearings are factory greased but will require periodic greasing. Use a high grade bearing grease such as EP-2 applied with an industrial grease gun to the bearing capsule Zenk fitting. Use manufacturer recommended standard lubricant based on ambient working temperature. Two or three good pumps should normally be enough. Do not pump so much grease into the bearing that it begins to push out around the bearing seal. This will cause failure of the seal and also possibly get grease on the rail head which will cause traction problems for the wheel. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

BOLTS AND HARDWARE:

Ace World Companies does not include bolts and hardware as spare parts. It is assumed user can locate and apply the proper hardware. However, as a guideline, **Ace World Companies** uses domestic grade 5 hardware as a minimum in all its products. Any hardware provided by user should be grade 5 or better. Below is a sample of identification on the bolt heads and torque values to tighten bolts.

Size	Torque Foot-Lbs.	
	Dry	Lub.
8 mm	17	13
1/2 - 13 UNC	75	58
5/8 - 11 UNC	150	115
3/4 - 10 UNC	270	205



The above torque specifications chart is based on S.A.E. bolt steel classifications. The torque values vary for dry or lubricated threads. The term lubricated includes the application of thread lubricants, lubricizing, cadmium plating and the use of hardened washers. All **Ace World Companies** hardware is installed with split or lock washers.

MAINTENANCE AND REPAIR

REPAIR:

Repair of **Ace World Companies** products is primarily limited to replacement of the worn or damaged parts. These parts include items such as wheel assemblies and drive assemblies.

If structural damage occurs to the frame of the endtruck, most likely the entire endtruck will need to be replaced. This manual does not include information on determining whether this is necessary or on how to remove and replace the existing endtruck frame. Contact **Ace World Companies** for information and guidance on removing the endtruck.

Refer to the appropriate drive section at the end of this manual for guidance on damage and/or repair to the drive assemblies.

UNDER RUNNING ENDTRUCKS DESCRIPTION

USB SERIES:

Ace World Companies designs and manufactures two sizes of under running endtrucks (6" and 8") suitable for single beam and double beam under running bridges as well as patented track applications. These under running endtrucks consist of a structural frame, drive wheel assembly, idler wheel assembly, drive assembly and energy absorbing bumpers and safety drop bars.

The structural frame is made from a 500 Grade B bolted together with yoke plates at the ends and reinforced beam mounting plate located at the center where the user attaches the bridge beam.

The wheel assemblies consist of pairs of single flanged wheels designed following the stringent criteria in the latest CMAA specifications which dictates the width of the running surface versus the allowable wheel load. **Ace World Companies under running single** flanged wheels are designed to run on either standard "S" beams with tapered flanges or wide flange beams with flat flanges. Each truck has one pair of idler wheels and one pair of drive wheels. The drive wheel and idler wheel are identical except the drive wheel has the drive gear cut into the wheel flange. The bearings are supported on machined axles and are adjustable in the field to suit the runway beam flange width. The axle is supported by a compression fit collar welded to the tube frame. This arrangement gives a well balanced support base which prevents the axle from bending or twisting.

The drive assembly consists of a totally enclosed oil bath gear reducer and crane duty brake/motor mounted to the drive axle plate via a machined mounting adapter. The drive assembly supports the drive pinion shaft on one end and a machined flange bearing supports the drive pinion shaft on the other end. This arrangement assures pinion and gear alignment without needing to adjust or shim anything.

NOTE:

Motors and gear reducers are covered in the end section of this manual. Please refer to the appropriate motor/reducer section for the type drive provided.

UNDER RUNNING ENDTRUCKS INSTALLATION

UF SERIES:

The wheel assemblies can be removed while the crane is on the runway. To accomplish removal of either the drive wheel assembly or an idler wheel assembly, follow the steps below:

- 1) Move the empty trolley hoist to the opposite end of bridge.

WARNING!

Disconnect and lock out the power source feeding the crane mainline or other power source. Injury or death to personnel may result if this precaution is not followed.

- 2) If a drive wheel assembly is being removed, first remove the drive assembly by removing the bolt at the end of the pinion drive shaft. Then remove the four bolts holding the drive assembly to the endtruck frame. Be careful, at this point, the drive will rotate freely on the pinion shaft. Carefully slide the drive off the pinion shaft and secure. Disconnect the wires to the drive if no sure way of securing the drive after it is removed from the pinion shaft is found and lower drive to the ground.
- 3) Remove the bolts holding the bearing capsule to the frame. Carefully while supporting the pinion shaft weight, pull the bearing capsule from the truck frame. The pinion shaft can now be lowered to the ground.

The above two steps do not need to be done if an idler wheel is being removed.

- 4) Remove the safety drop bar in front of the wheel assembly to be removed.
- 5) Using a suitable jack, jack up the end of the endtruck to take any dead weight from the wheel. The wheel should spin freely on the axle.
- 6) Remove the bolts holding the axle keeper plate to the frame. With the keeper or suitable wrench handle, turn the axle to back the axle out of the threaded truck frame. As the wheel contacts the inside of the truck frame, reach inside the frame and hold into the wheel while the axle is completely backed out of the frame. The wheel can now be removed out the front of the truck.

WARNING!

The wheel is not retained to the axle. Be careful while turning the axle out of the frame that the wheel does not come off the axle and fall to the ground.

REPAIR OF WHEEL ASSEMBLY

WARNING!

The wheel is not retained to the axle. Be careful while turning the axle out of the frame that the wheel does not come off the axle and fall to the ground.

REPAIR OF THE WHEEL ASSEMBLIES:

Repair of the wheel assemblies is limited to replacement of the components. Inspect the wheel gear and running surface of the wheels for wear. If the bearings need to be replaced, they must be replaced in pairs. Remember, the wheel bearings are sealed and can not be lubricated by the user. The bearings are put into the wheels with a light press fit and held secure by a snap ring, inspect the drive pinions for wear. While the unit is disassembled, it is a good time to clean the old grease from the pinions and wheel gear and regrease.

Installation of the under running wheel assemblies follows the reverse of the removal outlined above.

ASSEMBLY OF ENDTRUCK:

WARNING!

Be sure the crane power source is still locked out. Failure to insure this may result in injury or death to personnel.

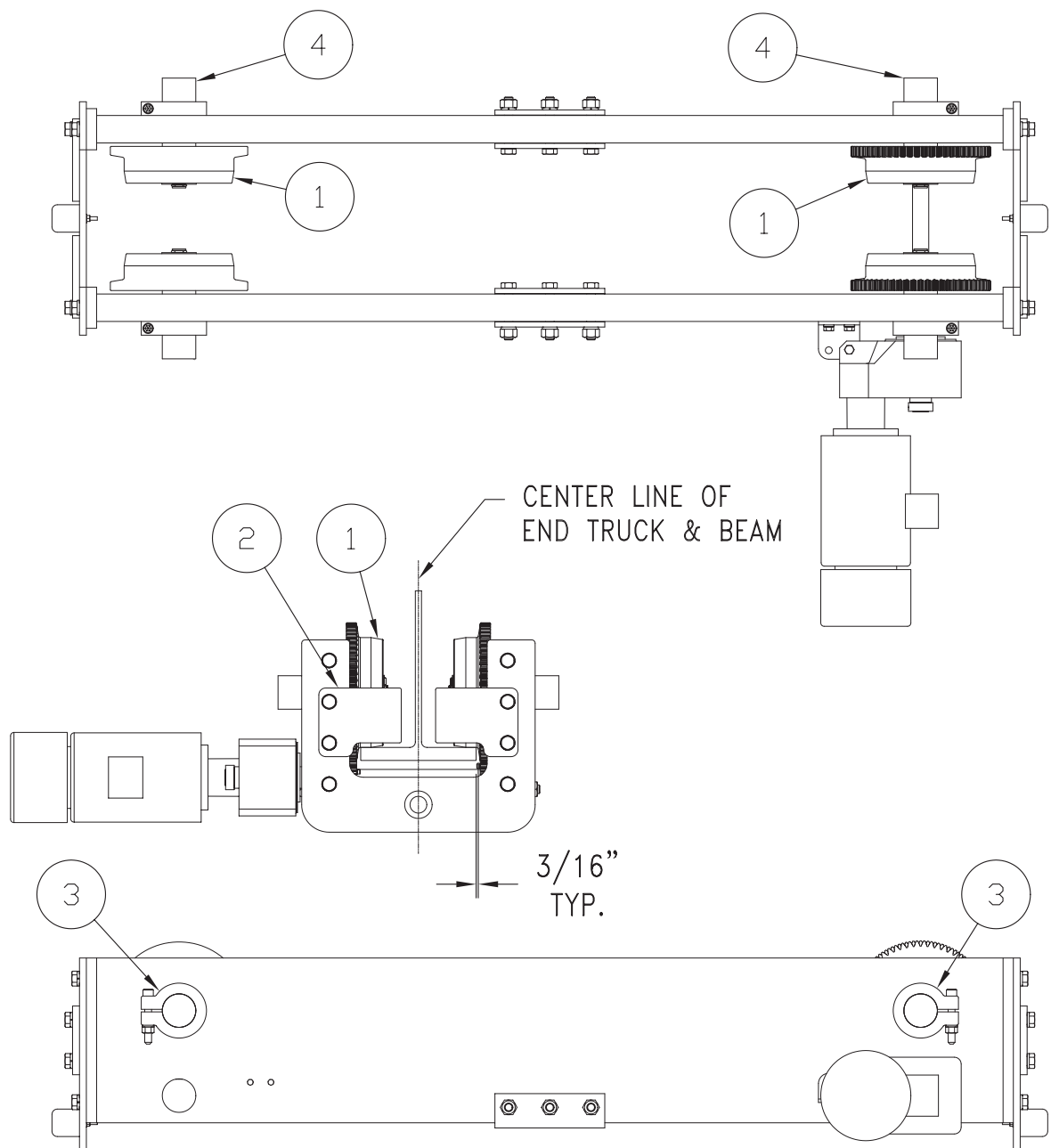
(Applies to UF Series)

- 1) Clean the inner race of the bearings and apply a thin film of oil. With the truck frame still jacked up, put the wheel and bearing assembly back into the end of the truck frame and align with the axle hole.
- 2) Clean the truck frame axle bore and the axle. Apply a thin film of oil or grease to the axle and in the truck frame.
- 3) Install the axle into the truck frame (it should be a slip fit).
As the axle enters the truck frame align the wheel and slide the wheel bearings onto the axle. Continue to slide the axle until the bearings and wheel are completely seated on the axle. The wheel bearing on the flange side of the wheel should shoulder up to the axle shoulder.

ASSEMBLY OF ENDTRUCK (cont'd):

- 4) Continue until the wheel flange contacts the runway beam. With the wheel flange contacting the beam flange and the wheel bearings completely seated on the axle, back the axle out to give you .125 inch clearance between the wheel flange and the beam flange.
- 5) Tighten the compression collar to lock axle in place.
- 6) Reinstall the safety drop bar and tighten the bolts.
- 7) Reinstall the pinion drive shaft if removed. Engage the pinions with the wheel gears. Install the bearing capsule and bearing and tighten the bolts. Be sure the pinion drive shaft is pushed fully into the bearing capsule. Be sure the pinions align with the wheel gear and adjust if required.
- 8) Clean the pinion shaft and bore of the drive assembly. Apply a thin film of anti seize to the pinion shaft and slide the drive assembly on the shaft up to the truck frame and engage the pilot bore. Install the drive bolts and tighten.
- 9) Install the bolt in the end of the pinion shaft and secure. Recheck the alignment of the pinions with the wheel gears and adjust if required. There should be some backlash between the pinions and the wheel gears.
- 10) Remove the jack and lower the truck and wheel assembly to the runway beam. Again check all the alignments and bolt tightness.
- 11) Restore power to the crane and test operation fully before listing a load or putting crane back into operation.

USB Under Running End Truck Installation Guide



USB UNDER RUNNING END TRUCK INSTALLATION GUIDE

(WITH THE END TRUCK ON THE GROUND OR IN AN ACCESSIBLE LOCATION)

1. Begin by removing all end truck wheels (ref. Balloon 1) by sliding them off the end of their shafts.
2. Remove all drop lugs (ref. Balloon 2). (Drop lug fasteners are 5/8" hex head bolts).
3. Loosen all axle keeper fasteners (ref. Balloon 3) and remove all axles (ref. Balloon 4) from the end truck.

(THE END TRUCK IS NOW READY FOR POSITIONING BELOW THE RUNWAY BEAM)

4. Raise the end truck into place below the runway beam.
NOTE: The centerline of the end truck **must** be in line with the centerline of the beam.
5. Replace all but one drop lug on each end truck. Tighten all 5/8" hex head bolts to 125 FT-LBS torque.
6. Roll or lower **one** wheel into place in the corner of the end truck with a missing drop lug. Replace one axle in the end truck, with the wheel in place, so that the shoulder of the axle is flush up against the wheel bearing. Replace the drop lug for that corner of the end truck and tighten both 5/8" hex head bolts to 125 FT-LBS torque.
7. Remove **one** drop lug from the corner of the end truck with a missing wheel.
8. Repeat STEPS 6 & 7 until all wheels have been replaced.
9. With the end truck centered on the runway beam, position all wheels, by adjusting the axle, so that on each side there is approximately a 3/16" gap between the wheel flange and the edge of the beam.
10. Once the wheels are positioned properly, tighten all axle keeper.
11. Finally, loosen the screws on the drive pinion torque lock bushings (ref. Balloon 5) and position all pinions so that the outside faces of the pinions are aligned with the outside faces of the drive wheel. After positioning, tighten all torque lock bushing screws (alternating screws in clockwise fashion every couple turns) to lock pinions onto shaft.
12. Lubricate gear wheels and pinions. (See page 4 for Lubricant Details)

TOP RUNNING ROTATING AXLE ENDTRUCKS WHEEL ASSEMBLY REMOVAL

The wheel assemblies can be removed while the crane is on the runway. To accomplish removal of either the drive wheel assembly or an idler wheel assembly, follow the steps below:

1. Move the empty trolley hoist to the opposite end of the bridge.

WARNING!

Disconnect and lock out the power source feeding the crane mainline or other power source. Injury or death to personnel may result if this precaution is not followed.

2. Block the crane from moving on the runway by placing wheel chocks in front of the wheels opposite the side of the crane the wheel assembly is being removed. Do not rely on the drive brake assembly to hold the crane in position.
3. If a drive wheel assembly is being removed, first remove the drive assembly by removing the bolt at the end of the drive axle. Then remove the bolt which secures the drive to the torque arm. Be careful at this point, the drive will rotate freely on the drive axle. If drive assembly is flange mounted, remove the four bolts holding the drive to the bearing capsule.
With all the mounting bolts removed, carefully slide the drive off the drive axle and support securely on the walkway or other means. If no means is available to support the drive after it is removed from the axle, first disconnect the wires to the drive, remove the mounting bolts and lower drive to the ground.
4. Remove the rail sweep and bumper assembly.
5. Remove the bolts holding the bearing capsules to the truck frame.
6. Using a suitable jack, placed behind the wheel and not in front of the wheel, jack up the endtruck frame enough so the bearing capsule will clear the truck frame as the wheel assembly is rolled out the front of the truck. This may be as much as three inches.

NOTE

These are suggested practices.

TOP RUNNING ROTATING AXLE ENDTRUCKS

WARNING!

The wheel assembly is extremely heavy. Caution must be observed that nothing falls to the ground or other personnel are not under the location where the wheel assembly is being removed.

7. Carefully roll the wheel assembly out of the truck frame. Once the wheel assembly clears the truck frame, attach a suitable sling or other rigging and lower assembly to the ground.

****CAUTION****

**BEARING CAPSULES ARE A SLIP FIT AND MAY FALL.
REMOVAL OF CAPSULES MAY BE NEEDED.**

Repair of the wheel assemblies is limited to replacement of the components. Inspect the wheel running surface for wear. If bearings need to be replaced, they must be replaced in pairs. The bearings are slip fit into the bearing capsule and light press fit on to the axle. Be careful when removing the bearings to not damage the bearing seal between the bearing and the axle shoulder. While the unit is disassembled, it is a good idea to clean all the components of the old grease and regrease.

Installation of the rotating axle wheel assemblies follows the reverse of the removal outlined above.

WARNING!

Be sure the crane power source is still locked out. Failure to insure this will result in injury or death to personnel.

TOP RUNNING ROTATING AXLE ENDTRUCKS WHEEL ASSEMBLY INSTALLATION

- 1) Clean all components. Install the axle into the wheel by heating the wheel bore and pressing the axle into the wheel with a large hydraulic press. Press axle into the wheel all the way up to the shoulder of the axle.
- 2) Install bearing grease seal onto the axle and locate all the way up to the shoulder.
- 3) Heat the bearing in a bearing heater and install on the axle all the way up to the seal and shoulder. Follow good bearing installation procedures to prevent damage to the bearing that will lead to premature failure.
- 4) After the bearing has cooled, install the bearing capsules onto the bearings, tapping lightly around the circumference with a wooded mallet. Insure the bearing is fully seated into the capsule.
- 5) With the truck frame still jacked up, position the assembled wheel assembly on the rail in front of the endtruck frame. Carefully roll the wheel assembly into the truck frame so the bearing capsules are centered on the frame boxes.

WARNING!

The wheel assembly is extremely heavy. Caution must be observed that nothing falls to the ground or other personnel are not under the location where the wheel assembly is being removed.

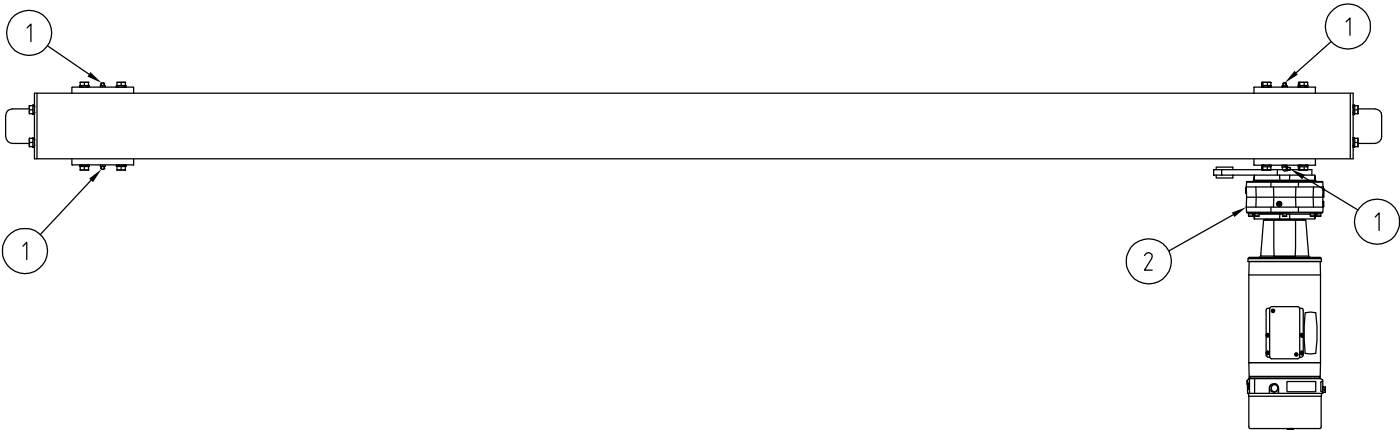
- 6) While keeping the bearing capsules centered on the bores, carefully lower the truck frame down onto the capsules. It is critical that the capsules seat properly and completely into the frame bores. Be sure the bolt holes in the capsules line up with the tapped holes in the truck frame before allowing the weight of the crane onto the capsules.
- 7) Reinstall the bearing capsule bolts and tighten.
- 8) Reinstall the rail sweep and bumper assembly.
- 9) If the bearings were not greased prior to assembly with the truck frame, grease the bearings with several good pumps from a grease gun.

TOP RUNNING ROTATING AXLE ENDTRUCKS

- 10) Reinstall the drive assembly. Check the drive assembly key in the axle. Clean the bore and install the drive on the drive axle. Refer to the end section of this manual for instructions on installing the drive assembly depending on the type drive used.
- 11) Install all the drive assembly bolts. Reconnect the motor wires if wires were disconnected. Be careful, the drive assembly is heavy and it will rotate freely on the drive axle until the torque arm bolt is attached or the flange bolts are installed.
- 12) Recheck all bolts for tightness. Remove the wheel chocks.
- 13) Restore power to the crane and test operation fully before lifting a load or putting crane back into operation.

RECOMMENDED LUBRICATION

Based on 2000 Service Hours per Year



ITEM	TYPE	SCHEDULE	VOLUME
1	CHEVRON ULTRA DUTY EP2	6 MONTHS	6 PUMPS OF GREASE GUN
2	SEE MOTOR/REDUCER SECTION	—	—

TOP RUNNING FIXED AXLE ENDTRUCKS DESCRIPTION

Ace World Companies designs and manufactures 6", 8" & 10" fixed axle top running endtrucks suitable for light duty single & double girder cranes. These fixed axle top running tube endtrucks consist of a structural tube frame, drive wheel assembly, idler wheel assembly, energy absorbing bumpers, rail sweeps and drive assembly.

The structural tube frame is made from ASTM A500 Grade B tubing with internal diaphragms welded inside the tube just behind each wheel assembly. The endtruck tube is completely welded before the bored holes for the fixed axles are machined on a horizontal boring mill. This process insures parallel axle alignment.

The wheel assemblies consist of identical alloy steel machined drive and idler wheels with the only difference being the width of one flange on the drive wheel where the wheel gear is cut into the flange. Each wheel is fitted with two sealed deep groove ball bearings designed to provide the required bearing life as specified in CMAA standards. The bearings are supported by machined alloy axles fitted through the bored axle holes in the tube. Machined spacers between the wheel and the tube keep the wheel centered in the tube.

The drive assembly consists of a helical reducer .

NOTE

Motors and gear reducers are covered in the end section of this manual. Please refer to the appropriate motor/reducer section for the type drive provided.

TOP RUNNING FIXED AXLE ENDTRUCKS WHEEL ASSEMBLY REMOVAL

The wheel assemblies can be removed while the crane is on the runway. To accomplish removal of either the drive wheel assembly or an idler wheel assembly, follow the steps below:

- 1) Move the empty trolley hoist to the opposite end of the bridge.

WARNING!

Disconnect and lock out the power source feeding the crane main-line or other power source. Injury or death to personnel may result if this precaution is not followed.

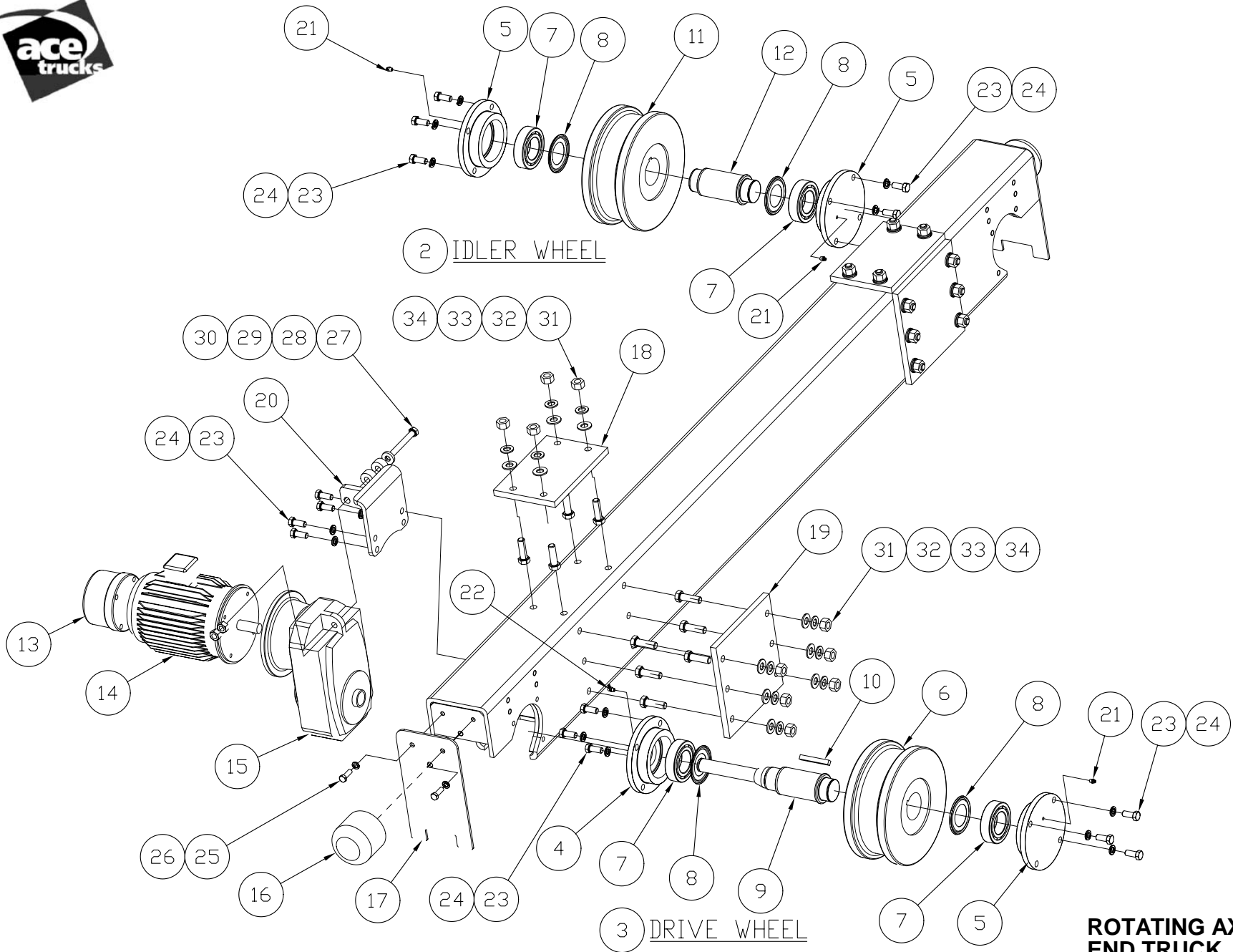
- 2) If a drive wheel assembly is being removed, first remove the drive assembly by removing the four bolts holding the drive assembly to the truck tube. Be careful, at this point, the drive is very heavy. Slowly pull the drive assembly away from the truck frame and secure it. Disconnect the wires to the drive if no sure way of securing the drive after it is removed and lower it to the ground.
- 3) Using a suitable jack, jack up the end of the truck behind the wheel being removed just enough so the wheel will spin freely on the axle.
- 4) Remove the bolts holding the keeper plate to the truck frame.
- 5) With a hammer and block of wood, drive the axle through the wheel assembly towards the outside of the span. As the axle is driven out, the spacer will fall free. Be careful they do not fall to the ground.
- 6) Pull the axle free of the truck frame. Jack the truck frame higher so the wheel can be slid out the bottom of the truck frame.

TOP RUNNING FIXED AXLE ENDTRUCKS WHEEL INSTALLATION

WARNING!

Be sure the crane power source is still locked out. Failure to insure this will result in injury or death to personnel.

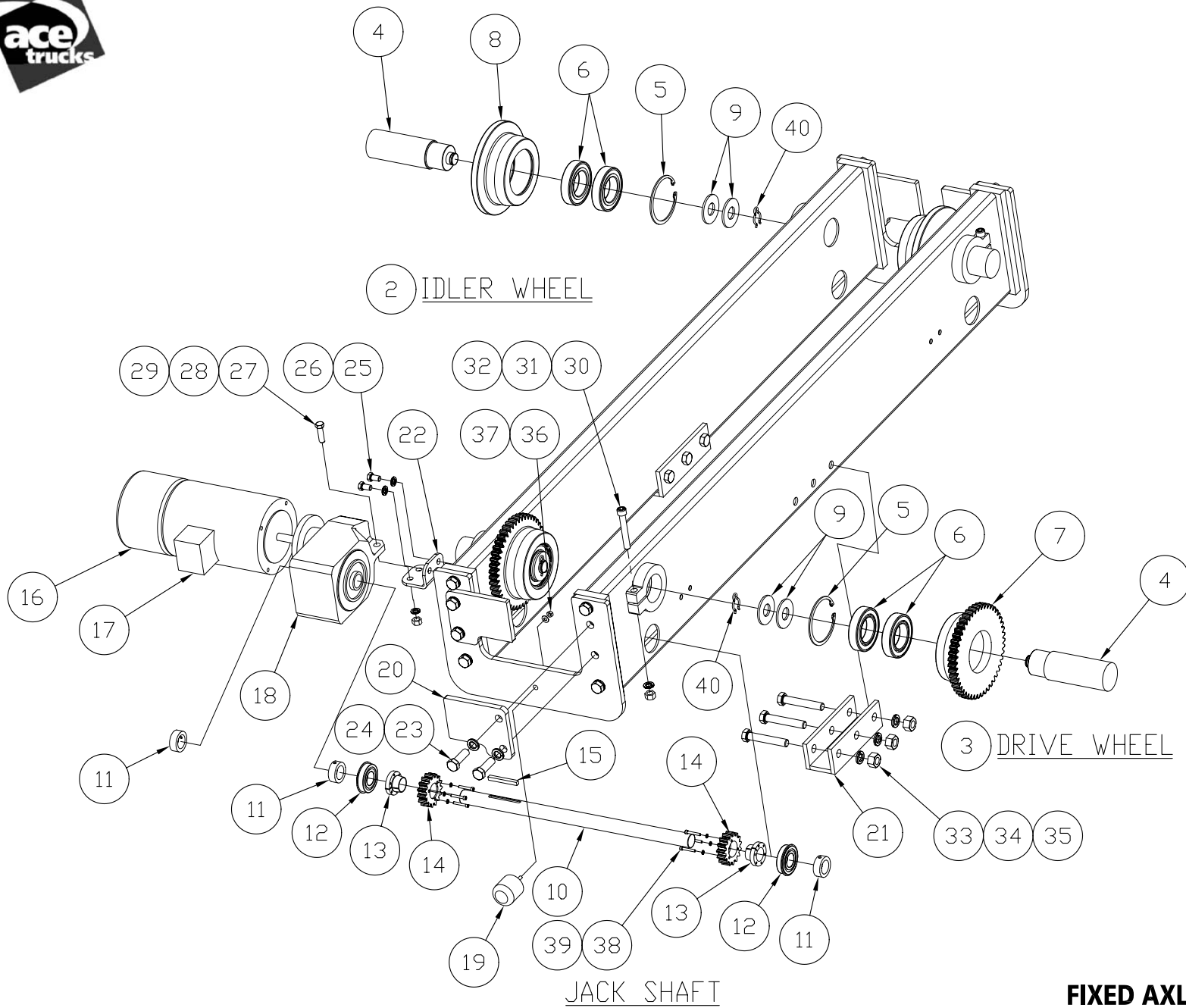
- 1) Clean all components. Clean the inner race of the bearings and apply a thin film of oil. With the truck frame still jacked up, put the wheel and bearing assembly back into the end of the truck frame and align with the axle hole.
- 2) Clean the truck frame axle holes and apply a thin coat of grease.
- 3) Lower the truck frame so the wheel bearings inner bore aligns with the axle holes.
- 4) Install the axle from the outside of span, starting with the end with the keeper plate slot. Push the axle through the hole and into the bearings. Drive the axle completely through the wheel bearings and through the truck frame hole on the inside of span. Install the spacer so it is flush with the truck frame. The keeper plate slot should be flush with the truck frame.
- 5) Reinstall the keeper plate and bolts and tighten.
- 6) Check the drive pinion for wear and replace if required. Reinstall the drive assembly insuring the pinion engages with the wheel gear. Install and tighten the drive assembly bolts. Rewire the motor if the wires were removed.
- 7) Lower the truck frame so the wheel contacts the rail. Remove the jack and wheel chocks.
- 8) **Be sure lubrication has been applied to the pinion & gear on wheel.** Inspect the alignment of the pinion and wheel gear through the inspection hole on top of the truck frame. Adjust pinion location if required. This is accomplished by removing the drive assembly and adjusting location of pinion on the motor shaft.
- 9) Restore power to the crane and test operation fully before lifting a load or putting crane back into operation.



**ROTATING AXLE
END TRUCK
TOP RUNNING
6" AND UP**

Rotating Axle End Truck Top Running 6" Wheel & Up Parts List

- 1 Frame, Top Running End Truck
- 2 Idler Wheel Assembly
 - 5 Capsule, closed
 - 7 Bearing, roller
 - 8 Seal
 - 11 Idler, wheel
 - 12 Axle, Idler
 - 21 Zert fitting, straight
 - 23 Bolt
 - 24 Nut, heavy hex
- 3 Drive Wheel Assembly
 - 4 Capsule, open
 - 5 Capsule, closed
 - 6 Drive, wheel
 - 7 Bearing, rollar
 - 8 Seal
 - 9 Axle, Drive
 - 10 Key
 - 21 Zert fitting, straight
 - 22 Zert fitting, 90°
 - 23 Bolt
 - 24 Nut, heavy hex
- 13 Brake
- 14 Motor
- 15 Gearbox
- 16 Bumper
- 17 Rail sweep
 - 25 Bolt
 - 26 Nut, heavy hex
- 18 Girder plate top
- 19 Girder plate side
 - 30 Bolt (girder plate mounting)
 - 31 Washer, lock (girder plate mounting)
 - 32 Washer, load indicating (girder plate mounting)
 - 33 Nut, heavy hex (girder plate mounting)
- 20 Torque arm
 - 24 Bolt
 - 25 Washer, lock
 - 26 Bolt (gearbox mount)
 - 27 Washer (gearbox mount)
 - 28 Washer, lock (gearbox mount)
 - 29 Nut, heavy hex (gearbox mount)



2 IDLER WHEEL

3 DRIVE WHEEL

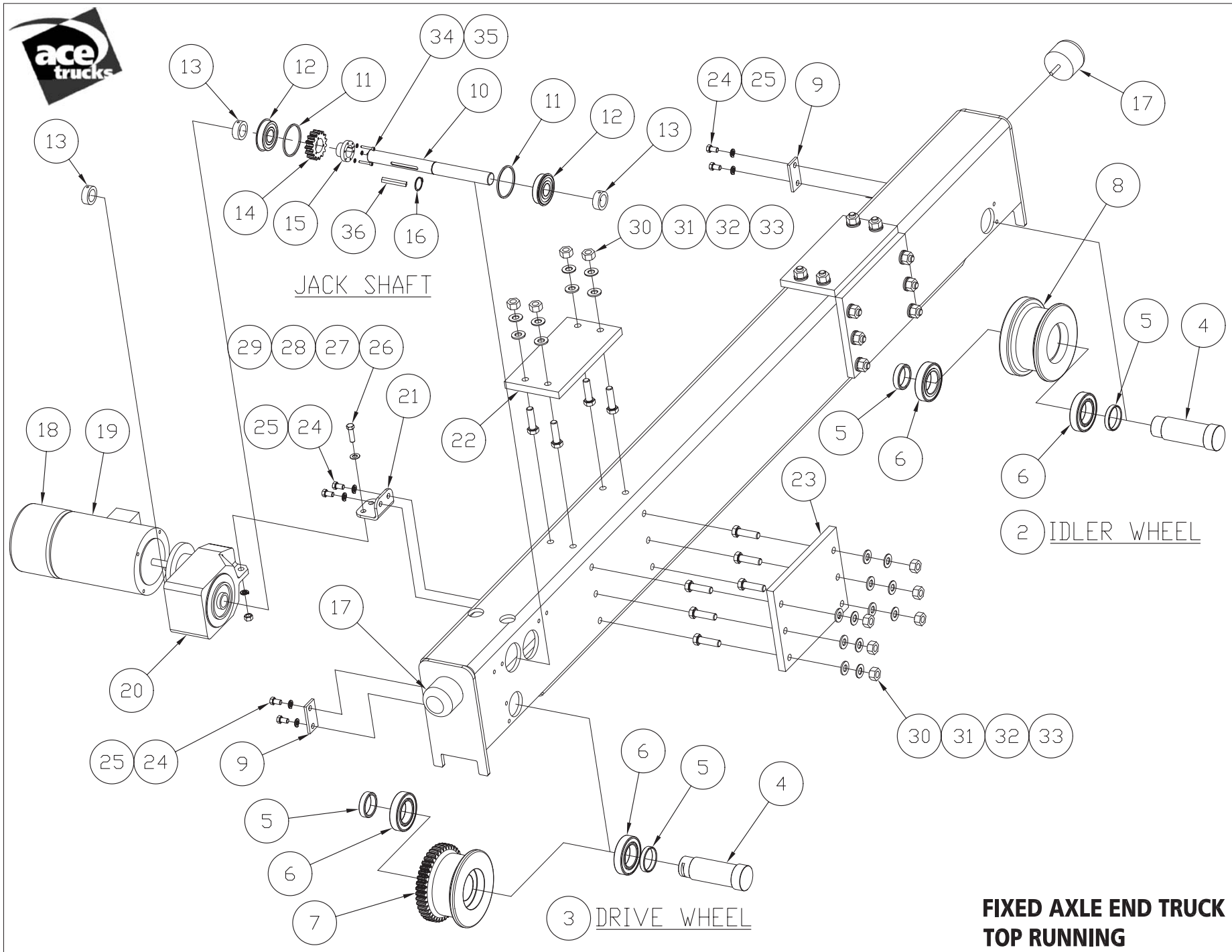
JACK SHAFT

**FIXED AXLE END TRUCK
UNDER RUNNING**

Fixed Axle End Truck Under Running Parts List

- 1 Frame, Under Running End Truck
- 2 Idler Wheel Assembly
 - 4 Axle, wheel
 - 5 Snap ring, internal
 - 6 Bearing, ball
 - 8 Idler, wheel
 - 9 Spacer, 1" dia washer
 - 40 Clip, hairpin
- 3 Drive Wheel Assembly
 - 4 Axle, wheel
 - 5 Snap ring, internal
 - 6 Bearing, ball
 - 7 Drive, wheel
 - 9 Spacer, 1" dia washer
 - 40 Clip, hairpin
- Jack Shaft Assembly
 - 10 Jack shaft
 - 11 Collar, shaft
 - 12 Bearing, ball, snap ring
 - 13 QD bushing
 - 14 Pinion
 - 15 Key
 - 38 Cap screw
 - 39 Washer, lock
- 16 Brake
- 17 Motor
- 18 Gearbox
- 19 Bumper
 - 36 Nut, heavy hex
 - 37 Washer, lock
- 20 Drop Lug
 - 23 Bolt
 - 24 Washer, lock
- 21 Girder plate, mounting
- 22 Torque arm
 - 25 Bolt
 - 26 Washer, lock
 - 27 Bolt (gearbox mount)
 - 28 Washer, lock (gearbox mount)
 - 29 Nut, heavy hex (gearbox mount)
- 30 Cap screw
- 31 Washer, lock
- 32 Nut, heavy hex
- 33 Bolt (girder plate mounting)
- 34 Washer, lock (girder plate mounting)
- 35 Nut, heavy hex (girder plate mounting)



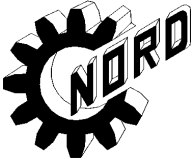


**FIXED AXLE END TRUCK
TOP RUNNING**

Fixed Axle End Truck Top Running Parts List

- 1 Frame, Top Running End Truck
- 2 Idler Wheel Assembly
 - 4 Axle, wheel
 - 5 Spacer
 - 6 Bearing, ball
 - 8 Idler, wheel
- 3 Drive Wheel Assembly
 - 4 Axle, wheel
 - 5 Spacer
 - 6 Bearing, ball
 - 7 Drive, wheel
- Jack Shaft Assembly
 - 10 Jack shaft
 - 11 Spacer
 - 12 Bearing, ball, snap ring
 - 13 Collar, shaft
 - 14 Pinion
 - 15 QD bushing
 - 16 Snap ring, external
 - 34 Cap screw
 - 35 Washer, lock
 - 36 Key
- 17 Bumper
- 18 Brake
- 19 Motor
- 20 Gearbox
- 21 Torque arm
 - 24 Bolt
 - 25 Washer, lock
 - 26 Bolt (gearbox mount)
 - 27 Washer (gearbox mount)
 - 28 Washer, lock (gearbox mount)
 - 29 Nut, heavy hex (gearbox mount)
- 22 Girder plate top
- 23 Girder plate side
 - 30 Bolt (girder plate mounting)
 - 31 Washer, lock (girder plate mounting)
 - 32 Washer, load indicating (girder plate mounting)
 - 33 Nut, heavy hex (girder plate mounting)





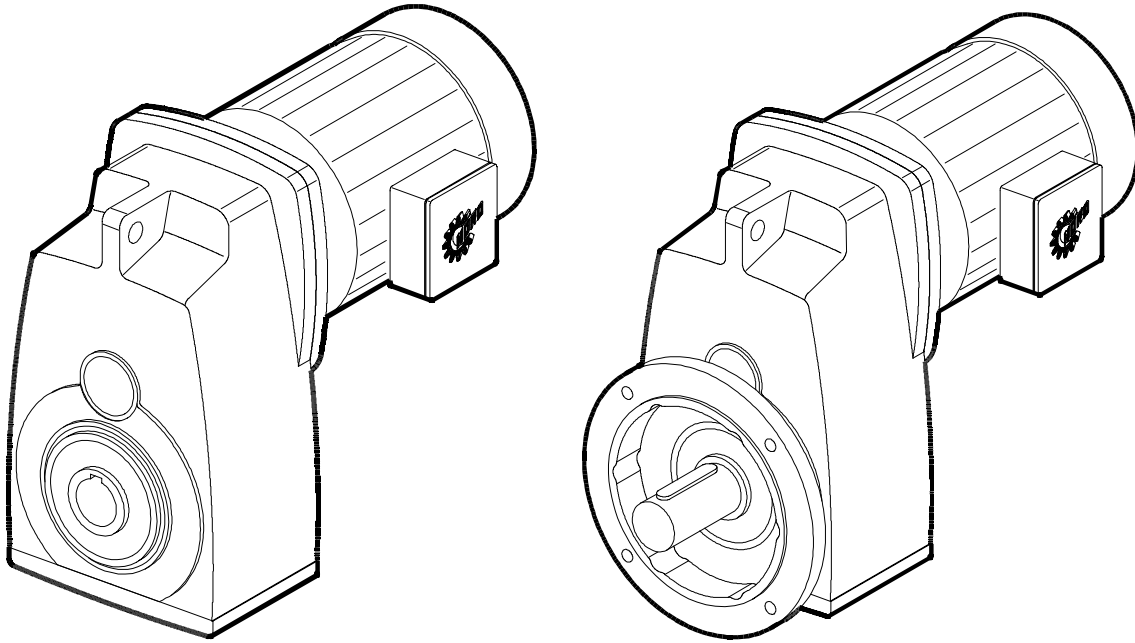
UNICASE® Shaft Mount Gearboxes Installation and Maintenance Instructions

BIM 1020

USA

CDN

Retain These Safety Instructions For Future Use



INSPECTION OF UNIT

Thoroughly inspect the equipment for any shipping and handling damage before accepting shipment from the freight company. If any of the goods called for in the bill of lading or express receipt are damaged or the quantity is short, do not accept until the freight or express agent makes an appropriate notation on your freight bill or express receipt. If any concealed loss or damage is discovered later, notify your freight carrier or express agent at once and request him to make an inspection. We will be very happy to assist you in collecting claims for loss or damage during shipment; however, this willingness on our part does not remove the transportation company's responsibility in reimbursing you for collection of claims or replacement of material. Claims for loss or damage in shipment must not be deducted from the NORD Gear invoice, nor should payment of the NORD Gear invoice be withheld awaiting adjustment of such claims, as the carrier guarantees safe delivery.

If considerable damage has been incurred and the situation is urgent, contact the nearest NORD Gear Sales Office for assistance. Please keep a written record of all communications.

RECORD NAMEPLATE DATA

Locate the gear reducer nameplate and record all nameplate data for future reference.

SK _____ S/N _____

RATIO _____ MAX TORQUE _____ RPM _____ MTG. POS _____

STORAGE

PROPER STORAGE UNTIL INSTALLED

Keep unit in a dry, temperature controlled area. If stored other than said, long term storage methods must be applied to the unit including complete fill with lubricant. Protect machined surfaces and rotate shafts periodically. Prior to putting unit into service, drain lubricant and refill to proper level as determined by the mounting position.

PROPER HANDLING OF THE UNIT

Exercise care to prevent damage to the unit when moving. Lift only at designed lifting points. Do not attach other machinery and lift by the unit lifting points. The lifting points are to be used to lift the unit only. Insure that adequate safety measures are taken to protect personnel during transportation. Protect the mounting surface from damage.

COUPLING ALIGNMENT

Shaft couplings should be installed according to the coupling manufacturer's recommendations for gap, angular and parallel alignment. In many installations, it is necessary to allow for thermal and mechanical shaft movement when determining shaft alignment. The coupling manufacturer's recommendations should be followed.

AXIAL DISPLACEMENT

The gap between shaft ends should be the same as the specified coupling gap unless overhung mounting of the coupling hub is specified. The coupling gap and shaft gap must be sufficient to accommodate any anticipated thermal or mechanical axial movement.

ANGULAR ALIGNMENT

Insert a spacer or shim stock equal to the required coupling gap between the coupling hub faces and measure the clearance using feeler gauges. Repeat this at the same depth at 90-degree intervals to determine the amount of angular misalignment.

PARALLEL ALIGNMENT

Mount a dial indicator to one coupling hub, and rotate this hub, sweeping the outside diameter of the other hub. The parallel misalignment is equal to one-half of the total indicator reading. Another method is to rest a straight edge squarely on the outside diameter of the hubs at 90-degree intervals and measure any gaps with feeler gauges. The maximum gap measurement is the parallel misalignment.

CHECKING ALIGNMENT

After both angular and parallel alignments are within specified limits, tighten all foundation bolts securely and repeat the above procedure to check alignment. If any of the specified limits for alignment are exceeded, realign the coupling.

SPROCKET OR SHEAVE ALIGNMENT

Align the sheaves or sprockets square and parallel by placing a straight edge across their faces. Alignment of bushed sheaves and sprockets should be checked after bushings have been tightened. Check horizontal shaft alignment by placing a level vertically against the face of the sheave or sprocket. Adjust belt or chain tension per the manufacturer's specified procedure.

OUTBOARD PINION ALIGNMENT

Align the pinion by adjusting the gear tooth clearance according to the manufacturer's recommendations and checking for acceptable outboard pinion tooth contact. The foundation bolts may have to be loosened and the unit moved slightly to obtain this contact. When the unit is moved to correct tooth contact, the prime mover should be realigned.

RECHECK ALIGNMENT

After a period of operation, recheck alignment and adjust as required.

1. Properly install unit on a rigid foundation
 - adequately supported
 - securely bolted into place
 - leveled so as not to distort the gear case
2. Properly install couplings suitable for the application and connected equipment.
3. Ensure accurate alignment with other equipment.
4. Furnish and install adequate machinery guards as needed to protect operating personnel and as required by the applicable standards of the Occupational Safety and Health Administration (OSHA), and by other applicable safety regulations;
5. Ensure that driving equipment is running in the correct direction before coupling to reducers with backstops (designed to operate only in a specific direction) or machinery designed to operate only in one direction.

CHANGES IN PERFORMANCE SPECIFICATIONS

Owner has the responsibility to consult with NORD GEAR if such items such as applied loads, operating speeds or other operating conditions have changed.



WARNING:

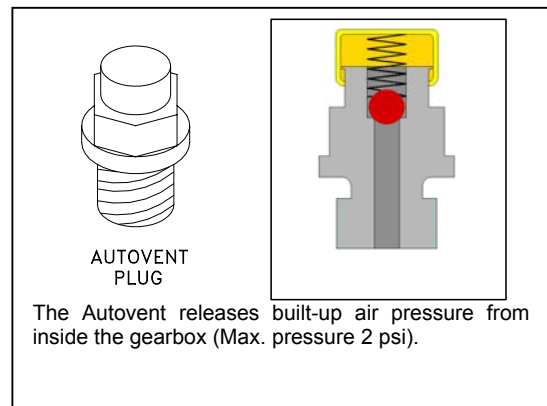
LOCK OUT POWER before any maintenance is performed. Make absolutely sure that no voltage is applied while work is being done on the gearbox.

START-UP

1. Ensure that switches, alarms, heaters, coolers and other safety and protection devices are installed and operational for their intended purpose.
2. Verify that the installed mounting position is the same as the nametag mounting position. If not, adjust the oil level accordingly and relocate the vent plug, fill plug and drain plug according to the mounting position. See following.

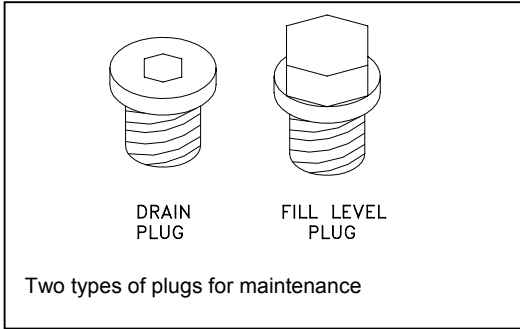
AUTOVENT PLUG

The Autovent plug is brass in color and will be located at the highest point on the gearbox. It operates like a check-valve to allow the reducer to relieve internal pressure while preventing lubricant contamination during cooling. A spring presses a ball or plunger against a machined orifice until pressure exceeds 2 psi. Above 2 psi the air is allowed to escape depressurizing the gearcase. When internal pressure drops below 2 psi, the autovent re-seals closing the unit to the outside environment. After shutdown, the reducer cools along with the air inside the reducer. The unit will temporarily maintain a slight vacuum until normalization occurs. NORD Gear supplies an Autovent as a standard feature.



FILL LEVEL & DRAIN PLUGS

The drain plugs are metric socket head cap screws. They will be located at the lowest part of the gearbox for ease of draining. The fill level plug is a hex head cap screw. It will be located between the Autovent and drain plug. Both types of plugs will have gaskets included to prevent oil from leaking.



LUBRICANT

All NORD reducers are shipped from the factory properly filled with lubricant and all plugs are installed according to the mounting position given on the reducer nametag. Acceptable oil fill level is within 1/2 inch of the bottom of the fill plug threads.

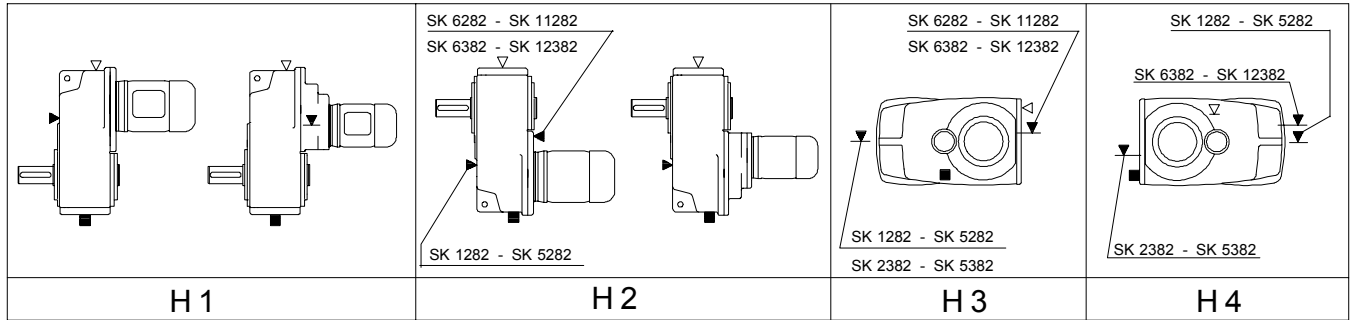
OPERATION AND MAINTENANCE CHECKLIST

1. Operate the equipment as it was intended to be operated
2. Do not overload.
3. Run at correct speed.
4. Maintain lubricant in good condition and at proper level.
5. Dispose of used lubricant in accordance with applicable laws and regulations.
6. Apply proper maintenance to attached equipment at prescribed intervals recommended by the manufacturer.
7. Perform periodic maintenance of the gear drive as recommended by NORD.

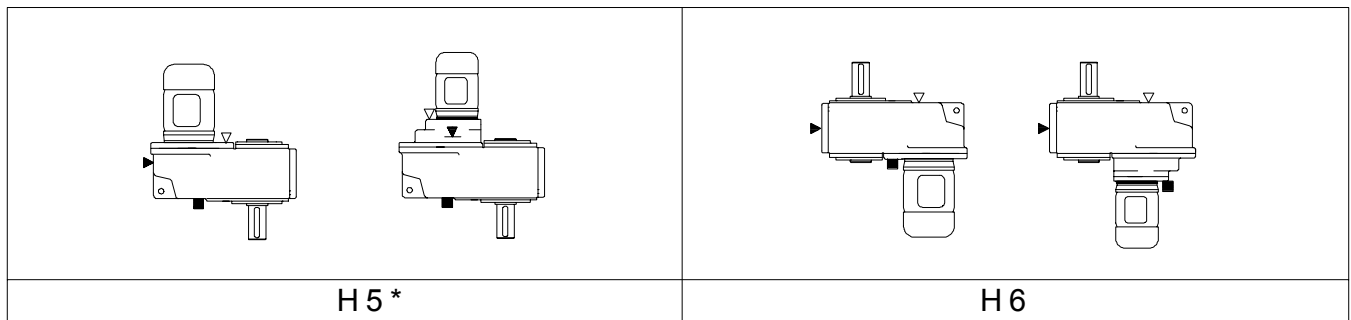
MOUNTING POSITIONS

These charts detail the mounting positions for horizontal and vertical mounting. The Autovent, oil fill plug and drain plug are indicated on each mounting position picture. The factory set mounting position and plug locations match that shown on the gearbox nametag. For mounting orientations other than shown consult NORD Gear.

Horizontal position



Vertical position



Symbols:



* Mounting position H5 with lubricant expansion unit recommended

SK0182NB & SK1382NB have no vent or drain plugs. They are filled with synthetic oil so the units are "Lubed for Life".

MAINTENANCE

Mineral lubricant should be changed every 10,000 service hours or after two years. For synthetic oils, the lube should be changed every 20,000 service hours or after four years. In case of extreme operating (e.g. high humidity, aggressive environment or large temperature variations), shorter intervals between changes are recommended.







OIL SPECIFICATIONS

NORD supplies all reducers filled with oil from the factory. Consult the sticker adjacent to the fill plug to determine the type of lubricant installed at the factory. Standard lubricant is ISO VG220 mineral-based oil. However, some units have special lubricants designed to operate in certain environments or to extend the service life of the lubricant. If in doubt about which lubricant is needed, contact NORD Gear.

STANDARD OIL – ISO VG220

Ambient Temperature	Formulation
20 to 104°F (-5 to 40°C)	Mineral

TYPICAL OILS

Viscosity ISO NLGI	Formulation	Service Temperature Range						
VG 460	Conventional Mineral	20°C to +50°C 68F to +122°F	Mobilgear 634	Omala 460	7EP	Klüberoil GEM 1-460	Energol GR-XP 460	Tribol 1100/460
	Synthetic PAO	-30°C to +80°C -22°F to +176°F	Mobil SHC 634	Omala 460 HD	Isolube EP 460	Klübersynth EG 4-460	N/A	Tribol 1510/460
VG 320	Conventional Mineral	0°C to +30°C 32°F to +86°F	Mobilgear 632	Omala 320	6EP	Klüberoil GEM 1-320	Energol GR-XP 320	Tribol 1100/320
	Synthetic PAO	-35°C to +80°C -31°F to +176°F	Mobil SHC 632	Omala 320 HD	Isolube EP 460	Klübersynth EG 4-320	N/A	Tribol 1510/320
VG 220	Conventional Mineral	-5°C to +40°C +20°F to +104°F	Mobilgear 630	Omala 220	5EP	Klüberoil GEM 1-220	Energol GR-XP 220	Tribol 1100/220
	Synthetic PAO	-34°C to +80°C -30°F to +176°F	Mobil SHC 630	Omala 220 HD	Isolube EP 220	Klübersynth EG 4-220	N/A	Tribol 1510/220
VG 150 & VG 100	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 629	Omala 100	4EP	Klüberoil GEM 1-150	Energol GR-XP 100	Tribol 1100/100
	Synthetic PAO	-37°C to +10°C -35°F to +50°F	Mobil SHC 629	Omala 150 HD	Isolube EP 150	Klübersynth EG 4-150	N/A	N/A
VG 68	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 626	Omala 68	2EP	Klüberoil GEM 1-68	Energol GR-XP 68	Tribol 1100/68
	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 626	N/A	Isolube EP 68	N/A	N/A	N/A
VG 32	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 624	N/A	N/A	Klüber-Summit HySyn FG-32	N/A	N/A

PAO = Poly Alpha Olefin

SPECIAL PURPOSE LUBRICANTS

Ambient Temperature	Formulation	Manufacturer	Oil Brand Name
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	Chevron	FM ISO 220
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	OilJAX	Magnaplate 85W140-FG
5 to 125°F (-20 to 50°C)	Fluid Grease	Mobil	Mobilux EP023
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Mobil	Mobilith SHC 007
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Shell	Albida LC

STANDARD BEARING GREASE – NLGI 2EP Lithium

Ambient Temperature	Formulation
-20 to 140°F (-30 to 60°C)	Mineral

OPTIONAL BEARING GREASES

Ambient Temperature	Formulation	Manufacturer	Grease Brand Name
-40 to 230°F (-40 to 110°C)	Synthetic	Shell	Aeroshell 6
-40 to 230°F (-40 to 110°C)	Food Grade - Synthetic	Lubriplate	SFL1

LUBRICANT CAPACITY

Each reducer has the oil level and oil quantity adjusted according to the mounting position shown in the tables. When replacing the oil, consult the tables below to determine the proper amount of oil to be installed according to the reducer size and mounting position. Note that this is approximate and the final level will be adjusted when the reducer is installed. Acceptable oil fill level is within 1/2 inch of the bottom of the fill plug threads.

LUBRICATION CAPACITY - SHAFT MOUNT 'CLINCHER' GEARBOXES

		MOUNTING POSITION					
		Horizontal				Vertical	
		H1	H2	H3	H4	H5	H6
SK 0182NB	quarts	0.42	0.63	0.53	0.53	0.58	0.58
	liters	0.40	0.60	0.50	0.50	0.55	0.55
SK0282NB	quarts	0.74	0.85	0.95	0.95	1.16	1.06
	liters	0.70	0.80	0.90	0.90	1.10	1.00
SK 1282	quarts	0.95	0.95	1.00	1.00	1.27	1.37
	liters	0.90	0.90	0.95	0.95	1.20	1.30
SK 2282	quarts	1.74	2.01	1.90	1.90	2.11	2.54
	liters	1.65	1.90	1.80	1.80	2.00	2.40
SK 3282	quarts	3.33	3.44	3.33	3.33	4.33	4.33
	liters	3.15	3.25	3.15	3.15	4.10	4.10
SK 4282	quarts	4.97	5.02	4.97	4.97	5.71	6.45
	liters	4.70	4.75	4.70	4.70	5.40	6.10
SK 5282	quarts	7.93	7.93	7.61	7.61	9.30	9.30
	liters	7.50	7.50	7.20	7.20	8.80	8.80
SK 6282	quarts	18.0	12.7	14.8	10.6	18.5	14.8
	liters	17.0	12.0	14.0	10.0	17.5	14.0
SK 7282	quarts	26.4	21.1	22.2	16.9	28.5	22.2
	liters	25	20	21	16	27	21
SK 8282	quarts	39.1	31.7	32.8	32.8	43.3	34.9
	liters	37	30	31	31	41	33
SK 9282	quarts	78.2	58.1	62.4	72.9	76.1	74.0
	liters	74	55	59	69	72	70
SK 10282	quarts	95	42	87	63	95	95
	liters	90	40	82	60	90	90
SK 11282	quarts	174	153	148	106	206	169
	liters	165	145	140	100	195	160

		MOUNTING POSITION					
		Horizontal				Vertical	
		H1	H2	H3	H4	H5	H6
SK 1382NB	quarts	1.37	1.48	2.01	2.11	2.22	2.43
	liters	1.30	1.40	1.90	2.00	2.10	2.30
SK 2382	quarts	1.80	2.01	1.59	1.59	3.28	2.75
	liters	1.70	1.90	1.50	1.50	3.10	2.60
SK 3382	quarts	4.33	3.49	3.49	3.49	5.92	4.33
	liters	4.10	3.30	3.30	3.30	5.60	4.10
SK 4382	quarts	6.24	5.18	5.18	5.18	8.77	7.19
	liters	5.90	4.90	4.90	4.90	8.30	6.80
SK 5382	quarts	13.21	7.08	8.77	8.77	14.80	12.68
	liters	12.50	6.70	8.30	8.30	14.00	12.00
SK 6382	quarts	17.4	10.1	13.2	14.8	19.0	13.7
	liters	16.5	9.6	12.5	14.0	18.0	13.0
SK 7382	quarts	23.3	16.9	20.1	24.3	26.4	21.1
	liters	22	16	19	23	25	20
SK 8382	quarts	35.9	26.4	31.7	37.0	40.2	33.8
	liters	34	25	30	35	38	32
SK 9382	quarts	77.2	47.6	63.4	68.7	78.2	74.0
	liters	73	45	60	65	74	70
SK 10382	quarts	90	77	85	85	93	93
	liters	85	73	80	80	88	88
SK 11382	quarts	169	148	143	164	222	164
	liters	160	140	135	155	210	155
SK 12382	quarts	169	148	143	164	222	164
	liters	160	140	135	155	210	155

Note: Filling quantities are approximate figures. Oil level must be checked according to oil level plug after final installation. Acceptable oil fill level is within 1/2 inch of the bottom of the fill plug threads. For mounting angles not shown, consult factory.

TROUBLE SHOOTING

PROBLEM WITH THE REDUCER		POSSIBLE CAUSES	SUGGESTED REMEDY
Runs Hot	Overloading	Load exceeds the capacity of the reducer	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce load
	Improper lubrication	Insufficient lubrication	Check lubricant level and adjust up to recommended levels
		Excessive lubrication	Check lubricant level and adjust down to recommended levels
		Wrong lubrication	Flush out and refill with correct lubricant as recommended
Runs Noisy	Loose foundation bolts	Weak mounting structure	Inspect mounting of reducer. Tighten loose bolts and/ or reinforce mounting and structure
		Loose hold down bolts	Tighten bolts
	Worn RV Disc	Overloading unit may result in damage to disc	Disassemble and replace disc. Recheck rated capacity of reducer.
	Failure of Bearings	May be due to lack of lubricant	Replace bearing. Clean and flush reducer and fill with recommended lubricant.
		Overload	Check rated capacity of reducer.
Insufficient Lubricant	Level of lubricant in the reducer not properly maintained.	Check lubricant level and adjust to factory recommended level.	
Output Shaft Does Not Turn	Internal parts are broken	Overloading of reducer can cause damage.	Replace broken parts. Check rated capacity of reducer.
		Key missing or sheared off on input shaft.	Replace key.
		Coupling loose or disconnected.	Properly align reducer and coupling. Tighten coupling.
Oil Leakage	Worn Seals	Caused by dirt or grit entering seal.	Replace seals. Autovent may be clogged. Replace or clean.
		Overfilled reducer.	Check lubricant level and adjust to recommended level.
		Autovent clogged.	Clean or replace, being sure to prevent any dirt from falling into the reducer.
		Improper mounting position, such as wall or ceiling mount of horizontal reducer.	Check mounting position. Name tag & verify with mounting chart in manual.

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MIDWEST

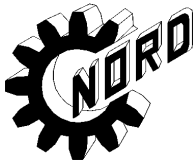
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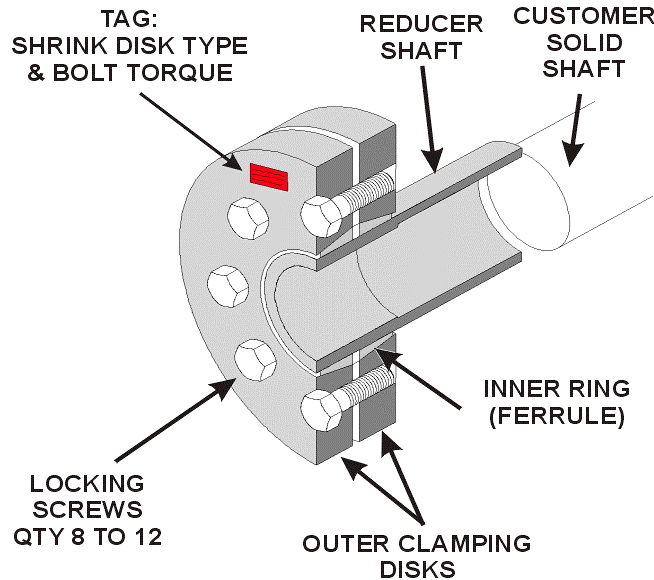
Hollow Shrink Disc Shaft Installation and Maintenance Instructions

BIM 1001

USA

CDN

Retain These Safety Instructions For Future Use



Installation Instructions:

1. Mating shaft tolerances are normally tighter for shrink discs due to the gripping forces needed. Customer shaft diameter has to be machined according to ISO h6 or f6 tolerances (f6 easier to machine but lower gripping forces as shown in catalog). Refer to Table 1 for h6 and f6 tolerances for customer shafts.
2. Remove transportation spacers (if provided) located between outer collars. Do not take the unit apart.
3. Lightly tighten locking screws until most play between outer collars and the conical inner ring (ferrule) is eliminated. You must be able to easily turn the ferrule with your fingers.
4. Lightly lubricate the bore of the ferrule, with grease, for easier mounting onto outside diameter of the reducer hollow shaft.
5. Slide the shrink-disc onto hollow shaft.
6. Wipe the reducer bore and the mating solid shaft clean of any lubricants and dirt. Only use solvent if the parts feel oily to the touch after wiping with a clean rag.
7. Slide the reducer onto the solid shaft until it is about half way through.
8. Lubricate the remaining portion of the solid shaft with a #2 grease, where it will be inserted into the hollow shaft.
9. Tighten the locking screws in a circular pattern. Refer to Table 2 for tightening torques. Initially, tighten locking screws finger tight to position outer collars. Then tighten 1/4

to 1/2 turn at a time until specified tightening torque (per table) is reached.

10. Continue tightening each bolt at rated torque until no further rotation is seen. This assures the shrink disc is fully seated.



Warning:

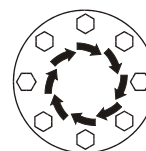
The surface area between the hollow shaft and the solid shaft must be free of lubricant or the connection may slip in service.



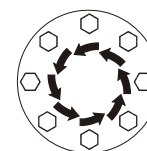
Warning:

Always tighten in a circular pattern. Never tighten bolts in a star pattern or connection may slip in service.

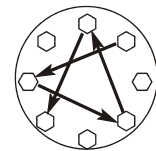
BOLT TIGHTENING PATTERN



CLOCKWISE
CIRCULAR
PATTERN
RIGHT



COUNTER
CLOCKWISE
CIRCULAR
PATTERN
RIGHT



STAR
PATTERN
WRONG

Customer shaft diameter tolerance with Shrink Disc fit h6

Metric (mm)

- $\leq \varnothing 18 = +0.000/-0.011$
- $> \varnothing 18 \leq \varnothing 30 = +0.000/-0.013$
- $> \varnothing 30 \leq \varnothing 50 = +0.000/-0.016$

- $> \varnothing 50 \leq \varnothing 80 = +0.000/-0.019$
- $> \varnothing 80 \leq \varnothing 120 = +0.000/-0.022$
- $> \varnothing 120 \leq \varnothing 180 = +0.000/-0.025$

Inch

- $\leq \varnothing 0.750 = +0.0000/-0.0004$
- $> \varnothing 0.750 \leq \varnothing 1.125 = +0.0000/-0.0005$
- $> \varnothing 1.125 \leq \varnothing 2.000 = +0.0000/-0.0006$
- $> \varnothing 2.000 \leq \varnothing 3.000 = +0.0000/-0.0007$
- $> \varnothing 3.000 \leq \varnothing 4.750 = +0.0000/-0.0008$
- $> \varnothing 4.750 \leq \varnothing 7.000 = +0.0000/-0.0010$

Shaft finish to be 125 micro inches or smoother.

Customer shaft diameter tolerance with Shrink Disc fit f6 (looser fit)

Metric (mm)

- $\leq \varnothing 18 = -0.016/-0.024$
- $> \varnothing 18 \leq \varnothing 30 = -0.020/-0.029$
- $> \varnothing 30 \leq \varnothing 50 = -0.025/-0.036$
- $> \varnothing 50 \leq \varnothing 80 = -0.030/-0.043$
- $> \varnothing 80 \leq \varnothing 120 = -0.036/-0.051$
- $> \varnothing 120 \leq \varnothing 180 = -0.043/-0.061$

Inch

- $\leq \varnothing 0.750 = -0.0006/-0.0011$
- $> \varnothing 0.750 \leq \varnothing 1.125 = -0.0008/-0.0013$
- $> \varnothing 1.125 \leq \varnothing 2.000 = -0.0010/-0.0016$
- $> \varnothing 2.000 \leq \varnothing 3.000 = -0.0012/-0.0019$
- $> \varnothing 3.000 \leq \varnothing 4.750 = -0.0014/-0.0023$
- $> \varnothing 4.750 \leq \varnothing 7.000 = -0.0017/-0.0027$

Shaft finish to be 125 micro inches or smoother

Tightening Torques for Locking Screws

Shrink Disk Type	Bore Size Inches (mm)	Locking Screws (Bolts)		
		Qty	Size	Torque in-lbs (Nm)
SNxx/35V	0.9375 – 1.000 (24 - 26)	8	M5X25	60 (7)
SNxx/40V	1.125 - 1.250 (28 - 32)	8	M6X35	110 (12)
SNxx/46V	1.3125 - 1.4375 (34 - 36)	10	M6X35	110 (12)
SNxx/55V	1.5625 - 1.75 (40 - 45)	8	M8X40	270 (30)
SNxx/62V	1.875 - 2.0625 (48 - 52)	10	M8X40	270 (30)
SNxx/76V	2.1875 - 2.5625 (55 - 65)	10	M10X50	520 (59)
SNxx/90V	2.5625 - 2.9375 (65 - 75)	10	M12X70	885 (100)
SNxx/108V	2.9375 - 3.375 (75 - 85)	12	M12X70	885 (100)
SNxx/128V	3.750 - 4.125 (95 - 105)	8	M16X70	2,210 (250)
SNxx/138V	4.125 - 4.500 (105 - 115)	8	M16X70	2,210 (250)
SNxx/158V	4.500 - 5.125 (115 - 130)	12	M16X80	2,210 (250)
SNxx/185V	5.3125 - 5.875 (135 - 150)	12	M16X80	2,210 (250)
SNxx/210V	6.250 (160)	12	M16X80	4,340 (490)
SNxx/230V	6.3125 - 7.500 (160 - 190)	12	M20X100	4,340 (490)

Maintenance

Shrink disks are maintenance free.

Removal

- Loosen locking screws in circular pattern as they were tightened, by approximately 1/4 to 1/2 turn at a time until finger tight. Do not remove locking screws completely.
- Loosen the outer collars from the tapered inner ring. This may require tapping the bolts with a soft faced hammer or prying lightly between the outer collars.
- Remove hollow-shaft reducer from solid shaft.

Preparation for Re-Use:

- Disassemble and thoroughly clean all parts. Wire brush to remove any excessive rust or dirt.
- Lubricate the taper of the outer collars and of the inner ring with Molycote G-Rapid plus (product of Dow Corning) or equivalent.
- Grease screw threads and head contact area with multipurpose grease.

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MIDWEST

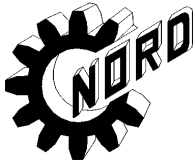
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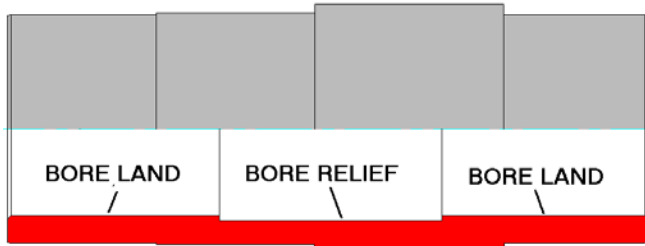


Hollow Keyed Shaft & Fixing Element Installation and Maintenance Instructions

BIM 1002



Retain These Safety Instructions For Future Use



CAUTION:

For hollow bore reducers designed to use rectangular keys, the mating solid shaft must be made to mating rectangular dimensions. Otherwise the supplied keys will not fit properly. **Not doing so may cause the hollow shaft or the key to fail.**

CAUTION:

Key(s) must engage the full land length at each end of the hollow bore shaft. **Not doing so may cause the hollow shaft or the key to fail.**

Basic Design

Nord uses a tight tolerance ISO 286 class H7 for its hollow bore shafts. And, recommends a close fit of mating components to prevent excessive free play that might lead to failure. Straightness, roundness, and diameter tolerance variations of both shafts combined with the low clearance between would make installation difficult without special design features to compensate.

A relief area is cut in the center section of the hollow bore. In most cases, Nord furnishes 2 short keys instead of a single long key. The bore relief and break of the keys are done as design features to ease assembly of the solid shaft. If a key supplied by others is used, it must engage the full land length at each end of the hollow bore shaft.

Assembly

Before assembly, lubricate the hollow bore lands and the solid (male) shaft diameter with anti-seize compound (preferred), assembly paste or at a minimum, use a #2 grease. Anti-seize compounds are available from many manufacturers such as Loctite, Kluber, etc. This will aid installation of the reducer. But more importantly, the lubricant will aid removal should it be required at a later date.

After installation, a bead of silicone or grease around both ends of the hollow bore and solid shaft intersections will help prevent moisture from wicking down the shaft and corroding the two together.

Design of Mating Connection

Tolerance of Customer shaft with keyseat (in)	
0.625 – 1.500	+0.0000 / -0.0020
1.525 – 2.500	+0.0000 / -0.0030
2.625 – 7.000	+0.0000 / -0.0040

Shaft finish to be 125µ inches or smoother

Key Dimensions

Most keyed sizes use standard square keys and some units use rectangular keys (refer to the catalog for details). If the reducer shaft uses a rectangular key the mating, solid (male) shaft must be made to rectangular key dimensions. For dimensions of the mating male shaft keyway, see ANSI B17.1 or a general engineering text such as the "Machinery's Handbook". The male shaft should be made with a Class 2, transitional fit (slightly loose to slightly tight). If the key fit is tight at assembly it may require hand fitting of the keys (i.e. light filing of the key sides).

Keys in the female shaft are designed to be a low clearance. This is to allow for easier assembly with the mating male shaft, without allowing too much clearance that may work loose during use.

Preventing Axial Movement

Due to the slight oscillations inherent in any rotating shaft, Nord offers an optional "fixing element kit". This is a method to prevent the reducer from "walking out" of position. The kit includes all of the necessary parts to secure the shaft by using a tapped hole in the end of the mating male shaft. Refer to Nord's Constant Speeds catalog for dimensions in the fixing element section.

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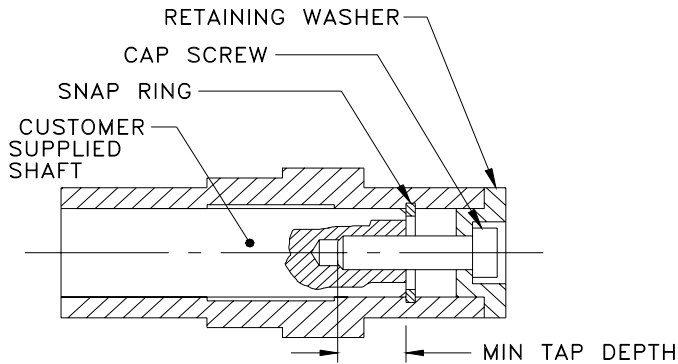
CANADA

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Brampton, Ontario L6T 4A1
Phone 905-796-3606
Fax 905-796-8130

Optional Fixing Element Kit

The fixing element kit is used to prevent axial movement of the reducer during operation. A bolt and special washer tension the solid (male) shaft against a snap ring inside the hollow bore or a shoulder on the male shaft at the entry end of the bore. A plastic cover (not available with all sizes) seals the fixing element bolt. A bead of silicon, or grease applied between the hollow shaft end and the retaining washer will help prevent moisture wicking down the shaft and corroding the shafts together.

Kits are designed to fit multiple of bore sizes and may contain more than one bolt and/or snap ring. Use most appropriate parts and discard remaining components. Only one bolt, snap ring, retaining washer, and plastic cover are required per reducer. See Table for allowable thrust load ratings on the snap rings.



Bolt Tightening

If the "Customer Supplied Solid Shaft" is pulled up against the "Snap Ring" as shown in the figure above, then the shaft retaining screw labeled "Cap Screw" should be tightened lightly snug. The screw should also be secured with a thread-locking compound to prevent the screw from backing out. Be careful not to over tighten the retaining "Cap Screw" or the snap ring may be pulled out of its seating groove.

If the "Customer Supplied Solid Shaft" is shouldered and pulled up against the end of the hollow shaft and not the "Snap Ring," then the shaft retaining "Cap Screw" should be tightened to standard torque as recommended by bolt manufacturers based on the bolt grade and materials.



CAUTION:

Maximum Edge Break on the solid (male) shaft must not exceed the value shown, otherwise the thrust capacity of the snap ring will be reduced.

Shaft Bore inch	Max. Thrust on Snap Ring † lbs [N]	Bolt Size	Max. Edge Break on Solid Shaft †	
			Radius inch	Chamfer Inch
5/8	710 [3,158]	10 - 32	0.027	0.021
3/4	1,460 [6,494]	1/4 - 20	0.032	0.025
13/16	3,700 [16,458]	1/4 - 20	0.047	0.036
1	2,800 [12,455]	3/8 - 16	0.042	0.034
1-1/4	3,900 [17,348]	7/16 - 14	0.047	0.036
1-3/16	3700 [16458]	7/16 - 14	0.047	0.036
1-3/8	5050 [22463]	5/8 - 11	0.048	0.038
1-7/16	5500 [24465]	5/8 - 11	0.048	0.038
1-1/2	6000 [26689]	5/8 - 11	0.048	0.038
1-5/8	6900 [30693]	5/8 - 11	0.064	0.05
1-3/4	8050 [35808]	5/8 - 11	0.064	0.05
1-13/16	8450 [37587]	5/8 - 11	0.064	0.05
1-15/16	9700 [43148]	5/8 - 11	0.064	0.05
2	10300 [45816]	5/8 - 11	0.064	0.05
2-1/16	10850 [48263]	5/8 - 11	0.078	0.062
2-3/8	14300 [63609]	3/4 - 10	0.078	0.062
2-7/16	14900 [66278]	3/4 - 10	0.078	0.062
2-3/4	19200 [85405]	3/4 - 10	0.092	0.074
2-15/16	19500 [86740]	3/4 - 10	0.092	0.074
3-3/16	25000 [111205]	3/4 - 10	0.104	0.083
3-1/4	27000 [120101]	3/4 - 10	0.104	0.083
3-15/16	39300 [174814]	7/8 - 9	0.124	0.099
4	40700 [181042]	7/8 - 9	0.128	0.102
4-1/16	41000 [182376]	7/8 - 9	0.128	0.102
4-3/8	44600 [198390]	7/8 - 9	0.154	0.123
4-3/4	49000 [217962]	7/8 - 9	0.154	0.123

† Maximum edge break must be equal or less than shown.

BRAKE MOTOR INFORMATION

Ace motors are three phase totally enclosed motors incorporating an electromagnetic spring-set disc brake. Motor load is stopped automatically when power is turned off, ensuring a precise stop and quick braking action. Brake activation is obtained without axial sliding of the shaft and is specifically engineered to provide years of worry free performance.

Ace brake motors have been designed to be used with lifting and translating machinery. The integral brake design utilizes an asbestos free brake disc, with a high coefficient of friction. All Ace brake motors have a power-off manual release for convenience and use in the case of power loss.

Ace brake motors incorporate either a NEMA or IEC Design B, totally enclosed motor platform, utilizing a Class H insulation system (inverter rated), providing superior motor protection against voltage spikes induced by variable frequency drives.

Motors are available from stock in both 4 pole (1800 RPM) and 6 pole (1200 RPM) designs, and are available from 3/4 HP thru 10 HP.

All Ace brake motors have Klixon style motor protectors, and can be modified (upon request) to meet specific environmental requirements.

U.L., CSA, ISO Standards and Approvals.

Underwrites Laboratories, Inc.

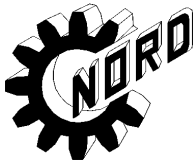
1. U.L recognized Class H insulation system. File #E55555, Guide Number OBJY2.
2. U.L. recognized protector winding combinations. File #E57955. Guide Number XEWWR2.

Canadian Standards Association

1. CSA Report Number L33543, Guide Number 260-0-0.
2. CSA Report Number LR62104.

ISO Quality Certification

Design and Manufacturing Facility, ISO 9001, Certificate Number RvC #93-102.
EN29001, BS5750: Part I and ANSI/ASQC Q91-19 ISO9002 Certificate Number RvC #93-090.



Motor Brakes Installation and Maintenance Instructions

BIM 1090

USA

CDN

Retain These Safety Instructions for Future Use

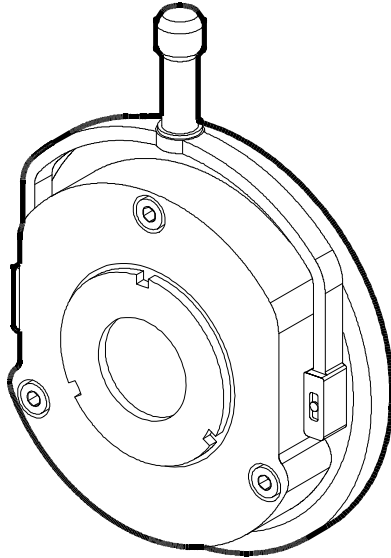


TABLE OF CONTENTS

General Description – Brakes & Rectifiers.....	2
Rectifier Part Numbers and Ratings.....	2
Technical Data – <i>Precima</i> Brakes.....	3
Maintenance – <i>Precima</i> Brakes.....	4
Parts List – <i>Precima</i> Brakes.....	5
Brake Pad Replacement – <i>Precima</i> Brakes.....	6
Maintenance – <i>Mayr</i> Brakes (10-20Nm)	7
Maintenance – <i>Mayr</i> Brakes (400-800Nm).....	8
Hand Release Air Gap Setting – <i>Precima</i> & <i>Mayr</i>	9
Brake Torque Adjustment.....	9
Connection Diagrams – 60Hz.....	10
Connection Diagrams – 50Hz	11
Trouble Shooting.....	11

Safety Notice

This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electric Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury.

This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the motor products shipped by NORD Gear. If you have a question about a procedure or are uncertain about any detail, DO NOT PROCEED. Please contact your NORD distributor for more information or clarification.



WARNING:

LOCK OUT POWER BEFORE ANY MAINTENANCE IS PERFORMED. MAKE ABSOLUTELY SURE THAT NO VOLTAGE IS APPLIED WHILE WORK IS BEING DONE ON THE GEARBOX. READ SAFETY INSTRUCTIONS PRIOR TO ANY WORK DONE ON THE MOTOR.



DANGER:

THE USER IS RESPONSIBLE FOR CONFORMING TO THE NATIONAL ELECTRIC CODE AND ALL OTHER APPLICABLE LOCAL CODES. WIRING PRACTICES, GROUNDING DISCONNECTS AND OVERCURRENT PROTECTION, ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

GENERAL DESCRIPTION

BRAKES

General

NORD brakes are “spring set”. When power is removed from the brake, the brake will automatically set to hold the load. NORD brakes are DC voltage brakes and in most instances are supplied with a motor mounted brake rectifier for easy connections to AC power. AC power is taken directly from the power line or from the terminal block of the motor and converted to DC by the supplied rectifier in the terminal box. **If the motor is connected to a frequency inverter, soft start, or is a two-speed motor, the AC power must be supplied to the brake rectifier separately from the motor power.**

When the brake is de-energized (Power Off), the braking springs exert a force against the anchor plate, which prevents the brake rotor from rotating. When the brake coil is energized (Power On), a magnetic field builds and pulls the anchor plate across the air gap to the brake casing, which frees the brake rotor and allows the motor shaft to rotate.

NORD Gear typically use brakes manufactured by Precima and Mayr. The Mayr brake is used mainly on the 20Nm and some of the 400-1200Nm sizes. For questions regarding brake manufacturer, please contact NORD Gear.

RECTIFIERS

General

The DC power required to energize the brake is not available in most applications. AC power is available in all applications since it is required to power the motor. The rectifier converts the available AC voltage to the DC voltage needed to power the brake.

Features

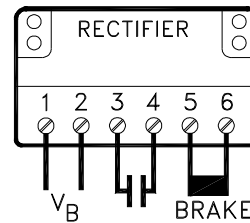
- Individual power supply for each motor.
- Compact size; mounted inside motor terminal box.
- Multiple voltage options
- Solid state bridge rectifier
- Integral protection against transient voltage spikes
- Half wave rectifier:
DC voltage is 45% of the applied AC voltage
- Full wave rectifier:
DC voltage is 90% of the applied AC voltage

Standard Rectifiers

As standard, NORD integral gearmotors with a DC brake include a rectifier mounted in the motor terminal box to supply DC power to the brake. The rectifier can be wired for switching either the AC power source or the DC voltage supply (output). Wiring the DC switching gives the fastest reaction (de-energize – brake engage – stopping) time. If AC switching is used, the source power can be attached to the motor brake terminals. Tapping into the motor terminals gives the slowest de-energize time (stopping), due to the collapsing time of the motor magnetic field.

Terminals

- 1 & 2 Brake system connection AC voltage
- 3 & 4 Switch contact or jumper (for DC switching)
- 5 & 6 Connection brake coil



Special Function Rectifiers & Current Sensing Relays

NORD offers special function rectifiers (Option FR) which provide improved brake performance. Refer to “BIM 1095 FR Brake Rectifier” for more information.

Another way of improving brake performance is using NORD’s current sensing relay (Option IR). It requires no external wiring and screws into the spare side hole of the conduit box. Refer to “BIM 1092 IR Relay” for more information.

RECTIFIER PART NUMBERS & RATINGS

Part #	Color	Style	Input Voltage	Output Current	Temp
19141000	Black	Full-wave	110-230 VAC ± 10%	2A	-10°C to 80°C
19141010	Yellow	Half-wave	230-480 VAC ± 10%	2A	-10°C to 80°C
19141020	Grey	Half-wave	500-575 VAC ± 10%	2A	-10°C to 80°C



Cautions

- **Brake torque** - The brake torque is measured with a mean friction radius of the brake pad surface with a circumferential speed of 1m/sec (197 fpm).
- **Brake torque tolerance** - For different applications and operating conditions, brake torque can vary from +40/-20% compared to the rated brake torque.
- **Hoisting (lifting/lowering) applications** - must have the brake wired for fast response (DC-switching)
- **Initial operation & wear-in period** - In new condition, the brake will have a reduced torque of up to 30%. In order to achieve full rated brake torque, a short run-in period is required. The run in time will vary depending on system loads.

MAINTENANCE – PRECIMA BRAKES

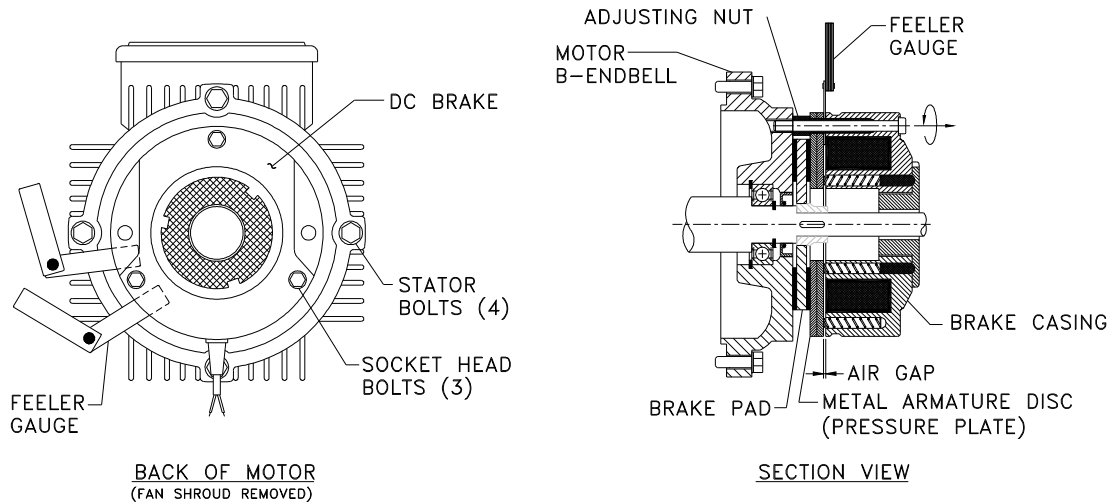
General

In order to get maximum life out of the brake, the air gap must be set properly and checked at regular intervals. As the brake wears and decreases in thickness, the air gap will increase. If the air gap is too large, the brake coil may not have enough magnetic force to pull the metal armature disc across the gap and the brake rotor will drag. Refer to the table below for maximum air gap allowance and minimum brake pad thickness.

Brake Air Gap Adjustment:

When a complete brake motor is supplied by NORD, the air gap is already set at the factory. If the brake is ordered as a part, the air gap must be set at the time of assembly. **All brake air gap adjustments must be made with the brake assembled onto the motor and power off (Brake Engaged).** If the brake has an optional hand release (Option HL), refer to page 9 for additional instructions.

While checking the air gap, measure the gap around the socket head cap screws as shown in the picture below.



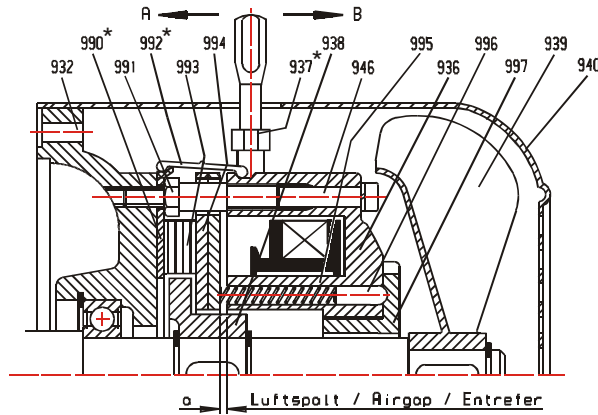
- Loosen the socket head cap screw that attaches the brake to the motor B-endbell.
- Depending if the air gap needs to be increased/decreased, turn the adjusting nut accordingly. A quarter or half turn is usually sufficient for adjusting purposes.
- After adjusting the nut, tighten the socket head cap screw back onto the brake.
- Measure the air gap for spacing - Repeat process to achieve recommended setting.

Size	Rated Torque lb-ft [Nm]	Power of Brake Coil W	Air Gap Setting in [mm]	Max Air Gap Before Re-Adjustment in [mm]	Minimum Rotor (Brake Pad) Thickness in [mm]
5	3.75 [5]	22	0.008 [0.2]	0.031 [0.8]	0.177 [4.5]
10	7.5 [10]	28	0.008 [0.2]	0.031 [0.8]	0.217 [5.5]
20	16 [20]	34	0.012 [0.3]	0.031 [0.8]	0.301 [7.6]
40	30 [40]	42	0.012 [0.3]	0.035 [0.9]	0.374 [9.5]
60	44 [60]	50	0.012 [0.3]	0.039 [1.0]	0.453 [11.5]
100	75 [100]	64	0.016 [0.4]	0.043 [1.1]	0.492 [12.5]
150	110 [150]	76	0.016 [0.4]	0.043 [1.1]	0.571 [14.5]
250	188 [250]	100	0.019 [0.5]	0.047 [1.2]	0.650 [16.5]

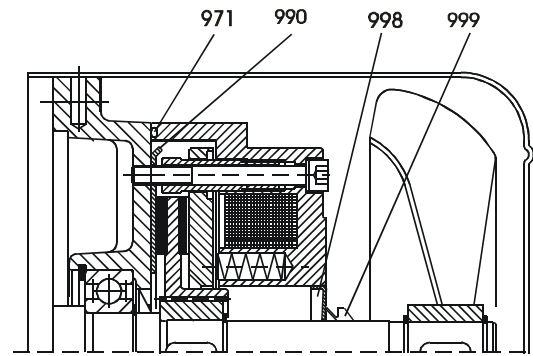
Rubber Dust Boot (Option SR)

The optional rubber dust boot protects the brake from dusty/sandy debris from reaching the brake pad. However, it also keeps the brake dust from getting out. Regular maintenance must be done to the brake to remove the brake dust. The amount of brake dust accumulated will vary with the brake size and application.

PARTS LIST – PRECIMA BRAKES



Normal Design, Enclosure IP55
with following options:
RG – Stainless Steel Disc (Item 990)
SR – Dust Boot-includes Option RG (Item 992)
HL – Hand Release (Item 937)



Optional Brake with optional IP66 enclosure

932 Non-drive endshield
936 Brake coil
937 Manual brake lever – optional
938 Brake hub
939 Fan
940 Fan cover
946 Fixing screw
971 O-ring - optional
990 Friction plate - optional
991 Setting bolt

992 Dust protection ring¹⁾ – optional
993 Brake disc
994 Anchor plate
995 Spring
996 Pressure plate adjustment**
997 Adjustable ring **
998 Bushing/seal - optional
999 V-ring - optional

¹⁾ Not available for 400N, and 800 Nm.

** Only for brakes that are 5 Nm to 40 Nm

BRAKE PAD REPLACEMENT – PRECIMA BRAKES

LIST OF TOOLS

Following are a list of tools to remove the brake:

- Screw drivers – Philips & Flat (to remove the fan cover)
- External snap ring pliers (to remove fan retaining snap ring)
- Large screw drive or a small pry bar (to pop off the fan)
- Metric sockets & T-handles and open-end wrenches



IMPORTANT

Ensure that the reducer load is supported. Removal of the brake will let the load free fall, which may cause injury. Disconnect the power from the motor.

PROCEDURE

When the brake pad is worn to the minimum thickness as shown in the chart on page 5, the pad should be replaced to maintain the proper operation. To replace the pad:

- Remove the 4 bolts to remove the fan cover
- If the brake has a hand release, this can be removed by unscrewing.
- Remove the fan cover and note the position of the hand release slot if applicable.
- Remove the snap ring holding the cooling fan.
- Carefully remove the cooling fan, key and second snap ring.
- If the brake is equipped with a dust boot, remove it.
- Remove the 3 socket head cap screws holding the brake coil to the motor end-bell.
- Remove the brake coil, noting the hand release and power cable locations.
- The brake pad will now slide off the hub holding it on the shaft.
- Clean the brake, install the pad and reassemble.

NOTE: Upon reassembly, the brake air gap setting must be checked and adjusted if needed, as noted in MAINTENANCE.

PRECIMA BRAKE REPLACEMENT PARTS				
BRAKE SIZE	BRAKE DISC (PAD) [ITEM 993]	HANDLE [ITEM 937]	STAINLESS DISC [ITEM 990]	DUST BOOT [ITEM 992]
5 NM	19120042	19150042	19130042	19110042
10NM	19120082	19150082	19130082	19110082
20NM ¹⁾	19120162	19150162	19130162	19110162
40NM ²⁾	19120322	19150322	19130322	19110402
40NM ³⁾	19120402	19150322	19130322	19110402
60NM	19120602	19150602	19130602	19110602
100NM	19120802	19150802	19130802	19110802
150NM	19121502	19151502	19131502	19111502
250NM	19122402	19152402	19132500	19112502
400NM	Call Factory	Call Factory	Call Factory	Call Factory
800NM	Call Factory	Call Factory	Call Factory	Call Factory

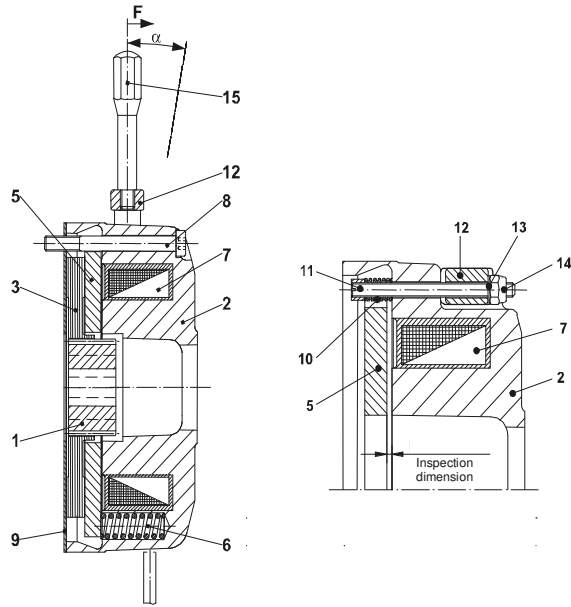
1) Alternate-Special order only. Standard brake is by Mayr – see page 7.

2) 90 and 100 frame motors with spline style hub.

3) 112 frame motor with hex style hub

MAINTENANCE – MAYR BRAKES (10 - 20Nm)

1. Gear hub
2. Coil carrier complete with coil (7)
3. Rotor
5. Armature disc
6. Helical spring (torque)
7. Coil
8. Fixing screw
9. Friction disc
10. Helical spring (hand release)
11. Threaded bolt
12. Lever
13. Washer
14. Hexagon nut
15. Hand release bar
16. Shoulder screw



This style brake needs very little maintenance while it is in operation. The air gap does not need to be adjusted. It is pre-set at the factory and is self adjusting for the life of the brake rotor pad. When the brake is not operation properly, the rotor pad may need to be replaced. The brake coil will have to be removed to check the brake pad thickness.

Size	Rated torque	Power of Brake Coil	Minimum Rotor Thickness (brake pad)
10	7.4 lb-ft / 10 Nm	33 Watts	0.20" / 5.2 mm
20	16 lb-ft / 20 Nm	43 Watts	0.27" / 6.8 mm

BRAKE PAD REPLACEMENT

LIST OF TOOLS

Following are a list of tools to remove the brake:

- Screw drivers – Philips & Flat (to remove the fan cover)
- External snap ring pliers (to remove fan retaining snap ring)
- Large screw drive or a small pry bar (to pop off the fan)
- Metric sockets & T-handles and open-end wrenches



IMPORTANT

Ensure that the reducer load is supported. Removal of the brake will let the load free fall, which may cause injury. Disconnect the power from the motor.

PROCEDURE

- Remove the 4 bolts to remove the fan cover.
- If the brake has a hand release, it can be removed by unscrewing it.
- Remove the fan cover and note the position of the hand release slot if applicable.
- Remove the snap ring holding the cooling fan in place.
- Carefully remove the fan, key and second snap ring.
- Remove the 3 socket head cap screws holding the brake coil to the motor endbell.
- Remove the brake coil, noting the hand release and power cable locations.
- The brake pad will now slide off the hub holding it on the shaft.
- Clean the brake coil, replace the pad, and reassemble.

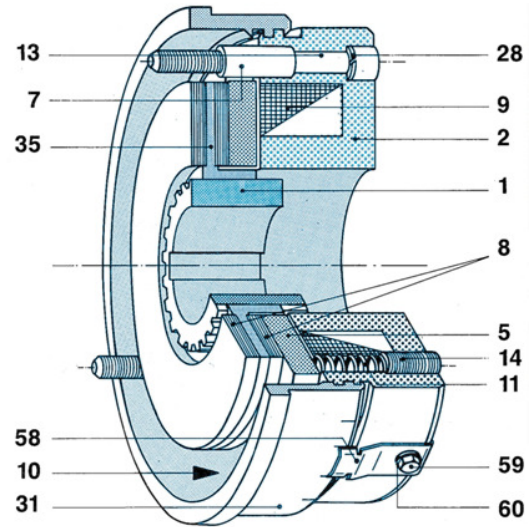
NOTE: The air gap is self adjusting and can not be measured with the brake assembled. To check the proper operation, apply pressure to the hand release lever and turn the motor by hand to check for free rotation.

MAYR BRAKE REPLACEMENT PARTS								
BRAKE SIZE	Complete Brake Part Number (Includes Brake Disc)					BRAKE DISC (PAD) [ITEM 3]	HANDLE [ITEM 15]	STAINLESS DISC [ITEM 9]
	24VDC	105VDC	180VDC	205VDC	250VDC			
10NM	N/A	N/A	N/A	19021934	N/A	19120084	19150074	N/A
20NM	19030224	19030924	19031904	19031924 ¹⁾	19032524	19120164	19150164	19130164

1) Standard NORD brake

MAINTENANCE - MAYR BRAKES (400 - 800Nm)

1. Gear hub
2. Coil body complete with coil (9) and guide bushes (7)
5. Armature disc
7. Guide bush
8. Friction lining
9. Coil
10. Anchor Plate
11. Helical spring
13. Fixing screw
14. Set screw
28. Spring washer
31. Threaded distance ring open
35. Rotor with friction linings (8)
58. Lock washer
59. Locking screw
60. Spring washer



This style brake may need the air gap adjusted or have the pad replaced. Both procedures are listed below.

Brake Size	Rated Torque	Power of Brake Coil	Minimum Rotor Thickness (Brake pad)	Air Gap Setting
400	300 lb-ft / 400 Nm	134 Watts	0.53" / 13.5 mm	0.015" / 0.4 mm
800	600 lb-ft / 800 Nm	196 Watts	0.79" / 20 mm	0.020" / 0.5 mm

LIST OF TOOLS

Following are a list of tools to remove the brake:

- Screw drivers – Philips & Flat (to remove the fan cover)
- External snap ring pliers (to remove fan retaining snap ring)
- Large screw drive or a small pry bar (to pop off the fan)
- Metric sockets & T-handles and open-end wrenches



IMPORTANT

Ensure that the reducer load is supported. Removal of the brake will let the load free fall, which may cause injury. Disconnect the power from the motor.

PROCEDURE FOR CHECKING AND ADJUSTING THE AIR GAP

- Remove the 4 bolts to remove the fan cover.
- Remove the fan cover.
- Remove a plug from the threaded distance ring (31) and measure the air gap with a feeler gauge. If the distance is larger than 0.012"/0.3mm over the nominal setting listed in the table, the air gap should be adjusted.
- Loosen the fixing screws (13)
- Loosen the locking screw (59) and lock washer (60).
- Turn the threaded distance ring counterclockwise to decrease the air gap. One graduation on the stamped scale corresponds with .004"/0.1mm.
- Tighten the fixing and clamp screws and recheck the air gap.
- If the air gap is within specifications, reassemble the fan cover.

PROCEDURE FOR REPLACING THE BRAKE ROTOR PAD

- Remove fan cover and snap ring.
- Carefully remove the fan, key and second snap ring.
- Remove the 3 socket head cap screws holding the brake coil to the motor endbell.
- Remove the brake coil.
- The brake pad will now slide off the hub holding it on the shaft.
- Clean the brake coil, replace the pad, and reassemble.

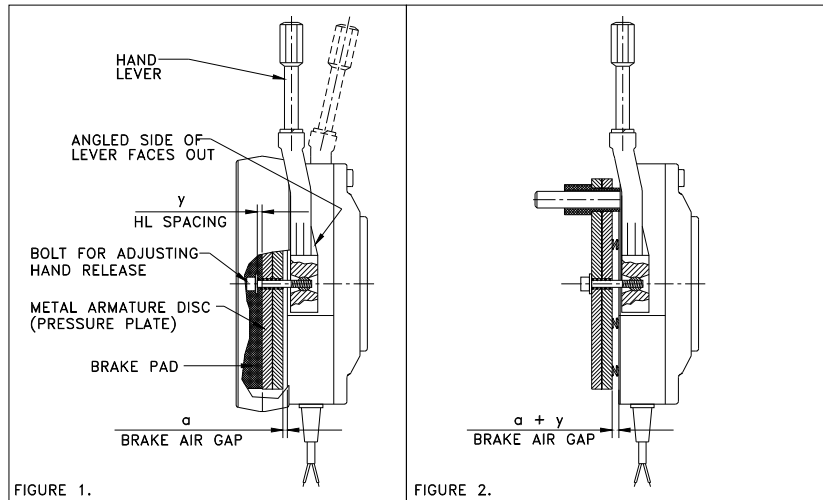
NOTE: Check the air gap per the above procedure.

MAYR BRAKE REPLACEMENT PARTS		
BRAKE SIZE	BRAKE DISC (PAD)	HANDLE
400NM	19124004	19154002
800NM	Call Factory	Call Factory

HAND RELEASE BRAKE AIR GAP SETTING

When a complete brake motor is supplied by NORD, the brake air gap and hand release lever spacing are already set from the factory. Only the brake air gap will need to be adjusted for maintenance (Precima Brakes). Refer to the brake air gap setting on page 4. Thread adhesive is applied to the hand release adjusting bolt so it will not lose the setting. The spacing for the hand release can be checked only with the brake assembled onto the brake B-endbell. If the spacing needs to be adjusted, remove the brake from the motor B-endbell and the adjusting bolt will be accessible. Refer to Figure 1. ***20Nm Mayr brake air gaps do not need adjustment.**

If the brake is sent by itself from the factory, the brake air gap and hand release lever spacing must be set. If the air gap is set less than recommended, the brake will lose holding force prematurely. If very little air gap is set, the brake will not engage. Setting the brake air gap must be done with the brake removed from the motor. The "new" brake air gap value will be the sum of the brake air gap value and the hand release spacing value. After the gap has been set, assemble the brake onto the motor and measure both the brake air gap and hand release spacing with a feeler gauge. Refer to Figure 2.

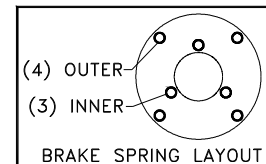


BRAKE SIZE									
	5	10	20*	40	60	100	150	250	400
y	0.040" 1 mm	0.040" 1 mm	0.040" 1 mm	0.040" 1 mm	0.040" 1 mm	0.047" 1.2 mm	0.047" 1.2 mm	0.059" 1.5 mm	0.059" 1.5 mm

* Mayr Brake Hand Release: Tighten hand lever bolts snug and then back off by 2 turns.

ADJUSTING BRAKE TORQUE

The table below shows the rated torque of brakes as springs are removed (7, 5 or 3 springs). The springs are placed in such a way where there are three centers and four outer springs. The four outer springs are the ones that are removed for decreasing the torque. When decreasing the torque, remove springs opposite of each other to prevent uneven brake wear.



TORQUE ADJUSTMENT SPECIFICATIONS

Brake Size	Rated Torque (full torque) lb-ft [Nm]	Rated Torque lb-ft [Nm]	Rated Torque lb-ft [Nm]	Ring Nut Torque Adjustment	
				Torque Reduction Per Click Lb-ft [Nm]	Minimum Brake Torque Available lb-ft [Nm]
	7-springs	5-springs	3-springs		
5	3.7 [5]	2.6 [3.5]	1.5 [2.0]	0.15 [0.2]	0.9 [1.2]
10	7.4 [10]	5.18 [7.0]	3 [4.0]	0.15 [0.2]	1.8 [2.4]
20 ¹⁾	15 [20]	N/A	N/A	0.81 [1.1]	7.5 [10.0]
20 ²⁾	15 [20]	10.3 [14]	6 [8]	0.22 [0.3]	3.6 [4.8]
40	30 [40]	20.72 [28]	12.58 [17]	0.74 [1.0]	8.5 [11.4]
60	44 [60]	32 [43]	19 [25]	Does not include a ring nut	
100	74 [100]	52 [70]	31 [41]	Does not include a ring nut	
150	111 [150]	79 [106]	48 [65]	Does not include a ring nut	
	8-springs	6-springs	4-springs		
250	184 [250]	138 [186]	92 [124]	Does not include a ring nut	
400	295 [400]	221 [298]	148 [200]	Does not include a ring nut	
800	600 [800]	442 [596]	296 [400]	Does not include a ring nut	

1) Standard Stock MAYR Brake 2) Special Order PRECIMA Brake



MOTORS

Standard efficiency, 1.15 Service factor
 Inverter duty, TEFC
 Synchronous speed 1800rpm @ 60Hz, 4-pole
 Voltages: 230/460 & 332/575 – 60Hz, Three-phase
 Continuous Duty, 40°C Ambient, up to 3300ft Elevation
 Class B temperature rise, Class F insulation



Frame Size	HP	kW	n _n Full Load rpm	Full-load current I _n			I _a /I _n %	Code Letter	T _n lb-in	T _a /T _n	T _k /T _n	pf	Eff. %	J _m Inertia lb-ft ²
				230V A	460V A	575V A								
63S/4	0.16	0.12	1700	0.88	0.44	0.35	300	H	5.93	2.7	3.5	0.66	52	0.00499
63L/4	0.25	0.18	1680	1.12	0.56	0.45	300	G	9.38	2.3	2.5	0.72	57	0.00665
71S/4	0.33	0.25	1710	1.56	0.78	0.62	340	H	12.3	2.3	3.0	0.64	63	0.0133
71L/4	0.50	0.37	1720	1.90	0.95	0.76	400	G	18.3	2.2	2.7	0.69	71	0.0173
80S/4	0.75	0.55	1710	2.70	1.35	1.08	400	H	27.6	2.0	2.3	0.71	72	0.0304
80L/4 **	1.0	0.75	1650	3.65	1.83	-	280	D	38.2	2.1	2.2	0.64	70	0.0623
90S/4 **	1.5	1.1	1660	4.83	2.42	-	320	D	57.0	2.6	2.5	0.68	73	0.0887
90L/4 **	2.0	1.5	1660	6.33	3.17	-	340	D	75.9	2.5	2.4	0.70	74	0.1182
100L/4 **	3.0	2.2	1700	9.04	4.52	-	350	D	111	2.2	2.5	0.70	75	0.1699
100L/40 **	5.0	3.7	1725	15.2	7.62	-	510	G	183	2.7	3.1	0.75	81	0.2831
132S/4 **	7.5	5.5	1730	19.8	9.91	-	380	C	273	2.2	2.6	0.71	85	0.8796
132M/4 **	10	7.5	1730	25.7	12.9	-	440	E	364	2.7	3.0	0.73	87	1.197
160M/4 *	15	11	1760	36.8	18.4	-	820	K	537	2.8	3.3	0.85	89	1.187
160L/4 *	20	15	1760	49	24.5	-	800	J	716	2.8	3.3	0.86	89	1.661
180M/4 *	25	18.5	1750	60	30.0	-	740	H	900	2.6	3.0	0.87	89	3.085
180L/4 *	30	22	1755	71	35.5	-	800	J	1080	2.9	3.3	0.87	90	3.560
200L/4 *	40	30	1755	91	45	-	580	F	1440	2.6	2.6	0.89	92	10.68
225S/4 *	50	37	1755	124	62	-	670	H	1800	2.2	2.2	0.83	91	13.29
225M/4 *	60	45	1760	143	71	-	700	H	2150	2.8	2.8	0.86	91	16.85
250M/4 *	75	55	1760	170	85	-	700	H	2690	2.6	2.6	0.89	90	19.93
280S/4 *	100	75	1770	223	111	-	670	G	3560	2.6	2.6	0.87	91	37.02
280M/4 *	125	90	1775	290	145	-	650	G	4440	2.6	2.6	0.86	91	42.71
315S/4 *	150	110	1775	345	173	-	750	H	5330	3.1	3.1	0.87	90	80.68
315M/40 *	200	150	1775	445	223	-	750	H	7100	3.2	3.2	0.86	93	125.8

* - Underwriter Laboratories Recognition - pending

** - Carries the CE mark

Abbreviations

- n_n - Full-load speed
- I_n - Full-load current
- I_a/I_n - Locked-rotor current ratio (percentage)
- T_n - Full-load torque
- T_a/T_n - Locked-rotor torque ratio
- T_k/T_n - Break-down torque ratio
- pf - Power factor
- Eff. - Nominal efficiency
- J_m - Motor inertia

CONNECTION DIAGRAMS

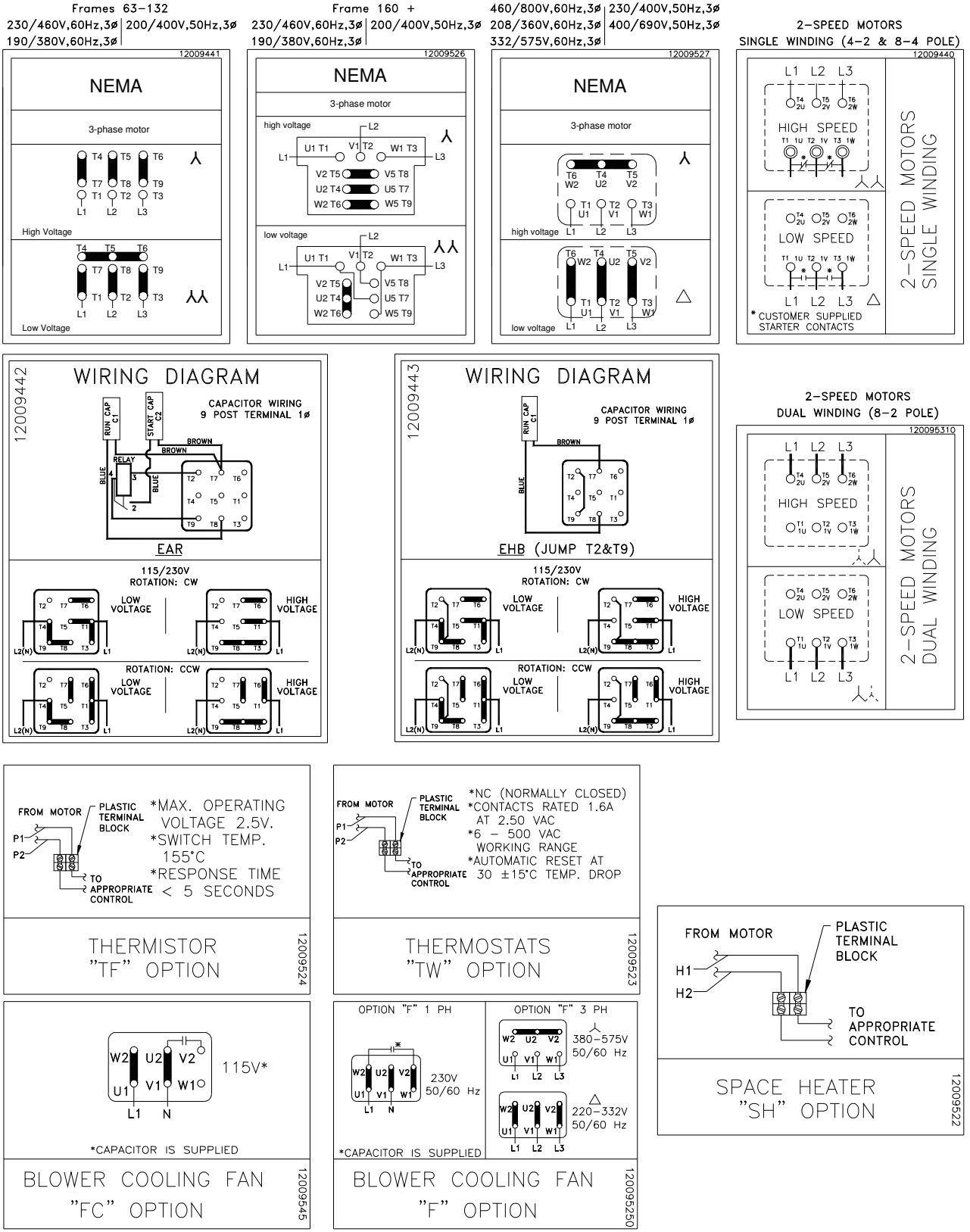


Figure 2. Motor Connection and Wiring Diagrams