



**BRAWN
MIXER[®]**

AN NBE COMPANY

OPERATION

AND

MAINTENANCE

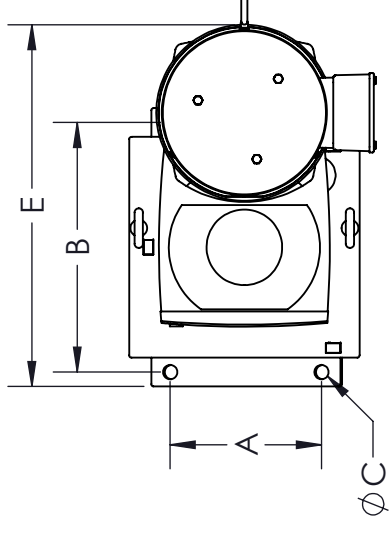
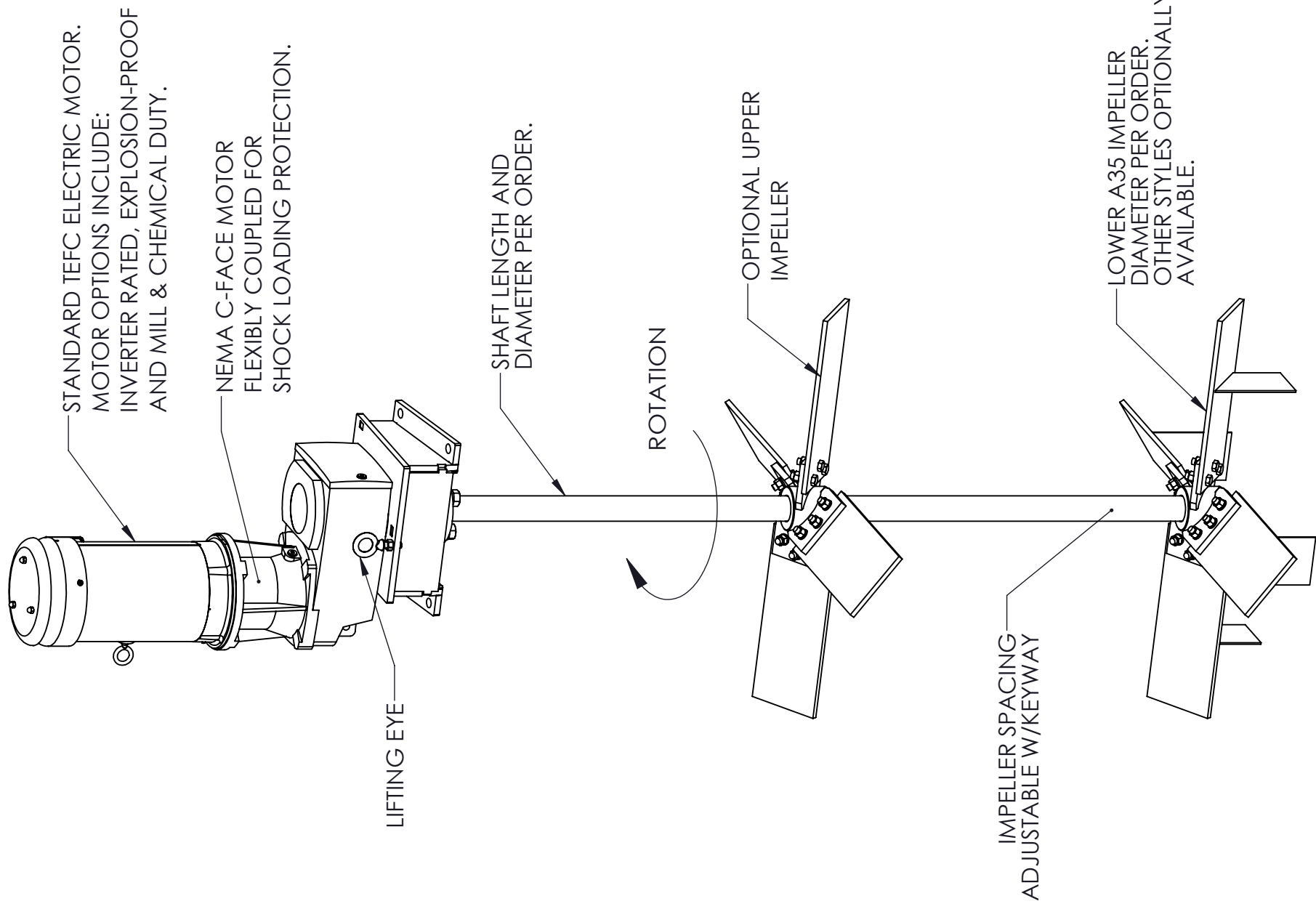
MANUAL

SERIAL NUMBER

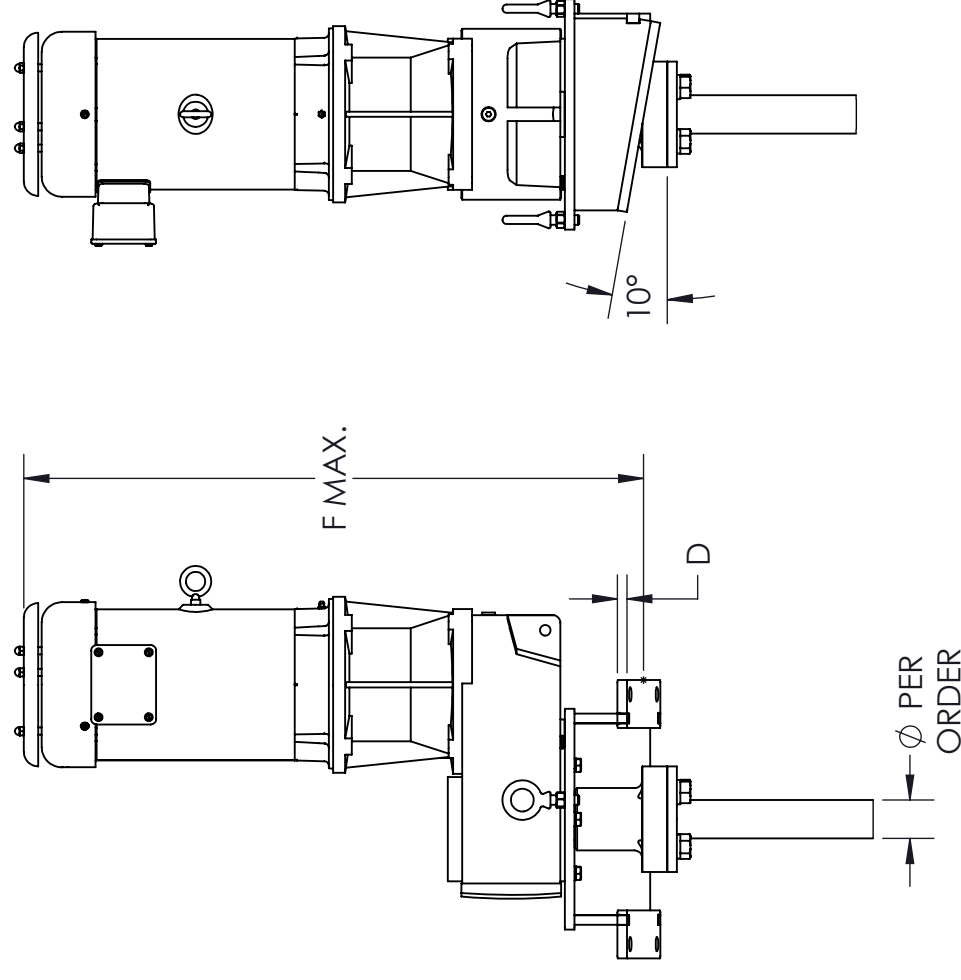
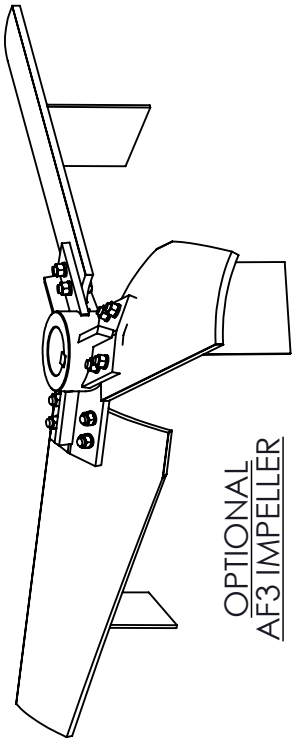
CUSTOMER: _____

SALES REP.: _____

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OPTIONAL
AF3 IMPELLER



Ø PER
ORDER

ALL DIMENSIONS ARE IN INCHES.

CASE SIZE	DIMENSIONS						BASIC ① WGT. (LBS)
	A	B	ØC	D	E	F	
2	8.0	13.0	0.75	0.50	17.0	27.5	145
3	8.0	13.0	0.75	0.50	18.3	29.2	190
4	10.0	16.5	0.88	0.75	22.3	35.0	305

NOTE:
1. BASIC WEIGHT DOES NOT INCLUDE
SHAFT, IMPELLER(S) OR MOTOR.

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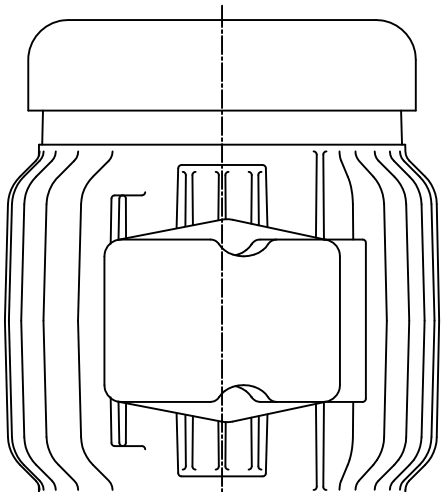
BRAUN MIXER
AN INDEPENDENT COMPANY

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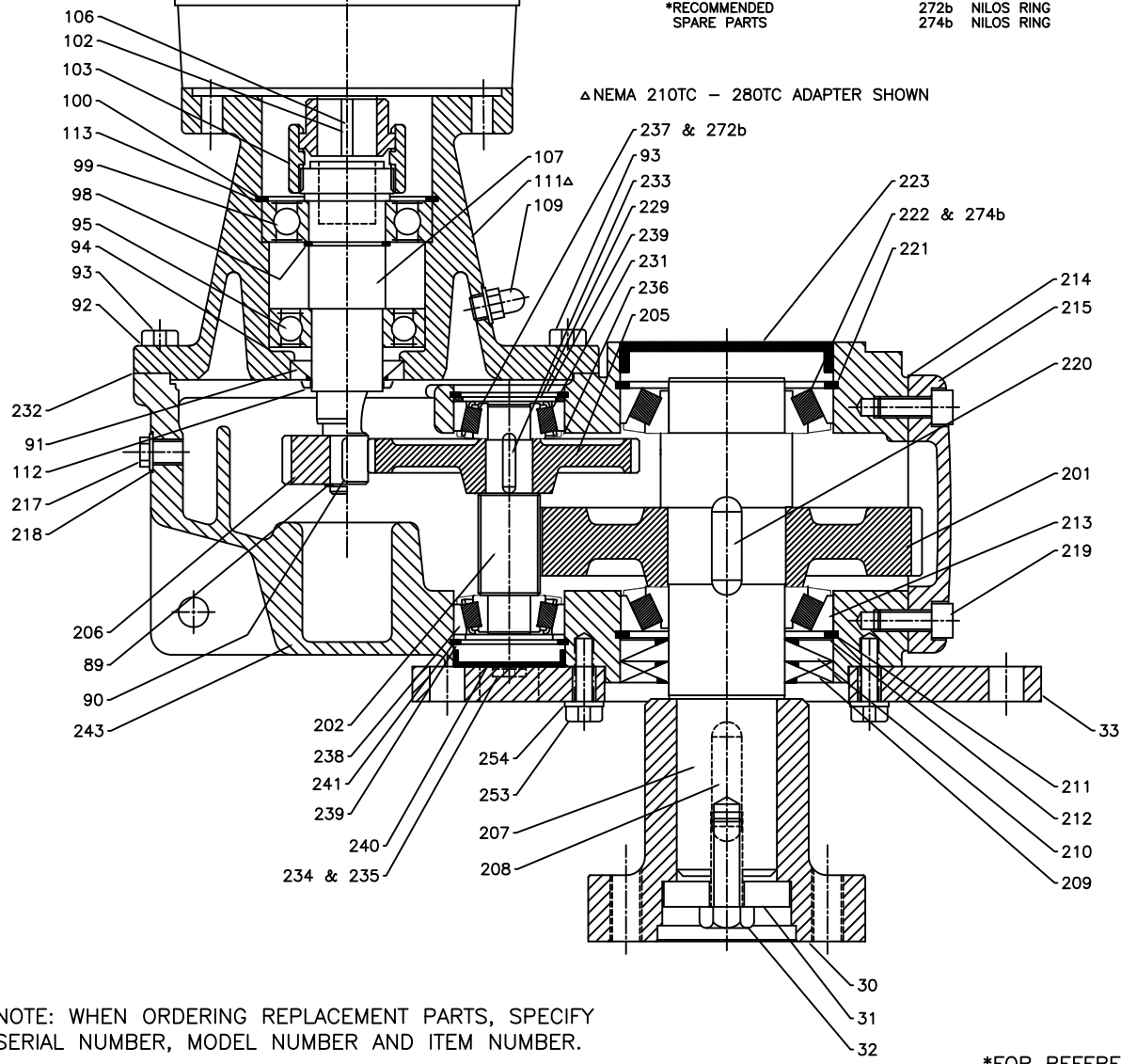
MIXER MODEL
BTO
ANGLE RISER MOUNTED MIXER
DIMENSION AND ASSEMBLY DRAWING

DWG. NO. **B- TK0099M** REV.

FOR REFERENCE ONLY



- | | | | |
|------|-------------------------|------|---------------------------------|
| 30 | SHAFT COUPLING | 201 | LOW SPEED GEAR |
| 31 | THRUST WASHER | 202 | LOW SPEED PINION |
| 32 | HEX HEAD BOLT | 205 | HIGH SPEED GEAR |
| 33 | MOUNTING PLATE | 206 | HIGH SPEED PINION |
| | | 207 | OUTPUT SHAFT |
| | | 208 | KEY |
| 89 | SNAP RING | *209 | OIL SEAL |
| 90 | KEY | *210 | OIL SEAL |
| 91 | OIL SEAL | *211 | SNAP RING |
| 92 | WASHER | *212 | SHIM KIT |
| 93 | HEXAGON SCREW | *213 | OUTPUT SHAFT BEARING (LOWER) |
| 94 | SNAP RING | *214 | GASKET |
| | (APPLIES TO NEMA FRAMES | 215 | GEAR CASE COVER |
| | 56C - 180TC ONLY) | 217 | VENT PLUG |
| 95 | INPUT SHAFT BEARING | *218 | GASKET |
| 98 | SNAP RING | 219 | SOCKET HEAD SCREW |
| 99 | INPUT SHAFT BEARING | 220 | KEY |
| *999 | 100 SNAP RING | *221 | SNAP RING |
| 102 | KEY | *222 | OUTPUT SHAFT BEARING (UPPER) |
| 103 | COUPLING | *223 | SEAL PLUG |
| 106 | SET SCREW | 229 | SPACER (TAPERED ROLLER BEARING) |
| 107 | INPUT SHAFT | *231 | SNAP RING |
| 109 | BREATHER VENT | *232 | GASKET |
| 111 | NEMA ADAPTER | 233 | KEY |
| 112 | OIL SLINGER | 234 | DRAIN PLUG |
| 113 | SHIM | *235 | GASKET |
| | | 236 | SPACER (BALL BEARING) |
| | | *237 | PINION SHAFT BEARING |
| | | *238 | PINION SHAFT BEARING |
| | | *239 | SNAP RING |
| | | *240 | SEAL PLUG |
| | | *241 | SHIM KIT |
| | | 243 | HOUSING |
| | | 253 | HEX HEAD BOLT |
| | | 254 | LOCK WASHER |
| | | 272b | NILOS RING |
| | | 274b | NILOS RING |
- *999 C-FACE INPUT KIT
- *RECOMMENDED SPARE PARTS



Δ NEMA 210TC - 280TC ADAPTER SHOWN

NOTE: WHEN ORDERING REPLACEMENT PARTS, SPECIFY SERIAL NUMBER, MODEL NUMBER AND ITEM NUMBER.

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MIXER MODEL
BTO CUT-AWAY
 2 SIZE THRU 9 DOUBLE REDUCTION
 DIMENSION AND ASSEMBLY DRAWING

DWG. NO. **A- TK0065** REV.

DRAWN BY: TJD	DATE: 5-19-97	© 2018
APPROVED BY:	DATE:	

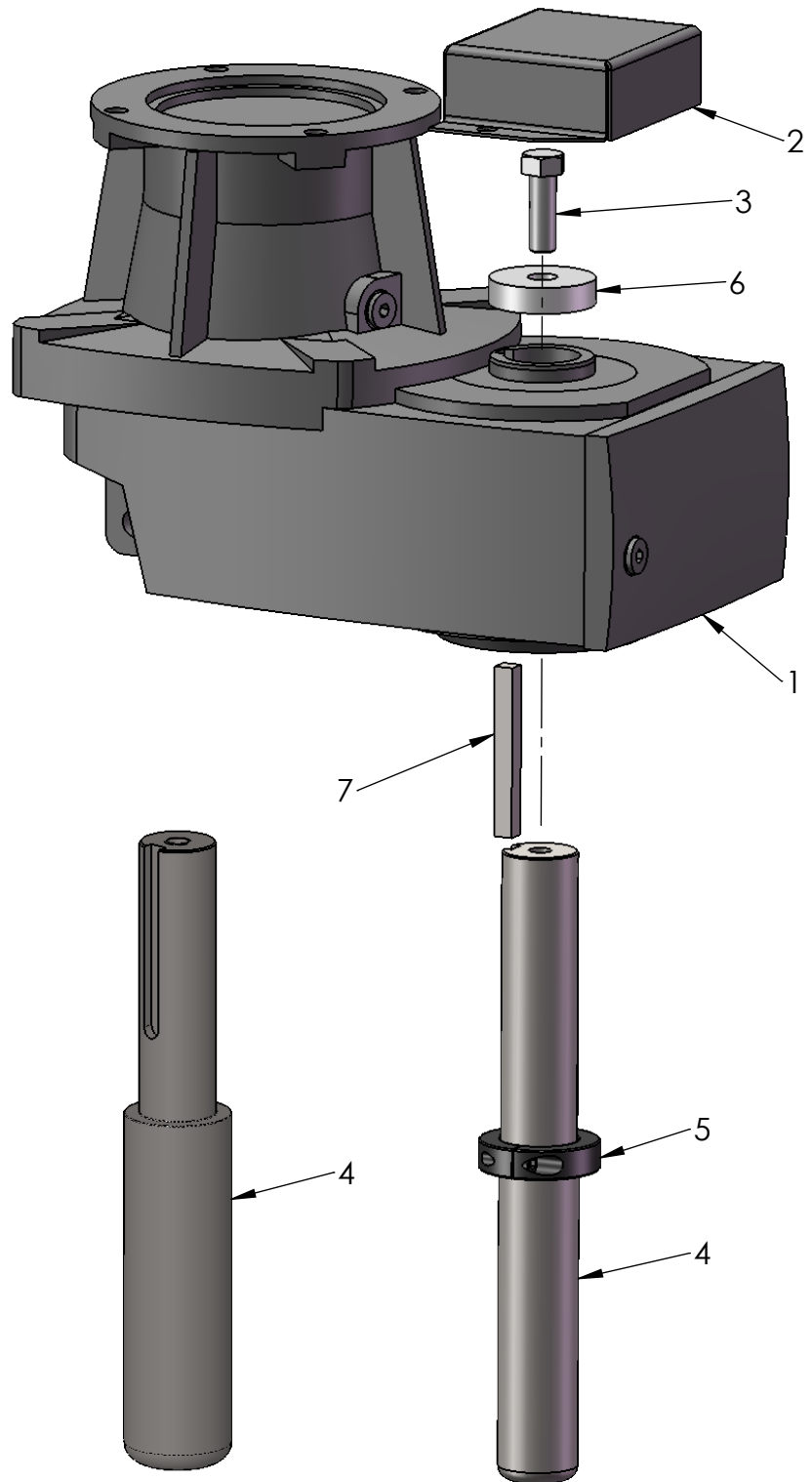
MIXER SHAFT ASSEMBLY

1. ATTACH THE SHAFT COLLAR (ITEM 5) TO THE MIXER SHAFT (ITEM 4).

2. PLACE THE KEY (ITEM 7) ON THE MIXER SHAFT AND SLIDE THE MIXER SHAFT INTO THE HOLLOW OUTPUT SHAFT ON THE GEARDRIVE (ITEM 1).

3. PLACE THE THRUST WASHER (ITEM 6) OVER THE HOLLOW OUTPUT SHAFT ON THE TOP OF THE GEARDRIVE. APPLY THREADLOCKER TO THE THREADS OF THE HEX HEAD CAP SCREW (ITEM 3), INSTALL IT THRU THE THRUST WASHER AND INTO THE MIXER SHAFT. TORQUE THE GRADE 5 HEX HEAD CAP SCREW TO THE RECOMMENDED VALUE IN THE O&M MANUAL.

4. ATTACH THE GUARD (ITEM 2) ON THE TOP OF THE GEARDRIVE.



* QUANTITY VARIES DEPENDING ON SHAFT DESIGN.

7	1	KEY
6	1	THRUST WASHER
5	1	SHAFT COLLAR
4	1	MIXER SHAFT
3	*	HEX HEAD CAP SCREW
2	1	GUARD
1	1	GEARDRIVE
ITEM NO.	QTY.	PART NAME

ALTERNATE CONST.
OF SHAFT

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MIXER MODEL BTO SHAFT ASSEMBLY

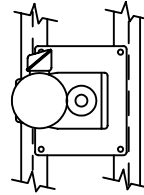
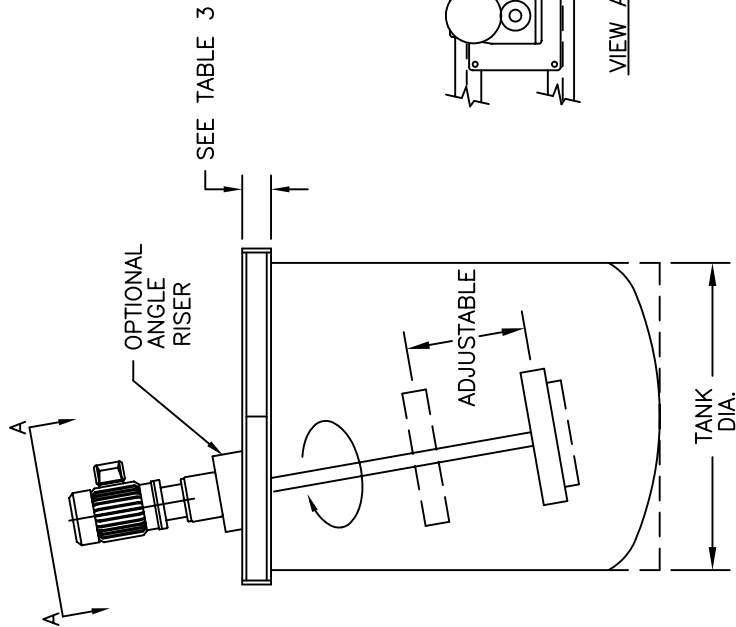
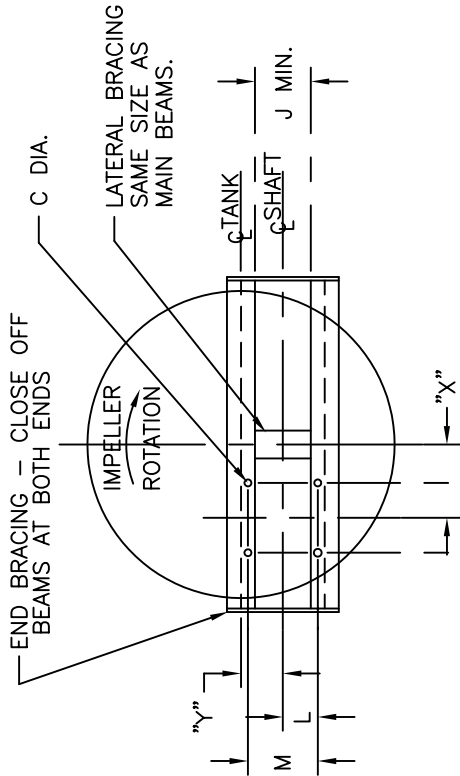
DIMENSION AND ASSEMBLY DRAWING

DRAWN BY: BSB DATE: 10/29/2018 © 2018

APPROVED BY: DATE:

DWG. NO. **A- TK0145**

REV.



VIEW A-A

ANGULAR OFF-SET MOUNTING
(SEE TABLE 4 FOR DIMENSIONS X & Y)

MOUNTING HOLE DIMENSIONS

CASE SIZE	DIMENSION - INCHES				
	C	J	L	M	O
BTO					P
2	.75	5.9	6.50	13.00	4.00
3	.75	7.4	6.50	13.00	4.00
4	.88	8.8	8.25	16.50	5.00

TABLE 1

DESIGN LOADS

CASE SIZE	DOWNWARD LOAD (LBS.)	BENDING (IN. LBS.)	TORSIONAL (IN. LBS.)
2	620	7,500	5,110
3	1,015	17,650	8,450
4	1,510	34,500	14,350

TABLE 2

TYPICAL MOUNTING BEAM SIZES

CASE SIZE	TANK DIAMETER OR BEAM SPAN		
	UP TO 10'	OVER 10' UP TO 15'	OVER 15' UP TO 20'
BTO			
2	M4 x 13	M6 x 20	W8 x 24
3	W5 x 16	W8 x 18	W8 x 28
4	W5 x 16	W8 x 18	W8 x 35

TABLE 3

NOTES:

1. TYPICAL SUPPORT STRUCTURE IS CONSTRUCTED OF TWO STEEL BEAMS WITH LATERAL AND END BRACING
2. CONTINUOUS WELDS ARE PREFERRED OVER SKIP WELDS WHEN INSTALLING LATERAL AND END BRACING.
3. WARRANTY APPLIES ONLY TO ITEMS FURNISHED BY BRAWN MIXER, INC. ALL OTHER EQUIPMENT AND DESIGNS ARE THE RESPONSIBILITY OF OTHERS. BRAWN MIXER, INC. DOES NOT WARRANT, GUARANTEE, OR ASSUME ANY RESPONSIBILITY FOR THE DESIGN OR CONSTRUCTION OF THE MOUNTING STRUCTURE FOR THE MIXER.
4. DESIGN LOADS ARE GREATER THAN ACTUAL LOADS BY A SUITABLE FACTOR TO PROVIDE FOR ADEQUATE DESIGN OF MIXER MOUNTING STRUCTURE.

TABLE 4

TANK DIA.	"X"	"Y"
65"	17"	9.75"
68"	18"	10.25"
72"	18.75"	10.75"
75"	19.5"	11.25"
79"	20.25"	11.75"
82"	21.25"	12.25"
88"	22.25"	12.75"
89"	23"	13.25"
92"	24"	13.75"
96"	24.75"	14.25"
99"	26.75"	14.75"
103"	28.5"	15.25"
107"	29.25"	16.25"
111"	30"	17.25"
117"	31.75"	18.25"
124"	33.5"	19.25"
130"	35.25"	20.25"
137"	37"	21.25"
143"	38.75"	22.25"
146"	40.5"	23.25"
149"	42.5"	24.25"
155"	44"	25.25"
161"	45.5"	25.5"
167"	47.5"	27.5"
171"	49"	28.5"
176"	50.75"	29.5"
179"	52.5"	30.5"
187"	56"	32.5"
196"	59.5"	34.5"
207"	63"	36.5"
219"	66.5"	38.5"
230"	70"	40.5"

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FILE NO. SDB104B DATE 3-31-97 ©1997

BRAWN MIXER, INC.

MIXER MODEL

BTO ANGLE MOUNT

DIMENSION AND ASSEMBLY DRAWING

CONTENTS

Mixer Installation / Assembly / Dimension Drawings

Safety	1
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- Develop a safety checklist for this equipment and perform regular maintenance to ensure continued and proper operation.
- Do not make any field changes or modifications without reviewing the change with your BRAWN sales representative or the BRAWN Customer Service Department.

CUSTOMER SERVICE

Mixer Model #.....**BTO-SERIES**
 Mixer Serial # _____
 Contact:
 ➤ Customer Service..... 616/399-5600
 ➤ E-Mail sales@brawnmixer.com

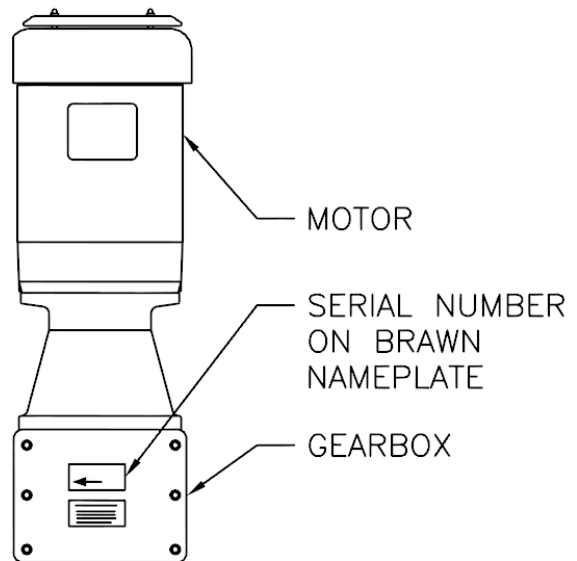
SAFETY

The precautions mentioned in this manual are not intended to cover all hazards that may exist in a plant or on this equipment. Using safety mechanisms require the constant attention of everyone in the vicinity of this (or any) equipment.

A plant and the related equipment are only as safe as the personnel are safety-minded. Proper equipment maintenance and the use of personal safety devices will contribute as much toward safety as will any number of mechanical safety devices.



- To assure maximum safety, optimum performance, and to gain knowledge of the product, it is essential that you or any other operator of this equipment read and understand the contents of this manual before the mixer is operated.
- Installation, operation and maintenance must be performed only by qualified personnel.
- Do not operate this equipment unless all safety devices are installed and working properly. Check all devices prior to starting the equipment.
- Disconnect and lock out electrical power before installing or servicing the mixer.
- Do not touch rotating parts (keep all guards and safety devices installed while operating).



BTO SERIES MIXERS



BRAWN NAMEPLATE

CUSTOMER SERVICE, Cont.

You have received a quality engineered and manufactured BRAWN mixer. We value your business, and we will strive to provide you with the proper service and equipment to meet your needs.

The information contained in this BRAWN Mixer Operator's Manual is designed to assist you in putting your BRAWN mixer into operation without further delay. **Please read the entire manual before attempting to start your mixer.** If you have any further questions or if, by some chance, there are some missing components, contact your BRAWN Mixer Representative or the factory immediately.

We welcome your comments and suggestions concerning any BRAWN Mixer product. Please direct these comments in writing to the National Sales Manager at BRAWN Mixer, located in Holland, Michigan. To expedite troubleshooting service, please make your initial contact through your BRAWN Mixer Representative. If, for whatever reason, your representative cannot be reached and you have an emergency condition, please call us directly at 616/399-5600 and ask for the Customer Service Department.

Remember, you are backed by your BRAWN Mixer Technical Representative and the factory support team. We are here to assist you; let us know how we can be of help.

INITIAL INSPECTION

1. Upon receipt of your Brawn mixer, check for possible shipping damage. Report any damage immediately to the carrier and to Brawn Mixer.
2. All Brawn mixers are shipped with the shaft and impeller(s) disassembled from the drive assembly. In addition, the clamp or cup mount and any mounting hardware for portable mixers are shipped loose.
3. Storage: Mixers should not be stored near vibrating machinery to avoid damage to the bearings. Store mixers as packaged by the factory. For longer storage periods, consult factory. If electric motors have been subjected to humid conditions, check the insulation resistance between phase and mass and between the different phases. The resistance should not be less than 100 megohms. If the resistance is less, please consult the factory. If mixer is stored for more than a year, the condition of the gear lubricant should be checked before the mixer is put in operation (see lubrication instructions).

INSTALLATION

[REFER TO ASSEMBLY / DIMENSION DRAWING]

Refer to the mixer installation / assembly drawing for important mounting structure design, assembly, mounting, and dimensional data.

1. The mixer is shipped with two eyebolts located in the mounting base. These should be used in combination with the hole at the rear of the gear drive for lifting of the mixer assembly.
2. Install the mixer drive on the mounting structure and secure with properly-sized, Grade 5 or better hardware. Torque the hardware as recommended in **TABLE 1**.

INSTALLATION, Cont.

- Couple the mixer shaft to the gear drive output shaft coupling and secure with the hardware provided. Torque as recommended in **TABLE 1**. Refer to precautions under the **Shaft and Impeller Assembly** section.
- Install impeller(s) on lower shaft (refer to **Shaft and Impeller Assembly** section).

TABLE 1: RECOMMENDED TORQUE VALUES

HARDWARE SIZE	TORQUE VALUES (FOOT POUNDS)	
	STANDARD GRADE 2 & 300 SERIES STAINLESS	HIGH STRENGTH GRADES 5 & 8
3/8-16	17	27
7/16-14	27	40
1/2-13	40	65
9/16-12	65	90
5/8-11	85	125
3/4-10	135	225
7/8-9	145	365
1-8	210	545

BOLT-TIGHTENING RECOMMENDATIONS:

Inadequately or improperly tightened hardware can loosen due to vibration during mixer operation. This can result in reduced mixer life or damage to equipment. Recommended torque values for tightening all in-tank and mounting hardware are listed in **TABLE 1**. These average torque values should be considered only as a guide and not as absolute values.

SHAFT & IMPELLER ASSEMBLY

To install the impeller on the shaft, slide the impeller hub over the mixer shaft, place the hook key in position, lower the hub over the hook key and tighten the set screw. The set screw must seat in the countersunk hole in the hook key. Proper impeller mounting is illustrated in **FIGURE 1**. If an axial flow impeller of bolt-together construction is used, blades should be bolted to the bottom of the impeller hub ears as shown in **FIGURE 2**.

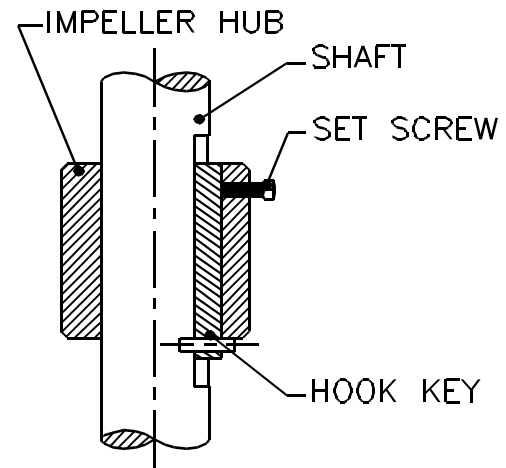


FIGURE 1: IMPELLER MOUNT WITH HOOK KEY

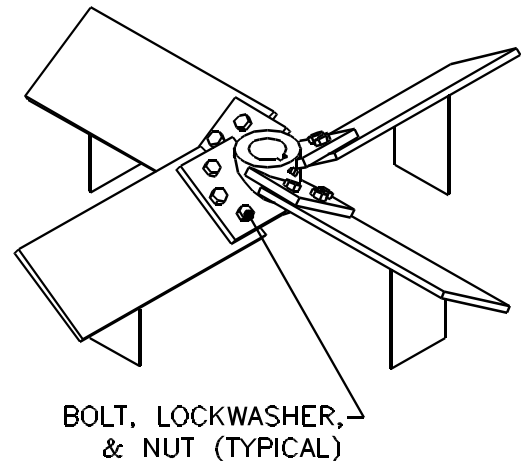


FIGURE 2: TYPICAL AXIAL FLOW IMPELLER ASSEMBLY (A45 SHOWN)

START UP

- All units are lubricated before shipment. The lubricant level should be checked with the unit mounted in its correct operating position. Lubricant should be added or removed to bring it to the correct level. The catalog for the gear unit shows the oil level for various mounting positions.

START UP, Cont.

2. Connect the motor in accordance with the motor nameplate. The motor starter should incorporate overload protection. Before operating the mixer, jog the motor and observe mixer shaft rotation. Proper rotation is clockwise, as viewed from the top, unless otherwise noted.
3. Check all bolts and fasteners for tightness. It is good maintenance practice to recheck all bolts after two weeks of operation and periodically thereafter. Refer to **TABLE 1** for recommended torque values.
4. Do not attempt to start mixer with impellers buried in solids or solidified liquids.



CAUTION

Do not operate mixer with the tank empty or the lowest impeller submerged with less than $\frac{1}{2}$ of the impeller diameter of liquid above it. Damage to the mixer and/or mounting structure may result.

ELECTRIC MOTORS

This equipment contains HAZARDOUS VOLTAGES, ROTATING PARTS AND HOT SURFACES. SEVERE PERSONAL INJURY OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warnings, safety notices, and maintenance procedures contained herein. The successful and safe operation of this equipment is dependant upon proper handling, installation, operation and maintenance.



WARNING

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

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

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

STORAGE

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

INSTALLATION

Installation must be handled by qualified service or maintenance personnel.

OPERATION



CAUTION

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

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

1. Check motor starting and control device connections against wiring diagrams. Check voltage, phase, and frequency of line circuit (power supply) against motor nameplate.

ELECTRIC MOTORS, Cont.

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



CAUTION

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

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

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

- 230°F (110°C) for class "B" insulation
- 275°F (135°C) for class "F" insulation
- 302°F (150°C) for class "H" insulation

VOLTAGE REGULATION

Motors will operate successfully under the following conditions of voltage and frequency variation, but not

necessarily in accordance with the standard established for operation under rated conditions:

1. When the variation in voltage does not exceed 10% above or below normal, with all phases balanced.
2. When the variation in frequency does not exceed 5% above or below normal.
3. When the sum of the voltage and frequency of the voltage does not exceed 10% above or below normal (provided the frequency variation does not exceed 5%).

MAINTENANCE

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

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

This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures.

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

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

ELECTRIC MOTORS, Cont.

BEARING LUBRICATION



CAUTION

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

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

For best results, grease should be compounded from a polyurea base and a good grade of petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature ranges should be from -15°F to +250°F for class B insulation, and to +300°F for classes F and H. Most leading oil companies have special bearing greases that are satisfactory. Relubricate bearings every six months (more often if conditions require) as follows:

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off pipe plugs and remove from housings.
3. Remove hardened grease from drains with a stiff wire or rod.
4. Add grease to inlet with hand gun until small amount of new grease is forced out drain.
5. Remove excess grease from ports, replace inlet plugs, and run motor ½ hour before replacing drain plug.
6. Put motor back in operation.

INSULATION RESISTANCE

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

$$\frac{\text{Rated Voltage of Machine} + 1000}{1000} = \text{Insulation Resistance in Megohms}$$

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

CLEANING



WARNING

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

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

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

MAINTENANCE / LUBRICATION

Gear units should have the oil changed every 10,000 hours or 2 years. If synthetic lubricant is used, it should be changed every 20,000 hours or 4 years. For adverse operating conditions, the interval should be shorter. **DO NOT MIX SYNTHETIC AND MINERAL BASED OILS.** Units should be checked periodically for increased noise, surface temperature, vibration, shaft movement and amperage draw. Units with inspection covers should not be operated with the inspection cover removed.



CAUTION

Oil should be changed more often if reducer is used in a severe environment (i.e., dusty, humid).

MAINTENANCE / LUBRICATION, Cont.

All 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 level is within ½ inch of the bottom of the fill plug threads. 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 Brawn.

TABLES 2 and 3 offer suggestions on the viscosity and manufacturers of recommended lubricants.



CAUTION

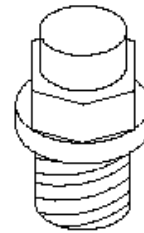
In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this industry.

TABLE 2: APPROXIMATE OIL CAPACITY (QTS.) FOR GEAR DRIVES

CASE SIZE	OIL CAPACITY
2	2.1
3	4.3
4	5.7
5	9.3

AUTOVENT PLUG: The Autovent plug (**FIGURE 3**) 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 reseals 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.



AUTOVENT
PLUG

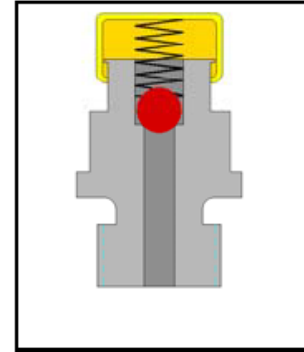
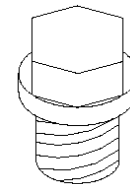


FIGURE 3: THE AUTOVENT RELEASES BUILT-UP AIR PRESSURE FROM INSIDE THE GEARBOX (MAX. PRESSURE 2PSI).

FILL LEVEL & DRAIN PLUGS: The drain plugs (**FIGURE 4**) 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 the drain plug. Both types of plugs will have gaskets included to prevent oil from leaking.



DRAIN
PLUG



FILL LEVEL
PLUG

FIGURE 4: TWO TYPES OF PLUGS FOR MAINTENANCE.

WARNING

To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up.



Sealed vent



Activated vent

TABLE 3: RECOMMENDED LUBRICANTS
STANDARD OIL - ISO

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Oil Manufacturer</i>	<i>Oil Brand Name</i>
20° to	Mineral	Texaco	Meropa
20° to	Mineral	Shel	Omala EP

OPTIONAL

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Oil Manufacturer</i>	<i>Oil Brand Name</i>
14° to	Syntheti	Texaco	Pinnacle EP680
14° to	Syntheti	Shel	Omala HD 680
-13° to	Syntheti	Texaco	Pinnacle EP220
-13° to	Syntheti	Shel	Omala HD 220
-40° to 50°	Syntheti	Texaco	Pinnacle EP32
-40° to 50°	Syntheti	Shel	Omala HD
20° to	Food	Chevro	FM ISO 220
20° to	Synthetic Food Grade	OilJA	Magnaplate 85W140-FG
5° to	Fluid Grease	Mobi	Mobilux
-30° to	Synthetic Fluid Grease	Mobi	Mobilith SHC
-30° to	Synthetic Fluid Grease	Shel	Tivela Compound A

STANDARD BEARING GREASE - NL GI 2EP Lithium

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Grease Manufacturer</i>	<i>Grease Brand Name</i>
-20° to	Mineral	Texaco	Multifak
-20° to	Mineral	Shel	Cypernia RA/C3

OPTIONAL BEARING

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Grease Manufacturer</i>	<i>Grease Brand Name</i>
-58° to	Syntheti	Texaco	Starfak 2202
-58° to	Syntheti	Shel	Aero
5° to	Food	Lubriplate	SIF 1

STORAGE

Units shipped from Brawn Mixer are intended to be used within 30 days after receipt and presumed to be stored indoors in a heated building. Store mixers as packaged by the factory. If you intend on storing units under adverse conditions or for a long period of time, special storage precautions will be necessary.

1. Store in a sheltered area away from chemical vapors or steam.
2. Cover.
3. Do not store in sunlight or near high heat.
4. Spray oil on exposed shafts and seals. Remove oil on start-up.
5. Rotate output shaft 360° every 3-4 weeks.
6. Mixers should not be stored near vibrating machinery to avoid damage to the bearings.
7. If electric motors have been subjected to humid conditions, check the insulation resistance between phase and mass and between the different phases. The resistance should not be less than 100 megohms. If the resistance is less, please consult the factory.

WARRANTY

WARRANTY: All equipment or parts covered by this manual are guaranteed free from defective material and workmanship for a period of twelve (12) months from date of shipment, under normal use and service. This warranty does not cover failure of normal wear parts unless the failure of such part has resulted from defective material and workmanship. BRAWN Mixer will repair or replace, at its option, any equipment which has been found to be defective and is within the warranty period, provided that the equipment is shipped, with previous factory authorization, freight prepaid, to BRAWN's plant in Holland, Michigan, USA. All return shipments are made FOB BRAWN's factory. BRAWN is not responsible for removal, installation, or any other incidental expenses incurred in shipping the equipment to or from BRAWN. In the case of components purchased by BRAWN Mixer and incorporated in the equipment, the component manufacturer's guarantee shall apply. NOTE: Any modifications or corrective work done to the equipment which were not specifically authorized in writing by BRAWN Mixer shall void this limited warranty, and BRAWN Mixer shall accept no liability for any of the corrective work or expenditures which were conducted without their prior, written authorization. BRAWN Mixer shall not be held liable for any further cost, expense, or labor to replace equipment or replaceable parts, or indirect or consequential damages.

With the exceptions of the limited warranty set out above, there are no other understandings, agreements, representations, or warranties implied (including any regarding the merchantability or fitness for a particular purpose), not specified herein, respecting this agreement or equipment, hereunder. This contract states the entire obligation of BRAWN Mixer in connection with this transaction.

SHOULD WE MAKE A MISTAKE...

BRAWN Mixer's Direct Returns Policy

To ensure proper handling of your return, please take a moment to read the following:

- **ALL** returns require a **RETURN GOODS AUTHORIZATION (RGA) NUMBER**. We are unable to process your return or issue proper credit without an approved **RGA** number.
- **ALL** returns must be **COMPLETE**, including all original warranties, manuals, documentation and packaging.
- **ALL** product must be received within 14 days of issuing an **RGA** number.

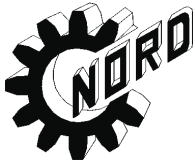
How to Return Product

You must have a **RGA** number before you return any product to BRAWN Mixer. To obtain this number, call **616/399-5600** and ask for Customer Service. Be sure to have available the following information:

- ✓ your order number
- ✓ the BRAWN product serial number
- ✓ the part number and description of the product
- ✓ the reason for the return

◆ IMPORTANT ◆

The RGA number must be written clearly on all boxes being returned. C.O.D. shipments will not be accepted.



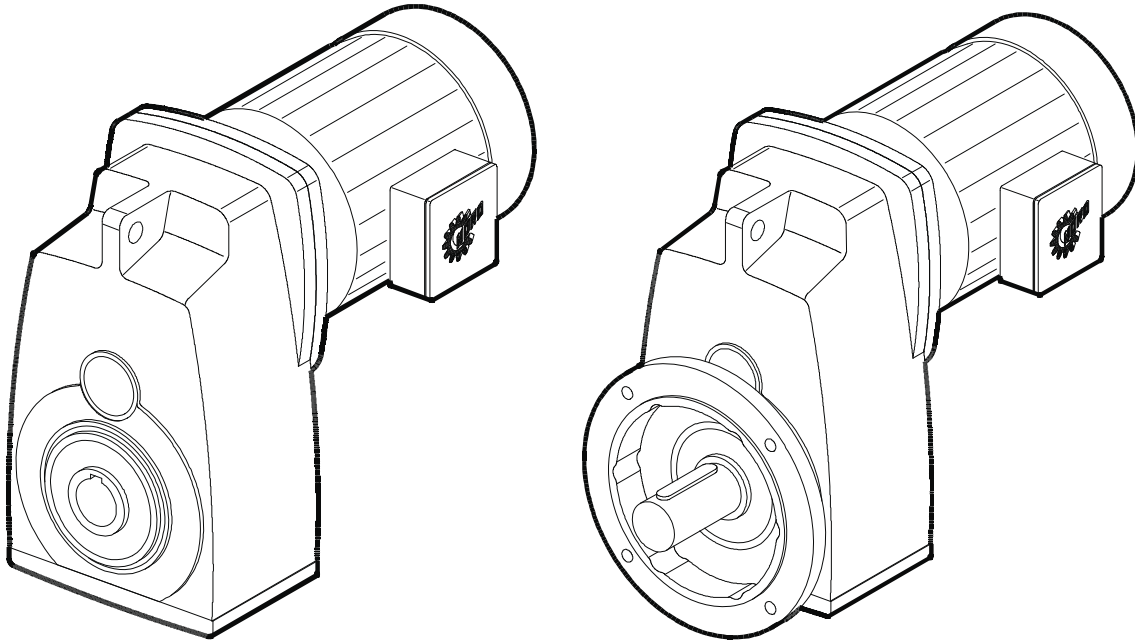
UNICASE® Shaft Mount Gearboxes Installation and Maintenance Instructions

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.

INSTALLATION OF UNIT

To ensure long service and dependable performance, an enclosed gear drive must be rigidly supported and the shafts accurately aligned. The following describes the minimum precautions required to accomplish this end.

FOUNDATION

The responsibility for the design and construction of the foundation lies with the user. The foundation must be adequate to withstand normal operating loads and possible overloads while maintaining alignment to attached system components under such loads.

MOUNTING POSITION

Unless a unit is specifically ordered for inclined mounting, the foundation must be level and flat. The lubrication system may not operate properly if the unit is not mounted in the position for which it is designed. It may be desirable to elevate the foundation to facilitate oil drainage.

CONCRETE FOUNDATION

If a concrete foundation is used, steel mounting pads and bolts of sufficient size to distribute the stress into the concrete should be grouted into the foundation.

STEEL FOUNDATION

If a structural steel foundation is used (i.e. wide flange beams or channels), a base plate or sole plate of suitable thickness should be used and should extend under the entire unit.

FOOT MOUNTED UNITS

Use shims under the feet of the unit to align the output shaft to the driven equipment. Make sure that all feet are supported so that the housing will not distort when it is bolted down. Improper shimming will reduce the life of the unit and may cause failure. Dowel pins may be installed to prevent misalignment and ensure proper realignment if removed for service.

SHAFT MOUNTED UNITS

Shaft mounted drives should be mounted as close to the driven equipment bearing support as possible to minimize bearing loads due to overhung load. Design of the joint connection between the torque reaction arm and the foundation is the user's responsibility.

Hollow Shaft Diameter tolerance

Metric (mm)

$\leq \varnothing 18 = +0.018/-0.000$
$> \varnothing 18 \leq \varnothing 30 = +0.021/-0.000$
$> \varnothing 30 \leq \varnothing 50 = +0.025/-0.000$
$> \varnothing 50 \leq \varnothing 80 = +0.030/-0.000$
$> \varnothing 80 \leq \varnothing 120 = +0.035/-0.000$
$> \varnothing 120 \leq \varnothing 180 = +0.040/-0.000$

Inch

$\leq \varnothing 4.375 = +0.0010 / -0.0000$
$> \varnothing 4.375 = +0.0015 / -0.0000$

Customer shaft diameter tolerances with keyed hollow shafts

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

$\leq \varnothing 1.500 = +0.000/-0.002$
$> \varnothing 1.500 \leq \varnothing 2.500 = +0.000/-0.003$
$> \varnothing 2.500 \leq \varnothing 7.000 = +0.000/-0.004$

Shaft finish to be 125 micro inches or smoother.

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

FLANGE MOUNTED UNITS

If a structural steel foundation is used (i.e. wide flange beams or channels), a base plate or sole plate of suitable thickness should be used and should extend under the entire unit. If a bulk head plate is used it should be of proper strength to minimize buckling distortions.

Flange Pilot 'AK' or 'AK1' tolerance

Metric (mm)

$> \varnothing 50 \leq \varnothing 80 = +0.012/-0.007$
$> \varnothing 80 \leq \varnothing 120 = +0.013/-0.009$
$> \varnothing 120 \leq \varnothing 180 = +0.014/-0.011$
$> \varnothing 180 \leq \varnothing 230 = +0.016/-0.013$
$> \varnothing 230 \leq \varnothing 315 = +0.000/-0.032$
$> \varnothing 315 \leq \varnothing 400 = +0.000/-0.036$
$> \varnothing 400 \leq \varnothing 500 = +0.000/-0.040$

Inch

$> \varnothing 1.969 \leq \varnothing 3.150 = +0.005/-0.0003$
$> \varnothing 3.150 \leq \varnothing 4.724 = +0.005/-0.0004$
$> \varnothing 4.724 \leq \varnothing 7.087 = +0.006/-0.0004$
$> \varnothing 7.087 \leq \varnothing 9.055 = +0.006/-0.0005$
$> \varnothing 9.055 \leq \varnothing 12.402 = +0.000/-0.0013$
$> \varnothing 12.402 \leq \varnothing 15.748 = +0.000/-0.0014$
$> \varnothing 15.748 \leq \varnothing 19.685 = +0.000/-0.0016$

BOLT STRENGTH

Bolt size, strength and quantity should be verified to insure proper torque reaction capacity whatever the mounting arrangement.

LUBRICATE SHAFTS

Both the hollow shaft and the driven shaft should be liberally lubricated before assembly. The unit must slide freely onto the driven shaft. Do not hammer or force the unit into place. For shrink disc, follow instructions below.

AXIAL RETENTION

Each drive shaft must be retained in place relative to the gear reducer. Or each gear reducer must be retained in place relative to the drive shaft. Either way NORD recommends the use of shaft shoulders, locking collars or FIXING ELEMENTS to axially retain the shaft or gear reducer in position.

SET SCREWS

If set screws are used for axial retention, they should be tightened evenly. Flats may be filed on the driven shaft and a thread-locking adhesive used for more position retention.

SNAP RING RETENTION

Placing external snap rings on drive shafts must be performed with caution. The groove, which the snap ring fits into, may weaken the drive shaft causing premature failure. NORD does not recommend this type of shaft retention.

THRUST PLATE

In applications, which are subject to high vibratory loads, a thrust plate will provide greater resistance to axial movement. Follow the manufacturer's recommendations for assembly.

SHRINK DISC

If a shrink disc is used to secure a reducer hollow shaft to the driven shaft, follow this assembly procedure. Start with the shrink disc mounted onto the extension of the hollow shaft disc locking bolts loosened.

1. Clean reducer bore and mating solid shaft to be free of any lubricants or dirt.
2. Slide reducer onto the solid shaft until it is about half way through.
3. Lubricate the remaining portion of the solid shaft with a #2 grease or similar lubricant. This part will be located under the bronze bushing. **Do not install grease under the shrink disc gripping area.** Finish installing the solid shaft into the reducer hollow bore.
4. Finger tighten all shrink disc bolts. Now, moving a circular pattern, tighten each shrink disc locking bolt 1/4 to 1/2 turn. **Do not use criss cross pattern.** Continue tightening in the same circular direction with 1/4 or 1/2 turn increments until all bolts reach the specified bolt tightening torque. Bolt tightening torque is shown on the shrink disc label for the particular unit.
5. Run unit for 24 hours, then retighten shrink disc locking bolts to the proper bolt torque as indicated above.

TORQUE REACTION ARM

On the shaft mount 'Clincher', torque is reacted through the integral torque tab, which is part of the casting. Commonly, NORD's optional RUBBER BUFFER bushings are installed on each side of the integral torque tab to dampen torque shocks and allow for mis-alignment received from the machinery during operation.

Torque arm connection fabrications should always be mounted perpendicular to a line through the output shaft center and the point at attachment of the torque arm to the unit housing. In this position the minimum load on the attachment structure arm will be experienced. The attachment structure must be rigid and may not deflect under any load. Doing so will place extra loads on the output bearings of the reducer.

PRIME MOVER MOUNTING

Align the prime mover to the reducer-input shaft using shims under the feet. Make sure that the feet are supported. Dowel the prime mover to its foundation.

SHAFT CONNECTIONS

When connecting shafts to either the input or output of the reducer, consider the following instructions.

FITS

Clearance or interference fits for coupling hubs should be in accordance with ANSI/AGMA 9002-A86 or as follows.

Output and Input shaft Diameter tolerance

Metric (mm)	$\leq \varnothing 18 = +0.012/+0.001$
	$> \varnothing 18 \leq \varnothing 30 = +0.015/+0.002$
	$> \varnothing 30 \leq \varnothing 50 = +0.018/+0.002$
	$> \varnothing 50 \leq \varnothing 80 = +0.030/+0.011$
	$> \varnothing 80 \leq \varnothing 120 = +0.035/+0.013$
	$> \varnothing 120 \leq \varnothing 180 = +0.040/+0.015$

Inch	$\leq \varnothing 1.750 = +0.0000/-0.0005$
	$> \varnothing 1.750 = +0.0000/-0.0010$

Output and Input shaft Drill and tap shaft end

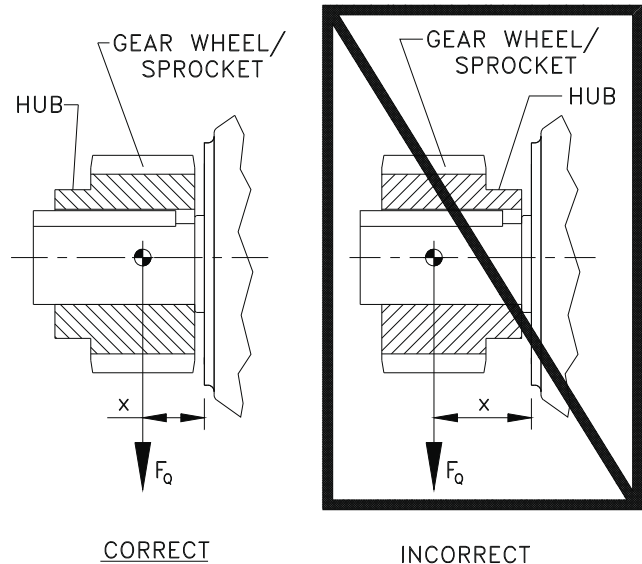
Metric (mm)	$\leq \varnothing 16 = M5$
	$> \varnothing 16 \leq \varnothing 21 = M6$
	$> \varnothing 21 \leq \varnothing 24 = M8$
	$> \varnothing 24 \leq \varnothing 30 = M10$
	$> \varnothing 30 \leq \varnothing 38 = M12$
	$> \varnothing 38 \leq \varnothing 50 = M16$
	$> \varnothing 50 \leq \varnothing 85 = M20$
	$> \varnothing 85 \leq \varnothing 130 = M24$

Inch	$\leq \varnothing 0.438 = \#10-24 \times 0.4 \text{ deep}$
	$> \varnothing 0.438 \leq \varnothing 0.813 = 1/4-20 \times 0.6 \text{ deep}$
	$> \varnothing 0.813 \leq \varnothing 0.938 = 5/16-18 \times 0.7 \text{ deep}$
	$> \varnothing 0.938 \leq \varnothing 1.125 = 3/8-16 \times 0.9 \text{ deep}$
	$> \varnothing 1.125 \leq \varnothing 1.375 = 1/2-13 \times 1.1 \text{ deep}$
	$> \varnothing 1.375 \leq \varnothing 1.875 = 5/8-11 \times 1.4 \text{ deep}$
	$> \varnothing 1.875 \leq \varnothing 3.250 = 3/4-10 \times 1.7 \text{ deep}$
	$> \varnothing 3.250 = 1-8 \times 2.2 \text{ deep}$

Outboard pinion and sprocket fits should be as recommended by the pin sprockets with interference fits should be heated according to the manufacturer's recommendations, generally 250°F to 300°F, (120°C to 150°C) before assembling to the shaft.

LOCATION

Coupling hubs should be mounted flush with the shaft ends, unless specifically ordered for overhung mounting. Pinions,



sprockets and sheaves should be mounted as close as possible to the unit housing to minimize bearing loads and shaft deflections.

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:

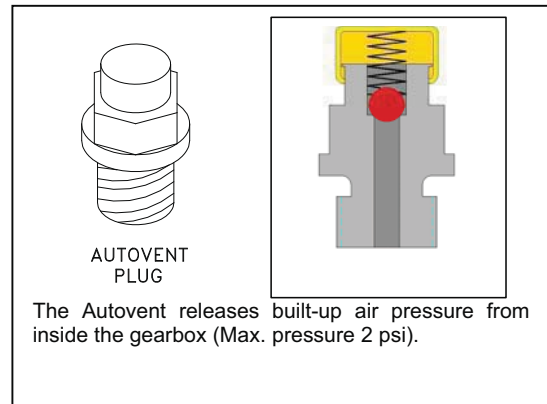
LOCK OUT POWER before any maintenance is performed. Make absolutely sure that no voltage is applied while work is being done on the gearbox.

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.

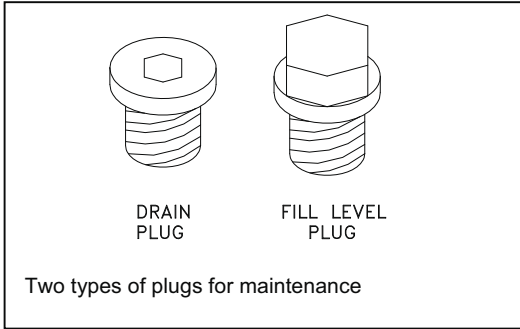
AUTOVENT PLUG

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.

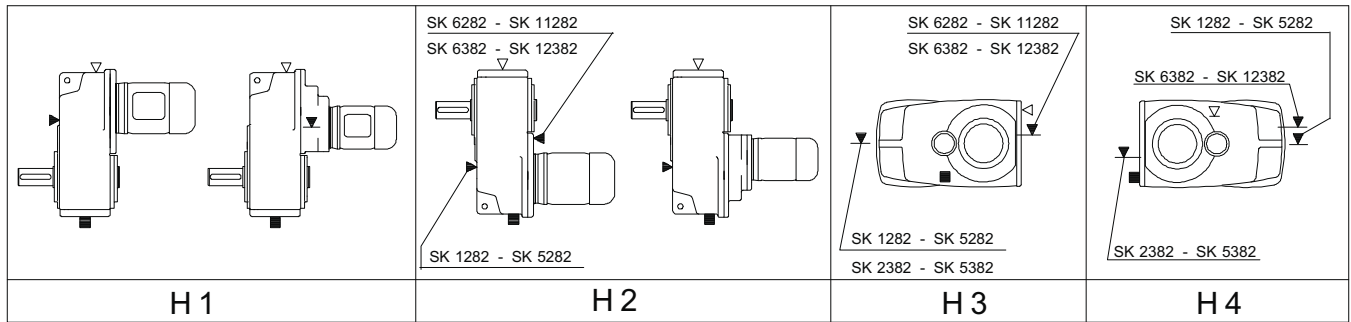
OPERATION AND MAINTENANCE CHECKLIST

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.

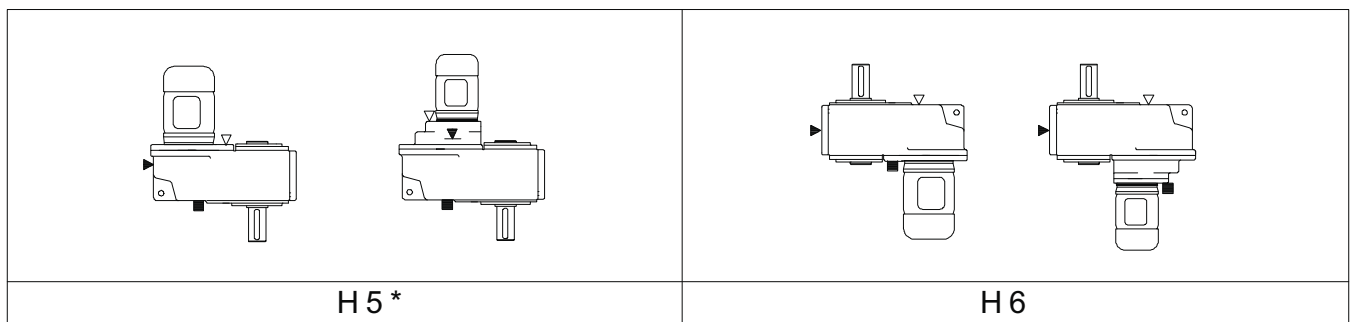
MOUNTING POSITIONS

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



* 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

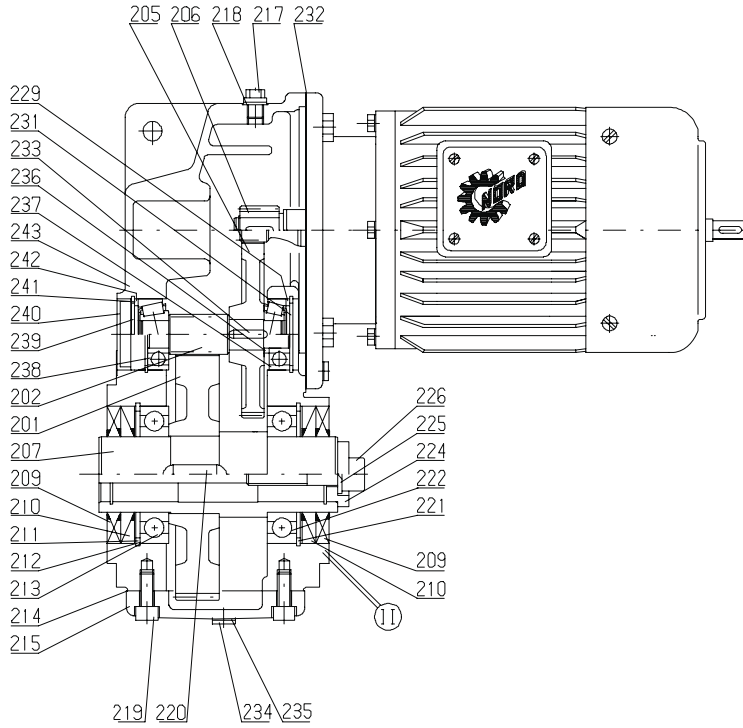
		MOUNTING POSITION					
		Horizontal				Vertical	
		H1	H2	H3	H4	H5	H6
SK 0182NB	quarts	0.42	0.63	0.53	0.53	0.58	0.58
	liters	0.40	0.60	0.50	0.50	0.55	0.55
SK0282NB	quarts	0.74	0.85	0.95	0.95	1.16	1.06
	liters	0.70	0.80	0.90	0.90	1.10	1.00
SK 1282	quarts	0.95	0.95	1.00	1.00	1.27	1.37
	liters	0.90	0.90	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.

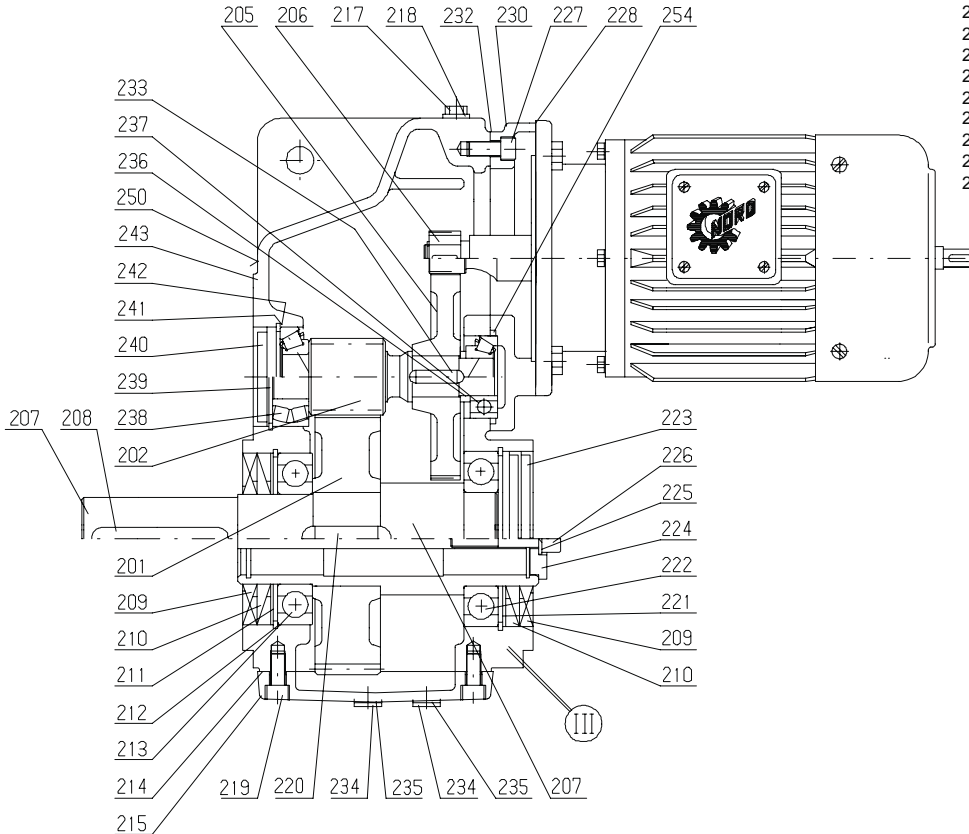
PARTS LIST

SK1282 - SK5282



- 201 Driven gear
- 202 Pinion shaft
- 205 Driving gear
- 206 Driving pinion
- 207 Output shaft (Hollow shaft)
- 208 Key
- 209 Shaft seal
- 210 Shaft seal
- 211 Circlip
- 212 Shim
- 213 Ball bearing
- 214 Seal
- 215 Gear case cover
- 217 Vent plug
- 218 Seal
- 219 Socket head screw
- 220 Key
- 221 Circlip
- 222 Ball bearing
- 223 Locking cap
- 224 Washer
- 225 Washer
- 226 Socket head screw
- 227 Socket head screw
- 228 Seal
- 229 Supporting disc
- 230 Gearbox cover
- 231 Circlip
- 232 Seal
- 233 Key
- 234 Drain plug
- 235 Seal
- 236 Supporting disc
- 237 Pinion shaft bearing
- 238 Pinion shaft bearing
- 239 Circlip
- 240 Locking cap
- 241 Shim
- 242 Supporting disc
- 243 Gear case
- 250 Locking cap
- 254 Spacer

SK6282 - SK11282



RECOMMENDED SPARE PARTS

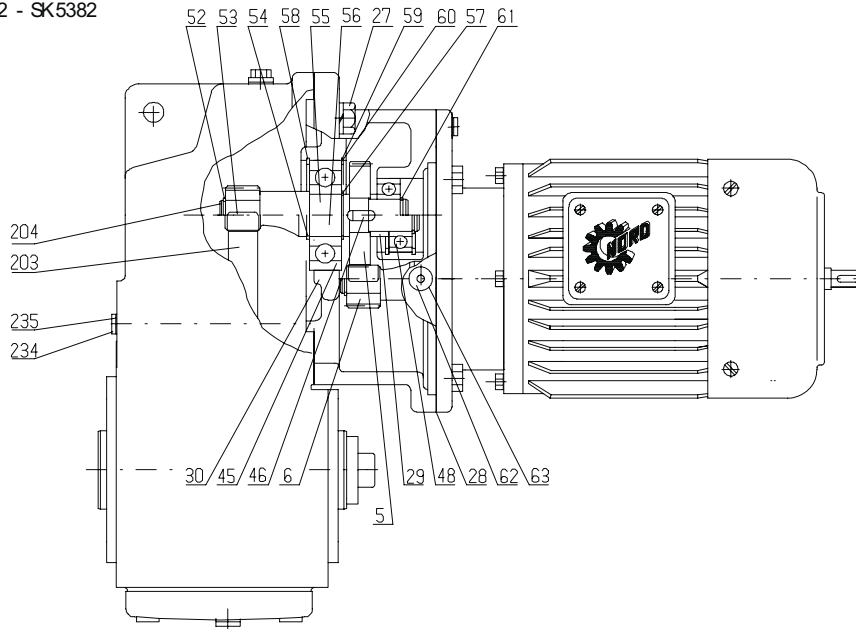
Bearings – all Gaskets – all Shims – all
 Seals – all Seal Plugs – all

IMPORTANT!

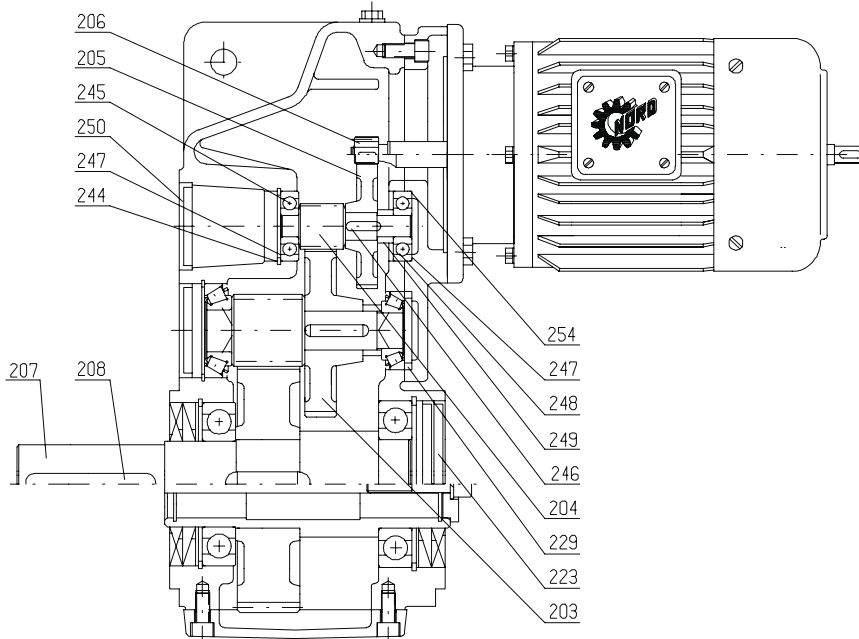
When ordering parts, it is necessary to have the **NORD SERIAL NUMBER** from the unit the parts are for. The serial number will dictate the correct parts for that particular unit. The gearbox nameplate will have the serial number on it.

PARTS LIST

SK1382 - SK5382



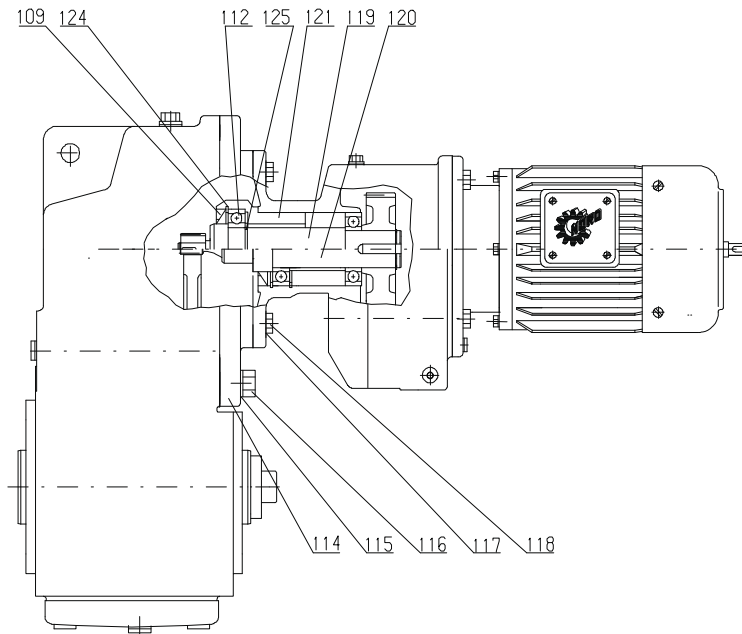
SK6382 - SK11382



- 5 Driving gear
- 27 Hexagon screw
- 28 Seal
- 29 Supporting disc
- 30 Third reduction gearcase
- 45 Ball bearing
- 46 Key
- 48 Ball bearing
- 52 Circlip
- 53 Key
- 54 Circlip
- 55 Intermediate shaft, plain
- 56 Intermediate shaft, gearcut
- 57 Circlip
- 58 Circlip
- 59 Shim
- 60 Circlip
- 61 Circlip
- 62 Drain plug
- 63 Seal
- 203 Driving gear
- 204 Pinion shaft SK 6382 - SK 9382
- 206 Driving pinion
- 207 Output shaft
- 208 Key
- 223 Locking cap
- 229 Supporting disc
- 234 Drain plug
- 235 Seal
- 244 Circlip
- 245 Ball bearing
- 246 Key
- 247 Shim
- 248 Ball bearing
- 249 Supporting disc
- 250 Locking cap
- 254 Spacer

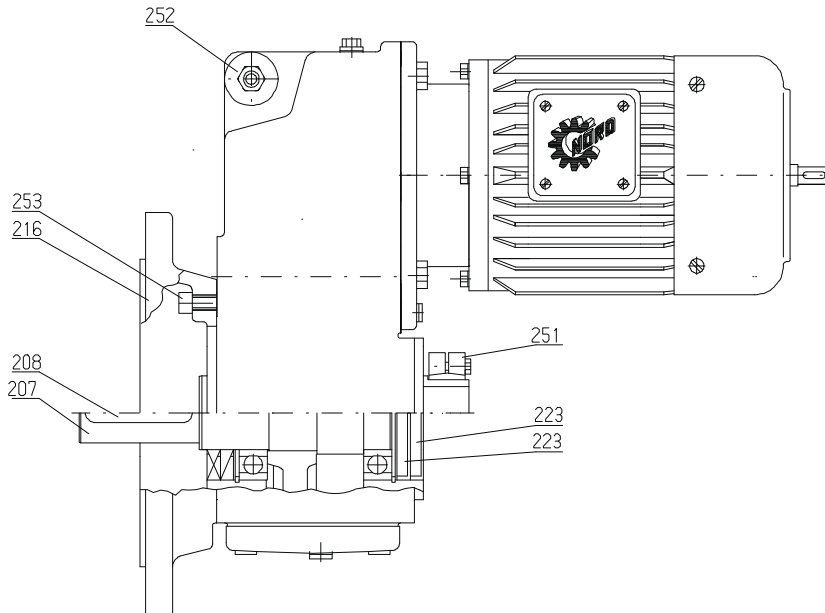
PARTS LIST

SK1282/02 - SK 11382/52



- 109 Shaft seal
- 112 Ball bearing
- 114 Intermediate flange
- 115 Washer
- 116 Hexagon screw
- 117 Washer
- 118 Hexagon screw
- 119 Intermediate shaft, plain
- 120 Intermediate shaft, gearcut
- 121 Bearing sleeve
- 124 Circlip
- 125 Circlip
- 207 Output shaft
- 208 Key
- 216 Flange
- 223 Locking cap
- 251 Shrink disc connector
- 252 Torque arm
- 253 Socket head screw

SK1282 - SK 11282
SK1382 - SK 11382



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.

NORD Gear Corporation

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WEST

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Fax 888-408-6673

MIDWEST

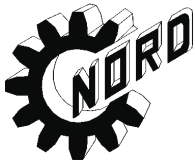
PO Box 367
800 Nord Drive
Waunakee, WI 53597
Phone 608-849-7300
Fax 800-373-6673

SOUTH

100 Forsyth Hall Dr.
Building 100B
Charlotte, NC 28273
Phone 704-529-1255
Fax 888-259-6673

CANADA

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



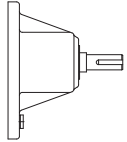
NORD Gearbox Inputs Installation and Maintenance Instructions

BIM 1009

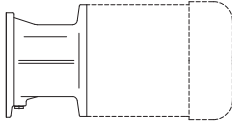
USA

CDN

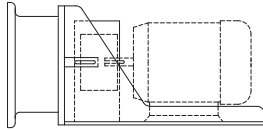
Retain These Safety Instructions For Future Use



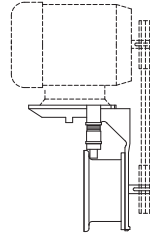
W-STYLE



NEMA/IEC



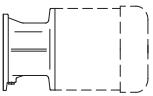
SUGAR SCOOP



MOTOR MOUNT
PLATFORM

⚠ 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.

NEMA/ IEC Motor Adapters



NORD Gear supplies a coupling that is to be mounted onto the motor shaft. It is important that the coupling is properly positioned. For **NEMA Input Adapters**, follow the Motor Installation Instructions below to insure full coupling engagement onto the input shaft. For **IEC Input Adapters**, the supplied coupling will mount directly against the motor shaft shoulder. No locating measurements need to be taken. *NOTE: Some of the larger IEC inputs will have a coupling spacer included to help locate the coupling. Slide the spacer against the motor shaft shoulder, slide the coupling against the spacer and tighten set screw(s).*

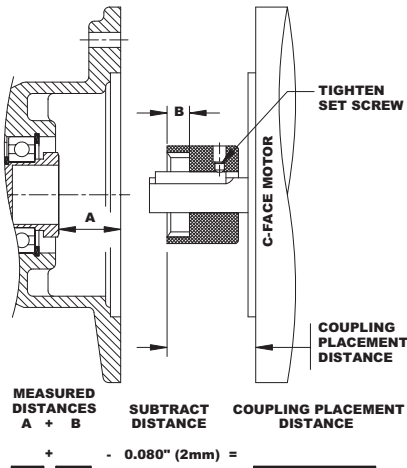
For the larger motor adapters (IEC160 / N250TC and larger), an **Automatic Lubricator** is supplied. **This will need to be activated at the time of startup.** For operation and activation instructions, refer to the "Automatic Lubricator" section.

NORD supplies three different types of couplings depending on the size of input: "J" style, "M" style and "Jaw" style coupling. Following are instructions on how to properly mount each type of coupling onto the motor. First, identify which coupling has been supplied to you by referring to the "Couplings for the NEMA and IEC Adapters" section on the next page. Make sure the motor flange and shaft are cleaned and verify that the proper key is in the motor shaft.

"J" Style Coupling

NEMA C-face Motor Installation Instructions

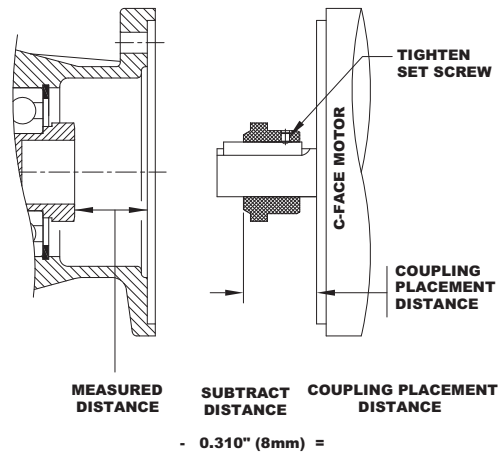
1. Measure the distance from the face of the input adapter to the face of the splined shaft and record that measurement as "A" in the equation below.
2. Measure depth of coupling engagement zone and record the measurement as "B" in the equation below.
3. Add "A" + "B" and subtract 0.08" (~2mm) from the distance. ***This needs to be done so that the coupling will not be preloaded after installation!***
4. Use that measurement to locate the coupling from the face of the motor onto the shaft.
5. Once in place, tighten the set screw to lock the coupling in place. It is recommended that the key is staked or bonded (Loctite) in place to prohibit the key from vibrating out.
6. Mount the motor onto the input adapter with customer supplied bolts. Make sure that the coupling from the adapter and the motor engage securely. Use lock washers or Loctite to prohibit bolts from becoming loose from vibration.



"M" Style Coupling

NEMA C-face Motor Installation Instructions

1. Measure the distance from the face of the input adapter to the face of the splined shaft and record that measurement.
2. Subtract 0.31" (~8mm) from the distance. ***This needs to be done so that the coupling will not be preloaded after installation!***
3. Use that measurement to locate the coupling from the face of the motor onto the shaft.
4. Once in place, tighten the set screw to lock the coupling in place. It is recommended that the key is staked or bonded (Loctite) in place to prohibit the key from vibrating out.
5. Mount the motor onto the input adapter with customer supplied bolts. Make sure that the coupling from the adapter and the motor engage securely. Use lock washers or Loctite to prohibit bolts from becoming loose from vibration.



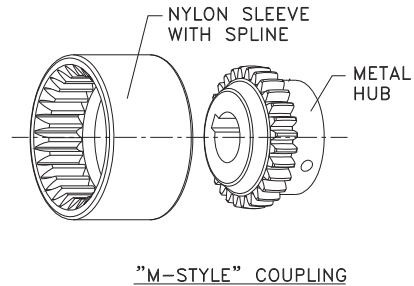
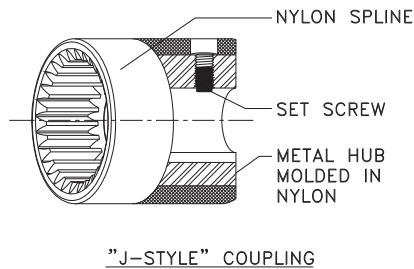
Couplings for the NEMA and IEC Adapters

Depending on the size of the input adapter to the gearbox, NORD Gear supplies two styles of couplings - BoWex® (gear tooth) and Rotex® (jaw) couplings.

BoWex® Couplings

NORD C-face adapter input shafts have a machined spline on the end. NORD incorporates two styles of BoWex® couplings, the “J” and “M” styles. The “J” style is a one-piece coupling with a metal hub and nylon spline. The “M” style is a two-piece coupling – the metal hub and a nylon sleeve. Nylon and steel components allow them to operate in high ambient temperatures without lubrication or maintenance.

- Nylon sleeves resist dirt, moisture, most chemicals and petroleum products
- No lubrication required
- Operating Conditions: -22°F - 195°F (-30°C - 90°C)
- Higher temperature coupling sleeve available up to 250°F (120°C)
- Special bore available



BoWex® Mechanical Ratings

“J” Style

Coupling Type	Available Bore Sizes	Cont. / Peak Torque	Input
J14	11, 14 mm 5/8 in.	10 / 20 Nm 89 / 177 lb-in	IEC 63, 71 NEMA 56C
J24	19, 24 mm 5/8, 7/8 in	20 / 40 Nm 177 / 354 lb-in	IEC 80, 90 NEMA 56C, 140TC
J28	28mm 1-1/8 in	45 / 90 Nm 399 / 797 lb-in	IEC 100, 112 NEMA 180TC

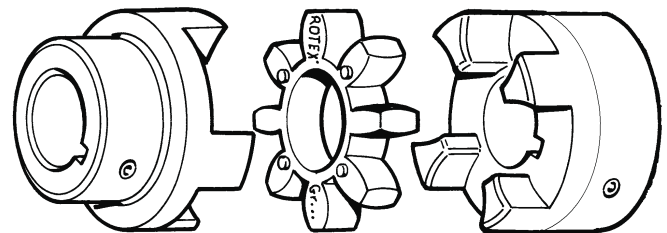
“M” Style

Coupling Type	Available Bore Sizes	Cont. / Peak Torque	Input
M14/M24/M28	Same as “J” style	Same as “J” style	Same as “J” style
M38	38 mm 1-1/8, 1-3/8 in.	80 / 160 Nm 708 / 1,416 lb-in	IEC 132 NEMA 180TC, 210TC
M42	42 mm 1-5/8 in	100 / 200 Nm 885 / 1,770 lb-in	IEC 160 NEMA 250TC
M48	48 mm 1-7/8 in	140 / 280 Nm 1240 / 2,478 lb-in	IEC 180 NEMA 280TC

Rotex® Couplings

The cast iron jaw type couplings have an integral urethane “spider” that provides smooth transmission of the motor torque. A set screw on the coupling prohibits axial movement along the motor shaft.

- Excellent shock and vibration dampening
- Excellent resistance to oils and most chemicals
- No metal-to-metal contact
- Operating Conditions: -40°F - 195°F (-40°C - 90°C)
- Higher temperature material (Hytrell) spider available up to 230°F (110°C)
- Special bores available



Hub Design 1

Spider

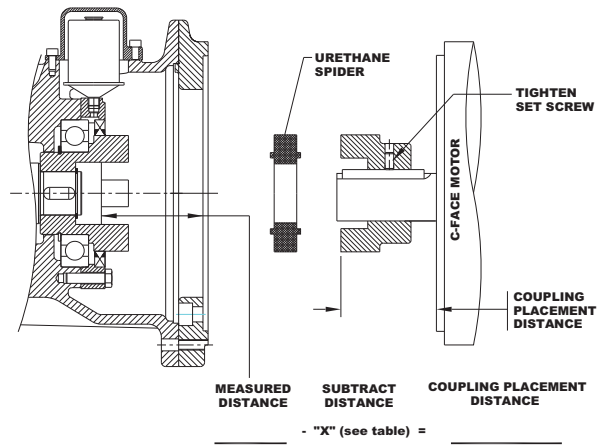
Hub Design 1a

Rotex® Mechanical Ratings

Coupling Type	Available Bore Sizes	Continuous / Peak Torque	Inputs Used With	Spider
R19	14, 19 mm	17 / 34 Nm 150 / 300 lb-in	SEK/SEP 100	Urethane 98 Shore A Hardness Color: Red
R24	19, 24 mm	60 / 120 Nm 530 / 1,060 lb-in	SEK/SEP 100, 130	
R28	32, 38 mm	95 / 190 Nm 840 / 1,680 lb-in	SEK/SEP 165, 215	
R38	1.89" (48mm) Max Bore	190 / 382 Nm 1,680 / 3,380 lb-in	-	Urethane 92 Shore A Hardness Color: Yellow
R42	2.44" (62mm) Max Bore	310 / 620 Nm 2,740 / 5,480 lb-in	-	
R48	42, 48 mm 1-5/8, 1-7/8 in	310 / 620 Nm 2,740 / 5,485 lb-in	IEC 160, 180 NEMA 250T, 280T SEK/SEP 300, 215	
R65	60 mm 2-1/8, 2-3/8 in	625 / 1,250 Nm 5,530 / 11,060 lb-in	IEC 225 NEMA 320T, 360T	
R90	65, 75, 80 mm 2-1/8, 2-3/8 in	2,400 / 4,800 Nm 21,240 / 42,480 lb-in	IEC 250, 280, 315 NEMA 360T, 400TS, 440TS	

**Jaw" Style Coupling
NEMA C-face Installation Instructions**

1. Measure the distance from the face of the input adapter to the face of the coupling as shown and record that measurement.
2. Subtract the "X" dimension from the measured distance. ***This needs to be done so that the coupling will not be preloaded after installation!***
3. Use that measurement to locate the coupling from the face of the motor onto the shaft.
4. The metal portion of the coupling should be heated up prior to assembly, generally 250°F to 300°F (120°C to 150°C). ****DO NOT HEAT THE URETHANE SPIDER.***
5. Once in place, tighten the setscrew to lock coupling in place. Let the coupling cool down before placing the spider into the jaws. It is recommended that the key is staked or bonded (Loctite) in place to prohibit the key from vibrating out.
6. Mount the motor onto the input adapter with customer supplied bolts. Make sure that the coupling from the adapter and the motor engage securely. Use lock washers or Loctite to prohibit bolts from becoming loose from vibration.



Coupling Size	"X" (Subtract this value from measured distance)
R14	0.06" (1.5mm)
R19 & R24	0.08" (2.0mm)
R28	0.10" (2.5mm)
R38/42	0.12" (3.0mm)
R48	0.14" (3.5mm)
R65	0.18" (4.5mm)
R90	0.22" (5.5mm)

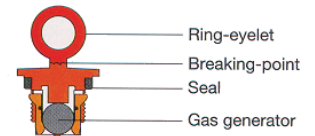
Automatic Lubricator

NORD Gear supplies the larger C-face motor adapters with an Automatic Lubricator. This will provide additional grease lubrication to the outboard bearing. As the pressure from the lubricator canistor pushes the new grease into the bearing, the old grease will flow into the cavity towards the gearbox. When the cavity is filled with the "used" grease, the pressure from the new grease pushes the used grease into the gear box thru the input seal. The old grease mixes with the oil but will not cause harm to the gearing or bearings. Regular oil changes with the gearbox will remove the old grease which has been pushed into the gearbox. Refer to the PARTS LISTS for inputs equipped with the Automatic Lubricator.

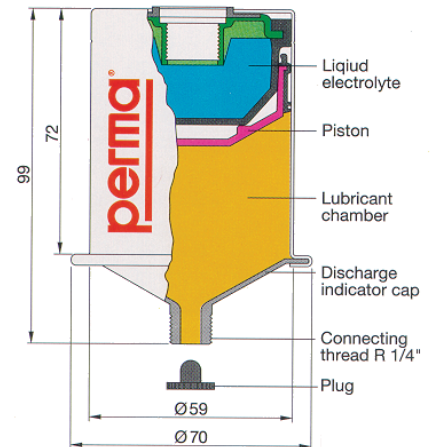


Principle of Operation

After tightening the plastic activating screw, the Zinc-Molybdenum pellet drops into the Citric Acid electrolyte. The chemical reaction builds up pressure that causes the piston to move forward. The lubricant is continuously injected into the lubrication point. At the end of the lubrication period, the discharge indicator cap becomes clearly visible indicating the lubricant has been fully discharged. The lubrication period is determined and defined by the color of the activating screw.



For the bearings used in NORD Gear products, a 12-month lubrication period is standard, indicated by a **gray activating screw**. This applies for an average operating time of 8 hours/day. For longer operating times, the replacement interval decreases to 6 months. Lubrication canisters are also available for cold temperature applications. Contact NORD Gear for more information.



Assembly Instructions

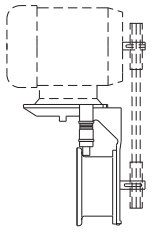
1. Remove the plug from the male connecting thread.
2. Screw male fitting into bearing housing within Input Adapter.
3. Insert activating screw into end of canister. Tighten until the ring-eyelet breaks off.
4. Replace every twelve months.

Perma Classic Specifications

Standard Lubricant	Klüber Petamo GHY 133 (synthetic)
NORD Part Number	28301000
Lubricant Volume	120 mL (4 oz.)
Operating Temperature Range*	-30°C to 150°C (-22°F to 302°F)
Discharge Time	12 months at 25°C (77°F)
Operating Position	Independent of mounting position, operates even under water.
Male Connecting Thread	1/4" NPT

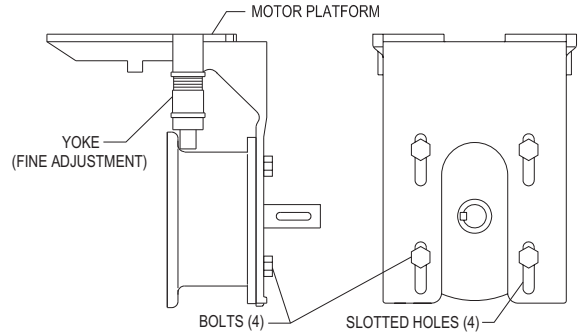
*The temperature range shown is for the Perma Classic Lubricator only and does not apply to other components and/or lubricants within the gear reducer.

MK Motor Mount Platform



For proper installation of the belt drive, consult the V-belts manufacturer. NORD MK motor mounts are adjustable in two ways. Slotted holes are provided at the input cylinder for the initial height adjustment. There are two fine adjustments at the Yoke to increase/decrease tension. Two Spanner head wrenches will be needed to tighten/loosen the fine adjustments. The four bolts holding the motor platform to the input cylinder must be loosened in order to use the fine adjustments.

The motor mounting platform has tapped holes to accept the foot pattern of the standard footed NEMA or IEC motor. All MK mounting input shaft diameters are metric.

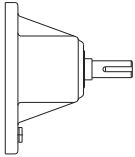


Align the sheaves or sprockets square and parallel by placing a straight edge across their faces. Alignment of bushed sheaves and sprockets should be checked after bushings have been tightened. Check horizontal shaft alignment by placing a level vertically against the face of the sheave or sprocket.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



WARNING:
NORD Gear does not furnish the safety guards for the traction mechanism. It is the responsibility of the customer to install a safety guard to conform to OSHA standards.

Solid Shaft (W-Type)



The shaft will be inch or metric, depending on how the unit was ordered. Measure and verify the shaft before mounting anything on the shaft. Below are the tolerances used for the solid shafts.

All solid input shafts have a tapped hole on the end for customer use. The chart below indicated the tap size for each shaft. Keys are also supplied with solid shaft.

Outboard pinion and sprocket fits should be as recommended by the manufacturer. The components should be heated according to the manufacturer's recommendations, generally 250°F to 300°F, (120°C to 150°C) before assembling to the shaft. The coupling hub or sprocket should be mounted per Figure 1.

On larger gearboxes, there is grease fitting on the W-Type inputs to grease the outboard bearing. About 0.75 ounce (20 - 25g) of synthetic grease should be added every 1,000 service hours. There is a sticker adjacent to the grease fitting detailing which grease should be used. **The standard bearing grease is Kluber Petamo GHY 133N synthetic grease. Bearings should be re-greased with a compatible product.**

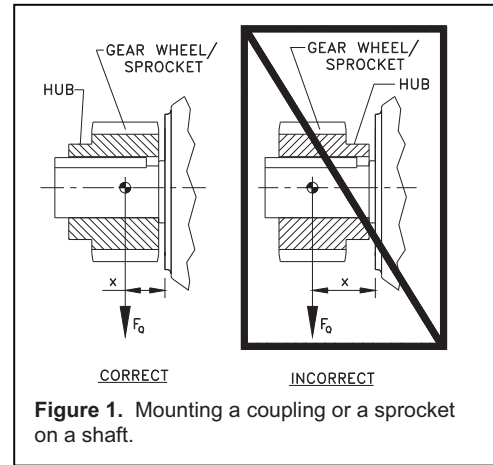


Figure 1. Mounting a coupling or a sprocket on a shaft.

Output and Input Shaft Diameter Tolerance

Metric (mm)

- ≤ ∅ 18 = +0.012/+0.001
- > ∅ 18 ≤ ∅ 30 = +0.015/+0.002
- > ∅ 30 ≤ ∅ 50 = +0.018/+0.002
- > ∅ 50 ≤ ∅ 80 = +0.030/+0.011
- > ∅ 80 ≤ ∅ 120 = +0.035/+0.013
- > ∅ 120 ≤ ∅ 180 = +0.040/+0.015

Inch

- ≤ ∅ 1.750 = +0.0000/-0.0005
- > ∅ 1.750 = +0.0000/-0.0010

Solid Shaft Drill and Tap Shaft End

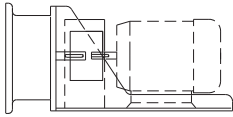
Metric (mm)

- ≤ ∅ 16 = M5
- > ∅ 16 ≤ ∅ 21 = M6
- > ∅ 21 ≤ ∅ 24 = M8
- > ∅ 24 ≤ ∅ 30 = M10
- > ∅ 30 ≤ ∅ 38 = M12
- > ∅ 38 ≤ ∅ 50 = M16
- > ∅ 50 ≤ ∅ 85 = M20
- > ∅ 85 ≤ ∅ 130 = M24

Inch

- ≤ ∅ 0.500 = #10-24 x 0.4 deep
- > ∅ 0.500 ≤ ∅ 0.875 = ¼-20 x 0.6 deep
- > ∅ 0.875 ≤ ∅ 0.938 = 5/16-18 x 0.7 deep
- > ∅ 0.938 ≤ ∅ 1.100 = 3/8-16 x 0.9 deep
- > ∅ 1.100 ≤ ∅ 1.300 = 1/2-13 x 1.1 deep
- > ∅ 1.300 ≤ ∅ 1.875 = 5/8-11 x 1.4 deep
- > ∅ 1.875 ≤ ∅ 3.500 = 3/4-10 x 1.7 deep
- > ∅ 3.500 = 1-8 x 2.2 deep

Sugar Scoop



Each sugar scoop includes the coupling for the motor and the coupling guard. The coupling guard must be mounted when the machine is in use. NORD's standard supplied coupling is the jaw type. Make sure the set screw is tighten after coupling is in place. The coupling hub or sprocket should be mounted per Figure 2.

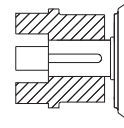


Figure 2. Place coupling flush with end of motor shaft and tighten setscrew.

Motor Installation Instructions

1. Make sure that the motor shaft is clean
2. Mount the coupling onto the motor. Place the coupling so that the inside face is flush with the end of the motor shaft (see Figure 2). The coupling should be heated prior to assembly, generally 250°F to 300°F (120°C to 150°C). ***DO NOT HEAT THE URETHANE SPIDER.** Once in place, tighten the setscrew into the motor shaft to lock coupling in place.
3. Let the coupling cool down before mounting the spider into the jaws. The spider should not be under axial compression when installed.
4. Place the motor onto the scoop and engage the couplings together. The scoop has slotted holes for axial alignment.

****The motor and input shaft must be aligned in all directions to assure proper operation of the system.**

5. Before tightening the motor feet down, check the coupling alignment with a straight edge or a level. Maximum parallel misalignment should not exceed 0.015" and angular misalignment should be held to 1.5°. Shim the motor feet to align the couplings. Careful alignment extends the life of not only the coupling but all the components of the drive train.
6. Once aligned, tighten the bolts on the feet to the scoop. Check the coupling alignment again due to compression of the shims.
7. Mount the supplied coupling guard to the scoop.
8. After a period of operation, recheck alignment and adjust as required.

NOTES

Automatic Lubricator

Some NORD gear units with NEMA (or IEC) adapters ranging in size from N250TC-N400TC (or IEC160-IEC315) are supplied with a factory-installed, field-activated, PERMA® Classic Automatic Lubrication Cartridge. The automatic lubricator is used to dispense lubricant to the outer most roller bearing of the input NEMA (or IEC) input assembly. The lubrication cartridge must be activated prior to commissioning the gear unit. (Figures 1 & 2)

Some newer versions of the NEMA (or IEC) adapters also include a grease purge. The grease purge area is sealed for transportation; however, it is recommended that the G1/4 sealing screw be removed and that the grease collection container provided by NORD be installed just prior to activating the automatic lubricant dispenser. (Figure 3)

Principle of Operation

First the activation screw is threaded into the lubrication canister. Then the ring-eyelet on top of the activation screw is tightened until its breaking point. This causes a zinc-molybdenum gas generator to drop into a citric acid liquid electrolyte, which is contained within an elastic bladder. An electrochemical reaction slowly releases small amounts of hydrogen gas and gradually pressurizes the bladder, pushing the piston towards the lubrication chamber.

Grease is continuously injected into the lubrication point until the bearing cavity is full. Any back pressure from the bearing will cause the system to neutralize. The bladder inside the canister will continue to slowly build pressure so that once the equipment resumes normal operation; the lubricator will also resume its normal function.

The lubricator contains approximately 120 cm³ or 120 ml (4.8 oz) of grease. For reference, a single stroke of a typical grease gun delivers approximately 1.0-1.2 cm³ (0.03-0.04 oz) of grease. This means the canister contains approximately 100 strokes of grease. See Figure 1 for a detailed view of the PERMA® Lubricator.

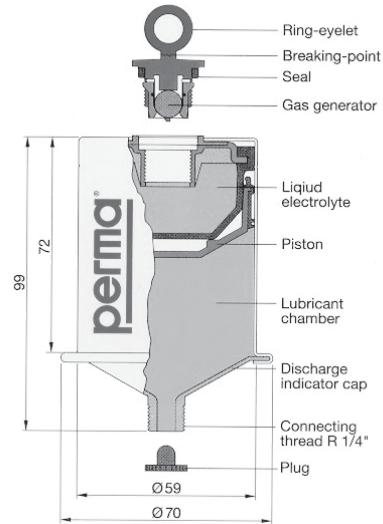


Figure 1 - PERMA® Automatic Lubrication Canister

NOTICE

- To prevent premature bearing failure, the lubrication dispenser must be activated prior to commissioning the gear reducer.
- The lubricator must only be used once and should never be opened or taken apart or permanent damage will result.
- Never unscrew the PERMA® canister from the lubrication point after activation or during the discharge period. This would cause a permanent pressure loss in the lubricator and would justify replacing the lubricator.



WARNING

- Avoid swallowing the gas generator, the liquid electrolyte, and the lubricant.
- Avoid contact of, the liquid electrolyte, and the lubricant with the eyes, skin or clothing.
- Observe all applicable MSDS sheets.
- Follow applicable local laws and regulations concerning waste disposal.

PERMA® Automatic Lubricator Options Supplied by NORD

NORD Part Number	28301000	28301010
Lubrication Option	Synthetic (standard)	Food Grade (optional)
PERMA® Classic Temperature Range ♦	0 to 40 °C (32 to 104 °F)	0 to 40 °C (32 to 104 °F)
Lubrication Volume	120 cm ³ or 120 ml (4.8 oz)	120 cm ³ or 120 ml (4.8 oz)
Grease Lubrication Mfg. / Type	Klüber / Petamo GHY 133	Lubriplate / FGL1
Lubrication Temperature Range ♦	-30 to 120 °C (-22 to 248 °F)	-18 to 120 °C (0 to 248 °F)

♦ The temperature range values shown do not apply to other components and/or lubricants within the gear reducer.

Lubricator Service Interval

The Automatic lubricator should be inspected approximately every 6 months. At the end of the lubrication period the piston becomes clearly visible through the clear nylon discharge indicator cap located at the bottom of the PERMA® canister (Figure 1); this helps indicate that the lubricant has been fully discharged at which time the lubricator should be replaced. When operating the gear unit 8 hours/day or less a replacement interval of 12 months or 1 year is possible. Ambient temperature will influence the discharge rate and may extend or shorten the replacement interval.

Ambient Considerations

The grease discharge rate is affected by the ambient temperature. PERMA® indicates that the lubricator contents will dispense for a 12 month period when the average temperature is 20 °C (68 °F). Grease dispensing rates depend primarily on average ambient conditions and not extreme highs and lows. Lower ambient temperatures will lead to slower dispensing rates and higher ambient temperatures will lead to faster dispensing rates.

Average Ambient Temperature	Discharge Period Months ♦
0 °C (32 °F)	>18
10 °C (50 °F)	18
20 °C (68 °F)	12
30 °C (86 °F)	6
40 °C (104 °F)	3

♦ Values are approximate.

Discharge can also be influenced by type of lubricant, vibration, and by the mating connecting parts in the lubrication system.

Activating the Automatic Lubricator

- Loosen and remove the M8x16 assembly socket head cap screws (1251).
- Carefully remove the protective cover (1252) installed over the automatic lubricator (1250-1).
- Screw the activation screw (1250-2) into the automatic lubricator (1250-1) and twist the ring-eyelet until it reaches its breaking point.
- Re-fit the cartridge cover (1250-1) and re-install and tighten the assembly screws (1251).
- Mark the activation date on the adhesive label that is provided.

Figure 2 - Activating the Automatic Lubricator

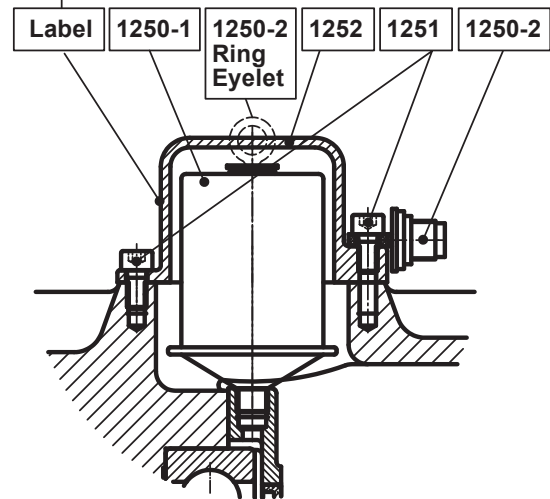
Attention!

Screw in the activation screw until the lug breaks off before commissioning the gear unit.

Dispensing time: 12 Months

Activation Date

Month	Year
1 2 3 4 5 6 7 8 9 10 11 12	11 12 13 14 15



- 1250-1 Automatic Lubricator
- 1250-2 Activation Screw
- 1251 Socket Head Cap Screws
- 1252 Protective Cover

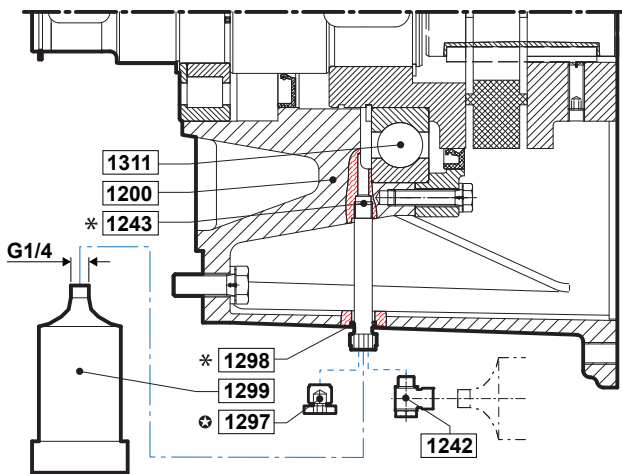
Grease Purge and Grease Drain Cup

Some versions of the NEMA (or IEC) adapters also include a grease purge and a grease drain cup (1299) for collecting old grease. The grease purge area is sealed for transportation.

It is recommended that the G1/4 sealing screw (1297) be removed and that the grease drain cup be installed after the automatic lubricant dispenser is activated.

The swivel fitting (1242) that NORD supplies allows the grease cup to be positioned at a 90° angle from its typical mounting. The swivel fitting allows the grease cup to be rotated so that it remains clear of any gear unit mounting obstructions.

Figure 3 – Grease Purge and Grease Cup Assembly



1200	NEMA or IEC Input Cylinder
1242	Swivel Fitting (P/N) 22006359)
1243	Extension*
1297	Screw Plug ⚙
1298	Seal Ring*
1299	Grease Drain Cup (P/N 2830100)
1311	Bearing

* Supplied on certain input assembly sizes as needed.

⚙ Remove the screw plug to install either the grease drain cup or the swivel fitting with the grease drain cup.

Grease Cup Servicing

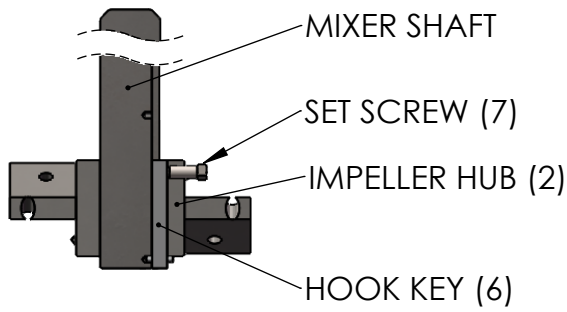
NORD suggests that with every second replacement of the automatic lubricator, the grease collection cup (NORD Part No. 28301210) should be emptied or replaced with a new one. Follow the steps below to service the grease cup.

1. Unscrew the grease drain cup (1299) from either the outlet port of the NEMA or IEC input cylinder or from the extension (1243) that is secured to the NEMA or IEC input cylinder.
2. To empty the grease drain cup (1299) insert a stiff rod through the hole in the grey cap-end of the drain cup and push the internal plunger towards the thread-end of the drain cup. Please note that the dark gray end cap is bonded into place and cannot be removed.
3. Collect and properly dispose of the grease being pushed out of the drain cup. Due to the design of the container a residual amount of grease may remain in the container.
4. After emptying and cleaning the grease cup it can be fitted back onto the grease outlet port of the NEMA or IEC adaptor.
5. In the event the grease cup becomes damaged or it should be replaced with a new container. Consider replacing the grease cup (P/N 2830100) with every second replacement of the automatic lubricator.

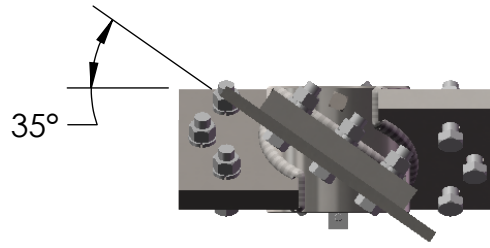
Replacing the Automatic Lubricator

A new automatic lubricator can be ordered from NORD by specifying the appropriate Part Number from the table at the bottom of Page 1 of this manual. Reference Figure 2 and follow the steps below to replace the automatic lubricator.

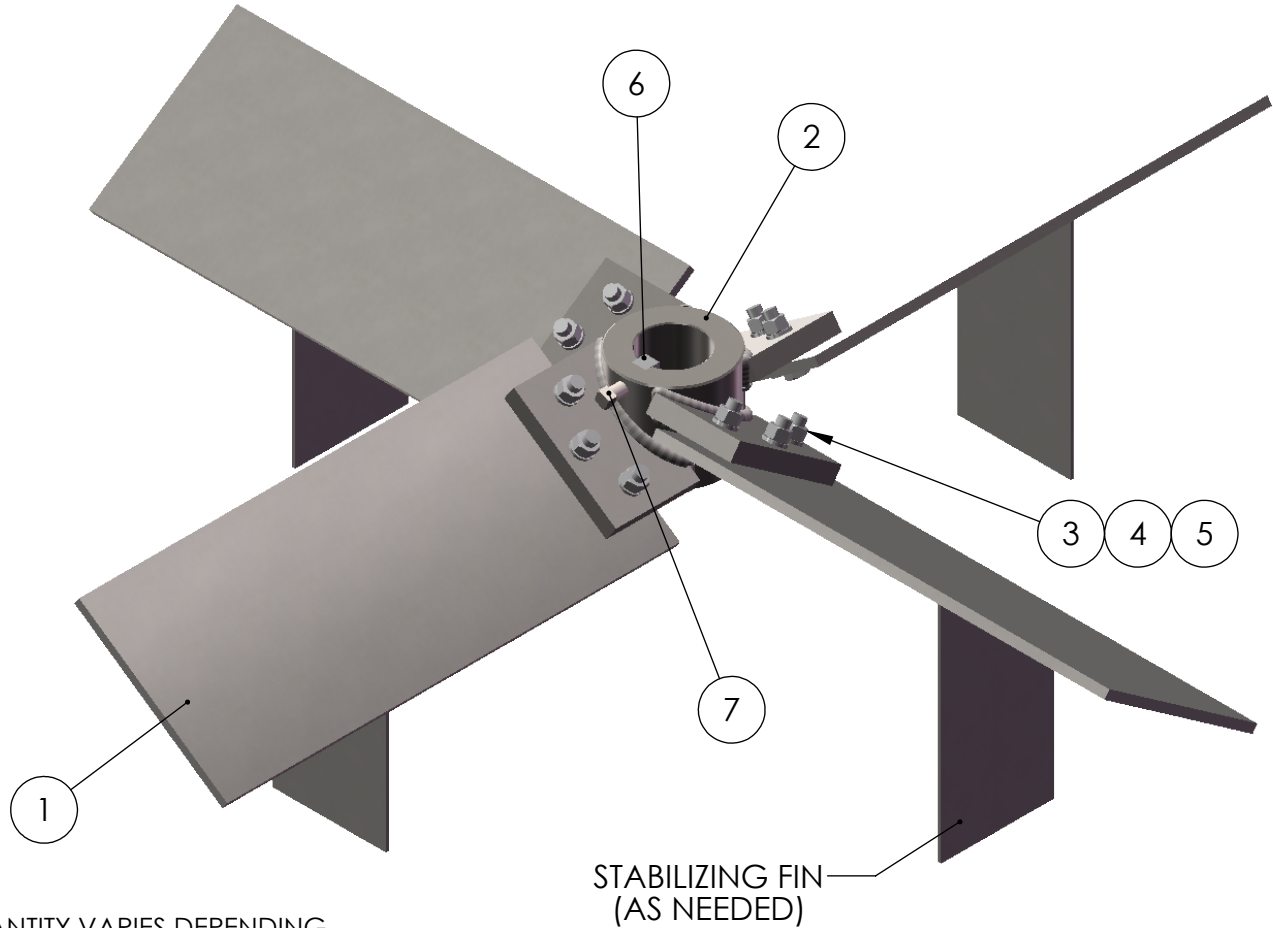
1. Loosen and remove the M8x16 socket head cap screws (1251) holding the protective cover (1252) in place.
2. Unscrew the automatic lubricator (1250-1) from the bearing cover area of the NEMA or IEC input cylinder.
3. Install the new automatic lubricator and activate per the instructions on page 2.
4. Re-install the protective cover (1252) and the assembly screws (1251).
5. Note the activation date of the newly installed automatic lubricator



HOOK KEY
INSTALLATION



SIDE VIEW



* QUANTITY VARIES DEPENDING ON IMPELLER DESIGN.

NO.	QTY	PART NAME
7	1	SET SCREW
6	1	HOOK KEY
5	*	HEX NUT
4	*	LOCK WASHER
3	*	HEX HEAD CAP SCREW
2	1	IMPELLER HUB
1	4	IMPELLER BLADE

NOTES:

1. INSTALL HOOK KEY (6) IN SHAFT WITH COUNTERSUNK
2. HOLE FACING SET SCREW (7).
3. TIGHTEN BLADE HARDWARE TO APPROPRIATE TORQUE (DRY) AS SPECIFIED IN O&M MANUAL.

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MIXER MODEL
A35 IMPELLER ASSEMBLY

WITH OR WITHOUT STABILIZER FINS
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