



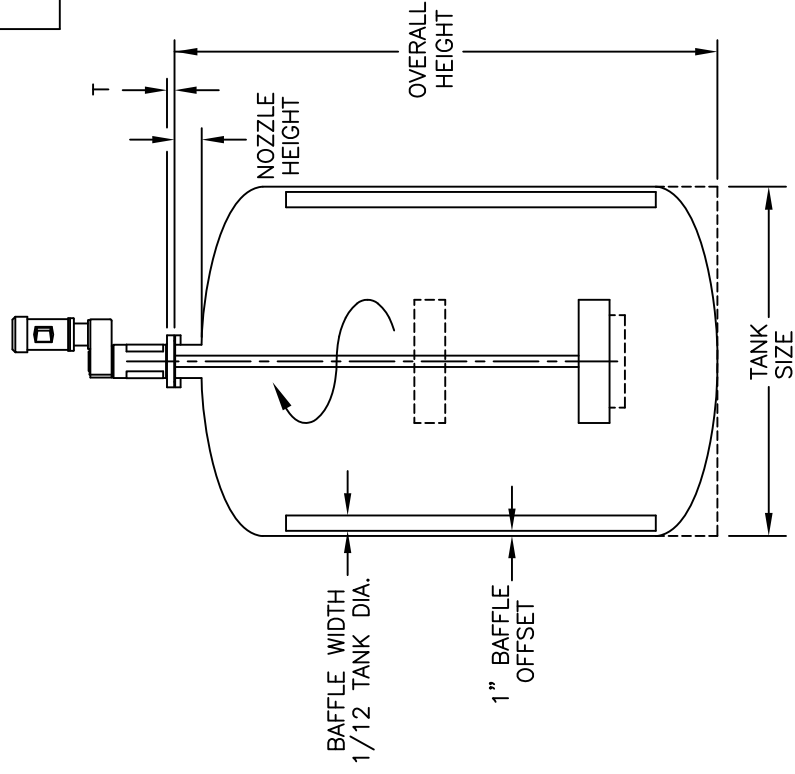
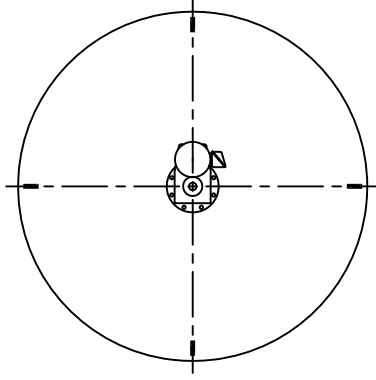
**OPERATION
AND
MAINTENANCE
MANUAL**

SERIAL NUMBER

CUSTOMER:_____

SALES REP.:_____

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MOUNTING HOLE DIMENSIONS						DESIGN LOADS		
CASE SIZE		150 LB. ANSI FLANGE DRILLING				DOWNWARD LOAD (LBS.)	BENDING (IN. LBS.)	TORSIONAL (IN. LBS.)
BTO	BTD	BRM	ANSI SIZE	O.D.	BOLT CIRC. HOLES	BOLT DIA.	T	
2			8	13.5	11.75	.75	2.00	7,500
3			8	13.5	11.75	.75	2.00	17,650
4			8	13.5	11.75	.75	2.00	34,500
5			8	13.5	11.75	.75	2.00	60,000
6			10	16.0	14.25	.88	2.25	158,000
7			10	16.0	14.25	.88	2.25	306,000
8			12	19.0	17.00	.88	2.50	355,000
9			14	21.0	18.75	1.00	2.75	419,000
	20		8	13.5	11.75	.75	2.00	17,650
	21		8	13.5	11.75	.75	2.00	34,500
	22		10	16.0	14.25	.88	2.25	60,000
		30	10	16.0	14.25	.88	2.25	60,000
		40	12	19.0	17.00	.88	2.50	95,000
		50	14	21.0	18.75	1.00	2.75	142,000
		60	16	23.5	21.25	1.00	2.75	235,000
		70	18	25.0	22.75	1.12	3.00	319,000
		80	20	27.5	25.00	1.12	3.25	476,000
		90	24	32.0	29.50	1.25	3.63	729,000

NOTES:

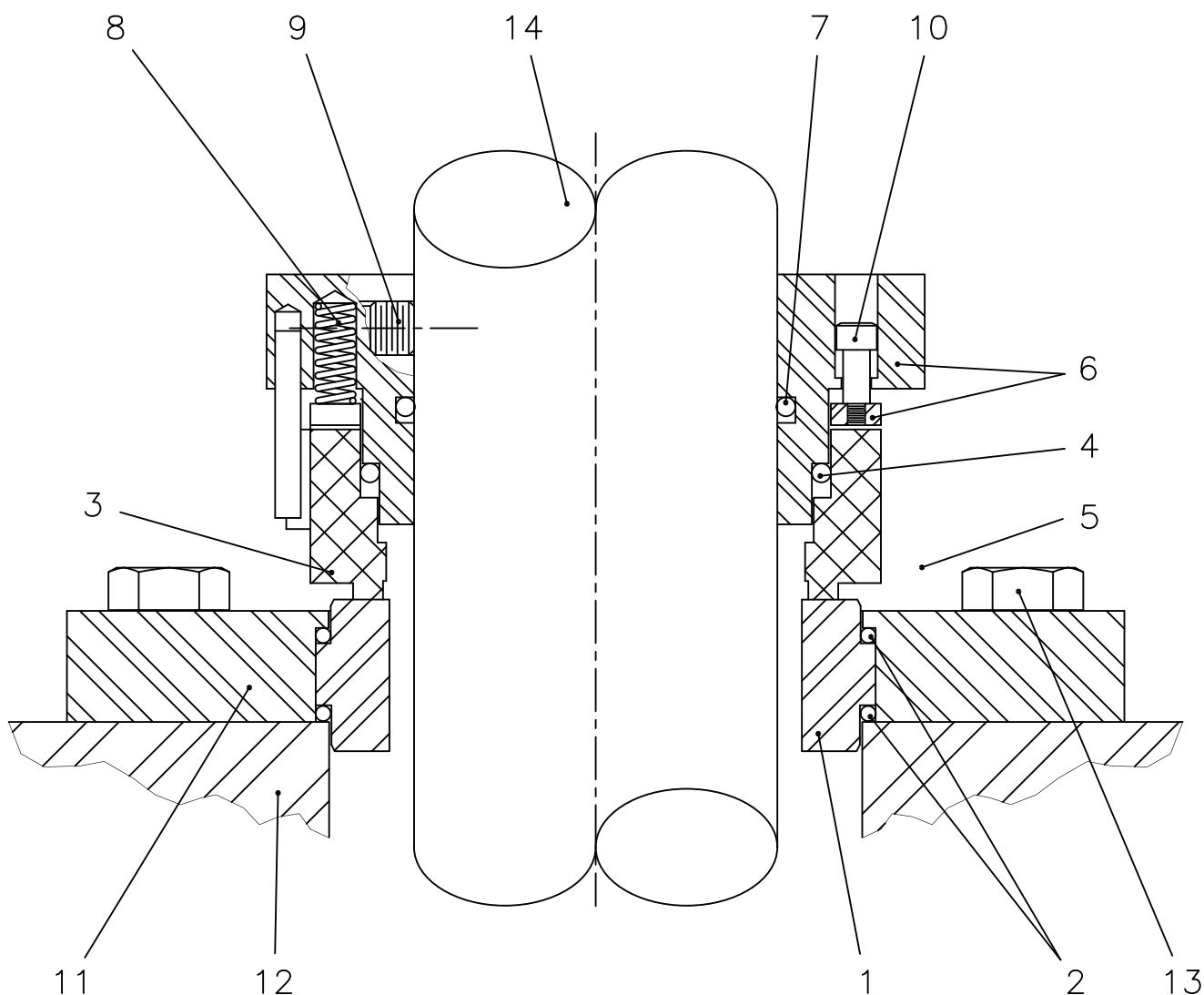
1. WARRANTY APPLIES ONLY TO ITEMS FURNISHED BY BRAWN MIXER, INC.
ALL OTHER EQUIPMENT AND DESIGNS ARE THE RESPONSIBILITY OF OTHERS.
BRAWN MIXER, INC. DOES NOT WARRANT, GUARANTEE, OR ASSUME ANY
RESPONSIBILITY FOR THE DESIGN OR CONSTRUCTION OF THE MOUNTING
STRUCTURE FOR THE MIXER.
2. DESIGN LOADS ARE GREATER THAN ACTUAL LOADS BY A SUITABLE FACTOR
TO PROVIDE FOR ADEQUATE DESIGN OF MIXER MOUNTING STRUCTURE.
3. ROUND TANKS REQUIRE BAFFLES AS SHOWN.
4. DESIGN LOAD AND NOZZLE MOUNTING INFORMATION, FOR CLOSED TANK
INSTALLATION, IS APPLICABLE FOR BOTH STUFFING BOX AND MECHANICAL
SEAL MIXERS.
5. FLANGE SIZES LARGER THAN STANDARD ARE AVAILABLE AS AN OPTION.

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BRAWN MIXER
MIXER MODEL

BTO, BTD & BRM ANSI FLANGE MOUNT
DIMENSION AND ASSEMBLY DRAWING



14	MIXER SHAFT
13	CAP SCREW
12	MIXER MOUNTING FLANGE
11	STATIONARY INSERT RETAINER
10	DRIVE COLLAR CAP SCREW
9	SET SCREW
8	SPRING
7	O-RING
6	DRIVE COLLAR ASSEMBLY
5	DRIVE PIN
4	SHAFT PACKING
3	SEAL RING
2	GASKET
1	STATIONARY INSERT
ITEM	DESCRIPTION

FOR REFERENCE ONLY

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12838 STAINLESS DRIVE
 HOLLAND, MI. 49424
 PH. 616-399-5600
 FAX 616-399-3084

MIXER MODEL
 SINGLE MECH SEAL ASSY
 FLOWSERVE VRA
 DIMENSION AND ASSEMBLY DRAWING

DRAWN BY: CMW DATE: 6-18-93 © 2018
 APPROVED BY: DATE:

DWG. NO. A- TK0045 REV.

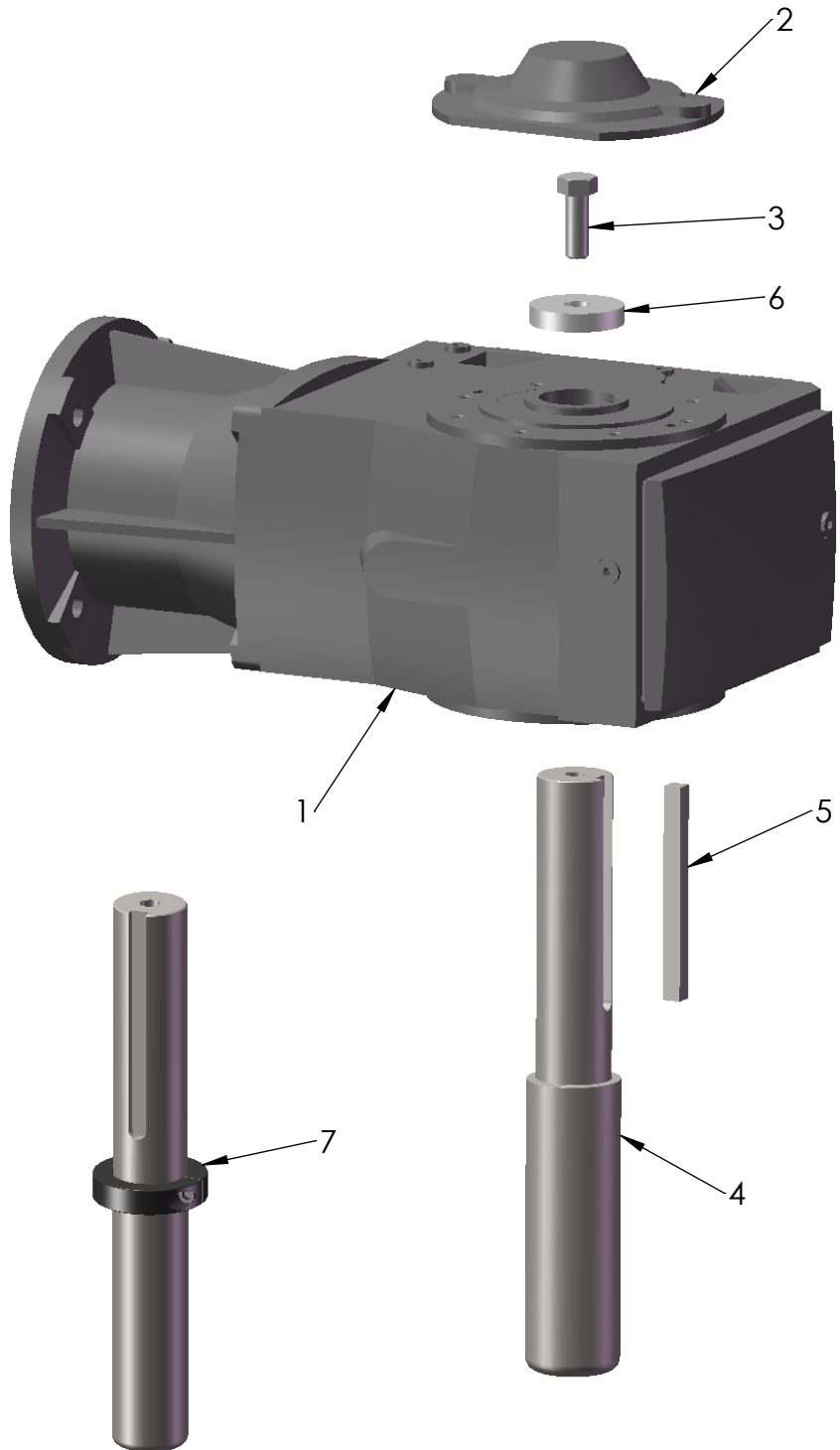
MIXER SHAFT ASSEMBLY

1. PLACE THE KEY (ITEM 5) ON THE MIXER SHAFT AND SLIDE THE MIXER SHAFT INTO THE HOLLOW OUTPUT SHAFT ON THE GEARDRIVE (ITEM 1).

2. 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.

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

ALTERNATE SHAFT CONSTRUCTION:
ATTACH THE SHAFT COLLAR (ITEM 7)
TO THE MIXER SHAFT (ITEM 4) BEFORE
STEP 1.



ALTERNATE
CONSTRUCTION
OF SHAFT

FOR REFERENCE ONLY

* QUANTITY VARIES DEPENDING
ON SHAFT DESIGN.

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

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12838 Stainless Drive
Holland, MI 49424

PH: 616-399-5600
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MIXER MODEL BTR SHAFT ASSEMBLY

DIMENSION AND ASSEMBLY DRAWING

DRAWN BY:BSB DATE: 10/29/2018 © 2018

APPROVED BY:

DATE:

DWG. NO. **A- TK0192**

REV.

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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 requires 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.



WARNING



- 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).
- Develop a safety checklist for this equipment and perform regular maintenance to ensure continued

and proper operation. 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 #.....**BTR-SERIES**

Mixer Serial #

Contact:

- Customer Service 616/399-5600
- E-Mail sales@brawnmixer.com

BRAWN NAMEPLATE



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.

CUSTOMER SERVICE, Cont.

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**.
3. 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.
4. Install impeller(s) on lower shaft (refer to **Shaft and Impeller Assembly** section).

TABLE 1: RECOMMEND 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**.

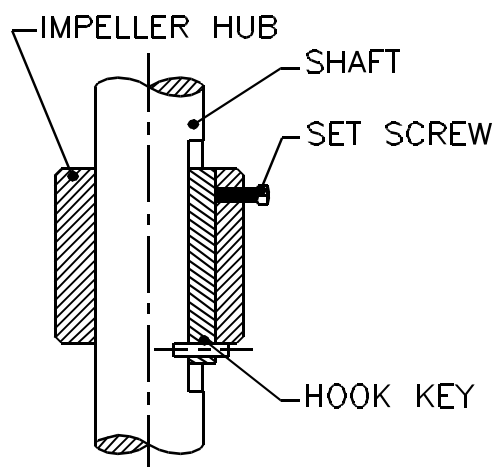
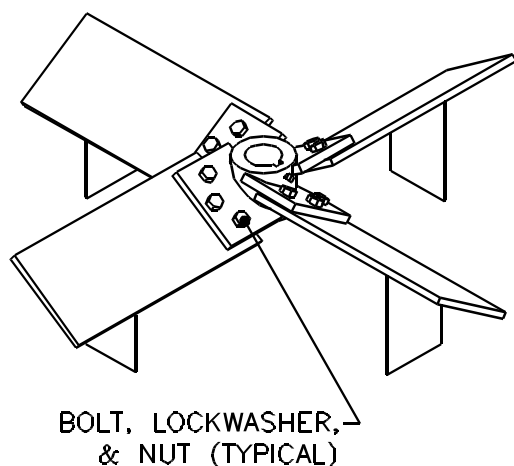


FIGURE 1: IMPELLER MOUNT WITH HOOK KEY



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

START UP

1. 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.
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 ½ 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 tolerance be maintained.
2. All plugs and hardware be securely fastened.
3. Any parts replacements, including hardware, be accurate duplicates of the originals.

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

STORAGE

Motors must be stored in a clean, dry, well ventilated location free from vibration and rapid or wide temperature variations. If the unit is to be stored longer than three months, consult factory. Ball bearing motors are shipped from the factory properly lubricated and ready to operate. When in storage, the motor shaft must be turned several rotations every month and 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 personal.

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



CAUTION

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

ELECTRIC MOTORS, Cont.

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 personal.

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

BEARING LUBRICATION



CAUTION

Do not lubricate motor while in operation, since excess grease will be forced through the bearings and into the motor before it will force its way out 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 class F and H. Most leading oil companies have special bearing greases that are satisfactory.

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

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off pipe plugs and remove from housings.
3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to inlet with hand gun until small amount of new grease is forced out 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.

ELECTRIC MOTORS, Cont.

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 safest 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 BASE 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)

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

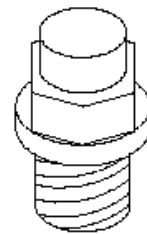
In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction. Factory supplied oil is not suitable for these applications or this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

MAINTENANCE / LUBRICATION, Cont.

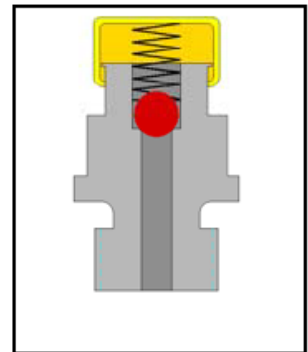
**TABLE 2: APPROXIMATE OIL CAPACITY (QTS)
FOR GEAR DRIVES**

CASE SIZE	OIL CAPACITY
9022	2.43
9032	3.49
9042	6.87
9052	12.2
9062	20.1
9072	20.1
9082	40.2

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 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.

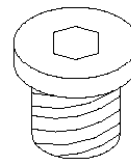


**AUTOVENT
PLUG**

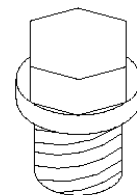


**FIGURE 3: THE AUTOVENT RELEASES BUILT-UP
AIR PRESSURE FROM INSIDE THE GEARBOX (MAX.
PRESSURE 2PSI).**

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.



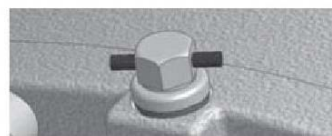
**DRAIN
PLUG**



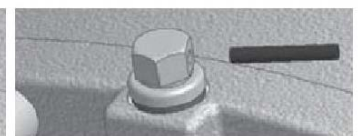
**FILL LEVEL
PLUG**

**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 VG220

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Oil Manufacturer</i>	<i>Oil Brand Name</i>
20° to 104°	Mineral	Texaco	Meropa 220
20° to 104°	Mineral	Shell	Omala EP 220

OPTIONAL LUBRICANTS

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Oil Manufacturer</i>	<i>Oil Brand Name</i>
14° to 176°	Synthetic	Texaco	Pinnacle EP680
14° to 176°	Synthetic	Shell	Omala HD 680
-13° to 140°	Synthetic	Texaco	Pinnacle EP220
-13° to 140°	Synthetic	Shell	Omala HD 220
-40° to 50°	Synthetic	Texaco	Pinnacle EP32
-40° to 50°	Synthetic	Shell	Omala HD 32
20° to 104°	Food Grade	Chevron	FM ISO 220
20° to 104°	Synthetic Food Grade	OilJAX	Magnaplate 85W140-FG
5° to 125°	Fluid Grease	Mobil	Mobilux EP023
-30° to 140°	Synthetic Fluid Grease	Mobil	Mobilith SHC 007
-30° to 140°	Synthetic Fluid Grease	Shell	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 140°	Mineral	Texaco	Multifak EP2
-20° to 140°	Mineral	Shell	Cybernia RA/C3

OPTIONAL BEARING GREASE

<i>Ambient Temperature (F)</i>	<i>Formulation</i>	<i>Grease Manufacturer</i>	<i>Grease Brand Name</i>
-58° to 230°	Synthetic	Texaco	Starfak 2202
-58° to 230°	Synthetic	Shell	Aero Shell
5° to 230°	Food Grade	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 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 facto



BTR-SERIES OPERATION & MAINTENANCE MANUAL

12838 Stainless Drive, Holland, MI 49424

Phone: 616/399-5600 Fax 616/399-3084

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, representatives, or warranties implied (including any regarding the merchant-ability 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 **RETURN GOODS AUTHORIZATION (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 Return Goods Authorization number must be written clearly on all boxes being returned. C.O.D. shipments will not be accepted.

MECHANICAL SEAL MAINTENANCE

Although mechanical seals, when properly installed, require minimal maintenance, periodic inspection should be performed to help identify and avert a potential failure. The following procedures are recommended:

1. Establish a daily routine of inspecting all equipment.
2. For lubricated seals, check for adequate seal lubricant in reservoir.
3. For double mechanical seals, check seal chamber pressure source (nitrogen bottle, etc.) for proper pressure (20 PSIG above tank pressure) and for adequate supply.
4. Observe mixer shaft when operating for excessive deflection. Shaft deflection (or run-out) at the top of the seal must not exceed .075" T.I.R. maximum. Run-outs exceeding this limit are an indication of mechanical or process problems (bent shaft, high inlet flow impinging directly on impeller, etc.) and not only will destroy the mechanical seal, but may damage other components of the mixer and tank.
5. Observe for signs of leakage around seal. Excessive leakage is an indication of seal face wear, improper installation, excessive shaft deflection, etc. If the seal has provided a relatively long service life, wear is probably the cause and indicates that repair or replacement of the seal is in order.
6. When mixer is not operating, check seal drive collar set screws, stationary insert retainer cap screws and mixer shaft coupling hardware for proper tightness. Also check for excessive clearances in the mixer shaft support bearings. This can be detrimental, not only to the mechanical seal, but also to the mixer final drive gearing.

MECHANICAL SEAL REPAIR

Mechanical seals are precision-manufactured, and effective sealing is dependent upon maintaining this precision. Therefore, if the proper equipment for repair of the seal is not available, it is recommended the seal be returned to the factory for repair.

The following points apply to virtually all mechanical seals:

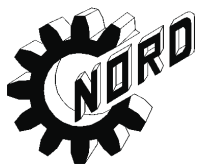
1. Read and follow the seal manufacturer's instructions.
2. Cleanliness of all seal components, especially the mating faces of seal ring and stationary insert, is of utmost importance.
3. Check the rotating seal components for excessive wear and to be certain the drive pins and springs are free in the pin holes or slots. Replace all worn or damaged components.
4. Install new set screws and make sure they are free in their threads to turn and seat properly.
5. Install new O-rings and shaft packing.
6. Seal rings and stationary inserts are delicate and require special handling. Careless handling of these components can result in irreparable damage such as fracture, chipping, scratches, etc.
7. Sealing faces are lapped surfaces and must be flat to within three (3) light bands for effective sealing. If lapping and inspection equipment is not available, return seal assembly to the factory for repair. A used seal face should not be mated with a new face.
8. Before re-installation of the seal, check the mixer shaft support bearings for excessive axial clearance (.005" maximum) and radial clearance (.001 maximum). Also check the output shaft face for excessive run-out (.003" maximum). Correct any deficiencies.
9. Visually inspect the mixer shaft for damage as indicated by nicks, scratches, dents, wear, etc. Shaft surface finish must be 32 RMS or better. Also inspect seal flange mounting surface for damage. Correct any deficiencies.

MECHANICAL SEAL REPAIR, Continued

10. Remove any burrs or sharp edges (such as along a keyway) that the seal must pass over to prevent damage to the shaft packing. When installing the seal, provide protection for the shaft packing from cuts by covering keyways and holes with a sleeve or Scotch tape. Lubricate the shaft and shaft packing with a lubricant compatible with the tank contents.
11. Before installing the seal, insure that all seal components and mating surfaces are clean and free from dirt, deposits, old gaskets, etc.
12. Refer to the seal manufacturer's instructions for proper seal installation and seal setting procedure.
13. After seal installation and before start-up, check all shaft hardware, seal mounting hardware and drive collar set screws for proper tightness. Checks for shaft run-out at the top of the seal while rotating the mixer shaft by hand (rotate gear drive input shaft while observing a dial indicator mounted to indicate run-out at the seal). Shaft run-out at the seal must not exceed .005" T.I.R. when rotated by hand.
14. For lubricated seals, connect all flushing lines, purge lines, etc. and fill and bleed the seal cavity with clean lubricant before starting mixer.
15. Pressurize the seal cavity (double seal only) to 20 PSIG above tank operating pressure.

MECHANICAL SEAL INSTALLATION

1. Install mixer on tank nozzle with all bolts thru mounting flange and tighten to recommended torque specifications.
2. Insert mixer shaft from inside tank up thru opening in flange and safely support in place.
3. Install all seal parts over the end of the shaft in the proper order and the proper orientation while protecting the seal faces from any contact. Let the disassembled seal parts sit loosely until steps 4 thru 8 are complete.
4. Attach removable coupling on top end of shaft with key, thrust washer, and thrust bolt(s). Tighten and check torque to recommended specifications.
5. Align shaft coupling with rigid drive coupling and secure with bolts (8).
6. Tighten and torque all bolts to recommended specifications.
7. Remove all shaft supports used for support such that the shaft is freely hanging.
8. Install impellers and/or hubs on to the shaft at this time.
9. Position the stationary seat of the seal in the pilot and secure with the gland ring. Assemble the rest of the seal as indicated in the following drawing. Also, follow all instructions in the seal manufacturer's assembly pages given at the end of this manual.



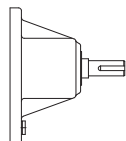
NORD Gearbox Inputs Installation and Maintenance Instructions

BIM 1009

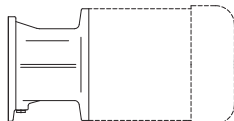
USA

CDN

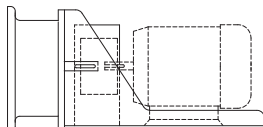
Retain These Safety Instructions For Future Use



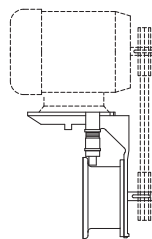
W-STYLE



NEMA/IEC



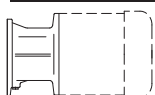
SUGAR SCOOP



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).*

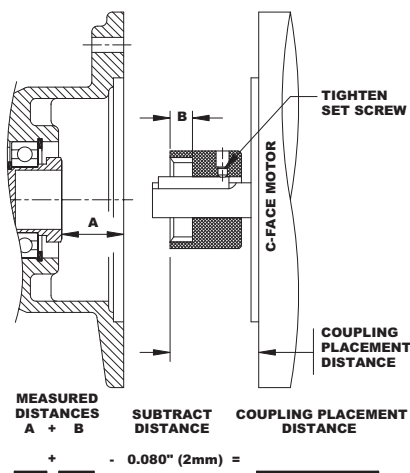
For the larger motor adapters (IEC160 / N250TC and larger), an **Automatic Lubricator** is supplied. **This will need to be activated at the time of startup.** For operation and activation instructions, refer to the "Automatic Lubricator" section.

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

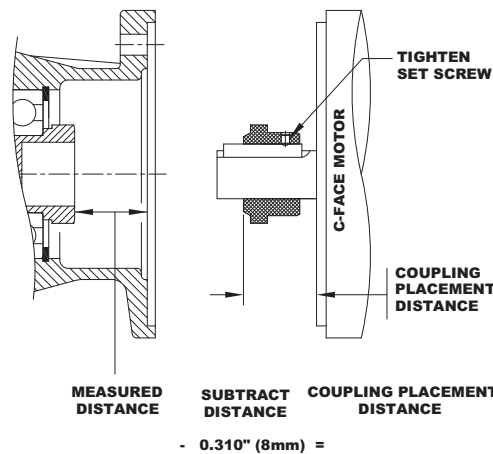
1. Measure the distance from the face of the input adapter to the face of the splined shaft and record that measurement as "A" in the equation below.
2. Measure depth of coupling engagement zone and record the measurement as "B" in the equation below.
3. Add "A" + "B" and subtract 0.08" (~2mm) from the 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.



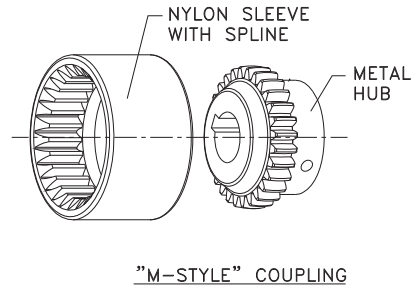
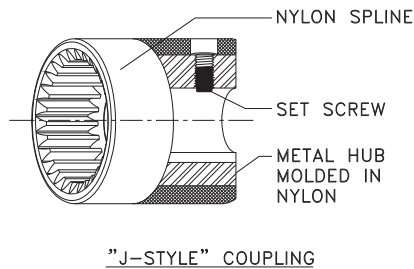
Couplings for the NEMA and IEC Adapters

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

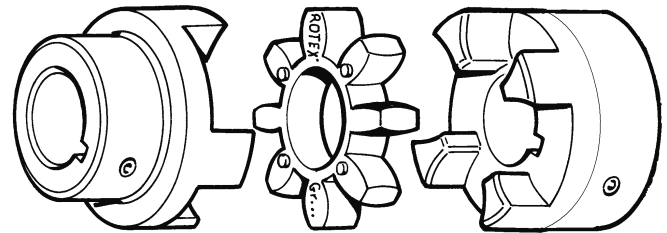
"M" Style

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 (Hytrel) spider available up to 230°F (110°C)
- Special bores available



Hub Design 1

Spider

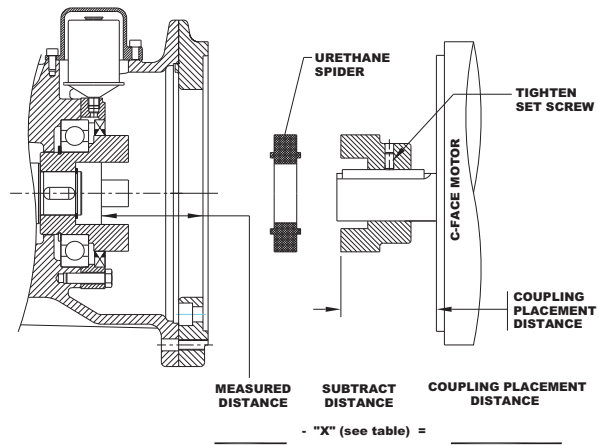
Hub Design 1a

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	Urethane 92 Shore A Hardness Color: Yellow
R38	1.89" (48mm) Max Bore	190 / 382 Nm 1,680 / 3,380 lb-in	-	
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 canister 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.

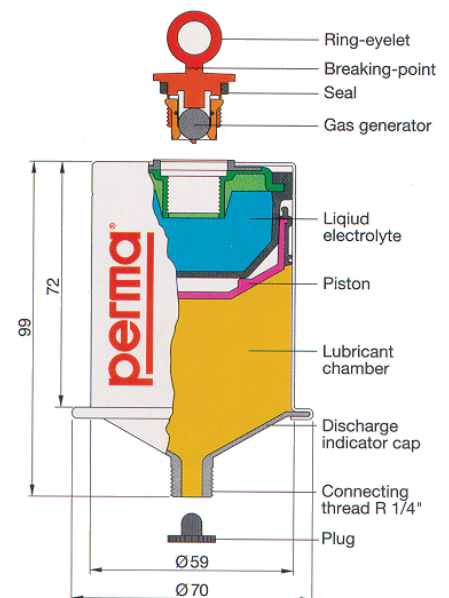
Assembly Instructions

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.

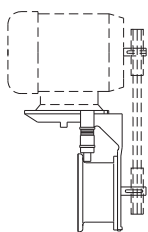
Perma Classic Specifications

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.

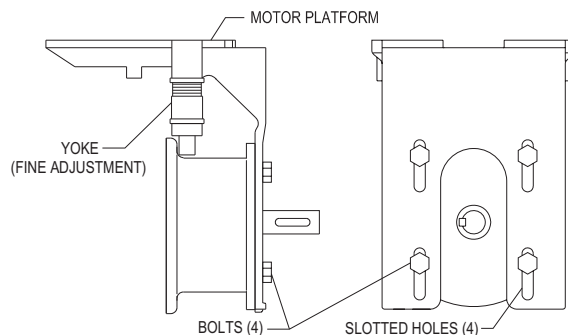


MK Motor Mount Platform



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.



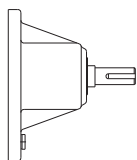
Align the sheaves or sprockets square and parallel by placing a straight edge across their faces. Alignment of bushed sheaves and sprockets should be checked after bushings have been tightened. Check horizontal shaft alignment by placing a level vertically against the face of the sheave or sprocket. 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.**

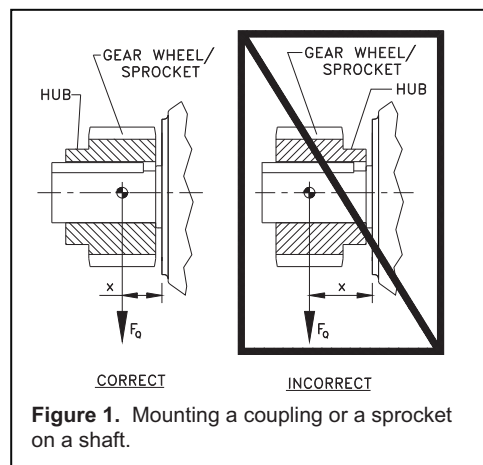


Figure 1. Mounting a coupling or a sprocket on a shaft.

Output and Input Shaft Diameter Tolerance

Metric (mm)

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

Inch

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

Solid Shaft Drill and Tap Shaft End

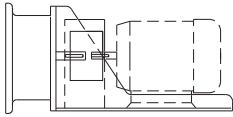
Metric (mm)

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

Inch

- $\leq \varnothing 0.500 = \#10-24 \times 0.4 \text{ deep}$
- $> \varnothing 0.500 \leq \varnothing 0.875 = \#16-20 \times 0.6 \text{ deep}$
- $> \varnothing 0.875 \leq \varnothing 0.938 = 5/16-18 \times 0.7 \text{ deep}$
- $> \varnothing 0.938 \leq \varnothing 1.100 = 3/8-16 \times 0.9 \text{ deep}$
- $> \varnothing 1.100 \leq \varnothing 1.300 = 1/2-13 \times 1.1 \text{ deep}$
- $> \varnothing 1.300 \leq \varnothing 1.875 = 5/8-11 \times 1.4 \text{ deep}$
- $> \varnothing 1.875 \leq \varnothing 3.500 = 3/4-10 \times 1.7 \text{ deep}$
- $> \varnothing 3.500 = 1-8 \times 2.2 \text{ deep}$

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.

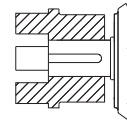


Figure 2. Place coupling flush with end of motor shaft and tighten setscrew.

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.

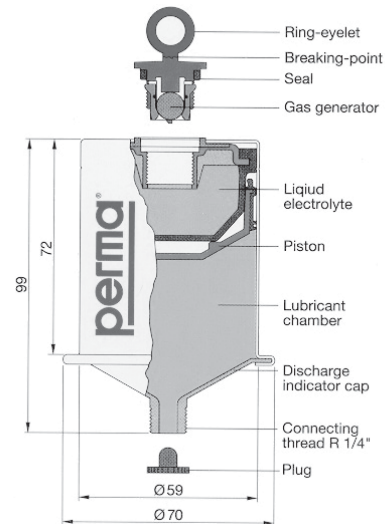


Figure 1 - PERMA® Automatic Lubrication Canister

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

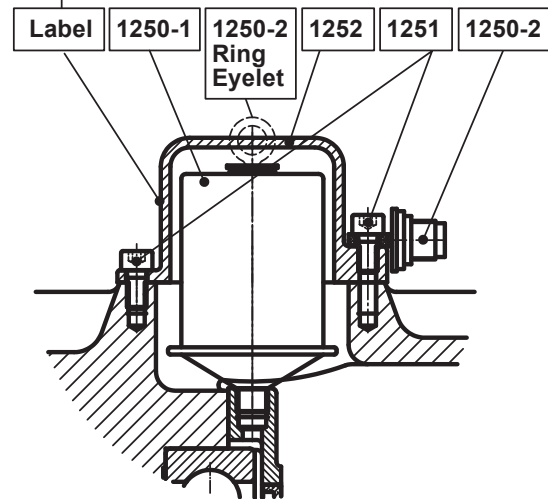
Attention!

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

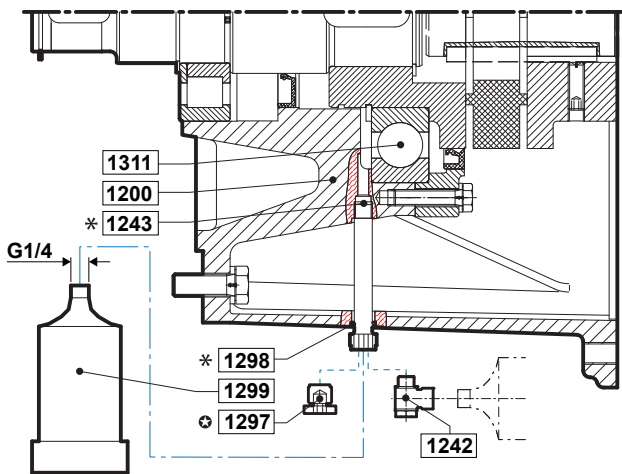
Grease Purge and Grease Drain Cup

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.

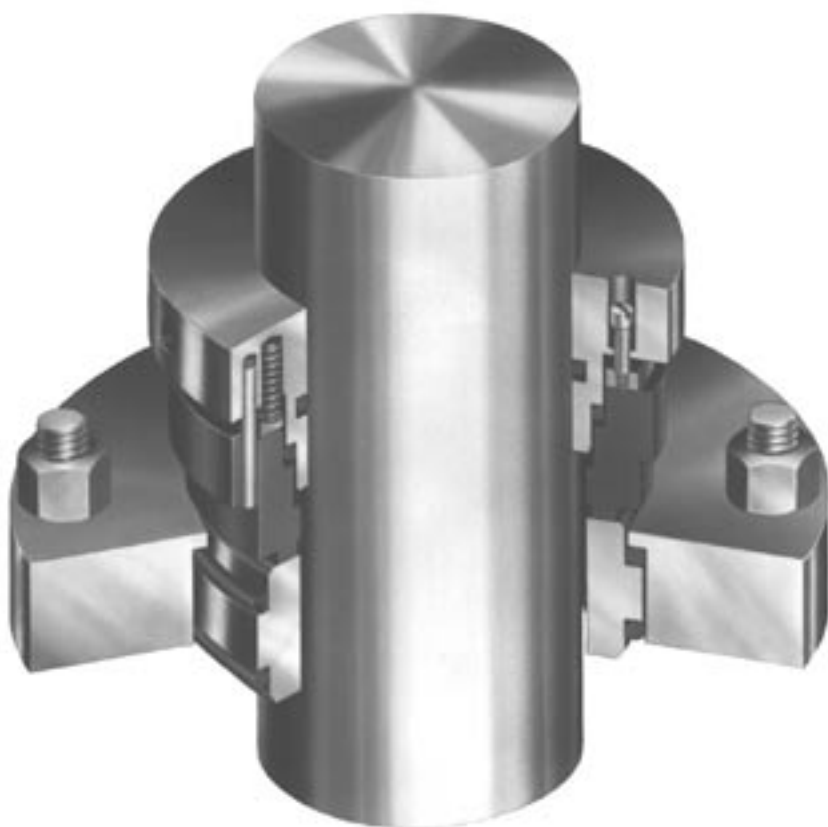
1. Loosen and remove the M8x16 socket head cap screws (1251) holding the protective cover (1252) in place.
2. Unscrew the automatic lubricator (1250-1) from the bearing cover area of the NEMA or IEC input cylinder.
3. Install the new automatic lubricator and activate per the instructions on page 2.
4.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



Installation Instructions

VRA & VRA-C Series

Outside balanced seals designed to operate
under relatively high pressures and low speeds

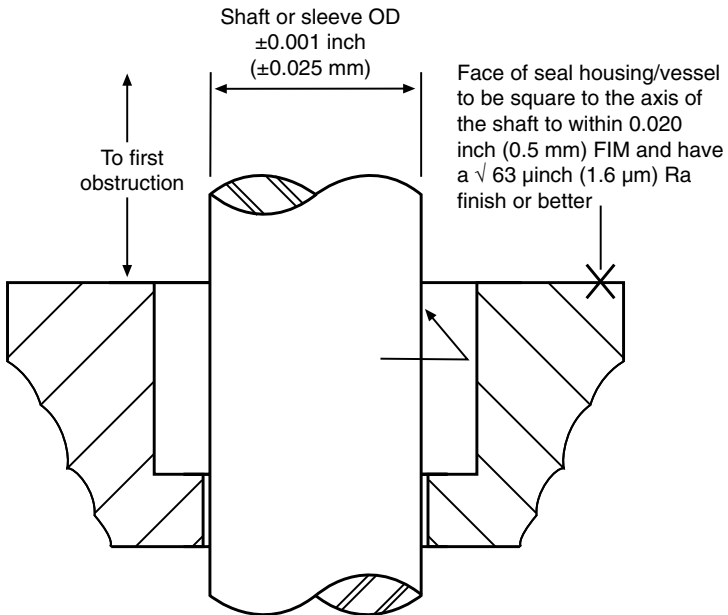


1 Equipment Check

1.1 Refer to Figure 1 for shaft, sleeve and seal housing requirements.

Seal Chamber Requirements

Figure 1



- Bearings, drive, and coupling must be in good condition
 - Maximum axial movement of shaft (end play) = 0.010 inch (0.25 mm) FIM
 - Maximum combined shaft concentricity and shaft deflection at face of housing total = 0.150 inch (3.8 mm) FIM
- 1.2 Refer to assembly drawing included with seal package for specific seal design, materials of construction, dimensions, and piping connections.
 - 1.3 Check shaft or sleeve OD, box bore, and box depth to ensure that they are dimensionally the same as shown on the seal assembly drawing.
 - 1.4 Check gland pilot and bolt holes to ensure they are adaptable to the equipment and are the same as shown on the assembly drawing.
 - 1.5 **Seal Faces:** While all seal parts are manufactured to precise tolerances, the seal faces (stationary and rotating face) are of primary importance. These two sealing faces are lapped flat to three light bands or better (34.8 millionths of an inch) and polished. It is imperative that these two faces be handled with care and kept perfectly clean.
 - 1.6 Do not apply oil or other lubricants to the seal faces or to the secondary seals.
 - 1.7 Lightly lubricate the rotating face gasket and the O-ring on seal drive ID with a lubricant compatible with the application and elastomer materials.

2 Installation

- 2.1 Install the two seat gasket O-rings furnished for the stationary face, one ring per side.
- 2.2 Install the stationary face into the gland ring with the sealing face first so it will protrude out the back of the gland ring.
- 2.3 Install the gland and stationary face over the shaft and ease it into position. Bolt the gland ring to the face of the stuffing box or seal housing by drawing the nuts down evenly. The gland ring gasket is one of the seal gasket O-rings, therefore, there is no concern for additional sealing elements in the area.
- 2.4 Install the sleeve gasket O-ring, into the O-ring groove of the seal drive assembly.
- 2.5 Install the rotating face gasket O-ring, on the first step and against the second step wall of the seal drive assembly.
- 2.6 Line up the slots on the rotating face OD with the drive pins in the seal drive assembly and slide the rotating face into place on the seal drive assembly extension surface.
- 2.7 Wipe the sealing faces of the rotating and stationary face clean.
Remember: **Do not oil the sealing faces.**
- 2.8 All outside VRA seal designs require that the rotating portion of the seal, seal drive with seal ring, be slid on the shaft as an entire unit to prevent damage to the rotating face. Slide the entire unit on the shaft until the stationary and rotating faces touch.
Remember: **Do not touch the sealing face of the rotating face.**
- 2.9 Set the seal to the distance given on the assembly drawing, furnished with the seal. This dimension is shown on the assembly drawing as the distance from the face of the equipment to the back of the seal drive. Make sure the spring gap is evenly spaced around the seal and lock the seal drive to the shaft with the seal drive set screws.

3 Operation Recommendations

- 3.1 The pressure acting on the seal must not exceed the pressure velocity rating of the seal design and materials of construction.
- 3.2 If the seal runs hot, check for proper seal setting and seal housing dimensions to insure that the seal is not over-compressed. Shut down the equipment immediately if the seal gets hot.
- 3.3 When the gas being sealed is other than air, never start up the equipment without properly venting.
- 3.4 This seal can be used if a full vacuum pressure condition exists.

For special problems encountered during installation, contact your nearest Flowserve Sales and Service Representative or Authorized Distributor.



TO REORDER REFER TO
B/M # _____
F.O. _____

4 Repair

This product is a precision sealing device. The design and dimension tolerances are critical to seal performance. Only parts supplied by Flowserve should be used to repair a seal. These are available from numerous Flowserve stocking locations. To order replacement parts, refer to the part code number and B/M number. A spare backup seal should be stocked to reduce repair time.

When repairs are not conducted at the customer's location, **decontaminate the seal assembly** and return it to Flowserve, with an order marked **"Repair or Replace"**. A **signed certificate of decontamination** must be attached. A **Material Safety Data Sheet (MSDS)** must be enclosed for any product that came in contact with the seal. The seal assembly will be inspected and, if repairable, it will be rebuilt, tested, and returned in its original condition.

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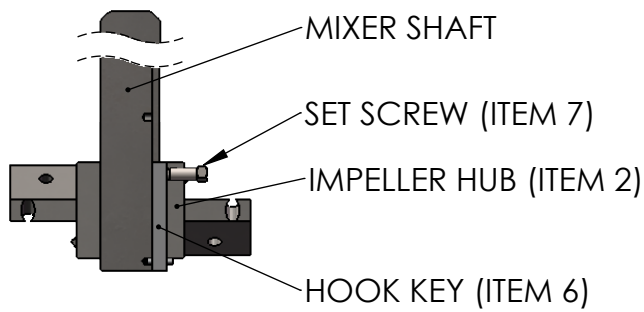
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Telefax: 49 201 2200-561

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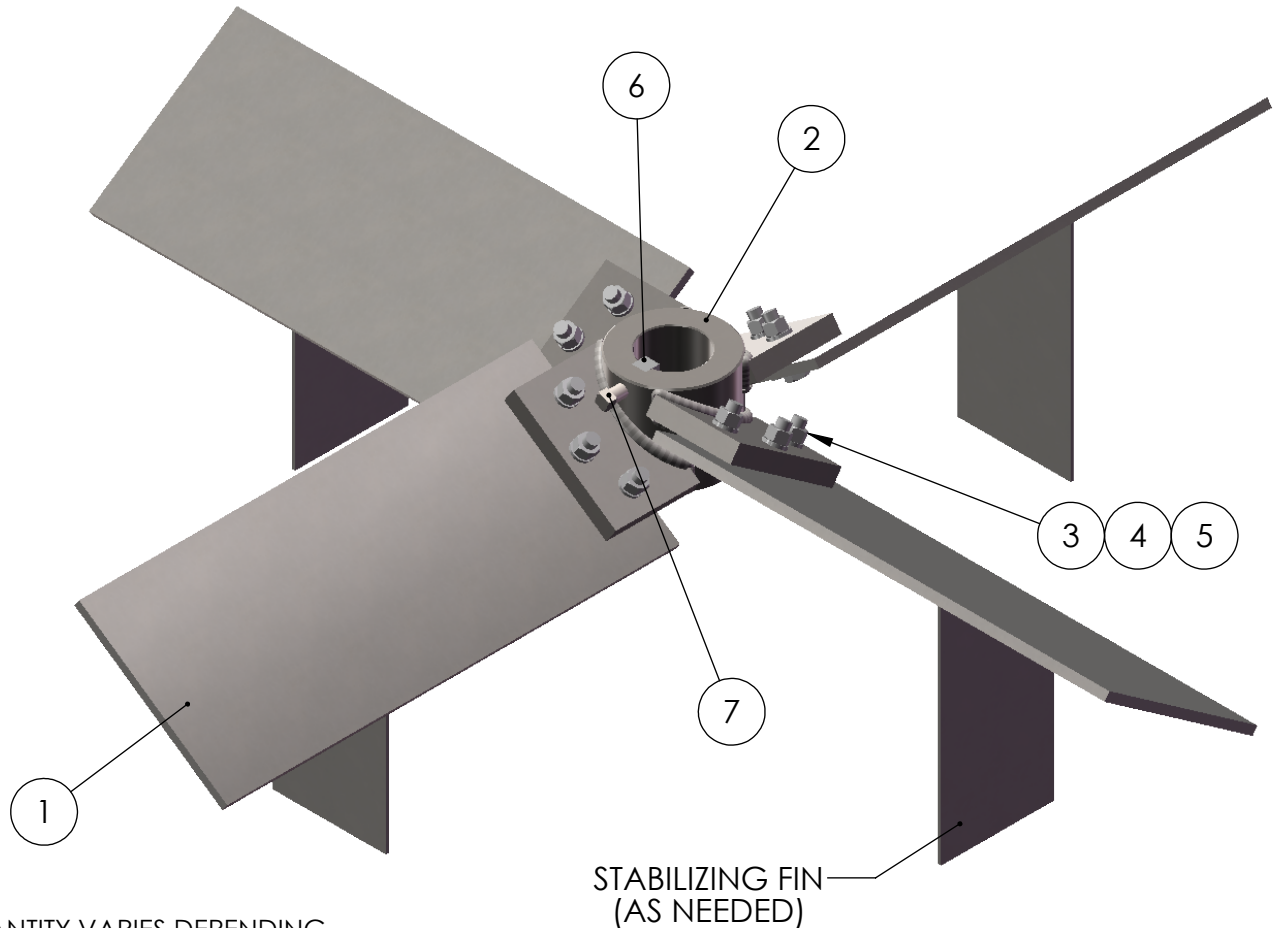
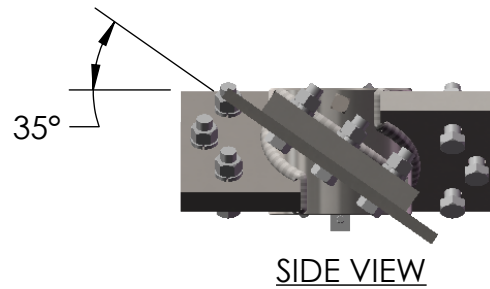
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HOOK KEY INSTALLATION



* QUANTITY VARIES DEPENDING
ON IMPELLER DESIGN.

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
NO.	QTY	PART NAME

NOTES:

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

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