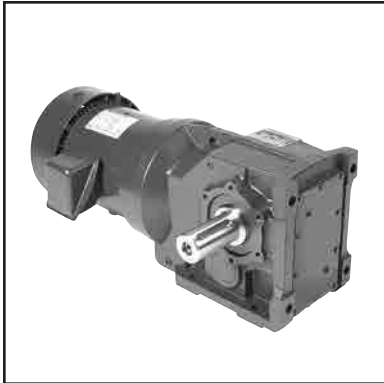


GROVE GEAR

TorqueLineTM
Helical Bevel Drives



**Installation,
Lubrication and
Maintenance
Instructions**

CONGRATULATIONS!

Your decision to purchase a world class reducer from Grove Gear will provide you with many years of trouble-free service if you adhere to the following installation and maintenance instructions.



MECHANICAL WARNINGS & CAUTIONS



IMPORTANT INFORMATION



Please Read Carefully

The following  and  information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your Grove Gear product.

Read **ALL** instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.



- Written authorization from Grove Gear is required to operate or use reducers in man lift or people moving devices.
- Check to make certain application does not exceed the allowable load capacities published in the current catalog.
- Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.
- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. Reducers should not be used as a brake.
- Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.
- Lifting supports including eyebolts are to be used for vertically lifting the gearbox only and no other associated attachments or motors.
- Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.



- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranties or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

Reseller/Buyers agree to also include this entire document including the warnings and cautions above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by Grove Gear.

ELECTRICAL WARNINGS & CAUTIONS





IMPORTANT INFORMATION



Please Read Carefully

Appropriate Grove Gear instructions provided with the motor and precautions attached to the motor should be read carefully prior to installation, operation and/or maintenance of the equipment. Injury to personnel or motor failure may be caused by improper installation, maintenance, or operation.

The following  and  information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your Grove Gear product:



- Disconnect power and lock out driven equipment before working on a motor.
- Always keep hands and clothing away from moving parts.
- The lifting support on the motor is not to be used to lift the entire machine. Only the motor attached directly to the support may be safely lifted by the support.
- Install and ground per local and national codes.
- Discharge all capacitors before servicing a single phase motor.
- Misapplication of a motor in a hazardous environment can cause fire or an explosion and result in serious injury. Only the end user, local authority having jurisdiction, and/or insurance underwriter are qualified to identify the appropriate class(es), group(s), division and temperature code. Marathon Electric personnel can not evaluate or recommend what motors may be suitable for use in hazardous environments. If a motor is nameplated for hazardous locations, do not operate the motor without all of the grease and drain plugs installed.
- Never attempt to measure the temperature rise of a motor by touch. Temperature rise must be measured by thermometer, resistance, imbedded detector or thermocouple.
- Motors with automatic reset thermal protectors will automatically restart when the protector temperature drops sufficiently. Do not use motors with automatic reset thermal protectors in applications where automatic restart will be hazardous to personnel or equipment.
- Motors with manual reset thermal protectors may start unexpectedly after the protector trips when the surrounding air is at +20°Fahrenheit or lower. If the manual reset protector trips, disconnect motor from its power supply. After the protector cools (five minutes or more), it can be reset and power may be applied to the motor.
- Connect all protective device leads, marked P1, P2, etc., per instructions supplied with the motor.
- Operation of a motor at other than its nameplate rating may result in fire, damage to equipment or serious injury to personnel.
- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.



- Consult qualified personnel with questions and all electrical repairs must be performed by trained and qualified personnel only.
- For motors nameplated as "belted duty only", do not operate the motor without belts properly installed.
- Motors and/or driven equipment should not be operated faster than their rated speed.
- For inverter applications, follow the inverter manufacturer's installation guidelines.
- Make sure the motor is properly secured and aligned before operation.

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranty or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

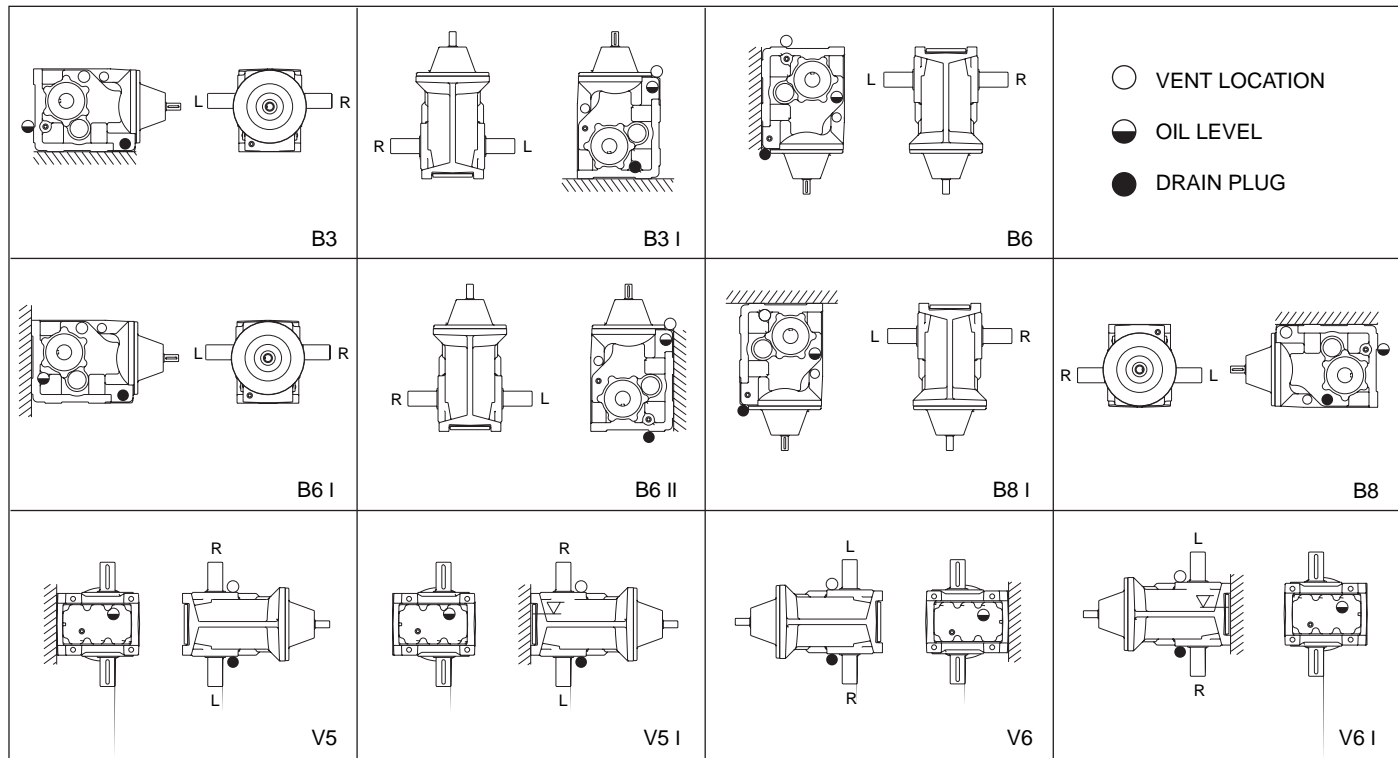
Resellers/Buyers agree to also include this entire document including the warnings and cautions above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by Grove Gear.

Mounting Positions / Lubrication GROVE GEAR

Mounting position must be specified on all orders, and included in the reducer description, so the correct amount of oil is installed at the factory.

Mounting Positions



Motorized Reducers & Gearmotors

The Reducer and Motor are assembled at the factory, and filled with the proper quantity of lubricant based on your specified mounting position. Integral Gearmotors are supplied with 3 phase 230/460v totally enclosed, fan cooled (TEFC) 1750 rpm general purpose motors. Special integral gearmotors are available. Consult the factory for details.

Standard Integral Gearmotors and Motorized Reducers are assembled at the factory with the conduit box and the conduit opening at the position illustrated in the dimensional section of the catalog. The user may rotate the body of the motor to reposition the conduit box (in 90° increments from original position). The conduit opening may also be repositioned at 90° increments from the original position. Both operations may be performed without disassembling the drive.

Lubrication

Size 8473 through 8973 Reducers and Gearmotors are filled with gear lubricant at the factory, to the correct level for the mounting position specified on the order. The lubricants in the chart on the next page are recommended for continuous operation in ambient temperatures of 30° to 125° F (0° to 50° C) and operating temperatures to 185° F (85° C). Consult factory for recommendation for other ambient temperatures or intermittent duty.

CAUTION If the mounting position is changed, the oil quantity must be adjusted to obtain the proper oil level. Mounting position must be one shown above. Consult the factory if you are not certain of the correct oil level or quantity. Consult the factory for mounting positions not shown.

GROVE GEAR**Lubrication**

Mobil Corporation	Chevron Corporation	Texaco Inc.	Citgo Petroleum Corporation	Shell Group of Companies	Castrol Limited
Mobilgear 630	Gear Compound EP ISO220	Meropa 220	EP Compound 220	Omala 220	Alpha SP220

Approximate Oil Capacity (pints) Triple Reduction

Mounting Position

Reducer Size	B3/B6I	B8	V5/V5I	V6/V6I	B6/B8I	B3I/B6II
8473	1.3	2.9	2.6	2.7	Contact Factory	3.5
8673	2.4	6.0	5.5	5.7	Contact Factory	7.2
8773	3.6	9.0	8.3	8.6	Contact Factory	10.8
8873	6.7	17.4	15.4	16.1	Contact Factory	20.1
8973	15.0	32.7	29.0	30.3	Contact Factory	37.8
81073	21.0	54.0	51.0	51.0	Contact Factory	71.0

Approximate Oil Capacity (pints) Quintuple Reduction⁽¹⁾

Mounting Position

Reducer Size	Unit	B3/B6I	B8	V5/V5I	V6/V6I	B6/B8I	B3I/B6II
8675	Primary	1.0	1.8	1.5	1.5	Contact Factory	1.4
	Secondary	2.4	6.0	5.5	5.7	Contact Factory	7.2
8775	Primary	1.6	3.0	2.3	2.3	Contact Factory	2.3
	Secondary	3.6	9.0	8.3	8.6	Contact Factory	10.8
8875	Primary	5.1	7.4	6.1	6.1	Contact Factory	5.5
	Secondary	6.7	17.4	15.4	16.1	Contact Factory	20.1

(1) Quin reduction units are compound units, the primary and secondary units are filled separately. Refer to the model table above and use the oil capacities shown.

Important Selection Information

Read ALL instructions and safety precautions prior to operating unit. Injury to personnel or unit failure may be caused by improper installation, maintenance, or operation.

Check to verify that the application does not exceed the capacities published in the current catalog.

Written authorization from GROVE GEAR is required to operate or use gear units in man lift or people moving devices.

The system of connected rotating parts must be free from critical speed, torsional, or other type vibration, regardless of how induced. The responsibility for this system analysis lies with the purchaser of the gear unit.

Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which the buyer shall apply the product. The application by buyer shall not be subject to any implied warranties of merchantability or fitness for a particular purpose.

Lubrication

All GROVE GEAR Helical Bevel gearmotors and gear reducers are supplied with the correct quantity of lubricating oil for the mounting position specified at time of order.

Before Installation

CAUTION Review the approved mounting positions and lubrication levels identified on page 4 of these instructions. Do not deviate from the mounting positions or lubrication levels shown without contacting the factory.

For transportation, the units are supplied as sealed gearcases, i.e., in place of the breather plug, a socket head plug is installed. The breather plug accompanies the unit in the lubrication instructions and hardware envelope.

Lubrication & Installation

GROVE GEAR

Before Operating

After final installation, install the breather plug in the location specified on page 4 for the appropriate mounting position.

CAUTION Do not operate the unit without making sure it contains the correct amount of oil. The oil level is correct when surface of the oil is level with the lowest point of the level plug shown on page 4.

CAUTION Do not overfill or underfill with oil. This could result in damage to unit and/or injury to personnel.

Changing Lubricant

After the first 100 hours of operation, drain out initial oil, and refill. Thereafter, oil should be changed at least every 7500 operating hours (15,000 for synthetic oil lubricant) or every 18 months (36 months for synthetic oil lubricant) – whichever occurs first.

CAUTION Oil should be changed with greater frequency if unit is used in a severe environment such as dusty or humid.

CAUTION If the unit cannot be located in a clear and dry area with access to an adequate cooling air supply, then precautions must be taken to avoid ingestion of contaminants such as water, and to avoid a reduction of cooling ability due to exterior contaminants.

WARNING Wear protective clothing and eye shields when installing or maintaining unit and machine.

WARNING Oil, housings, and other components can reach high temperatures during operation, and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.

Variations From Normal Conditions

Input speeds other than 1750 rpm, may require an adjustment in the oil level. Consult GROVE GEAR for special lubricant recommendations when operating at higher or lower speeds.

APPROVED LUBRICANTS

LUBRICANT	AGMA NUMBER	ISO-ASTM VISCOSITY GRADE
Mobilgear 630	5 EP	220

For continuous operation of Helical Bevel Gear Drives with ambient temperature of 30-125°F (0 to 52°C) and operating temperature to 185°F (85°C).

MOBILGEAR 630 LUBRICANT is a heavy duty industrial gear lubricant containing sulfur phosphorous antiwear additives. Lubricants of this general type and meeting the above specifications may be substituted where MOBILGEAR LUBRICANTS are recommended.

Lubricant selected must be compatible with nitrile rubber seals. For ambient temperature above 125°F (52°C), below 30°F (0°C), operating temperature above 185°F (85°C), or intermittent duty, consult the factory.

ALL TEMPERATURE SYNTHETIC 75W-90 LUBRICANT (MOBILUBE SHC® 75W-90)

MOBILGEAR SHC 75W-90 LUBRICANT is a premium gear box lubricant which is recommended for Helical Bevel Gear Drives in most applications, especially those subject to low start up temperature and/or high operating temperature. This lubricant is a synthesized hydrocarbon based material and a sulfur-phosphorous gear lubricant additive which provides longer lubrication intervals because of its increased resistance to thermal and oxidative degradation. This decreases maintenance costs. Further economy is realized because of the increased efficiency of units lubricated with MOBILGEAR SYNTHETIC LUBRICANT. This lubricant can be operated at temperatures considerably above 185°F (85°C). However, the factory should always be contacted prior to operating at high temperatures as damage may occur to seals or other components. Lubricant manufacturer and GROVE GEAR should be contacted when substituting a premium lubricant where SYNTHETIC lubrication is recommended. GROVE GEAR should also be contacted for proper lubricant selection for ambient temperatures below 30°F (0°C) or intermittent duty.

CAUTION Do not mix nonsynthetic and synthetic oil in the unit.

CAUTION If unit is used in the food or drug industry (including animal food) consult the petroleum supplier or GROVE GEAR for recommendation of lubricants which meet the specifications of FDA, USDA and/or other authoritative bodies having jurisdiction. Standard lubricants are not suitable for these applications or these industries.

Installation

WARNING Make certain that the power supply is disconnected before attempting to service or install the unit, or remove or install any components. Lock out the power supply, and tag it to prevent unsuspected application of power.

GROVE GEAR

Lubrication & Installation

SHIELD ALL ROTATING PARTS

⚠WARNING For safety, purchaser or user should provide protective shields over all shaft extensions and any moving apparatus mounted on the unit. The user is responsible for checking all applicable safety codes in his area and providing suitable shields.

⚠WARNING A unit cannot be used as an integral part of a machine super-structure which would impose additional loads on the unit other than those imposed by the torque being transmitted, or by any shaft mounted power transmitting device such as sprockets, pulleys, or couplings.

⚠WARNING Units ARE NOT to be considered fail safe or self locking devices. If these features are required, a properly sized, independent holding device must be utilized.

⚠WARNING For safe operation and to continue the unit warranty, when installing, reinstalling, or replacing a factory installed fastener for servicing purpose, or to accommodate the mounting of guards, shields or other light load imposing devices, or for mounting the unit, it becomes the responsibility of the purchaser or user to properly determine the quality, grade of fastener, thread engagement, load carrying capacity, tightening, torque, and the means of torque retention.

Couplings

Flexible couplings to input and output shafts are recommended because they minimize excessive bearing and shaft loading caused by misalignment. Follow coupling manufacturer's installation directions.

Shaft Mounted Models

GROVE GEAR recommends application of an anti-seize compound, such as Dow-Corning® 1000 High Temperature Anti-seize Paste or Never-Seez®, to the driven shaft during installation. This assists in preventing fretting corrosion and aids in unit removal. Driven shaft should be supported independently with pillow block bearings. A suitable Torque Arm must be provided and can be ordered separately (not supplied) to keep unit from rotating. A torque arm pad can be attached to any of the four available mounting surface locations of the unit. Install and position Torque Arm at 90° angle to a line drawn between the center of the output hollow bore and the bolt that attaches the Torque Arm to the Torque Arm Pad of the unit. The Torque Arm should be positioned to be in tension, NOT compression, based on output rotation of the gear drive. (Refer to Figure 1). A rigid torque arm can cause bearings to "load up" and cause premature bearing failure. To prevent this, provide a slight amount of "float" at the torque arm pivot points.

⚠CAUTION Inspect shafts and components for paint, burrs, or other imperfections before installing components. Do not use excessive force or pounding to install components onto unit shafts, as this may cause damage to shafts, bearings, or gears.

Preventative Maintenance

Keep shafts and vent plug clean to prevent foreign particles from entering seals or gear case. Inspect periodically for oil leaks.

Sheaves and Sprockets

When mounting sheaves or sprockets, they should be located as close to the Helical Bevel Gear Drive as possible. Excessive overhung load could result in premature failures of bearings or shaft. Refer to the general catalog or contact your local distributor for overhung load ratings.

⚠WARNING Any brakes that are used in conjunction with a unit must be sized or positioned in such a way so as to not subject the unit to loads beyond the capacities published in the current catalog.

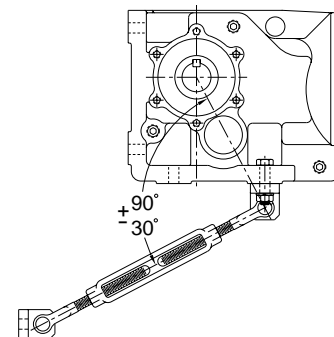
Flange Mounted Units

⚠CAUTION Units with the flange mount accessory are to be mounted and supported by the mounting flange only. The mounting pads on the housing are not to be used in conjunction with the mounting flange to support the unit.

Shaft Mounted Units With Mounting Flange

There must be concentricity between the driven shaft and the machine register that accepts the mounting flange pilot to prevent misalignment between the hollow shaft of the drive and the driven shaft.

Figure 1



Lubrication & Installation

GROVE GEAR

Shaft Output Units With Mounting Flange

If coupling to shaft – flexible couplings are recommended to minimize excessive bearing and shaft loading caused by misalignment. Follow coupling manufacturer's installation directions.

CAUTION The exterior holes on this drive are for mounting the drive or drive accessories (mounting flange, couplings, sprockets, etc.). They are not to be used for lifting the drive or any driver/driven equipment. The lifting eye included on this drive is to be used to vertically lift the drive only and no other associated attachments or motors.

Electric Motor and Hydraulic Motor and Pump Installation Instructions

For "C" Flange and Hydraulic Flange Units

1. Be sure all of the paint and masking have been removed from the face and pilot of the flange. Check the input bore to be sure it contains an adequate amount of anti-seize compound, which is normally installed at the factory. This compound will inhibit fretting corrosion between the motor or pump shaft and the unit bore.
2. Install the key (if round bore) to the maximum depth of the keyway provided in the bore.
3. Align keyways or splines of motor or pump and bore of unit and install motor or pump into frame.
4. **CAUTION** GROVE GEAR "C" flange reducers and Hydraulic Flange Reducers are designed to accept motors with shafts that do not exceed the maximum specified by the N.E.M.A. or SAE standards. If the motor or pump shaft bottoms out before the motor or pump flange seats against the reducer flange face, the motor or pump shaft length must be adjusted to N.E.M.A. or SAE standards.
5. Secure the motor or pump to the unit. Capscrews and lockwashers are provided with "C" flange units.

6. Tightening torques for mounting bolts are provided in the chart below.

CAPSCREW TIGHTENING TORQUE Grade 5 Capscrews (dry, without lubricant)

Capscrew Size	Tightening Torque (Ft. - Lbs.)
1/4 NC	8
5/16 NC	16
3/8 NC	29
1/2 NC	71
5/8 NC	143
3/4 NC	251

CAUTION Mounting bolts, coupling fasteners, and other power transmitting devices should be routinely checked to ensure that all parts of the unit are firmly anchored to provide proper operation. (Loose fasteners can cause alignment problems and excessive wear). Check end play in shafts. Noticeable movement might indicate service or parts replacement.

WARNING Make certain that all tools and other items are clear from rotating parts before starting machine. Stand clear, and start machine slowly to be sure all components are secure and operating properly.

CAUTION Test run unit to verify operation. If the unit being tested is a prototype, that unit must be of current production configuration.

GROVE GEAR has Sales Offices and a network of Industrial Power Transmission Distributors that can serve your needs worldwide. Check the Yellow Pages for one near you or contact the factory sales office.

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