Oil Capacities

Approximate Capacities in Quarts & Gallons

SINGLE REDUCTION REDUCERS - FLOOR MOUNTED POSITION

UNIT SIZE		20	25	30	35	40	50	60	70	80	100	120
WORM OVER GEAR	HO SHO	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 1/2 Gal.	2 1/2 Gal.	3 3/4 Gal.	6 1/2 Gal.	10 1/2 Gal.	19 Gal.	45 Gal.
	ALT OIL LEVEL	1/2 Qt.	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 1/2 Gal.	4 Gal.	6 1/2 Gal.	12 1/2 Gal.	26 Gal.
WORM UNDER GEAR	HU	1/2 Qt.	1 Qt.	1 1/2 Qt.	3 1/2 Qt.	1 1/2 Gal.	2 1/4 Gal.	3 1/2 Gal.	5 1/4 Gal.	7 3/4 Gal.	15 Gal.	30 Gal.
	SHU											
VERTICAL OUTPUT SHAFT	HV SHV	1 Qt.	1 Qt.	1 1/2 Qt.	2 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 3/4 Gal.	5 Gal.	6 1/2 Gal.	14 Gal.	26 Gal.

DOUBLE REDUCTION REDUCERS - FLOOR MOUNTED POSITION

UNIT SIZE	20 30	20 35	25 40	25 50	30 60	30 70	35 70	40 70	40 80	50 100	60 120
OO-UO-VO OOS-UOS-VOS	3 Qt.	1 1/2 Gal.	1 3/4 Gal.	2 3/4 Gal.	4 1/4 Gal.	7 Gal.	7 1/4 Gal.	7 1/2 Gal.	11 1/2 Gal.	20 3/4 Gal.	47 1/2 Gal.
OU-UU-VU	2 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 1/2 Gal.	4 Gal.	5 1/4 Gal.	5 1/2 Gal.	6 Gal.	8 1/2 Gal.	16 Gal.	30 Gal.
OUS-UUS-VUS			1 1/4 Gal.	2 Gal.	3 1/4 Gal.	6 1/4 Gal.	6 1/2 Gal.	7 Gal.	9 3/4 Gal.	18 1/2 Gal.	34 Gal.
OV-UV-VV OVS-UVS-VVS	2 Qt.	2 Qt.									

BEARING GREASE:
High quality lithium base NLGI #2 or NLGI #3

NOTES:

Note #1 - The listed synthetic lubricants are acceptable for use in force feed lubrication systems or other special applications.

Note #2 - Worm gears operating at a sliding velocity in excess of 10 m/s (2,000 ft. per min.) may require force feed lubrication. For force feed lubrication recommendations, see our Product Catalog or contact our Application Engineers.

Note #3 - If a reducer is to be operated at an input rpm other than that shown on the name plate, contact our Application Engineers for recommendations.

Note #4 - Pour point of the oil used should be 5˚ C (9˚ F) less than the minimum ambient temperature expected. For special temperature or operating conditions, contact our Application Engineers for the proper lubrication selection.

GEARMOTORS & HELICAL/WORM REDUCERS - ALL POSITIONS

UNIT SIZE		25	30	35	40	50	60	70	80
ALL MODELS MOUNTED WITH WORM UNDER GEAR	STANDARD SHAFT	2 Qt.	2 1/2 Qt.	1 1/4 Gal.	2 1/4 Gal.	3 Gal.	4 1/2 Gal.	7 Gal.	8 1/2 Gal.
	HOLLOW SHAFT								
ALL MODELS MOUNTED WITH WORM OVER GEAR		1 1/2 Qt.	1 1/4 Gal.	2 Gal.	2 1/4 Gal.	4 Gal.	5 Gal.	9 Gal.	11 Gal.
ALL MODELS MOUNTED WITH VERTICAL OUTPUT SHAFT		2 1/2 Qt.	3 1/2 Qt.	1 1/2 Qt.	2 1/4 Gal.	3 Gal.	3 3/4 Gal.	8 Gal.	10 1/2 Gal.
ALL MODELS MOUNTED WITH INPUT END UP		4 Qt.	1 1/4 Gal.	2 1/4 Gal.	3 Gal.	5 1/4 Gal.	6 3/4 Gal.	13 1/2 Gal.	16 Gal.
ALL MODELS MOUNTED WITH INPUT END DOWN		3 1/2 Qt.	1 Gal.	1 3/4 Gal.	2 1/2 Gal.	3 1/2 Gal.	4 3/4 Gal.	8 3/4 Gal.	10 1/2 Gal.

APPROVED SYNTETHIC LUBRICANTS:					
BRAND NAME:	Uptime SHC634 Synthetic Lubricant	Emery-2843 synthetic Lubricant	Keystone KSL-367 Synthetic Lubricant	Mobil SHC634 Synthetic Lubricant	Pinnacle 460 Synthetic Lubricant
MANUFACTURER:	Distributed by Textron Industrial Gears expressly from Mobil Oil company	Henkel Corp./Emery Group	Keystone/Atochem	Mobil Oil Corp.	Texaco Lubricants Co.

IMPORTANT: Do not overfill units. Fill to center line of oil gauge or to pipe plug identified with oil level sticker. Oil capacities will vary due to mounting positions or type of gearshaft mounting used, such as solid shaft, hollow shaft or spread bearings. Each reducer is built and oil levels are set at the factory for a specific mounting position.

TEXTRON DAVID BROWN Cone Drive POWER TRANSMISSION

240 E. 12th Street,
P.O. Box 272
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MI 49685-0272

Form #22389 4-00

Lubrication, Installation, Operation & Maintenance Instructions For Cone Drive Speed Reducers

Cone Drive double enveloping worm gear speed reducers are used throughout Industry to provide smooth and quiet speed reduction. When properly selected, applied and maintained, they will provide optimum performance.

IMPORTANT: In any applications of Cone Drive Products where breakage, damage, disconnection, any other malfunction of any drive train component, or excessive wear could result in personal injury or property damage, a fail safe device capable of stopping and holding the load in the event of such an occurrence must be incorporated after the drive train.

THE FOLLOWING INFORMATION IS FOR YOUR PROTECTION. PLEASE READ CAREFULLY.

1. Do not attempt to install or operate this reducer until all of these instructions are read and thoroughly understood. If you have any questions, please contact Cone Drive.

2. The horsepower or output torque capacity of this reducer and the service factor (maximum allowable operating cycle) are stamped on the reducer nameplate. **These values are not to be exceeded as overloading can result in reducer failure.**

   Exceeding the rating and duty cycle will void the warranty. Please contact Cone Drive with any questions regarding rating and service factors.

3. Each reducer is specifically arranged to operate at the input speed specified on the nameplate. If the input speed is not specified by the customer, it is set up for 1750 RPM and service factor 1.0. Do not operate the reducer at speeds or under service other than specified on the nameplate without contacting Cone Drive for specific instructions on oil level location and bearing settings.

4. Do not alter the reducer in any way without approval from Cone Drive.

5. This reducer has moving mechanical components and connected electrical devices, operating under high voltage to achieve its intended purpose. Operation and repair should only be done by qualified personnel.

6. Before servicing a speed reducer, the main electrical disconnect must be moved to and **locked** in the off-position. The person performing the work should **post on that disconnect a warning to others not to turn on the power.**

7. It is normal for the reducer to operate at a housing temperature of up to 200º F. To prevent burns, proper guards or shields must be provided by the purchaser or user to prevent personnel from touching the reducer.

8. Cone Drive products are furnished without guard covers. It is the responsibility of the purchaser or user to provide guards for all exposed shafting, couplings, sprockets, sheaves, belts, chains, clutches, and any other moving parts in accordance with current local, state and federal requirements.

9. Failure to follow the instructions contained in this bulletin may result in unit failure, property damage or personal injury.

Finish Coat Painting

Cone Drive speed reducers are furnished with a prime coat of paint on exterior housing surfaces. The reducer should be painted with a finish coat to protect the housing exterior, particularly if subjected to outdoor service, periodic washdown or harsh environments.

Mask all shafts, oil seals, tags, name plates, oil level stickers, breathers, gauges etc. before painting. (Painting seal lips can result in oil leakage.)

Installation

IMPORTANT: Unless otherwise specified on the reducer or in accompanying documentation, all Cone Drive speed reducers are shipped without oil and must be filled to the oil level gage or plug with the **proper** oil before start-up. See the following section on lubrication.

1. The speed reducer must be securely mounted to a rigid flat foundation or base plate. If necessary, shim under the reducer feet to provide a flat mounting surface.

2. Bolt the reducer to the foundation or mounting base using the largest diameter bolt that will fit through the foot holes of the reducer. **Be sure to use a bolt in all available mounting feet holes.** If the reducer will be subjected to heavy chain pull or thrust loading, **heat treated** mounting bolts must be used to prevent stretching and loosening of the bolts.

3. The input and output shafts of the reducer should be coupled to the motor and driven shafts with flexible couplings and the reducer aligned with these shafts within $\pm$.001". Solid or rigid couplings should be avoided. Failure to properly align shafts and the use of solid couplings can result in excessive coupling and bearing wear, shaft deflection and eventual failure of one (1) or more of the components.

4. Couplings, sheaves and sprockets should be mounted on the reducer shafts carefully. Do not pound or hammer them onto the shafts as this will damage bearings and oil seals.

5. Sprockets and sheaves should be mounted as close to the reducer as possible and "V" belts and chains adjusted to the proper tension to keep bearing loading and shaft deflection to a minimum. Too much tension in belts and improper location of sheaves and sprockets will lead to excessive chain pull, bearing wear and shaft deflection. For specific information on chain pull capacity, shaft stress and bearing life please contact Cone Drive.

6. **NOTE:** Exposed metal parts are coated with a commercial rust inhibitor. This rust inhibitor must be removed prior to installation. Failure to do so may result in difficulty in assembling close tolerance mating components.

6. **Before starting motor** review motor rotation, reducer rotation and required direction of driven machine to insure that the motor is wired for proper direction of rotation. In many instances a machine must run in one direction and failure to wire the motor properly can result in damage to the driven machine.

7. **IMPORTANT:** Fill unit to proper level with recommended oil. Grease all fittings with recommended grease (see section on lubrication). In the case of double or triple reduction reducers, be sure to fill each reduction stage to the proper oil level. Note: Some reducers may have been factory filled. Read all tags.

NOTE: All reducers are built for **one** mounting position, i.e.; floor mounted or wall mounted with worm vertical up or ceiling mounted, etc. If the reducer is to be mounted in any position other than the position for which it was furnished, contact Cone Drive for information on relocating oil level, grease packing bearings, etc., before start-up. If a reducer is operated in a mounting position other than the position for which it was assembled, reducer failure may occur from improper oil level or grease fitting location resulting in lack of lubrication to the gearset and bearings.

Start-Up

1. After the reducer has been properly mounted, aligned **and lubricated**, it is ready for start-up.

2. Make sure driven machine is clear of all obstructions and all safety guards and covers are in place, according to appropriate local, state and federal requirements. If possible, turn motor shaft by hand to confirm drive system is operating freely and in correct direction of rotation.

3. Jog motor to confirm proper rotation.

4. Operate reducer with minimum load for approximately 15 minutes (in both directions if applicable) to seat gears, bearings, and oil seals.

Operation

1. All reducers require a few hours of “run-in” under load to achieve optimum efficiency. During this initial run-in the reducer will probably run warmer than normal and draw more current than after the run-in period. Reducers operating at a very low load or speed will take much longer to run-in and even if operated continuously at low load or speed may never achieve the efficiency that they would if operated at or near their catalog rating.

2. **IMPORTANT:** Normal reducer operating temperature measured on the oil sump area of the housing should not exceed 100º F above ambient temperature or 200º F. If the reducer operating temperature exceeds 200º F, shut down the unit and contact Cone Drive. Excessive oil sump temperature is indicative of overloading, misalignment, or improper or marginal lubrication. Continuous operation of the reducer with the oil sump temperature above 200º F will result in breakdown of the oil and failure of the reducer.

Maintenance

1. The reducer oil level should be checked weekly and the recommended oil added as required to maintain the proper oil level.

2. Oil should be changed as outlined in the lubrication section.

3. All grease fittings should be lubricated with the recommended grease once per month.

4. The reducer, particularly finned areas and fan covers, should be kept clean to allow maximum heat dissipation.

5. All reducer and foundation bolts should be checked for tightness after three (3) months of service and annually thereafter.

6. If a reducer has to be repaired, contact Cone Drive for detailed instructions, blueprints, parts lists, etc. If it is necessary field service is available.

7. If a reducer is to be returned, contact Cone Drive for instructions and a returned material authorization (RMA) number.

Storage Recommendations For Cone-Drive Speed Reducers

If a reducer is to be stored or shut down for more than 30 days, it should be protected from water condensation and corrosion as follows:

Any enclosed system of gearing is subject to water condensation on the inside of the reducer caused by fluctuating ambient temperatures. This condensation can cause severe rusting of the worm and bearings which could lead to premature failure of the reducer. However, this condition can be easily prevented by following the recommendations outlined for various storage conditions. If the reducer is furnished with a motor, follow the motor manufacturers recommendations for motor preservation.

1. **Standard Shipping Procedure - Protection for Maximum Storage Duration of 30 Days.**
   Cone Drive speed reducers are treated inside using a rust inhibitor, the exterior is painted with one coat of primer, and all exposed shafting coated with a rust preventative prior to shipment. This procedure is intended to protect the reducers during shipment and short term inside storage for a maximum period of thirty (30) days after shipment.

2. **Long Term Storage (Indoors) for Periods up to One Year.** (a) Fill the reducer completely full with one of the lubricants shown on our approved list of lubricants. A copy of this lubricant list is shipped with each unit. (b) Rotate the wormshaft and gearshaft at least once per month to keep the seals from sticking to the wear rings and/or shafts. (c) If it is not practical to rotate the wormshaft periodically we recommend purchasing a spare set of oil seals to have on hand in the event of seal leakage at start-up. (d) Before putting the reducer into service, lower the oil in the reducer to the proper operating oil level.

3. **Long Term Storage (Outdoors) for Periods Up to One Year.** Proceed as in (2) with the following additions. (a) After filling the unit with oil, plug the breather hole with a pipe plug and wire the breather to the unit. (b) Paint the outside of the unit with a finish coat of paint. (Reducer from the factory is prime coated only.) (c) Coat all exposed shafting with a long term rust preventative.

4. **Extended Storage Periods Exceeding One Year.** (a) Immediately after receipt of the reducer treat the inside of the reducer with “Olin Chemicals Corp. - Dichan® 100 Vapor-Phase Corrosion Inhibitor for Ferrous Metals” by adding an amount specified by Olin Chemical, through the breather. Observe all Olin Chemicals Corp. cautions and warnings when handling this material. Plug the reducer and wire the breather to the unit. (b) Paint the exterior of the unit with a finish coat of paint. (c) Coat all exposed shafting with a long term rust preventative. (d) Place the unit in a heavy plastic bag treated with Dichan® 100 powder. Seal the bag air tight. (e) Crate the unit and cover the crate to keep out water. (f) Purchase a spare set of oil seals to have on hand at start-up

Lubrication Data

Lubrication is very important for successful operation of Cone Drive gearsets and speed reducers. Inadequate lubrication can result in increased power consumption, added maintenance and gearset failure. Please review the following recommendations and the “Approved List of Lubricants” shipped with all Cone Drive gearsets and speed reducers. Cone Drive recommends only those lubricants listed or any lubricant which meets all the requirements of AGMA (American Gear Manufacturers Association) 9004-D94 “Lubrication of Industrial Enclosed Gear Drives” as it applies to double enveloping worm gearing. Use of other lubricants can result in gearset failure which will not be covered under warranty. See reducers nameplate for the recommended lubricant.

Type of Oil
Performance is based on synthetic lubricants. Using a mineral oil will reduce the mechanical power and output torque ratings by 25%.

Ambient Temperature
The oils shown in the table on the following page are for use in an ambient temperature range of approximately 15° to 125°F with the low end of the range depending on the pour point of the specific oil used. If the ambient temperature will be below or above this range please contact Cone Drive for specific recommendations on proper lubricant as well as proper oil seal and shim materials.

Oil Sump Temperatures
The maximum recommended oil sump temperature is 200°F. Where reducers will be used at maximum ambient and full catalog rating. Contact Cone Drive for lubrication recommendations.

Sludge
It is necessary that the oil be clean and free from sludge at all times to obtain long life from a gear unit. Sludge in gear units may be caused by excessive heat, from dust and dirt and other contaminates and by the presence of moisture or chemical fumes. Therefore, every precaution should be taken to prevent water and foreign particles from entering the gear case.

Cone Drive Reducers are Shipped without Oil.
At assembly all reducers are treated with a rust inhibitor. This treatment coats all internal parts and will protect the reducer for a period of 30 days. If the unit is to be stored longer than 30 days, see long term storage instructions.

Oil Change
If an approved synthetic lubricant is used, it should be changed after 5000 hours of operation or once per year, whichever occurs first. These change intervals are recommended for units operating under favorable conditions. Where operating conditions are severe, such a rapid rise and fall in temperature of the gear case with accompanied sweating of the inside walls and resulting formation of sludge, or where operation is in moist or dusty atmospheres, or in the presence of chemical fumes or extended running at sump temperatures in excess of 180° F, it may be necessary to change the oil at intervals of one to three months. It is recommended a sampling program be established with your lubricant manufacturer where reducers are exposed to the severe operating conditions, mentioned above.

Oil Level
Cone Drive reducers are furnished with a bronze colored hex head pipe plug to indicate oil level. An oil level tag is affixed to the unit near the oil level indicator. Oil level should always be checked with the unit stopped. Estimated oil capacities for standard reducers, are listed in this section.

Double and Triple Reductions Reducers.
These units utilize separate housings and are furnished with separate oil sumps. It is important that all sumps are filled to the proper oil level.

Grease Packed Bearings
Bearings that are at least partially submerged in oil do not require special maintenance. However, bearings that are not submerged in oil require grease lubrication. Grease fittings and internal retainers are furnished when required. They should be greased with a high quality lithium base NLGI #2 or NLGI #3 bearing grease at normal maintenance intervals depending on the duty cycle of the reducer.

Extreme Pressure (E.P.) Lubricants
Extreme Pressure (E.P.) lubricants or cylinder oils with sulphur-phosphorus additives are not acceptable and should not be used in Cone Drive Speed reducers or worm gearing.