

STERLING
ELECTRIC, INC.

2000HB[®]

**K-SERIES HELICAL BEVEL GEAR
REDUCER**

INSTALLATION AND MAINTENANCE MANUAL

August 8, 2016

2000HB HELICAL BEVEL GEAR REDUCER INSTRUCTION MANUAL

SELECTION INFORMATION

Read ALL instructions prior to operating unit. Improper maintenance or operation may cause injury to personnel or reducer failure.

Written authorization from Sterling Electric is required to operate or use this unit 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. Information contained in this manual is considered correct at the time of publication and is subject to change without notice.

SAFETY ALERT

WARNING: For safety, purchaser 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.

WARNING: Hot oil or gear units can cause severe burns. Use extreme care when removing lubrication plugs and vents.

WARNING: 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.

WARNING: Any brakes that are used in conjunction with this unit must be sized or positioned in such a way as to not subject the unit to loads beyond the catalog rating.

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

CAUTION: If the unit 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. Units located in confined spaces may require forced air-cooling.

IMPORTANT INFORMATION

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, expressed or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the good 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 manufacturer be liable for consequential, incidental or other damages.

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

This instruction manual should be read together with all other printed information such as catalogs, supplied by Sterling Electric.

GENERAL OPERATION

1. Run the motor, which drives the unit, and check the direction of unit output rotation. Consult motor nameplates for instructions to reverse the direction of rotation.
2. Attaching the load: On direct-coupled installations, check shaft and coupling alignment between unit and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.
3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the unit output or the driven mechanism.

CAUTION: The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

INSTALLATION – FOOT MOUNTED

The following procedure is recommended for all foot mounted units with solid output shafts.

1. Clean shaft extensions.
2. Mount the unit using grade 5 or higher fasteners.
3. The ground footing, foundation, or base plate on which unit is installed must be rigid and stable and not susceptible to vibration from surrounding equipment or distortion which may cause premature failure of the unit.
4. Align unit with driven shaft and install flexible coupling – **DO NOT USE** rigid couplings.

5. Check angular alignment by using a feeler gauge between coupling hubs at four points, 90 degrees apart. Position the unit to obtain best possible alignment and correct coupling hub separation. Consult factory, equipment supplier, or coupling manufacturer for proper values.
6. Check the offset alignment between the two shafts. Use a dial indicator mounting on one hub (unit side, for example), with the dial indicator button contacting the alignment surface of the opposite hub. Rotate the opposite shaft slowly by hand and take a reading on at least four equally spaced points. Move unit until the indicator movement does not exceed 0.002 in. Transfer indicator to opposite hub and recheck. Recheck angular alignment as described above.
7. Fit guards in accordance with the relevant state and local safety regulations.
8. Check the oil level and install the breather vent (if required) as described in **LUBRICATION**.
9. Install the motor as described in **MOTOR INSTALLATION**.

INSTALLATION – SHAFT MOUNT

The following procedure is recommended for all straight bore shaft mounted units with standard torque arm. Refer to the Helical Bevel catalog for torque arm mounting and customer shaft dimensions when using the straight bore shaft mounting option.

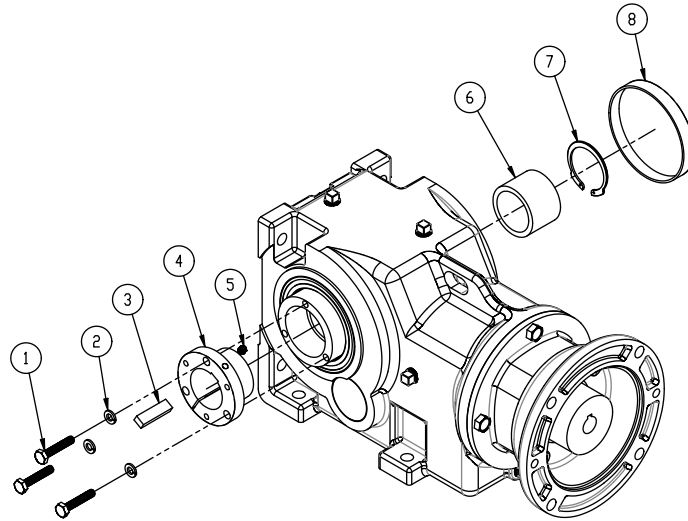
1. Clean driven shaft extension and output bore of the unit.
2. Apply anti-seize or anti-fretting compound (not supplied) to the hollow bore of the unit to aid removal at a later date.
3. Locate the unit in position onto the driven shaft by the most convenient method using good engineering practices; ensuring it is as close as possible to the bearing on the driven equipment.
4. Anchor the unit to a secure point on the structure by means of the torque arm or other flexible device.

WARNING: DO NOT RIGID MOUNT UNIT. Mounting should be such to allow freedom of movement of the reducer to pivot around the driven shaft centerline without imposing excessive loads than can lead to driven shaft breakage, premature reducer bearing failure, cracking of the conveyor structure, and leaks. Consult factory if needed.

5. Fit guards in accordance with the relevant state and local safety regulations.
6. Check the oil level and install the breather vent (if required) as described in **LUBRICATION**.
7. Install supplied shaft cover.
8. Install the motor as described in **MOTOR INSTALLATION**

INSTALLATION – TAPER LOCK BUSHING

The following procedure is recommended for all shaft mounted units using a taper lock bushing and standard torque arm. All taper lock bushing kits are supplied with bushing, mounting hardware, centering ring, snap ring, and shaft key. Refer to the Helical Bevel catalog for torque arm mounting and customer shaft dimensions when using the taper lock bushing mounting option. Refer to illustration below when installation units with taper lock bushings.



Item No.	Description	Qty	Item No.	Description	Qty
1	Hex Head Screw	3	5	Set Screw	1
2	Lock Washer	3	6	Centering Ring	1
3	Shaft Key	1	7	Internal Snap Ring	1
4	Taper Lock Bushing	1	8	Shaft Cover	1

1. Clean driven shaft extension and output bore of the unit.
2. Taper lock bushings should always be installed onto the driven shaft as close as possible to the bearing on the driven equipment.
3. Install the supplied centering ring and snap ring opposite the hollow shaft hub.
4. Install the supplied shaft key.

CAUTION: Taper lock bushings are meant to be dry mounted. **DO NOT USE** lubricants, anti-seize, or anti-fretting compounds on the bushing and shaft mounting area.

5. Align tapped holes in hollow shaft hub with drilled through holes in tapered bushing.
6. Insert hex head screws (supplied) through the drilled holes in tapered bushing and thread loosely into tapped holes in hollow shaft hub.
7. Position assembly on driven shaft. Make sure the key is in contact with the full length of the tapered bushing. Tighten hex head screws in a progressively and uniformly manner to the torque value listed below.

Unit size	Screw Size	Tightening Torque
K04	1/4-20	9 ft-lbs
K06	5/16-18	15 ft-lbs
K07	3/8-16	30 ft-lbs

WARNING: The tightening force on the hex head screws is multiplied many times by the wedging action of the tapered surface. If extreme tightening force is applied, or if a lubricant is used, bursting pressures will be created in the hollow shaft hub of the mating part.

8. Install set screw over shaft key and tighten.
9. Anchor the unit to a secure point on the structure by means of the torque arm.
10. Fit guards in accordance with the relevant state and local safety regulations.
11. Check the oil level and install the breather vent (if required) as described in **LUBRICATION**.
12. Install supplied shaft cover.
13. Install the motor as described in **MOTOR INSTALLATION**.

REMOVAL – TAPER LOCK BUSHING

WARNING: Hot oil or gear units can cause severe burns. Use extreme care when removing lubrication plugs and vents.

WARNING: 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.

1. Remove shaft cover.
2. To remove the unit, loosen set screw over the shaft key.
3. Loosen and remove hex head screws. These will be used as jack screws in the tapped holes in the taper lock bushing.
4. Insert hex head screws in the tapped holes in the taper lock bushing and progressively tighten each one until hollow shaft hub is loose on bushing.
5. Remove unit using caution.

MOTOR INSTALLATION

1. Mount the motor using the hardware supplied.

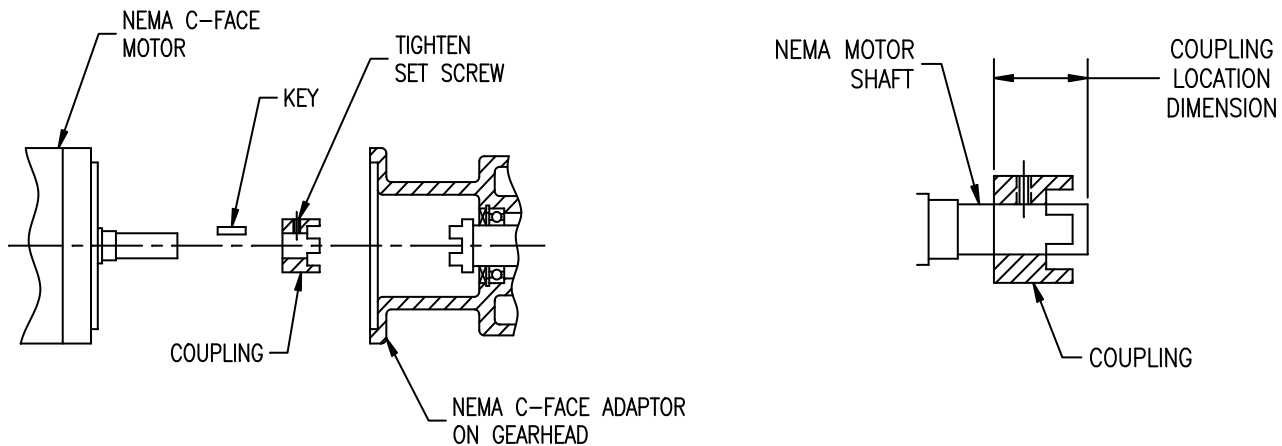
NOTE: With every C-face input bevel reducer, Sterling Electric supplies the motor coupling half, a key, and a flexible coupling spider. In order to aid removal at a later date, anti-seize compound (not supplied) can be applied to the motor shaft and C-face pilot diameter.

NOTE: The motor coupling must be mounted with the supplied parts. Failure to use the supplied parts could void the Sterling Electric Warranty.

2. Remove any dirt or adhesive residue from the motor shaft.

3. The supplied key is to be placed in the motor keyway and should be located under the motor coupling.
- NOTE: the key is not to extend beyond the coupling bore on EITHER side.
4. The motor coupling is to be mounted on the motor shaft and is to be located accordingly to the dimension specified in **NEMA Adapter Coupling Location**.
 5. Tighten the setscrew located on the motor coupling.
 6. Place the flexible motor spider between the jaws of the motor coupling. Align the motor coupling so that the jaws on the reducer coupling mesh with the motor coupling. The motor shaft will extend into the bore of the reducer coupling. Secure the flanged motor to the C-face adapter with the supplied hardware unless otherwise specified by the motor manufacturer.

NEMA Adapter Coupling Location



NEMA Frame Size	*Coupling location Dimension (in)		
	K043	K063	K073†
56C	1.79	1.90	
143TC / 145TC	1.85	1.97	1.79
182TC / 184TC	2.31	2.03	2.29
213TC / 215TC		N/A**	N/A**
254TC / 256TC			N/A**

*Coupling Location Dimension Tolerance is $-0.0/+0.031$

** Quill style input, only special key required.

† No special key required on R0702.

7. For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown in the chart under **LUBRICATION**. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the factory for level and vent recommendations on non-standard mounting positions.

WARNING: Prior to startup, verify that the unit is filled with the proper amount of oil based on the mounting position shown in the LUBRICATION section. Failure to do so will void the warranty.

CAUTION: Do not operate the unit without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, reducer or other equipment may result.

CAUTION: A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. (e.g. sprockets, pulleys, couplings)

CAUTION: For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

LUBRICATION

All standard helical bevel gear reducers ordered from the factory are shipped with standard compounded lubricant and is good for ambient temperature ranges of 30° F to 104° F. Beginning with a May, 2012 manufacture date, all washdown and stainless steel helical gear reducers ordered from the factory are shipped with synthetic NSF H1 Food Grade lubricant and is good for ambient temperature ranges of -10° F to 105° F. Position M1 is considered standard.

CAUTION: Use of synthetics can cause problems if they are not compatible with the seals or the conventional lubes they replace.

CAUTION: If the ambient temperature will be outside the range for the lubricant installed at the factory, drain and refill the reducer with the proper viscosity lubricant prior to use.

RECOMMENDED LUBRICATION OILS

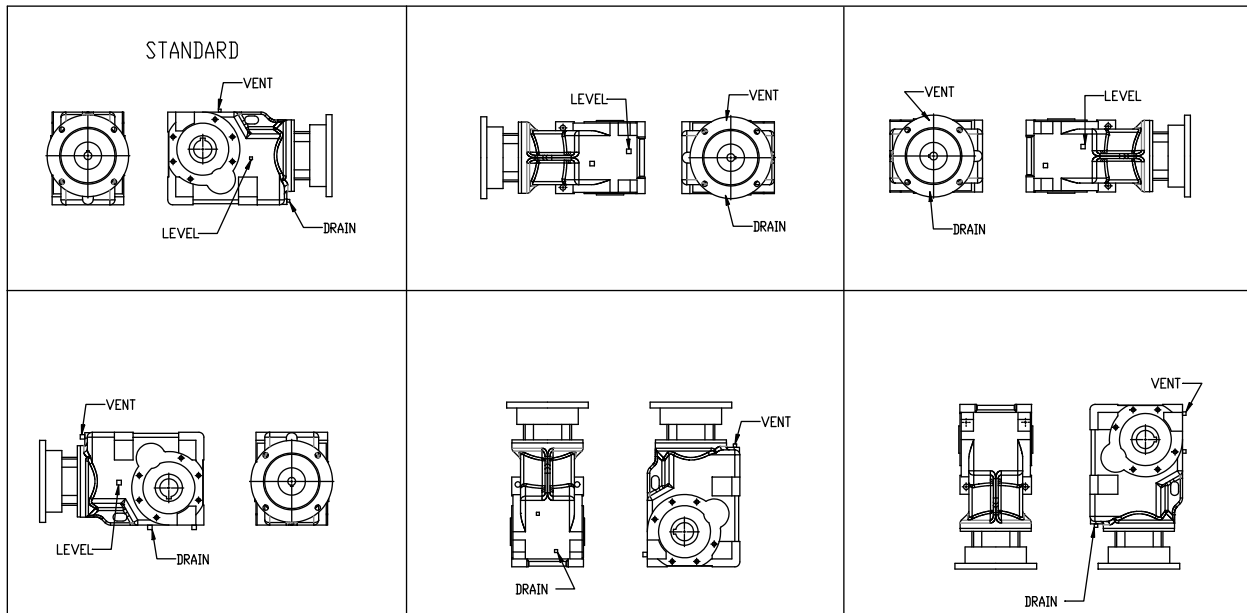
<u>Mineral Oils</u>			
Manufacturer	ISO Viscosity / AGMA No.		
	220 / 5EP	320 / 6EP	460 / 7EP
	Ambient Temperature Range		
	-5 to 25 °C (23 to 77 °F)	0 to 40 °C (32 to 104 °F)	10 to 50 °C (50 to 122 °F)
Chevron USA, Inc.	Gear Compound EP220	Gear Compound EP320	Gear Compound EP460
Exxon CO. USA	Spartan EP220	Spartan EP320	Spartan EP460
Mobil Oil Co.	Mobilgear 630X	Mobilgear 632X	Mobilgear 634X
Shell Oil Co.	Omala 220	Omala 320	Omala 460
<u>Synthetic Oils</u>			
Manufacturer	ISO Viscosity / AGMA No.		
	220 / 5EP	320 / 6EP	460 / 7EP
	Ambient Temperature Range		
	-5 to 25 °C (23 to 77 °F)	0 to 40 °C (32 to 104 °F)	10 to 50 °C (50 to 122 °F)
Chevron USA, Inc.	Tegra Synthetic EP220	Tegra Synthetic EP320	Tegra Synthetic EP460
Exxon CO. USA	Spartan SEP220	Spartan SEP320	Spartan SEP460
Mobil Oil Co.	Mobil Cibus SHC630	Mobil Cibus SHC632	Mobil Cibus SHC 634
Shell Oil Co.	Omala HD220	Omala HD320	Omala HD460
Summit Industrial	Syngear SH-7220	Syngear SH-7320	Syngear SH-7460

OIL CAPACITIES (FLUID OUNCE)

Mounting Position	Unit Size		
	K043	K063	K073
M1	34	58	118
M2	44	95	196
M3	44	95	196
M4	58	112	230
M5	75	142	294
M6	44	98	196

16 fl-oz = 1 pint
 2 pints = 1 quart
 4 quarts = 1 US gallon

VENT / LEVEL / DRAIN LOCATIONS



NOTE: The unit is filled at the factory with the proper amount of oil for the **STANDARD** mounting position. A level plug is provided for this position only so the unit can be checked for proper oil level prior to installation and start-up. All other mounting positions will require the oil level to be measured out prior to filling the unit based on the values in the table labeled **OIL CAPACITIES** above.

VENT PLUG LOCATION

Before putting the unit into operation, substitute the vent plug for the solid plug at the position desired. Arrows indicate the recommended vent plug locations. For washdown and stainless steel units with PAO synthetic oil, a vent is recommended but not required for normal operating conditions.

Change Intervals: Standard compounded lubricants should be changed every 10,000 operating hours. Synthetic lubricants should be changed every 20,000 operating hours.

CAUTION: Oil should be changed more often if the unit is used in a severe environment. (*i.e. dusty, humid*)

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.

MAINTENANCE

Your Sterling Electric unit has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Sterling Electric to maintain the warranty.

Frequently check the oil level of the unit. If oil level is low, (refer to the vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.

Inspect vent plug often to insure it is clean and operating.

CAUTION: Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The Sterling Electric line of speed reducers utilizes premium quality Viton® seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement of the seals can be easily accomplished by following the steps below:

1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Screw a #10 sheet metal screw into the hole and pry out the seal.
2. Clean the seal bore of sealant.
3. Before installing the new seal, use electrical tape to cover any keyways or sharp edges on the shaft to prevent seal lip damage.
4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

CLASS OF SERVICE

All capacity ratings are based on American Gear Manufacturers Association (AGMA) Standards. Load conditions must be within cataloged ratings published in the current Sterling Electric Catalog (available upon request).

LONG-TERM STORAGE (6 MONTHS UP)

Units must be stored indoors, in a dry, warm temperature.

Completely fill the unit with oil.

Rotate the input shaft so that the output shaft rotates at least one revolution per month.

Completely cover the input and output shaft with grease.

At the time of start up, drain the storage oil, install the breather, and fill to the proper oil level with correct lubricant for the operating condition.

WARRANTY (LIMITED)

The warranty will cover all of the parts in the gearmotor or reducer unit for 12 months from the date of shipment.

The warranty is only for parts and labor. In no event shall our liability exceed the original price of the unit, nor does it cover cost of on site repair, installation, or freight.

Contact the service department for a complete explanation as to the full warranty policies and conditions of sale.

All dimensions designs and specifications are subject to change without notice

SEAL AND BEARING SIZES

Input Bearings (Item #17)

Unit Size	Bearing Part Number and Size				
	Series	OD (mm)	ID (mm)	Width (mm)	Sterling P/N
K043	6207LLC3	72	35	17	400-0118-2
K063	6208LLC3	80	40	18	400-0171-9

(Item #22)

Unit Size	Bearing Part Number and Size				
	Series	OD (mm)	ID (mm)	Width (mm)	Sterling P/N
K043	6305	62	25	17	400-0008-9
K063	6306	72	30	19	400-0022-4

Intermediate Bearings (Item #2)

Unit Size	Bearing Part Number and Size				
	Series	OD (mm)	ID (mm)	Width (mm)	Sterling P/N
K043	32004	42	20	15	400-0558-2
K063	32205	52	25	19.25	400-0564-6

Output Bearings (Item #25)

Unit Size	Bearing Part Number and Size				
	Series	OD (mm)	ID (mm)	Width (mm)	Sterling P/N
K043	6011	90	55	18	400-0559-1
K063	6014	110	70	20	400-0563-7

Input Seal

Unit Size	Bearing Part Number and Size			
	Shaft (mm)	Bore (mm)	Width (mm)	Sterling P/N
K043	35	62	7	404-0350-0
K063	40	72	7	404-0362-8

End Cap Seal

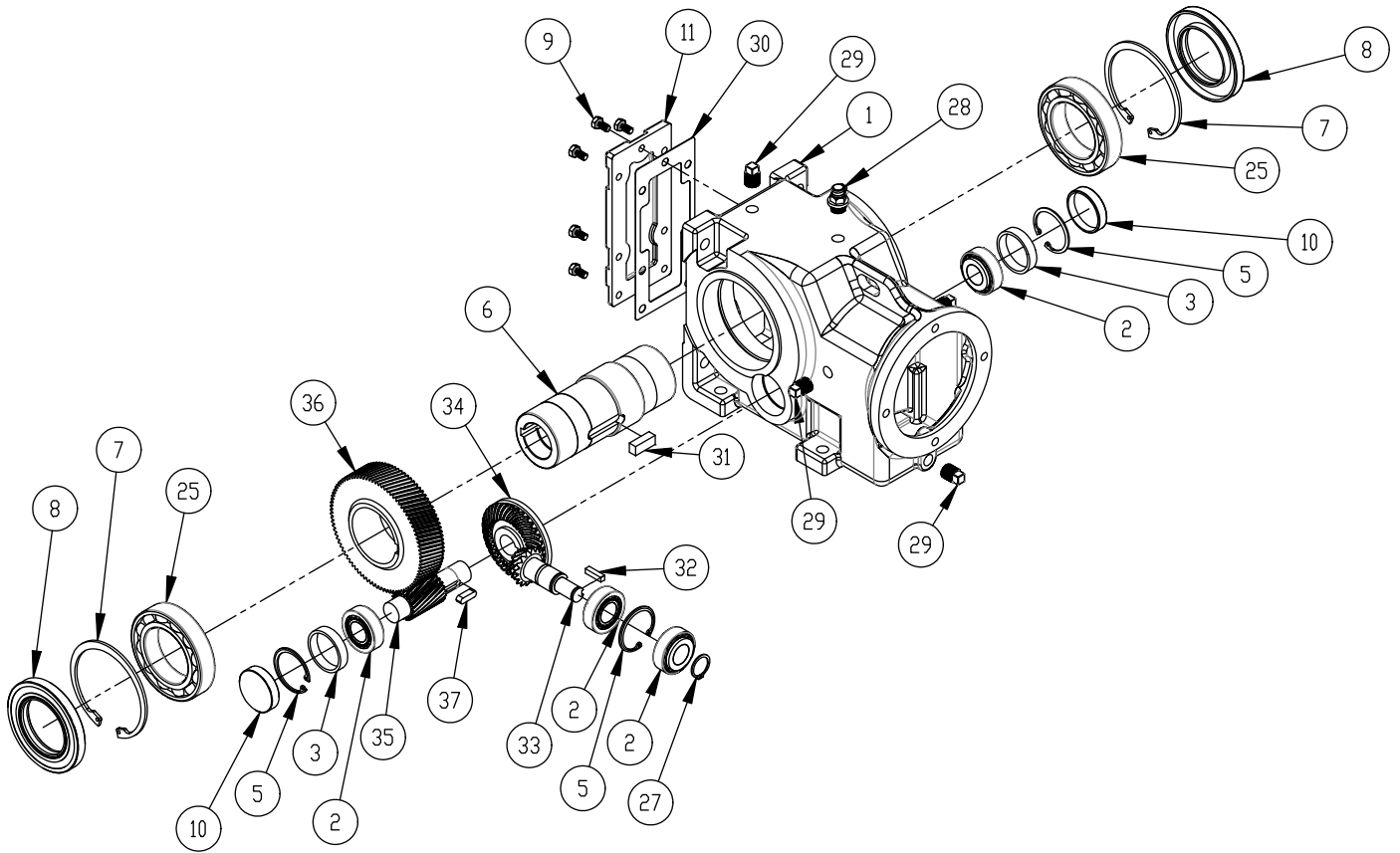
Unit Size	Bearing Part Number and Size			
	Shaft (mm)	Bore (mm)	Width (mm)	Sterling P/N
K043	-	42	7	404-0407-3
K063	-	52	7	404-0390-0

Output Seal

Unit Size	Bearing Part Number and Size			
	Shaft (mm)	Bore (mm)	Width (mm)	Sterling P/N
K043	55	90	10	404-0406-4
K063	70	110	10	404-0412-8

TRIPLE REDUCTION UNIT

Parts List



Item No.	Description	Qty	Item No.	Description	Qty	Item No.	Description	Qty
1	Gear Case Housing	1	14	Socket Head Screw	4	27	External Snap Ring	1
2	Tapered Roller Baring	4	15	Hex Head Screw	4	28	Breather / Vent	1
3	Spacer Ring	2	16	Input Shaft	1	29	NPT Plug	4
4	External Snap Ring	1	17	Double Sealed Ball Bearing	1	30	Cover Plate Gasket	1
5	Internal Bevel Ring	3	18	Motor Coupling Half	1	31	Key	1
6	Hollow Output	1	19	Input Seal	1	32	Key	1
7	Internal Snap Ring	2	20	Coupling Spider	1	33	Bevel Pinion	1
8	Output Seal	2	21	Internal Snap Ring	1	34	Bevel Gear	1
9	Hex Head Screw	7	22	Ball Bearing	1	35	Final Pinion Shaft	1
10	End Cap Seal	2	23	External Snap Ring	1	36	Final Gear	1
11	Cover Plate	1	24	Primary Pinion	1	37	Key	1
12	Input Adapter	1	25	Ball Bearing	2			
13	Input Motor Flange	1	26	Primary Gear	1			

NOTES: REPLACEMENT GEARS ARE AVAILABLE IN SETS ONLY. FOR EXAMPLE, A FINAL GEAR KIT WILL CONTAIN THE FINAL GEAR AND FINAL PINION SHAFT. A PRIMARY GEAR KIT WILL CONTAIN A PRIMARY GEAR AND A PRIMARY PINION. CONSULT FACTORY FOR PART NUMBERS. ALL BEVEL SETS MUST BE SHIMMED TO SET MOUNTING DISTANCE AND BEARING PRE-LOAD.

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