MagnaGear™ Speed Reducers
Size G100, Size G150, Size G210, Size G285, Size G390, Size G600

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see **dodgeindustrial.com** for updated instruction manuals.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

GENERAL INFORMATION:

The MagnaGear reducer is designed in accordance with the standards of the American Gear Manufacturers Association to give years of trouble-free operation. Unauthorized modifications are not allowed. In order to obtain good performance, there are precautions and procedures that must be observed when installing and servicing the reducer. This instruction manual contains installation, operating, and maintenance information for your reducer and its accessories. Additional information can be obtained by contacting your local Dodge sales office, distributor or authorized service center.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Dodge nor are the responsibility of Dodge. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

INSTALLATION

NOTE: This reducer is compatible with the Dodge Ability Smart Sensor, that can be installed in the adapter plug labeled "smart sensor". The plug and sensor can be moved to different locations as required by mounting position.

INITIAL RECEIVING INSPECTION

Carefully inspect the drive units for obvious outside damage. If any form of damage is present, notify the carrier and take photos for future use. Great care was taken to insure that the cargo was very well protected. Accessories such as heat exchangers, guards, and couplings may be packaged separately.

Reducer Lifting Instructions

If the reducer is not mounted on a base plate or swing base, the reducer may be lifted utilizing the four bolt holes located on top of the reducer at four corners. Use proper lifting equipment and safe lifting practices when lifting the reducer. The use of eye bolts and nylon straps are suggested to avoid damage to sheet metal or any painted surfaces. Metal lifting straps or cables can be used in place of nylon straps if needed.

Foundation

- A foundation for mounting the reducer must be of sufficient size and rigidity to prevent movement when the MagnaGear unit is installed and operated, and to maintain the alignment between the driven equipment, the MagnaGear, and the drive motor. The foundation surface be flat and level to within 1/16" (1.5 mm) to prevent distortion of the base plate or reducer when hold down bolts are tightened. A well laid concrete slab is the most effective way of ensuring a sound foundation. Steel sub bases can be used under the drive base.
- An elevated foundation will make oil drainage easier.
- The foundation must also have adequate strength and rigidity to withstand the operating forces resulting from the starting torque of the motor multiplied by the gear reduction ratio. Starting motor torque values can be three to even four times higher than nominal motor torque ratings.
- When the geardrive is directly attached to another component, i.e. shaft mounted on a pulley or an outboard bearing on the end of the reducer output shaft, one supporting structure shall be used to mount both components.

- Drive bases must be thermally stress relieved after fabrication for long term dimensional stability. It is preferred to have both the top and bottom surfaces machined flat to facilitate shimming. However, it is acceptable to have only the top mounting surfaces machined.

Steel Foundations

- When mounting a reducer on structural steel, an engineered rigid baseplate is recommended. Fabricated pedestals or baseplates must be carefully designed to assure that they are sufficiently rigid to withstand operating conditions. Dodge MagnaGear motor baseplates are fabricated from heavy steel to achieve the necessary rigidity. Bolt the reducer and baseplate securely to the steel supports with proper shimming to ensure a flat and level surface.

CAUTION: The reducer must be mounted on a flat base with proper shimming. Failure to observe this precaution could result in damage to or destruction of the equipment.

Concrete Foundations

If the reducer is to be mounted on a concrete foundation, grout steel mounting pads into the concrete base rather than grouting the reducer directly onto the concrete.

If the reducer is mounted on a baseplate which will be installed on a concrete foundation, use the following instructions:

- The top of the foundation slab or steel sub base should be left 1" to 1.5" (25 to 38 mm) lower than will finally be required to allow for grouting. When installing, the foundation should be roughened, cleaned, and dampened before placing the drive base in position. When installing the drive base on a steel sub base use epoxy type grout. When installing the drive base on a concrete foundation either epoxy type grout or non-shrinking Portland cement type of grout can be used.
- Foundation bolts should be secured in the concrete as shown in Fig. 1. Allow adequate length for the bolts. Foundation bolts can be placed in the concrete at the time the concrete is poured.

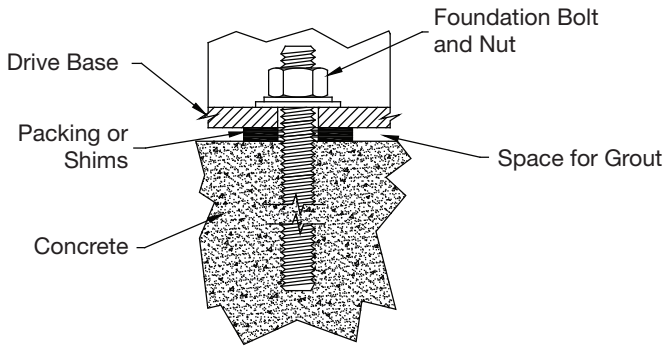


Figure 1

- Packing shims are placed between the top of the foundation and the baseplate until the unit is 1" to 1.5" (25 to 38 mm) clear of the foundation. Adjust the packing or shims until a level placed on the baseplate indicates the base is level.
- After a preliminary alignment between the MagnaGear input and output couplings, the space between the top of the concrete surface and the bottom of the drive baseframe must be filled with grout. The grout should be thoroughly worked under the baseplate and be allowed to completely set (at least 72 hours). After the grout has set, the holding bolts should be tightened evenly. Final alignment of the MAGNAGEAR should be checked after the grout has set and the hold down bolts have been tightened.

CAUTION: To move or lift a MagnaGear gearbox alone, use all 4 lifting holes in the corners of the upper housing. DO NOT use these holes to lift an entire drive motor-gearbox assembly. Use the lifting holes provided on the drive bases for lifting the drive assembly.

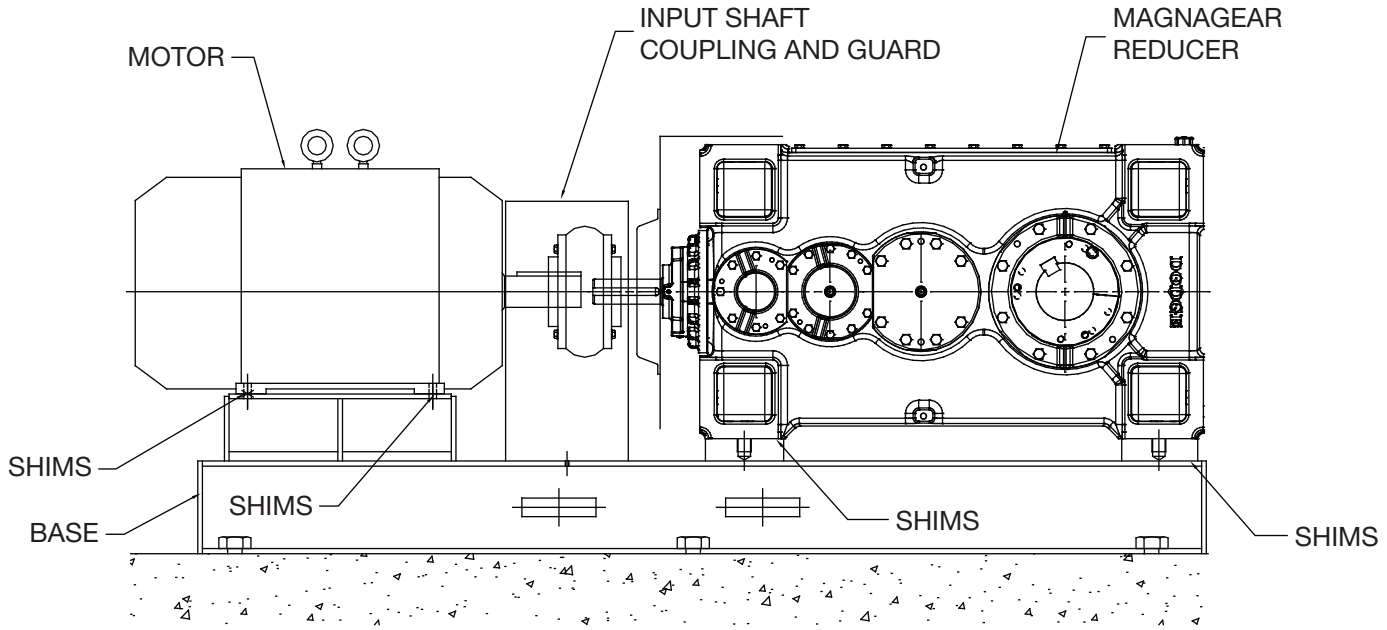


Figure 2 - Typical HD Base Mounting

ALIGNMENT AND LEVELING

If the reducer was received mounted on a baseplate or swing base, the alignment must be checked prior to operation. The possibility of misalignment in transit may occur. Recheck alignment to determine if misalignment has occurred. Remove fan covers if necessary to provide access to foundation bolts. Replace cover after tightening bolts.

Align the MagnaGear output shaft with the driven equipment shaft. The MagnaGear housing feet has tapped holes for leveling jackscrews. Start at the low speed end and work to the input side when leveling.

If shims are used to level or align the unit or baseplate, they must be distributed uniformly around the base to support the entire mounting surface. The supported load must be equalized to avoid any distortion or localized stress on the lower housing. It is preferred to shim under the drive base for height adjustment.

Use feeler gauges to determine the correct shim thickness needed to support each pad. All pads must be evenly supported when the reducer is secured.

Use shims large enough to provide adequate support. If shims are not installed properly, they may get dislodged from their location which will cause severe misalignment in the system resulting in severe damage to all the components in the system.

- When low speed shaft alignment is complete, bolt down the reducer and tighten mounting fasteners to the torque values appropriate for the bolt sizes per Table 1.
- Align the motor coupling hub with the reducer input shaft hub

CAUTION: The life of the MagnaGear reducer bearings is adversely affected by coupling misalignment.

- After both the high speed and low speed couplings have been aligned, tighten the motor hold down bolts to the torque values appropriate for the bolt sizes per Table 1. Re-check alignment.
- After alignment is completed, lubricate the couplings, if required, following the manufacturer's recommendations.
- Install high speed and low speed coupling guards in conformity with applicable safety standards for the location.

Shaft Mounted Units

Shaft mounted units require a torque arm. The connection between the gear unit and support must be flexible. The torque arm should be vertical and perpendicular to the gear drive or swingbase. Failure to follow these guidelines may result in damage to the gearbox or driven equipment. It may be beneficial to disengage the backstop when installing a shaft mounted gearbox by taking out the backstop attaching bolts. It is not necessary to remove the backstop. If the backstop is removed note the direction of the rotation arrow on the backstop, and reinstall the backstop with the proper freewheeling rotation after attaching the torque arm.

SWING BASE LIFTING INSTRUCTIONS

Lift the reducer assembly with nylon straps as shown. The use of wire rope or chain is not recommended due to the potential of damage. The nylon straps should not contact the motor housing or coupling guards due to potential sheet metal or paint damage. Note the alternate lifting point for lifting reducers with the optional electric fan kit installed. Metal lifting hooks can be used where nylon straps would be unsuitable.

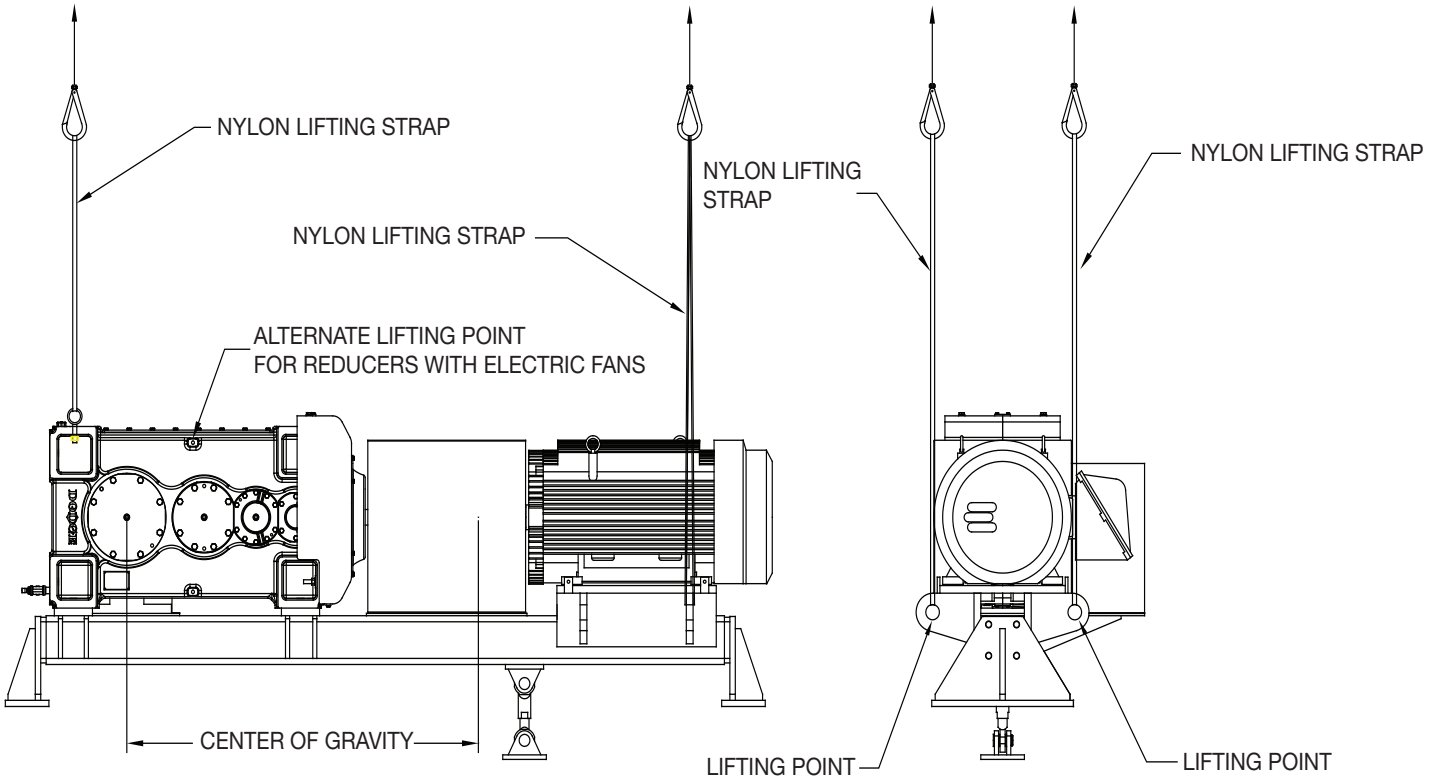


Figure 3 - MagnaGear Lifting Points

SWING BASE INSTALLATION

The swing base consists of a welded and machined steel structure which supports the reducer and motor assembly. There may be optional accessories mounted on the reducer such as a cooling fan, backstop, couplings, or heat exchanger.

To install the swing base to the driven equipment, use appropriate lifting equipment properly designed to safely lift the swing base into position.

If the reducer incorporates the hollow shaft design, slide one bushing onto the driven shaft and install the key. Next slide the reducer assembly onto the shaft and align the keyway in the hollow bore to the key. Slide the second bushing onto the shaft and align to the reducer and install all bolts. Torque all bolt to the recommended specifications listed in Table 1. See MagnaGear Bushing Installation for more detail.

If the reducer incorporates the solid shaft design a moment coupling is required for connection to the driven shaft. Follow all recommendations of the coupling manufacturer and torque all bolts to the recommended specifications listed in Table 1.

Once the swing base is attached to the driven equipment, level the swing base so that it is horizontal. Attach the swing base rod assembly to the mounting position provided for on the swing base. Making sure that the rod assembly is perpendicular to the swing base, mount the mounting bracket to the appropriate surrounding structure. Make sure that the mounting structure is sufficient to support the reaction forces of the driven machine.

If the reducer was received mounted on a swingbase, the alignment must be checked prior to operation. The possibility of misalignment in transit may occur.

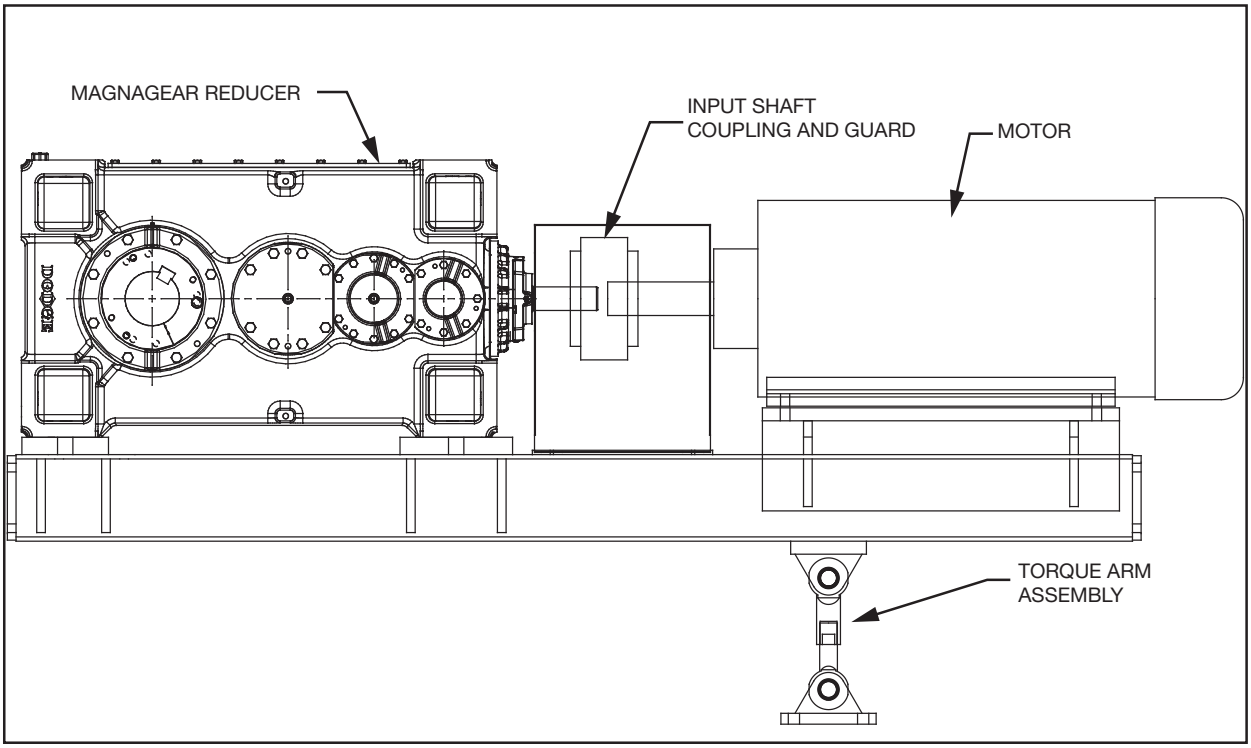


Figure 4 - Typical Swing Base Mounting of Hollow Bore Reducer

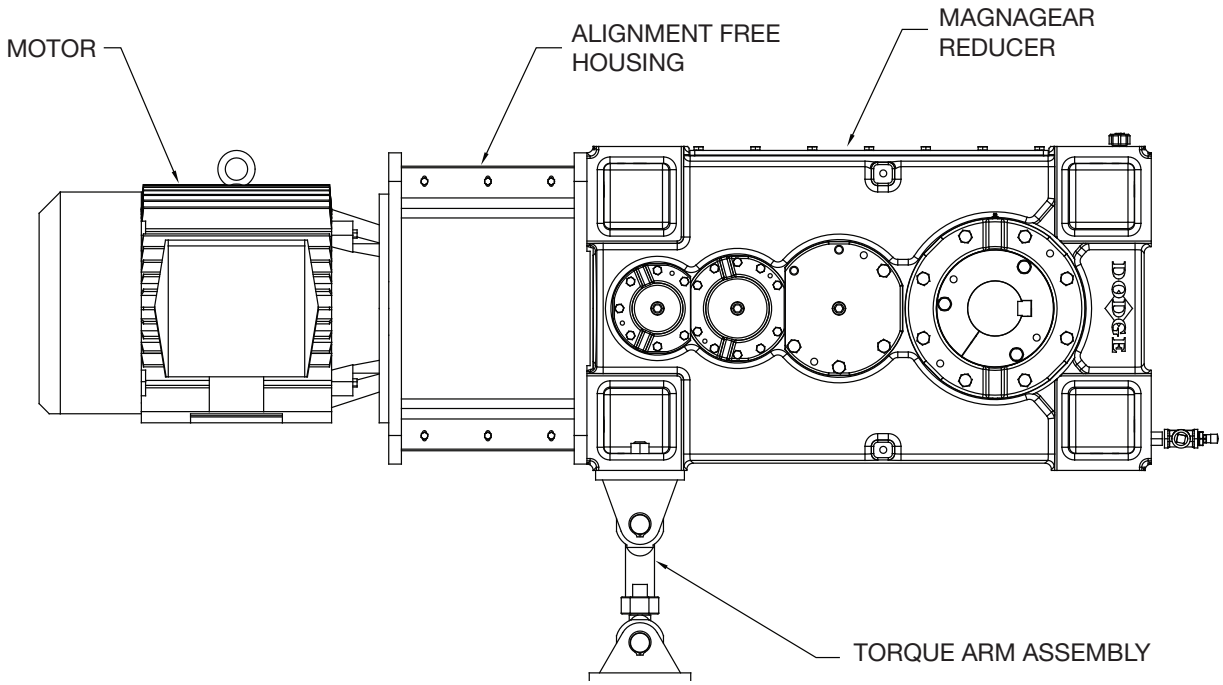


Figure 5 - Typical Alignment Free Mounting of Hollow Bore Reducer

ALIGNMENT FREE INSTALLATION

The alignment free drive consists of a motor, a welded and machined steel housing, a high speed coupling, and the reducer. The machined housing bolts to the reducers and motor and does not require additional alignment. The housing is machined such that the alignment is pre-designed into the housing. Inside the steel housing is a high speed coupling the couples the motor shaft to the reducer shaft. A torque arm assembly is provided to restrain reducer assembly rotation. In addition, there may be optional accessories mounted to the reducer such as a cooling fan, backstop, or heat exchanger.

To install the alignment free drive to the driven equipment, use appropriate lifting equipment properly designed to safely lift the drive assembly into position.

If the reducer incorporates the hollow shaft design, slide one bushing onto the driven shaft and install the key. Next slide the reducer assembly onto the shaft and align the keyway in the hollow bore to the key. Slide the second bushing onto the shaft and align to the reducer and install all bolts. Torque all bolt to the recommended specifications listed in Table 1. See MagnaGear Bushing Installation for more detail.

If the reducer incorporates the solid shaft design a moment coupling is required for connection to the driven shaft. Follow all recommendations of the coupling manufacturer and torque all bolts to the recommended specifications listed in Table 1.

Once the alignment free drive is attached to the driven equipment, level the swing base so that it is horizontal. Attach the torque rod assembly to the mounting position provided for. Making sure that the rod assembly is perpendicular to the drive assembly, mount the mounting bracket to the appropriate surrounding structure. Make sure that the mounting structure is sufficient to support the reaction forces of the driven machine.

If reducer was received assembled with the alignment free housing and motor, no additional alignment is required.

COUPLING INSTALLATION

Follow the installation instructions provided by the coupling manufacturer. Some general guidelines are provided that will aid in coupling installation. If the reducer is supplied with a backstop, do not connect couplings until the motor shaft direction of rotation is verified and is correct for the freewheeling rotation of the geardrive.

- Accurately measure the hub bore and shaft diameter to verify that each coupling hub and its shaft have an interference fit and that the amount of interference is adequate.
- Check the dimensions of the key on the shaft and on the coupling bore. Make sure the key is going to fit in the shaft and coupling keyways.
- Check the fit of the key in both the hub and shaft. The key should fit snugly against the sides of the keyway. A slight clearance should be present from top to bottom when the hub is on the shaft. Insert key flush with the end of the shaft.
- Check shaft, hub bore, and keys for nicks and burrs and remove as necessary.
- Use an oil bath to heat the coupling hubs to 245°F (118°C). Remove flexible elements before heating. Any kind of oil such as gear oil can be used as long as the flash temperature of the oil is high enough to avoid a fire hazard. Check the temperature of the coupling hub frequently with a Tempil-stick to avoid overheating.
- Alternatively mark the hub with a 275°F (135°C) temperature sensitive crayon (melts at prescribed temperatures) in several places on the hub. Remove flexible elements before heating. Use an oxy-acetylene or a blow torch to heat the hub. When using an oxy-acetylene torch use an excess acetylene mixture. Direct the flame toward the hub bore and keep it in motion while heating. Avoid over heating an area.

  Do not use an open flame in a combustible atmosphere or near combustible materials.

- Mount the hub on the shaft as quickly as possible to avoid heat loss. Carefully line up bore and keyway with shaft and keyway and slide hub onto shaft until the shaft is at the right location relative to the shaft end. If it is necessary to drive hub into position, lightly tap with a soft brass or lead hammer. DO NOT USE excessive pounding which can cause damage to the bearings or gears.
- Allow coupling hub and shaft assembly to cool.

COUPLING ALIGNMENT

Refer to the coupling manufacturer for the maximum recommended misalignment limits.

- Parallel or offset alignment is achieved by adding shims under the reducer and/or the drive base by moving the reducer and/or the drive base laterally as needed. A dial indicator gauge should be attached to the MagnaGear output coupling hub (low speed) and it should be positioned to contact the outside diameter of the pulley shaft or the outside diameter of the pulley coupling hub (Fig. 3). While slowly rotating the reducer shaft, the amount of eccentricity can be determined

  TIR (Total Indicator Reading) = 2 x P

  The difference in readings of the dial indicator gauge between any two locations 180 degrees apart will be double the amount of actual eccentricity.

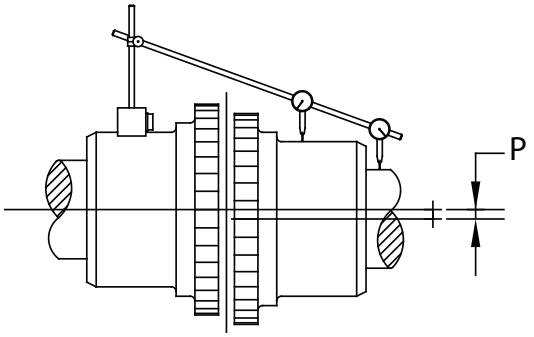


Figure 6

- Angular alignment is achieved by measuring the gap between the ends of the two coupling hubs in both the horizontal and vertical planes (Fig. 4).

TIR (Total Indicator Reading) = 2 x (X - Y)

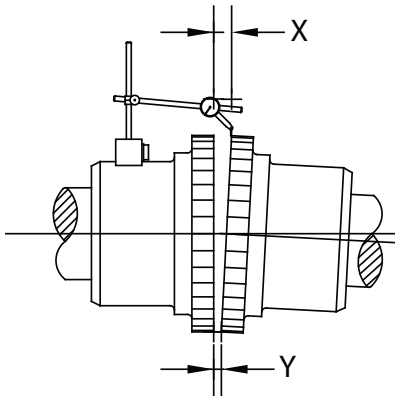


Figure 7

Table 1 - Mounting Fastener Tightening Torques (course thread series): lb-ft

Inch Fasteners		Metric Fasteners	
Nominal Diameter (in)	Grade SAE 5	Nominal Diameter (mm)	Class 8.8
1/4-20	6.5	M5x0.8	3.5
5/16-18	13	M6x1.0	5.5
3/8-16	23	M8x1.25	14
7/16-14	37	M10x1.5	27
1/2-13	57	M12x1.75	47
9/16-12	82	M16x2.0	120
5/8-11	110	M20x2.5	240
3/4-10	200	M24x3.0	580
7/8-9	320	M30x3.5	840
1-8	480	M36x4.0	1450
1-1/8-7	600		
1-1/4-7	840		
1-3/8-6	1100		
1-1/2-6	1450		

MAGNAGEAR BUSHING INSTALLATION: Sizes G100 - G600 Hollow Bore

The Dodge MagnaGear reducer is designed to fit both standard and short length driven shafts. The Standard Taper Bushings series is designed where shaft length is not a concern. The Short Shaft Bushing series is to be used where the driven shaft does not extend through the reducer.

Standard Taper Bushings:

1. One bushing assembly is required to mount the reducer on the driven shaft. An assembly consists of two tapered bushings, bushing screws and washers, two bushing backup plates and retaining rings, and necessary shaft key or keys. The driven shaft must extend through the full length of the reducer. If the driven shaft does not extend through the reducer do not use the standard tapered bushings; instead use the short shaft bushings as described in the Short Shaft Bushings section that follows. The minimum shaft length, as measured from the end of the shaft to the outer edge of the bushing flange (see Figure 9), is given in Table 2.
2. Install one bushing backup plate on the end of the hub and secure with the supplied retaining ring. Repeat procedure for other side.
3. Place one bushing, flange end first, onto the driven shaft and position per dimension “A”, as shown in Table 2. This will allow the bolts to be threaded into the bushing for future bushing and reducer removal.
4. Insert the output key in the shaft and bushing. For easy of installation, rotate the driven shaft so that the shaft keyseat is at the top position.
5. Mount the reducer on the driven shaft and align the shaft key with the reducer hub keyway. Maintain the recommended minimum distance “A” from the shaft bearing.
6. Insert the screws, with washers installed, in the unthreaded holes in the bushing flange and align with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing screws. Tighten the screws lightly. If the reducer must be positioned closer than dimension “A”, place the screws with washers installed, in the unthreaded holes in the bushing before

positioning reducer making sure to maintain at least 1/8" between the screw heads and the bearing.

7. Place the second tapered bushing in position on the shaft and align the bushing keyway with the shaft key. Align the unthreaded holes in the bushing with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing holes. Insert bushing screws, with washers installed in the unthreaded holes in the bushing. Tighten screws lightly.
8. Evenly tighten the screws in the bushing nearest the equipment to 25 lb-ft torque. Repeat this procedure on the outer bushing screws. Moving back to the bushing nearest the equipment, tighten the screws to the recommended torque value shown in Table 2. Repeat this procedure on the outer bushing screws.
9. Install torque are on the swingbase or tunnel housing.
10. Install torque arm fulcrum on a flat and rigid support so that the torque arm will be approximately at right angles to the reducer.

CAUTION: Unit is shipped without oil. Add proper amount of recommended lubricant before operating. Failure to observe this precaution could result in damage to or destruction of the equipment

11. Fill gear reducer with recommended lubricant. See Table 3.

Short Shaft Bushings:

1. One bushing assembly is required to mount the reducer on the driven shaft. An assembly consists of one long tapered bushing, one short tapered bushing, one tapered bushing wedge, bushing screws and washers, two bushing backup plates and retaining rings, and necessary shaft key or keys. The driven shaft does not need to extend through the reducer for the short shaft bushing to operate properly.

   The minimum shaft length, as measured from the end of the shaft to the outer edge of the bushing flange (see Figure 9), is given in Table 2.

Table 2 - Minimum Mounting Dimensions and Bolt Torques

Reducer Size	Standard Taper Bushing	Short Shaft Bushing
100	17.13	13.00
150	19.00	14.28
210	20.63	15.44
285	21.88	16.09
390	23.50	16.78
600	27.30	N/A

Bushing Screw Torque and Minimum Clearance for Removal			
Reducer Size	Fastener Size	Torque in Ft.-Lbs.	A
100	1/2-13	67 – 57	1.81
150	1/2-13	67 – 57	2.06
210	5/8-11	110 – 100	2.39
285	5/8-11	110 – 100	2.39
390	5/8-11	110 – 100	2.39
600	3/4-10	200 – 190	3.00

2. The long bushing is designed to be installed from the side of the reducer opposite the driven equipment as shown in Figure 8. The long bushing when properly installed is designed to capture the end of the customer shaft that does not extend through the reducer. Normally the reducer would be mounted such that the input shaft extends from the side of the reducer opposite the driven equipment however the reducer design allows installation of the reducer to be mounted in the opposite direction.
3. Install the tapered bushing wedge into the hollow bore of the reducer from the same side as the long bushing will be installed. When installing the tapered bushing wedge into the reducer hub, install the flange end first so that the thin taper is pointing outwards towards the long bushing as shown in Figure 9. The wedge is properly installed when it snaps into place in the reducer hub.

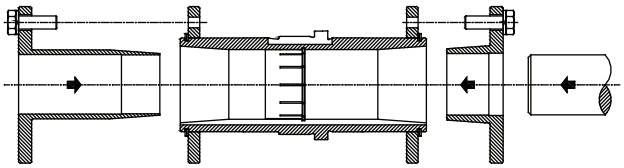


Figure 8 - Short Shaft Bushing Output Hub Assembly

4. Align the tapered bushing wedge keyway with the reducer hub keyway. The keyway in the wedge is slightly wider than the keyway in the reducer hub allowing for easier installation.
5. Install one bushing backup plate on the end of the hub and secure with the supplied retaining ring. Repeat procedure for other side.
6. Install the short bushing; flange first, on the driven shaft and position per dimension "A", as shown in Table 2. This will allow the bolts to be threaded into the bushing for future bushing and reducer removal.
7. Insert the output key in the shaft and bushing. For easy of installation, rotate the driven shaft so that the shaft keyseat is at the top position.
8. Mount the reducer on the driven shaft and align the shaft key with the reducer hub keyway. Maintain the recommended minimum distance "A" from the shaft bearing.
9. Insert the screws, with washers installed, in the unthreaded holes in the bushing flange and align with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing screws. Tighten the screws lightly. If the reducer must be positioned closer than dimension "A", place the screws with washers installed, in the unthreaded holes in the bushing before positioning reducer making sure to maintain at least 1/8" between the screw heads and the bearing.
10. Place the long bushing in position on the shaft and align the bushing keyway with the shaft key. Use care to locate the long bushing with the tapered bushing wedge installed earlier. Align the unthreaded holes in the bushing with the threaded holes in the bushing backup plate. If necessary, rotate the bushing backup plate to align with the bushing holes. Insert bushing screws, with washers installed in the unthreaded holes in the bushing. Tighten screws lightly.
11. Alternately and evenly tighten the screws in the bushing nearest the equipment to the recommended torque given in Table 2. Repeat procedure on outer bushing.
12. Install torque arm on the swingbase or tunnel housing.
13. Install torque arm fulcrum on a flat and rigid support so that the torque arm will be approximately at right angles to the reducer.

CAUTION: Unit is shipped without oil. Add proper amount of recommended lubricant before operating. Failure to observe this precaution could result in damage to or destruction of the equipment.

14. Fill gear reducer with recommended lubricant. See Table 3.

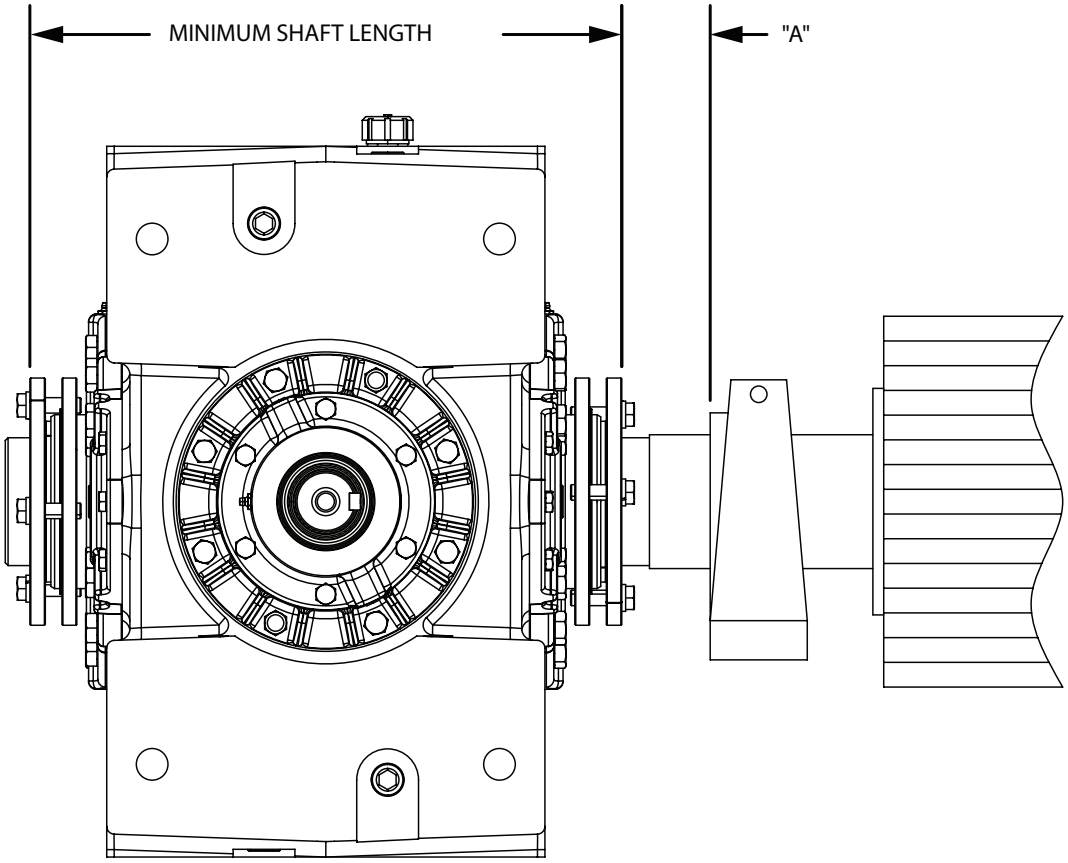


Figure 9 - Minimum Recommended Dimensions

Bushing Removal for Standard Taper or Short Shaft Bushings:

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in the bushing flanges are clean. If the reducer was positioned closer than the recommended minimum distance “A” as shown in Table 2, loosen the inboard bushing screws until they are clear of the bushing flange by 1/8”. Locate two (2) wedges at 180 degrees between the bushing flange and the bushing backup plate. Drive the wedges alternately and evenly until the bushing is free on the shaft.
3. Remove the outside bushing, the reducer, and then the inboard bushing.

Backstops:

The backstop is lubricated by the geardrive. There are no serviceable parts in the backstop assembly and no external lubrication is required.

To change the direction of rotation on a geardrive equipped with a backstop, the backstop must be reversed to allow free rotation in the opposite direction. To change the direction of rotation, follow the procedure below.

1. Remove all bolts retaining the backstop outer housing to the geardrive. Remove backstop outer housing. To aid removal, lightly tap the backstop outer housing with a brass or plastic hammer to break the seal between the reducer and the backstop outer housing. Do not use a steel hammer.
2. Clean and remove all RTV from the geardrive and backstop outer housing.
3. The inner race of the backstop is now visible and is held in place on the geardrive shaft by a snap ring. Remove the snap ring. Once the snap ring is removed, the inner race can be removed from the shaft. Do no use force, the inner race should be able to be removed from the shaft easily. Note the direction of the arrow stamped on the inner race. The direction of the arrow indicates the free direction of rotation. Turn the inner race end to end 180 degrees so the arrow is now reversed and slide the inner race back onto the shaft making sure the inner race lines up with the shaft key. Reinstall the snap ring.
4. Add a bead of RTV to the mating surface of the backstop outer housing making sure the RTV is added around each fastener hole. Do not apply excessive amounts of RTV to the backstop outer housing.
5. Before installing the backstop outer housing, the inner race sprags will need to be reset. To reset the sprags, a stiff two to three inch rubber band will be required. Stretch the rubber band around the sprags on the inner race. Once the backstop outer housing is piloted onto the inner race, cut and remove the rubber band. With a slight turning motion, slide the backstop outer housing into position. Do not force the backstop outer housing into position, if the outer housing is piloted correctly, it will slide easily into position.
6. Align the fastener holes in the backstop outer housing with the holes in the geardrive. Reinstall the previously removed bolts and tighten to the correct torque values given in Table 1.

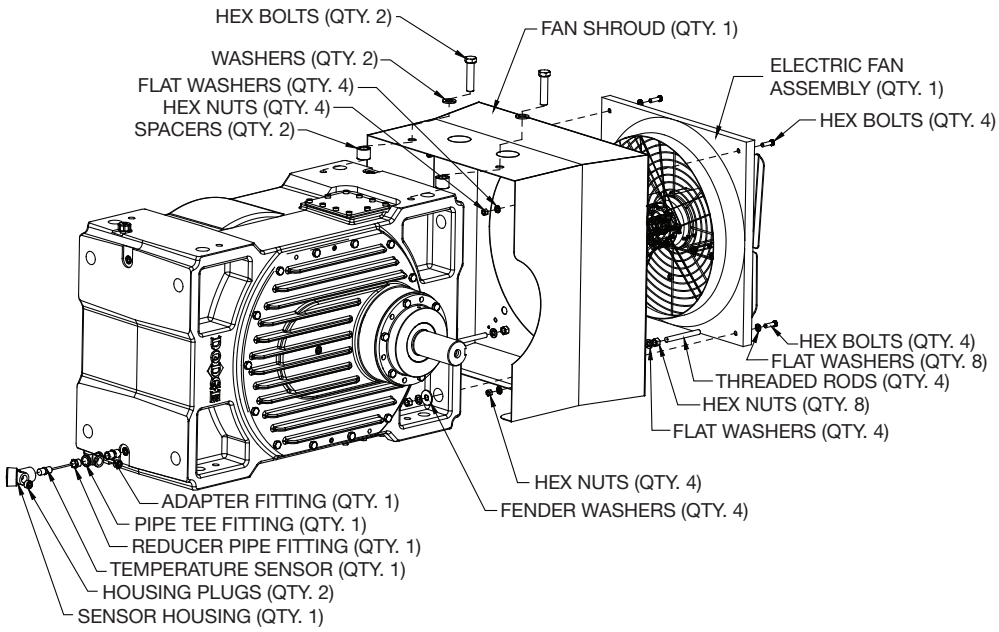


Figure 10 - Electric Cooling Fan Kit Instructions

INSTALLATION OF ELECTRIC COOLING FAN

Mount and align gearbox before installing electric fan kit . Remove the fan assembly and corresponding parts from the packing material. Verify and identify all of the components and fasteners shown on the graphic above. Sandwich the tabs located inside the fan shroud (qty.1) with the hex nuts (qty.4) and flat washers (qty.4) as shown in the graphic below.

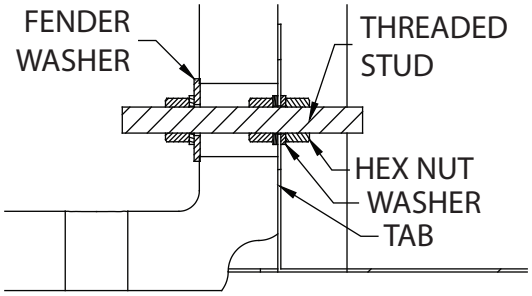


Figure 11 -- Fan Kit

Center the electric fan (qty. 1) with the clearance holes on the fan shroud (qty. 1) mounting face using the flat washers (qty. 8), hex bolts (qty. 4), and hex nuts (qty. 4). Lay the spacers (qty. 2) over the two drilled and tapped mounting holes on the top surface of the gearbox. Bring the electric fan shroud with assembled electric fan and rest it on the spacers. Use the flat washers (qty. 2) and hex bolts (qty. 2) and reach through the clearance holes (on top of the fan shroud) and spacers to thread the bolts into the tapped holes (qty. 1) then tighten the bolts. In the gearbox lower feet openings install the fender washers (qty. 2), flat washers (qty. 2), and hex nuts (qty. 2) to the foot side of the threaded studs.

WIRING OF ELECTRIC FAN

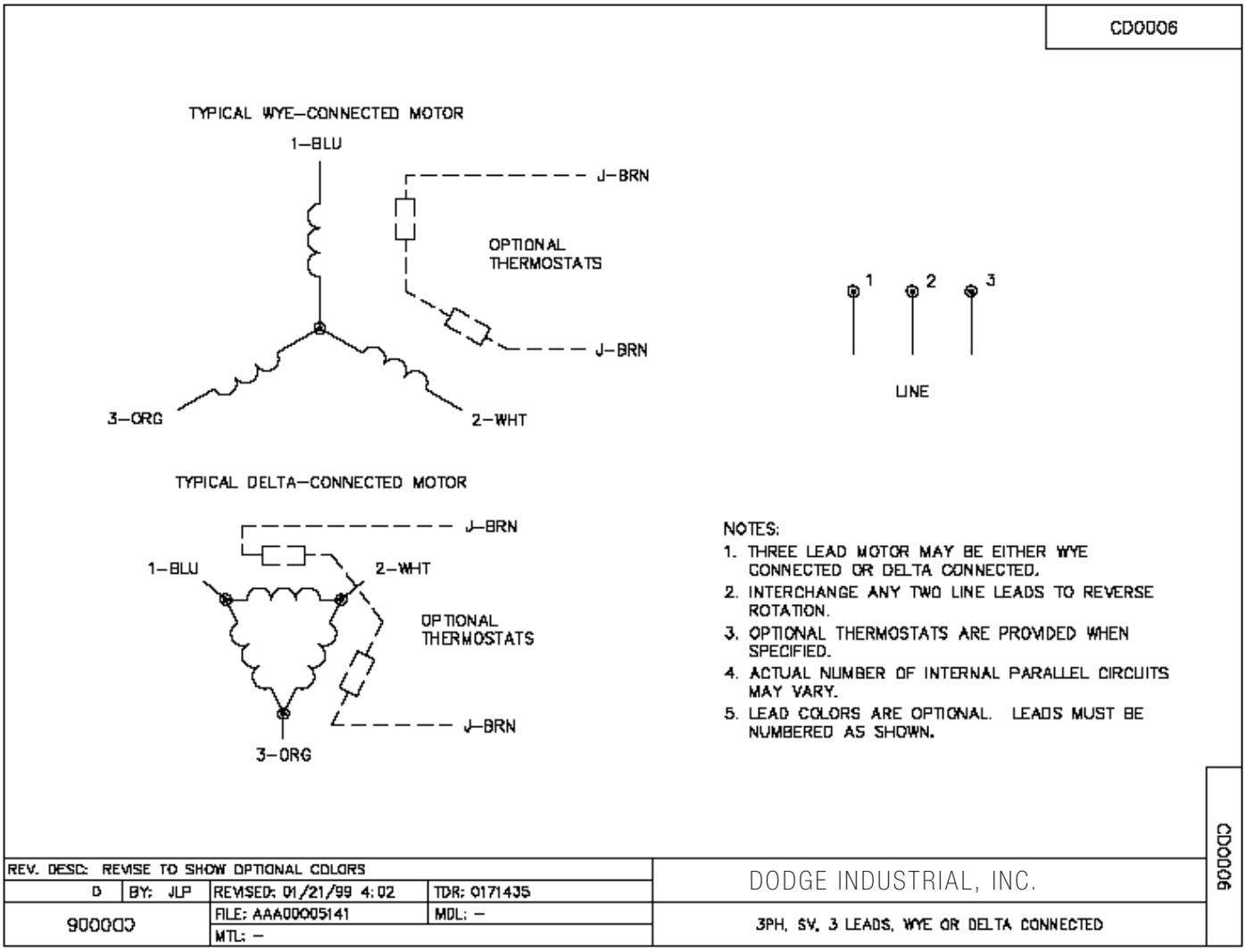
Use the attached electrical diagram below for wiring the electric motor.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

INSTALLATION OF (RTD) TEMPERATURE SENSOR

Verify that all of the fittings shown above have been supplied. Before adding lubrication to the gearbox remove the drain plug on the opposite side of the fan shroud. Assemble the adapter fitting (qty. 1), pipe tee fitting (qty. 1), reducer pipe fitting (qty. 1) temperature sensor (qty. 1) housing plugs (qty. 2), and sensor housing (qty.1) sealing each fitting with pipe sealant. Install the assembled components into the sump drain hole. Connect the RTD lead wires to the PLC. This is the device that signals the electric fan turning it off and on. The electric fan should operate when the sump temperature of the gearbox reaches 150°F. The resistance of the RTD at 150°F is 125.3729 Ω.

WARNING: The user is responsible for conforming to the National Electrical Code and all other applicable local codes. Wiring practices, grounding disconnects and overcurrent protection are of particular importance. Failure to observe these precautions could result in severe bodily injury or loss of life.



LUBRICATION

Mineral based EP oils are the preferred lubricant, suitable for operating temperatures up to 200°F (93°C) as well as for low ambient temperatures down to 25°F (-4°C). For lower temperatures or critical applications, synthetic lubricants which are suitable for operating temperatures up to 212°F (100°C) as well as for low ambient temperatures down to -25°F (-32°C).

Fill to the level indicated by the dipstick or sight glass. External oil lines, pumps and heat exchangers will require additional quantities of oil. Run the gearmotor for 3 minutes to fill the heat exchanger and lube passages. Recheck the oil level and add oil as required.

A 25 micron filter is recommended to filter oil before it enters the gearbox.

IMPORTANT: Because reducer is shipped without oil, it is necessary to add the proper amount of oil before operating reducer. Follow instructions on reducer warning tags and in the installation manual.

Under average industrial operating conditions using mineral oil, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. If using synthetic oil, the change interval can be increased to 8000 hours of operation or 18 months of service, whichever occurs first. Check oil level monthly. Drain reducer and flush with kerosene, clean magnetic drain plugs and refill to proper level with new lubricant.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in bodily injury.
Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F, the oil should be changed every 1 to 3 months, depending on severity of conditions.

The performance of the new oil will be higher if a better job is done in removing old oil from the reducer. A small amount of residual oil is usually not detrimental to performance. Never mix gear oils from different manufacturers or type. If changing oil brands or type, flush the geardrive by pouring a charge of the new oil into the gearbox and allow it to drain.

Table 3 - Oil Recommendations - ISO Grades		
	Output RPM	
Temperature Range	Up to 100	Over 100
15˚F to 60˚F 50˚F to 125˚F	220EP 320EP	220EP 220EP

Notes:
1. Assumes auxiliary cooling where recommended in the catalog.
2. Pour point of lubricant selected should be at least 10°F lower than expected minimum ambient starting temperature.
3. When properly selected for specific applications, MagnaGear backstops are suitable for use with EP lubricants.
4. Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer's representative for his recommendations.
5. For reducers operating in ambient temperatures between -22°F (-30°C) and 20°F (–6.6°C) use a synthetic hydrocarbon lubricant, 100 ISO grade or AGMA 3 grade (for example, Mobil SHC627). Above 125°F (51°C), consult Dodge Gear Application Engineering (864) 288-9050 for lubrication recommendation.
6. Mobil SHC630 Series oil is recommended for high ambient temperatures.

Greased Shaft Seals

Grease packed shaft seals must be re-greased depending on the contamination of the seal area. Under normal operating conditions re-grease the seals at every oil change. To re-grease the seals, remove the solid grease plug from the seal carrier and add fresh grease thru the zerk fitting provided while slowly rotating the reducer input shaft. Add enough grease to the seal carrier. Re-install the solid grease plug in the seal carrier until clean grease is purged from the seal carrier. Under extreme operating conditions, the seals should be re-greased every 1 to 3 months depending on the severity of the operating conditions.

DRAINING THE OIL

Shut down the geardrive and follow lock out tag out procedures to prevent accidental startup. Refer to the figure 5 for the oil drain location. Completely drain or pump the oil into a suitable container. If it is suspected that the oil is contaminated, the geardrive should be flushed by pouring a charge of oil equal to the fill amount and allow the oil to drain into a container. Thoroughly clean the magnetic drain plugs.

OIL SAMPLING

Change oil per the schedule in Preventive Maintenance Section. It is a good idea to have the lubricant supplier perform an oil analysis at the time of oil change. Consider setting up an oil sampling plan to determine the optimal time to change the lubricant based on its condition.

CAUTION: If your environment is especially high in moisture, dust and dirt, check the oil condition frequently. Take samples and check for condensation and sediment. Check the oil any time unusual ambient conditions might cause excessive condensation inside the gear case.

CAUTION: If environmental conditions become severe with excessive amounts of dirt, dust or moisture, contact Dodge Product Support to determine whether other devices may be needed to protect your reducer.

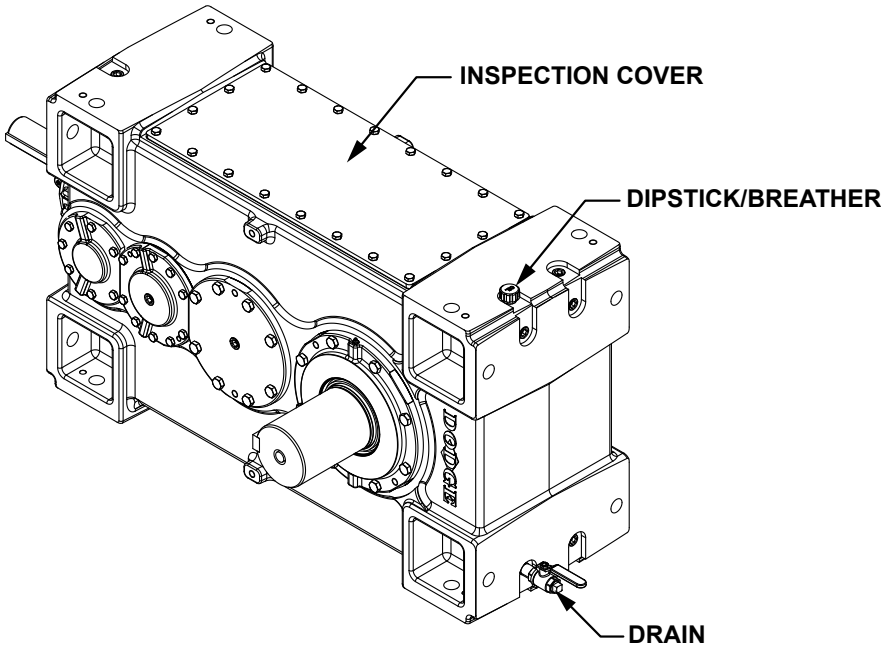


Figure 12 - Oil drain and dipstick / breather locations

START UP

General

After the installation of the MagnaGear drive unit is completed, check the following to ensure safe operation of each MagnaGear drive.

1. Check the couplings connecting drive motor to MagnaGear for proper alignment. Check that the couplings are filled with the correct grade of grease as recommended by the coupling manufacture.
2. Check all mounting bolts, nuts and screws to be sure they are tight.
3. Check that oil is up to the correct level on the dipstick or in the oil level sight gauge.
4. Check direction of rotation of all components.
5. Ensure that the breather, access covers and coupling guards are in place and secured. Please note that breathers are shipped in a bag which is attached to the breather connection port. Remove the breather from the bag and screw it into the breather port.

CAUTION: Do not operate unit with caps, covers or guards missing.

6. If equipped, operate the MagnaGear cooling pump to circulate lubricating/cooling oil through the system. Purge air from the pump housing volute by loosening plug at top portion of the volute. Check the oil level again to be sure oil is at the correct level with the pump running.
7. If the MagnaGear has an external backstop, check that the direction of rotation of the backstop and output drive shaft are the same.

IMPORTANT: Lubricant level checks should be done with the cooling pump running, if equipped.

PREVENTIVE MAINTENANCE

General

All maintenance and repair work should be carried out by trained personnel. Perform the following maintenance at the recommended intervals.

First day of operation

- Check oil temperature – Sump temperature will vary based on operating conditions and cooling method. The gearbox is designed for a maximum oil sump temperature of 200°F (93°C). For water cooled heat exchangers, water flow rate can be adjusted to obtain the desired temperature. Flow rates in the higher range will reduce the oil sump temperature. Check with the cooler manufacturer to determine the allowable flow rates through the cooler.
- Check for change in noise level
- Check for oil leaks

After first month or 600 hours of operation

- Check oil for water content
- Change oil
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Re-grease seals

Periodically

- Check oil level
- Check for leakage
- Check oil temperature for changes
- Check for change in noise level
- Change oil filter

Every 6 months or 2500 hours of operation

- Check oil for water content
- Change oil (Synthetic oil every 18 months or 8000 hours)
- Change oil filter with oil change
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system
- Re-grease seals

Every 18 months or 8000 hours of operation for synthetic lubricant

- Check oil for water content
- Change oil
- Change oil filter
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system

Oil Analysis Program

Oil change intervals can be extended provided an oil analysis programs is in effect. General guidelines for typical properties and contaminate levels are listed below. If an oil sample indicates any of the conditions listed, the oil and filter should be changed.

Viscosity Change:	+/- 15% of starting ISO value
Oxidation/TAN:	Increase of 2 in TAN over starting value
Water:	1000 ppm
Iron:	200 ppm
Silicon/Dirt:	50 ppm
Copper:	100 ppm
Aluminum:	20 ppm

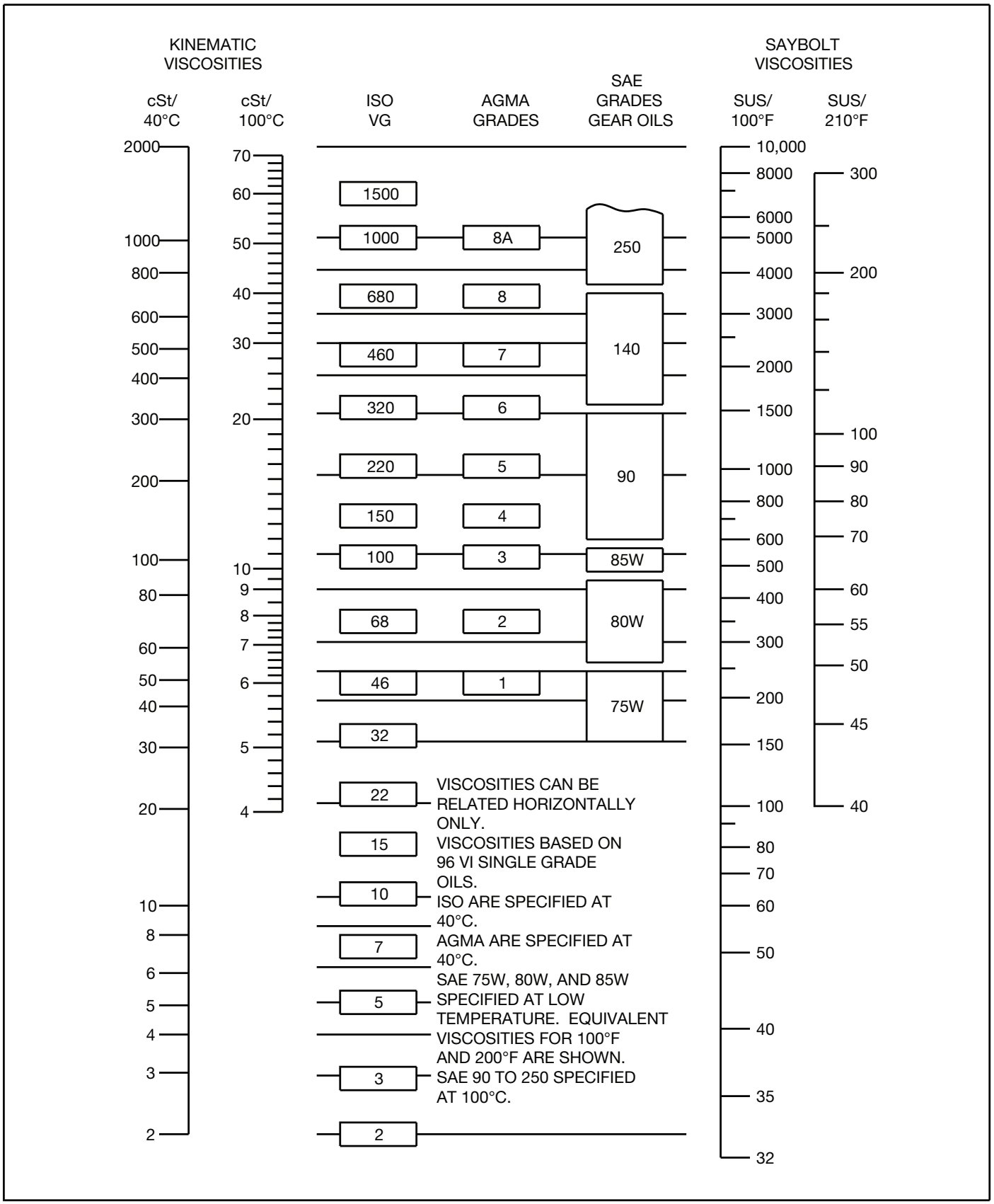
Typically a 4:1 ratio of iron to silicon indicated dirt contamination.

The values listed are guidelines. Trends are just as important as actual numbers. Increased contaminate values would indicate internal component wear is beginning to occur. The reducer should be monitored more frequently and may need to be removed from service for repair.

Oil Capacity

Approximate Oil Capacity For Horizontal Mounting * 1750 Input RPM		
Reducer Size	**Reducer Type**	**Oil Capacity (Gal.)**
G100	Right Angle Reducer (12.5 to 40:1 Ratio)	7.1
	Right Angle Reducer (45.0 to 63:1 Ratio)	8.2
	Parallel Shaft (8.0 to 12.5:1 Ratio)	7.1
	Parallel Shaft (14.0 to 22.4:1 Ratio)	8.2
	Parallel Shaft (25.0 to 63:1 Ratio)	8.6
G150	Right Angle Reducer (12.5 to 40:1 Ratio)	8.7
	Right Angle Reducer (45.0 to 63:1 Ratio)	10.1
	Parallel Shaft (8.0 to 16:1 Ratio)	8.7
	Parallel Shaft (18.0 to 22.4:1 Ratio)	10.1
	Parallel Shaft (25.0 to 63:1 Ratio)	10.5
G210	Right Angle Reducer (12.5 to 40:1 Ratio)	11.6
	Right Angle Reducer (45.0 to 63:1 Ratio)	14.0
	Parallel Shaft (8.0 to 18:1 Ratio)	11.6
	Parallel Shaft (20.0 to 22.4:1 Ratio)	13.6
	Parallel Shaft (25.0 to 63:1 Ratio)	14.6
G285	Right Angle Reducer (12.5 to 63:1 Ratio)	16.0
	Parallel Shaft (8.0 to 20:1 Ratio)	16.0
	Parallel Shaft (22.4:1 Ratio)	18.5
	Parallel Shaft (25.0 to 63:1 Ratio)	16.0
G390	Right Angle Reducer (12.5 to 63:1 Ratio)	17.6
	Parallel Shaft (8.0 to 20:1 Ratio)	17.6
	Parallel Shaft (22.4:1 Ratio)	20.5
	Parallel Shaft (25.0 to 63:1 Ratio)	17.6
G600	Right Angel Reducer (12.5 to 63:1 Ratio)	28.0
	Parallel Shaft (All Ratios)	28.0
* Oil Level is for horizontal mounting only if reducer is mounted at an angle or incline. Consult product support for correct oil level.		

OIL VISCOSITY EQUIVALENCY CHART



GUIDELINES FOR MAGNAGEAR REDUCER LONG-TERM STORAGE LESS THAN 6 MONTHS

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

Preparation:

1. Drain oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 4.
2. Seal the unit airtight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.
3. Cover all unpainted exterior parts with a waxy rust preventative compound that will keep oxygen away from the bare metal. (Non-Rust X-110 by Daubert Chemical Co. or equivalent)
4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside, or cover the unit with a durable waterproof cover which can keep moisture away.
5. Protect reducer from dust, moisture, and other contaminants by storing the unit in a dry area.
6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire exterior with a rust preventative.

When placing the reducer into service:

1. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
2. Clean the shaft extensions with petroleum solvents.
3. Assemble the vent plug into the proper hole.
4. Follow the installation instructions provided in this manual.

Table 4 – Quantities of VCI #105 Oil (VCI #105 and #10 are interchangeable)

Reducer Size	Quantity (Ounces / Milliliter)
100	2 / 59
150	3 / 89
210	4 / 118
285	6 / 177
390	8 / 237
600	10 / 296

GUIDELINES FOR MAGNAGEAR LONG-TERM STORAGE OVER 6 MONTHS

1. Recommended storage requirements for MagnaGear drives are listed below. Follow these recommendations for drives that will not be placed in service for at least six months from date of shipment.
2. Place MAGNAGEAR drives in a clean, dry, protected warehouse, where control over temperature, dust, dew point, shock and vibration are reasonably maintained.
3. The storage area is to be free from any shock or vibration of 2 mils max. at 60 hertz, to prevent bearings from brinelling. Exceeding the above limits will require vibration damping materials under units.
4. The storage area temperatures should not be below 50°F or over 120°F and relative humidity should be a maximum of 60%.
5. The MAGNAGEAR drive should be protected by a covering, but not sealed to allow air circulation.
6. Fill the MAGNAGEAR completely to the top with the same oil that will be used in operation. This will protect all the internal parts from corroding. Another advantage gained is to minimize the volume of air in the MAGNAGEAR as well as minimizing the in and out breathing of air as temperatures change. This will minimize the amount of moisture that can accumulate due to in and out breathing of air. Remove the oil breather and plug the opening
7. Coat exposed shafts with a thick layer of grease. Additional weather-proofing may be required for some installations. If there are any other exposed steel surfaces, on the MAGNAGEAR gearcase, or any other component, they should be coated with grease or other suitable rust inhibitors as well.
8. For the protection of bearings from brinelling, turn the MAGNAGEAR input shaft once a month. If a coupling is installed on the input shaft, the shaft can be turned by hand. Otherwise, use a chain wrench to turn the shaft. To protect the shaft from damage, wrap a soft cloth rag on the shaft and clamp the chain over the rag.
9. The input shaft should be turned by a sufficient number of times to allow the output shaft to turn by at least one turn plus 1/8 of a turn. After rotation, the output shaft should come to rest in a different angular orientation than before rotation, approximately 45 degrees away from the previous position. The number of turns of the input shaft should be equal to the gearbox ratio plus one eight of the ratio. For example if the nameplate on the gearcase shows the gear ratio as 24, then turn the input shaft by 24 plus 1/8 of 24.

   No input shaft turns = ratio + (ratio /8) Example: 24 + (24 / 8) = 24 + 3 = 27 turns

10. If either the input or output shafts are braced to support the weight of their respective couplings, or flywheels, remove the brace before turning the shafts. After rotating the shafts, reinstall the braces. Make sure the brace adequately supports the coupling, or the flywheel, to take the weight off the bearings.

Actual Ratio

MagnaGear Right Angle Triple Reduction Reducer						
Actual Ratio						
Nominal Ratio	**Size 100**	**Size 150**	**Size 210**	**Size 285**	**Size 390**	**Size 600**
12.50	12.409	12.510	12.353	12.698	12.569	12.634
14.00	13.998	14.112	13.962	14.409	14.401	13.994
16.00	15.657	15.784	15.634	16.414	16.193	15.928
18.00	18.230	18.378	17.630	18.224	17.789	17.343
20.00	20.390	20.556	19.620	20.346	20.144	19.652
22.40	22.543	22.726	22.960	22.761	21.959	21.910
25.00	24.670	24.870	25.552	25.308	25.151	24.327
28.00	28.105	28.333	28.528	28.254	29.115	27.489
31.50	31.103	31.356	31.200	31.607	31.738	30.500
35.50	35.030	35.314	35.609	34.998	36.351	35.814
40.00	41.221	41.473	41.120	40.646	39.996	40.469
45.00	46.655	47.033	46.800	45.705	44.224	44.902
50.00	49.770	50.174	50.578	50.091	49.188	49.598
56.00	55.572	56.023	55.841	56.550	55.097	55.147
63.00	61.832	62.210	61.679	60.289	62.250	61.807

MagnaGear Parallel Shaft, Double and Triple Reduction Reducer						
Actual Ratio						
Nominal Ratio	**Size 100**	**Size 150**	**Size 210**	**Size 285**	**Size 390**	**Size 600**
8.00	8.080	8.146	8.044	7.759	7.754	8.227
9.00	9.115	9.189	9.091	8.838	8.719	9.113
10.00	10.195	10.278	10.180	9.813	9.579	10.372
11.20	11.271	11.363	11.480	10.956	10.847	11.293
12.50	12.335	12.435	12.776	12.256	11.824	12.797
14.00	14.053	14.167	14.264	13.571	13.543	14.267
16.00	15.552	15.678	15.600	15.761	16.476	15.841
18.00	17.515	17.657	17.804	17.722	18.325	17.900
20.00	20.611	20.737	20.560	20.096	20.526	19.861
22.40	22.306	22.487	22.381	23.598	23.191	21.938
25.00	25.343	25.500	24.802	25.187	25.405	25.235
28.00	28.589	28.766	28.031	28.119	28.767	28.722
31.50	31.975	32.174	31.389	31.457	31.359	31.274
35.50	35.351	35.571	35.396	34.831	35.917	35.438
40.00	38.687	38.928	39.392	40.453	39.519	39.509
45.00	44.074	44.348	43.980	45.487	43.697	43.867
50.00	48.775	49.078	51.983	51.581	48.601	49.568
56.00	54.933	55.274	54.897	55.893	54.439	54.999
63.00	64.642	64.915	63.393	63.381	61.507	60.750

REPLACEMENT OF PARTS

IMPORTANT: Using tools normally found in a maintenance department, a MagnaGear speed reducer can be disassembled and reassembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears (for shrinking these parts on shafts) should be available.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who, for any reason, desire factory service. The oil seals are contact lip seals. Considerable care should be used during disassembly and reassembly to avoid damage to the surface on which the seals rub.

The keyseat in the input shaft, as well as any sharp edges on the output hub should be covered with tape or paper before disassembly or reassembly. Also, be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

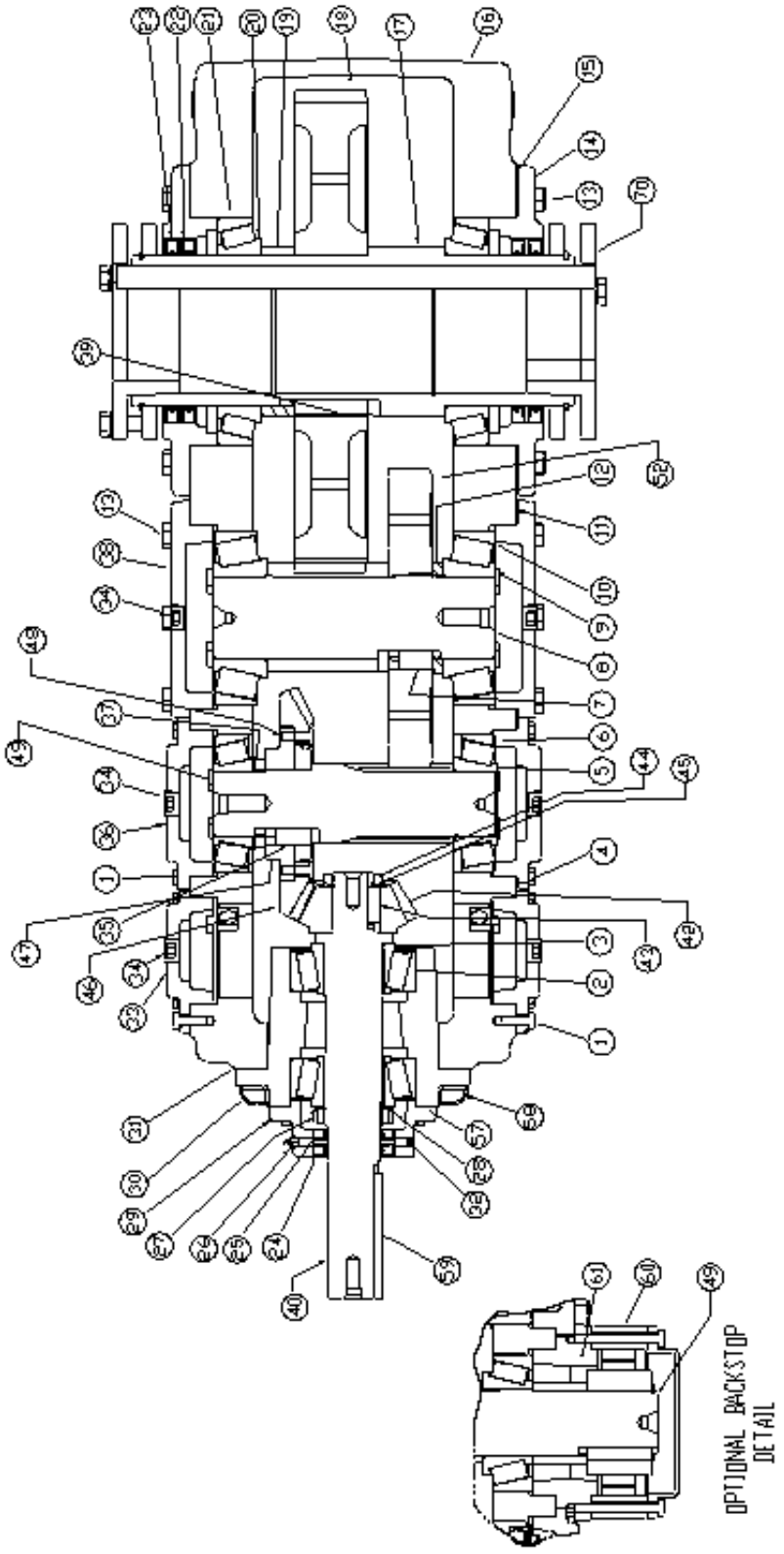
Ordering Parts: When ordering parts for reducer, specify reducer size number, reducer model number, part name, part number, and quantity.

It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also.

If the large gear on the output shaft must be replaced, it is recommended that an output shaft assembly consisting of a gear assembled on a shaft be ordered to ensure undamaged surfaces on the output shaft where the output seals rub. However, if it is desired to use the old output shaft, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals, the smooth surface of the output shaft must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against the rollers or cage of any bearing.

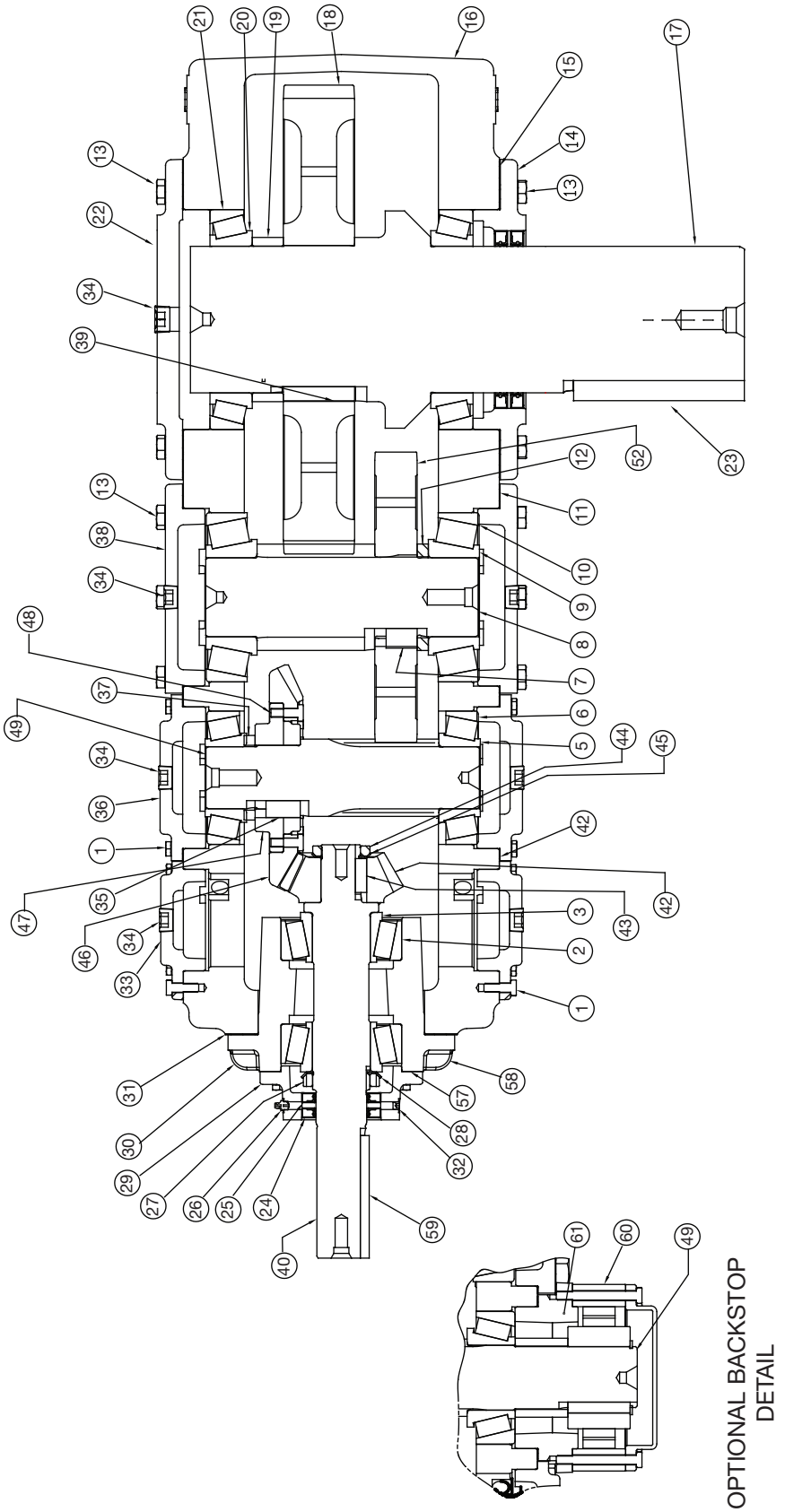
Because old shaft oil seals may be damaged in disassembly, it is advisable to order replacements for these parts.


OPTIONAL BACKSTOP
DETAIL

Parts Reference for MagnaGear G100 thru G600 Right Angle Hollow Bore Triple Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Bevel Bearing, Cup
3	Bevel Bearing, Cone
4	Shim, 2nd Stage
5	Bearing, 2nd Stage
6	Bearing, Cup
7	Key, Helical Gear
8	Pinion, Low Speed
9	Bearing, Cone
10	Bearing, Cup
11	Shim, 3rd Stage
12	Spacer, Low Speed Pinion
13	Bolt, Output Carrier
14	Seal Carrier, Low Speed
15	Shim, Low Speed
16	Housing
17	Output Hub, Tapered
18	Gear, Output
19	Spacer, Low Speed Shaft
20	Bearing, Cone
21	Bearing, Cup
22	Seal, Output Inner
23	Seal, Output Outer
24	Seal, Input Outer
25	Seal, Input Inner
26	Grease Fitting
27	Bearing, Locknut
28	Bearing, Lockwasher
29	Seal Carrier, High Speed
30	Housing, Input
31	Shim, Bevel Assembly
32	Plug, Socket Head Hex Pipe
33	Cap, 1st Stage
34	Plug, Socket Head Pipe
35	Key, Bevel Gear

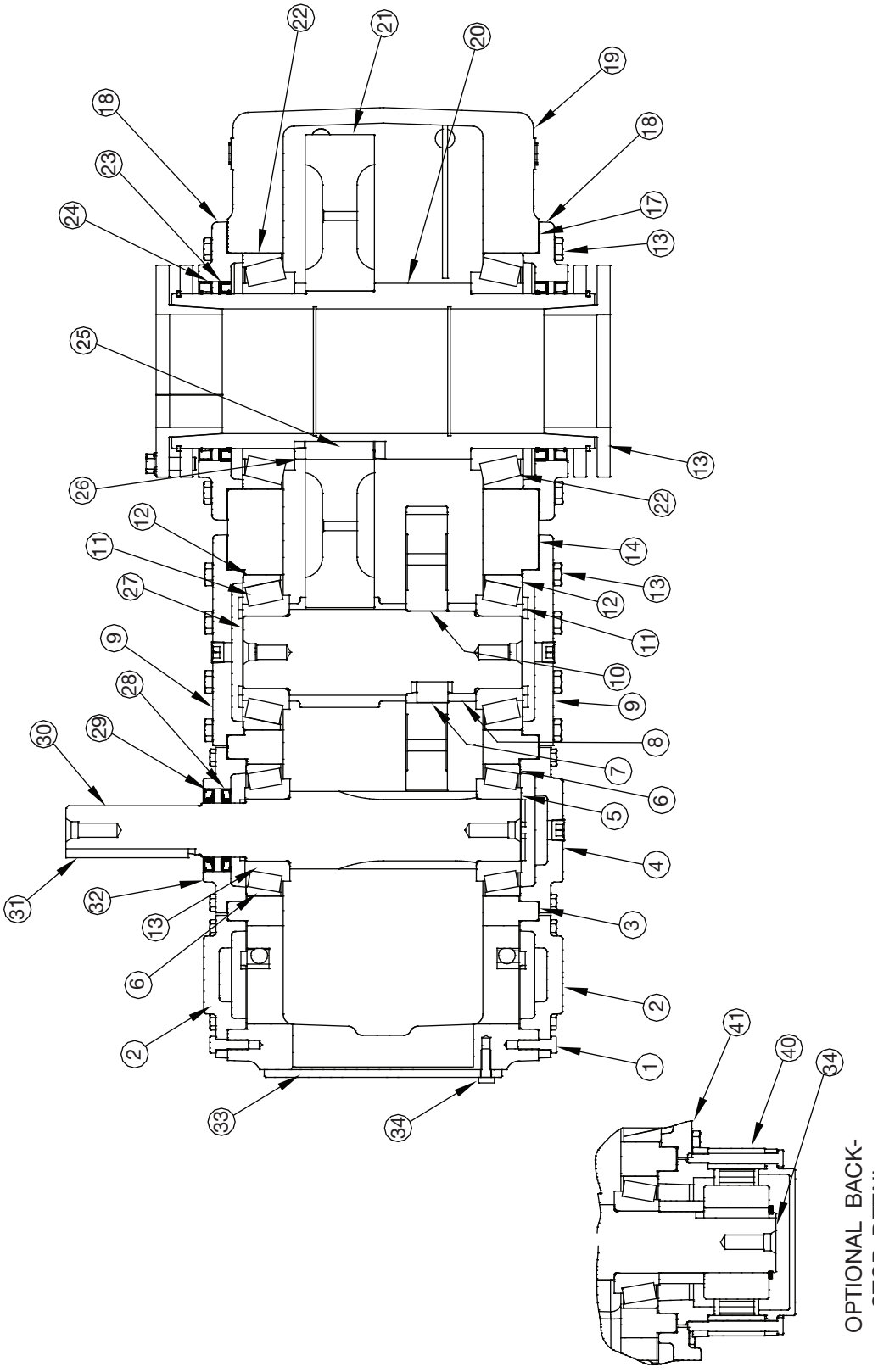
Ref.	Description
36	Cap, 2nd Stage
37	Spacer, Bevel Gear
38	Cap, 3rd Stage
39	Key, Output Gear
40	Pinion, Bevel
41	Pinion Shaft, Bevel
42	Pinion, Bevel Shell
43	Key, Bevel Shell Pinion
44	Locknut, Bevel
45	Lockwasher, Bevel
46	Gear, Bevel
47	Hub, Bevel Gear
48	Bolt, Bevel Gear Hub
49	Pinion, 2nd Stage
50	Spacer, Shell Pinion (12.5:1 Ratio Only)
51	Key, Shell Pinion (12.5:1 Ratio Only)
52	Gear, 2nd Stage
57	O-Ring, Bevel Input Housing
58	Bolt, Bevel Pinion Input Housing
59	Key, Input Extension
60	Backstop Assembly
61	Spacer Ring, Backstop
70	Bushing Assembly
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter


OPTIONAL BACKSTOP
DETAIL

Parts Reference for MagnaGear G100 thru G600 Right Angle Solid Shaft Triple Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Bevel Bearing, Cup
3	Bevel Bearing, Cone
4	Shim, 2nd Stage
5	Bearing, 2nd Stage
6	Bearing, Cup
7	Key, Helical Gear
8	Pinion, Low Speed
9	Bearing, Cone
10	Bearing, Cup
11	Shim, 3rd Stage
12	Spacer, Low Speed Pinion
13	Bolt, Output Carrier
14	Seal Carrier, Low Speed
15	Shim, Low Speed
16	Housing
17	Shaft, Output
18	Gear, Output
19	Spacer, Low Speed Shaft
20	Bearing, Cone
21	Bearing, Cup
22	Cap, Low Speed
23	Key, Output Shaft
24	Seal, Input Outer
25	Seal, Input Inner
26	Grease Fitting
27	Bearing, Locknut
28	Bearing, Lockwasher
29	Seal Carrier, High Speed
30	Housing, Input
31	Shim, Bevel Assembly
32	Plug, Socket Head Hex Pipe
33	Cap, 1st Stage
34	Plug, Socket Head Pipe
35	Key, Bevel Gear

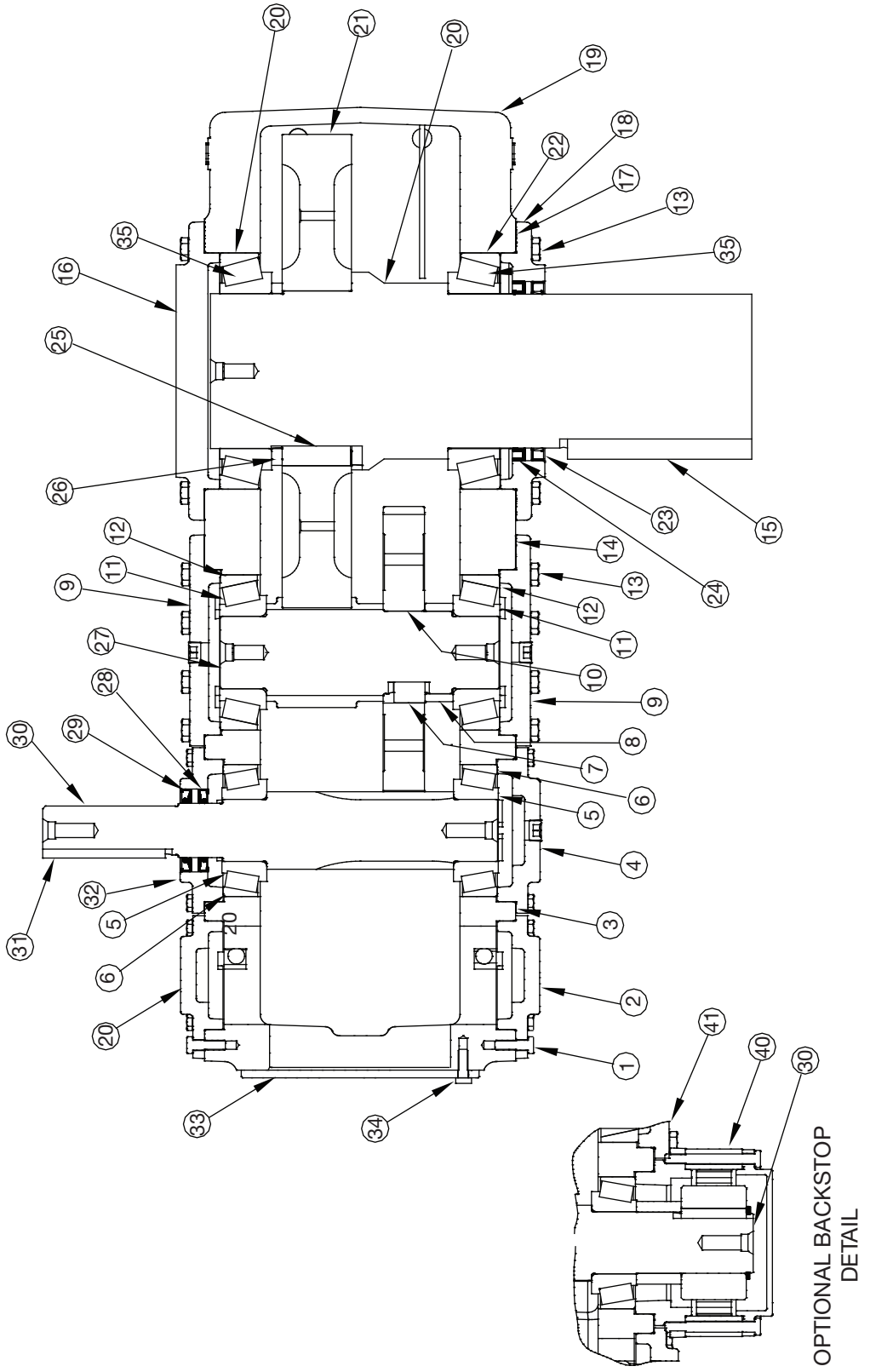
Ref.	Description
36	Cap, 2nd Stage
37	Spacer, Bevel Gear
38	Cap, 3rd Stage
39	Key, Output Gear
40	Pinion, Bevel
41	Pinion Shaft, Bevel
42	Pinion, Bevel Shell
43	Key, Bevel Shell Pinion
44	Locknut, Bevel
45	Lockwasher, Bevel
46	Gear, Bevel
47	Hub, Bevel Gear
48	Bolt, Bevel Gear Hub
49	Pinion, 2nd Stage
50	Spacer, Shell Pinion (12.5:1 Ratio Only)
51	Key, Shell Pinion (12.5:1 Ratio Only)
52	Gear, 2nd Stage
57	O-Ring, Bevel Input Housing
58	Bolt, Bevel Pinion Input Housing
59	Key, Input Extension
60	Backstop Assembly
61	Spacer Ring, Backstop
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter


OPTIONAL BACK-

Parts Reference for MagnaGear G100 thru G600 Parallel Hollow Bore Double Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Cap, 1st Stage
3	Shim, 2nd Stage
4	Cap, 2nd Stage
5	Bearing, 2nd Stage
6	Bearing, 2nd Stage
7	Key, Helical Gear
8	Pinion Spacer, Low Speed
9	Cap, 3rd Stage
10	Gear, 3rd Stage
11	Bearing, 3rd Stage
12	Bearing, 3rd Stage
13	Bolt, End Cap
14	Shim, 3rd Stage
17	Shim, Low Speed
18	Carrier, Seal
19	Housing
20	Hub, Tapered Bore
21	Gear, Output
22	Assembly, Bearing
23	Seal, Output
24	Seal, Output
25	Key, Output Gear

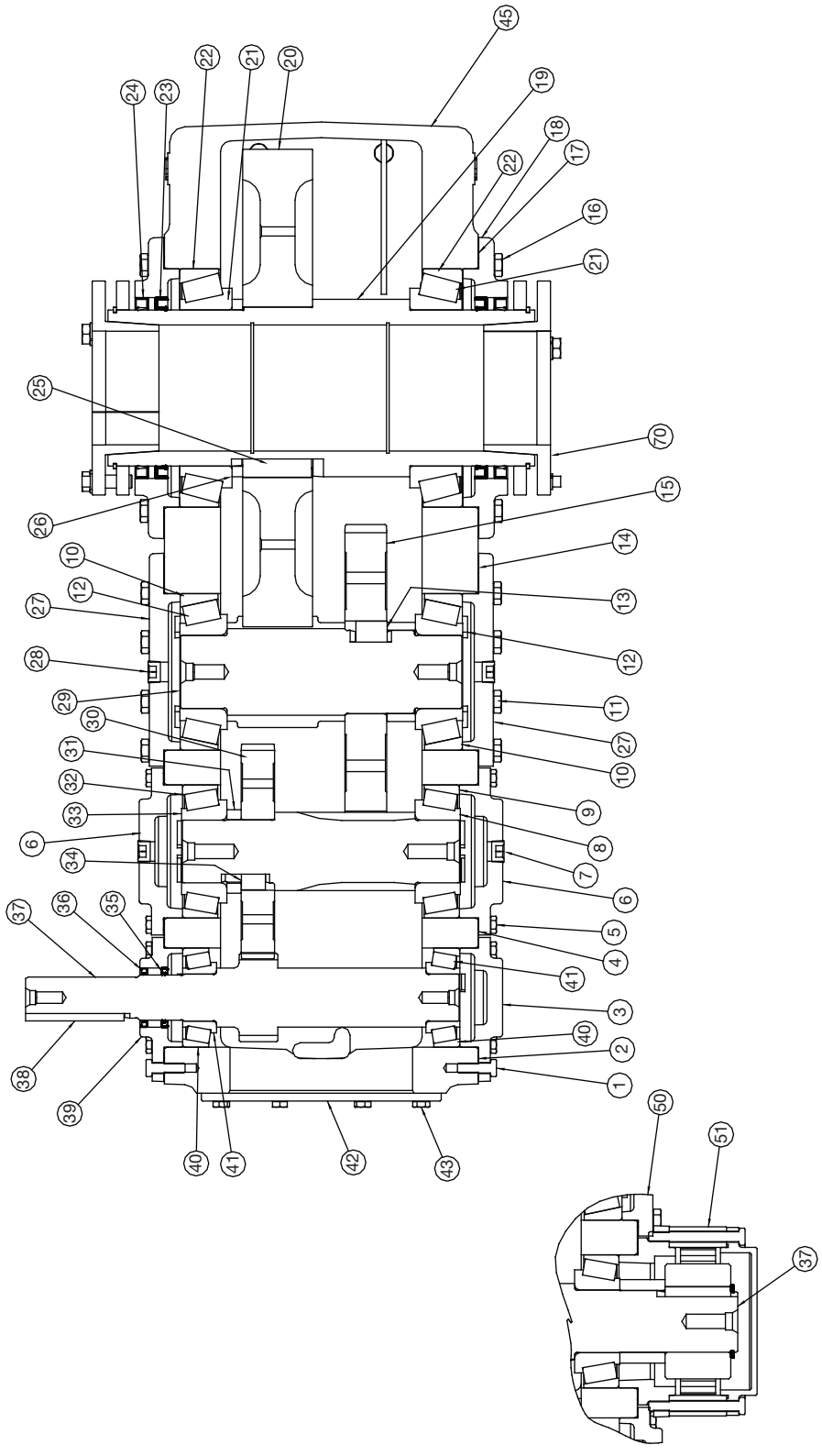
Ref.	Description
26	Spacer, Output Gear
27	Pinion, Low Speed
28	Seal, Input
29	Seal, Input
30	Pinion, Input
31	Key, Input Shaft
32	Carrier, 2nd Stage Seal
33	Cover, End
34	Bolt, End Cover
40	Assembly, Backstop
41	Spacer Ring, Backstop
70	Bushing Assembly
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter


OPTIONAL BACKSTOP
DETAIL

Parts Reference for MagnaGear G100 thru G600 Parallel Solid Shaft Double Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Cap, 1st Stage
3	Shim, 2nd Stage
4	Cap, 2nd Stage
5	Bearing, 2nd Stage
6	Bearing, 2nd Stage
7	Key, Helical Gear
8	Pinion Spacer, Low Speed
9	Cap, 3rd Stage
10	Gear, 3rd Stage
11	Bearing, 3rd Stage
12	Bearing, 3rd Stage
13	Bolt, End Cap
14	Shim, 3rd Stage
15	Key, Output Shaft
16	Cap, Low Speed
17	Shim, Low Speed
18	Carrier, Seal
19	Housing
20	Shaft, Output
21	Gear, Output
22	Bearing, Output Cup
23	Seal, Output
24	Seal, Output
25	Key, Output Gear

Ref.	Description
26	Spacer, Output Gear
27	Pinion, Low Speed
28	Seal, Input
29	Seal, Input
30	Pinion, Input
31	Key, Input Shaft
32	Carrier, 2nd Stage Seal
33	Cover, End
34	Bolt, End Cover
35	Bearing, Output Cone
40	Assembly, Backstop
41	Spacer Ring, Backstop
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter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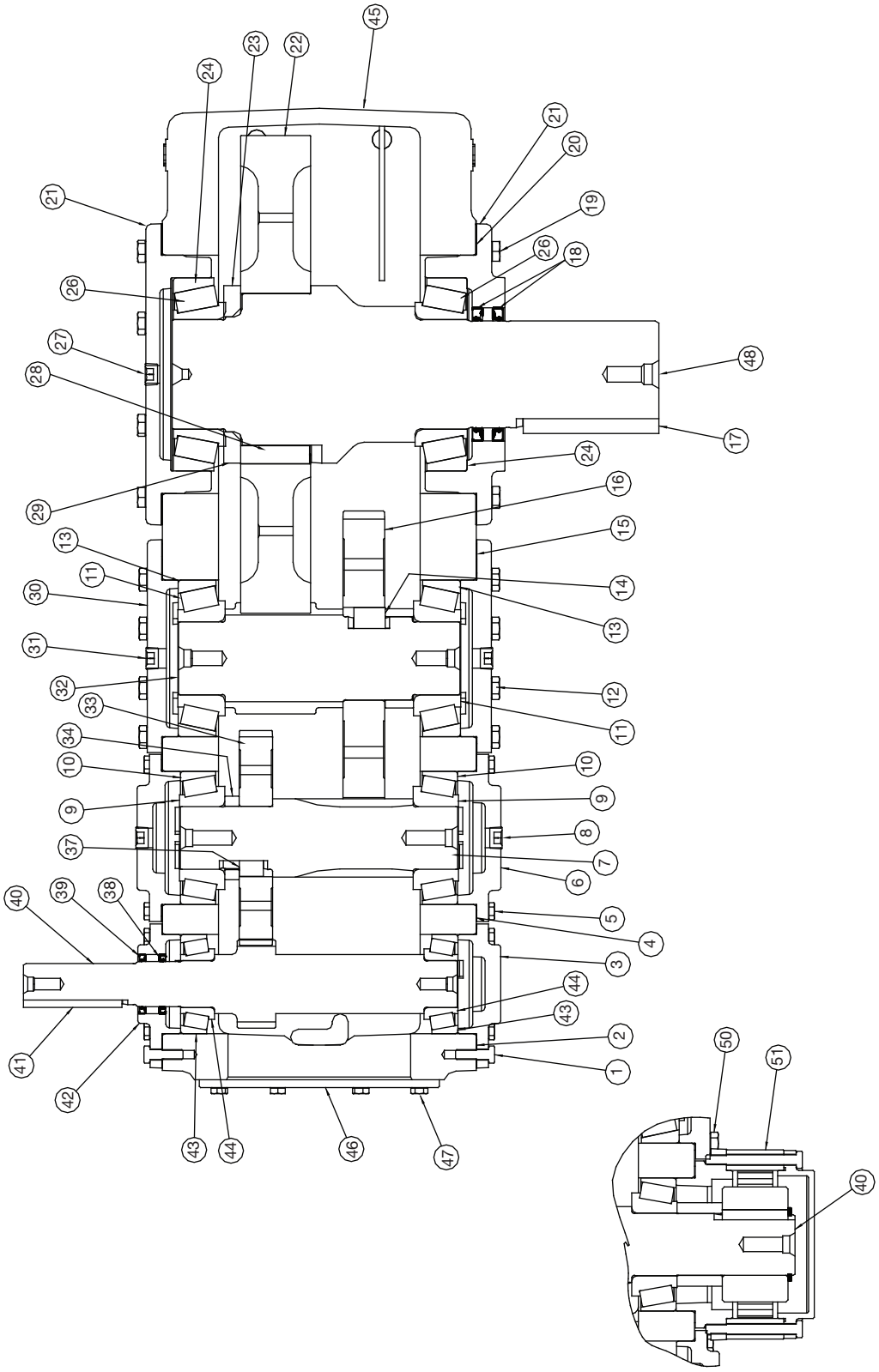
Parts Reference for MagnaGear G100 thru G600 Parallel Hollow Bore Triple Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Shim, 1st Stage
3	Cap, 1st Stage
4	Shim, 2nd Stage
5	Bolt, End Cap
6	Cap, 2nd Stage
7	Plug, Pipe
8	Bearing, 2nd Stage
9	Bearing, 2nd Stage
10	Bearing, 3rd Stage
11	Bolt, End Cap
12	Bearing, Low Speed
13	Key, Helical Gear
14	Shim, Low Speed
15	Gear, 2nd Stage
16	Bolt, End Cap
17	Shim, Low Speed
18	Carrier, Seal
19	Hub, Tapered Bore
20	Gear, Output
21	Gear, Output
22	Assembly, Bearing
23	Seal, Output
24	Seal, Output
25	Key, Output Gear
26	Spacer, Output Gear
27	Cap, Low Speed
28	Plug, Pipe
29	Pinion, Low Speed
30	Gear, 1st Stage Helical

Ref.	Description
31	Spacer, 2nd Stage Pinion
32	Bearing, 2nd Stage
33	Bearing, 2nd Stage
34	Key, Helical Gear
35	Seal, Input
36	Seal, Input
37	Pinion, Input
38	Key, Input Pinion
39	Carrier, Seal
40	Bearing, 1st Stage
41	Bearing, 1st Stage
42	Cover, Input
43	Bolt, Input Cover
45	Housing
50	Spacer Ring, Backstop
51	Assembly, Backstop
70	Bushing Assembly
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter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Parts Reference for MagnaGear G100 thru G600 Parallel Solid Shaft Triple Reduction Reducers

Ref.	Description
1	Bolt, End Cap
2	Shim, 1st Stage
3	Cap, 1st Stage
4	Shim, 2nd Stage
5	Bolt, End Cap
6	Cap, 2nd Stage
7	Pinion, 2nd Stage
8	Plug, Pipe
9	Bearing, 2nd Stage
10	Bearing, 2nd Stage
11	Bearing, Low Speed
12	Bolt, End Cap
13	Bearing, Low Speed
14	Key, Helical Gear
15	Shim, Low Speed
16	Gear, 2nd Stage
17	Key, Output Shaft
18	Seal, Output
19	Bolt, End Cap
20	Shim, Low Speed
21	Carrier, Seal
22	Gear, Output
23	Spacer, Low Speed
24	Bearing, Low Speed
25	Cap, Low Speed
26	Bearing, Low Speed
27	Plug, Pipe
28	Key, Output Gear
30	Cap, 3rd Stage

Ref.	Description
31	Plug, Pipe
32	Pinion, Low Speed
33	Gear, 1st Stage
34	Spacer, 2nd Stage Pinion
35	Bearing, 2nd Stage
36	Bearing, 2nd Stage
37	Key, Helical Gear
38	Seal, Input
39	Seal, Input
40	Pinion, Input
41	Key, Input Pinion
42	Carrier, Seal
43	Bearing, 1st Stage
44	Bearing, 1st Stage
45	Housing
46	Cover, Input
47	Bolt, Input Cover
48	Shaft, Output
50	Spacer Ring, Backstop
51	Assembly, Backstop
	Parts Not Shown On Drawing
	Cover, Inspection
	Gasket, Inspection Cover
	Bolt, Inspection Cover
	Breather, Dipstick
	Smart Sensor Adapter

Bushing Kit Assemblies for MagnaGear G100 thru G600 Hollow Bore Taper Bushed Reducers

Ref.	Description	Qty.	100K	150K	210K	285K	390K	600K
70	Bushing Kit, Tapered Bore							
	7-0” Bore	1	N/A	N/A	N/A	N/A	454130	448689
	6-1/2” Bore	1	N/A	N/A	N/A	N/A	454131	448688
	6-7/16” Bore	1	N/A	N/A	N/A	N/A	454132	448687
	6-0” Bore	1	N/A	N/A	N/A	454114	454133	N/A
	5-15/16” Bore	1	N/A	N/A	N/A	454115	454134	448686
	5-7/16” Bore	1	N/A	N/A	N/A	454116	454135	N/A
	4-15/16” Bore	1	N/A	N/A	454099	454117	454136	N/A
	4-7/16” Bore	1	N/A	454081	454100	454118	N/A	N/A
	4-3/16” Bore	1	N/A	454082	454101	454119	N/A	N/A
	3-15/16” Bore	1	N/A	454083	454102	454120	N/A	N/A
	3-7/16” Bore	1	454062	454084	454103	N/A	N/A	N/A
	3-3/16” Bore	1	454063	454085	N/A	N/A	N/A	N/A
	3-0” Bore	1	454064	454086	N/A	N/A	N/A	N/A
	2-15/16” Bore	1	454065	454087	N/A	N/A	N/A	N/A
	2-7/8” Bore	1	454066	N/A	N/A	N/A	N/A	N/A
	2-11/16” Bore	1	454067	N/A	N/A	N/A	N/A	N/A
	2-1/2” Bore	1	454068	N/A	N/A	N/A	N/A	N/A
	2-7/16” Bore	1	454069	N/A	N/A	N/A	N/A	N/A
	2-3/8” Bore	1	454070	N/A	N/A	N/A	N/A	N/A
	2-1/4” Bore	1	454071	N/A	N/A	N/A	N/A	N/A
	2-3/16” Bore	1	454072	N/A	N/A	N/A	N/A	N/A
	160MM Bore	1	N/A	N/A	N/A	N/A	454137	448695
	150MM Bore	1	N/A	N/A	N/A	454121	454138	448694
	130MM Bore	1	N/A	N/A	454104	454122	454139	448693
	125MM Bore	1	N/A	N/A	454105	454123	454140	448692
	120MM Bore	1	N/A	454088	454106	454124	N/A	448691
	110MM Bore	1	N/A	454089	454107	454125	N/A	448690
	100MM Bore	1	N/A	454090	454108	454126	N/A	N/A
	95MM Bore	1	N/A	454091	454109	N/A	N/A	N/A
	90MM Bore	1	454078	454092	454110	N/A	N/A	N/A
	85MM Bore	1	454073	454093	N/A	N/A	N/A	N/A
	80MM Bore	1	454074	454094	N/A	N/A	N/A	N/A
	75MM Bore	1	454075	454095	N/A	N/A	N/A	N/A
	70MM Bore	1	453079	N/A	N/A	N/A	N/A	N/A
	65MM Bore	1	454076	N/A	N/A	N/A	N/A	N/A
	60MM Bore	1	454077	N/A	N/A	N/A	N/A	N/A

Troubleshooting Chart

Trouble	What to Inspect	Action
OVERHEATING	1. Oil cooler (if equipped)	Check coolant and oil flow. If top of the heat exchanger is at a level above the gearbox normal oil level, air can get trapped in the heat exchanger. Loosen piping at the top of the heat exchanger and vent the air out. Oil temperature in the MAGNAGEAR should be about 150 to 165° F (65 to 74°C) when equipped with an oil cooler. Check pipes and cooler/heat exchanger for deposits of sediment.
	2. Oil level	Check dipstick or sight tube for correct oil level.
	3. Bearings	Check bearing end play and radial clearance. All shafts must turn freely when disconnected from load.
	4. Breather	Breather must be open. Replace if plugged.
	5. Type of oil	Oil viscosity higher than recommended for ambient temperature. Refer to oil selection section and fill with proper viscosity selection.
	6. Oil is dirty	Change oil
SHAFT FAILURE	1 Type of coupling	Rigid couplings between rigidly supported shafts can cause shaft failure. Replace with flexible coupling that provides required lateral float.
	2. Coupling alignment	Realign equipment as necessary.
	3. Overhung load	Sprockets or pulleys may be mounted on either the input or output shafts. Ensure proper tension.
	4. Excessive high energy loads	Equip MAGNAGEAR with couplings designed to absorb shock or repetitive shock loads
BEARING FAILURE	1. Overloads	Check nameplate rating and compare with MAGNAGEAR rating chart.
	2. Overhung loads	See "Shaft Failure"--Item 7.3.3
	3. Bearing adjustment	See "Overheating"--Item 7.1.3
	4. Bearing lubrication	If equipped, check operation of the lube oil pump. Output pressure at full speed should not be less than 15 psi (1 Bar). Clean or replace filter on pump. Replace worn, cracked or badly heat-discolored bearings.
	5. Rust formation	Seal unit to prevent entrance of moisture and to reduce condensation inside unit. Drain condensation often. Run the unit to full warm frequently during long shutdowns or fill the MagnaGear COMPLETELY with oil.
	6. Storage conditions	Long periods of storage in moist atmospheres will cause destructive rusting of bearings and gears. If this occurs, disassemble the unit, inspect and clean or replace parts.
OIL LEAKAGE	1. Oil level	Add oil or drain excess oil from housing as required. Maintain oil level as indicated by the fill arrow near the sight tube.
	2. Breather	If breather is clogged remove and replace.
	3. Oil seals	Check oil seals and replace if worn.
	4. Plugs, gauges and fittings	Apply thread sealant and tighten.
	5. Housing and caps	Tighten bolts or cap screws. If leak persists, remove housing cover and caps. (NOTE: Drain oil to level below housing cover to avoid spillage). Clean mating surfaces. Apply a 1/8" (3 mm) bead of silicon to the cap around the tenon. Tighten fasteners securely. Refill housing to proper level.
GEAR WEAR	1. Gear tooth wear and failure	Contact factory
	2. Backlash	Nominal range is .014" to .022". Contact factory.
	3. Misalignment	Check contact pattern on gear face. 75% of the total face, is correct.
	4. Overloads	See "Bearing Failure"--Item 7.4.1
	5. Oil level	See "Overheating"--Item 7.1.2
	6. Type of oil	See "Overheating" --Item 7.1.5
	7. Coupling lateral float	See "Shaft Failure" --Item 7.3.1
	8. Rust formation	See "Bearing Failure"--Item 7.4.5
NOISE	1. Unusual or increasing noise	See "Gear Wear" and "Bearings Failure"
	2. Defective Coupling	Contact coupling vendor
	3. Gear unit mounting has loosened	Tighten fasteners to recommended torques. Replace damaged fasteners.

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