MagnaGear™ Speed Reducers
Size G1400, Size G2100 and Size G3500
Instruction Manual

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.

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 sales office, distributor or authorized service center.

INSTALLATION

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.

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.

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

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. 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.

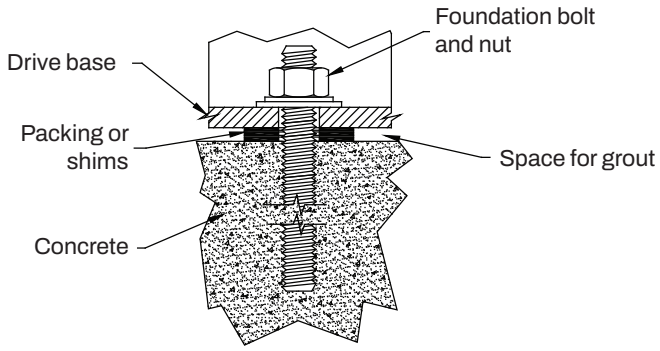


Figure 1

- 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.

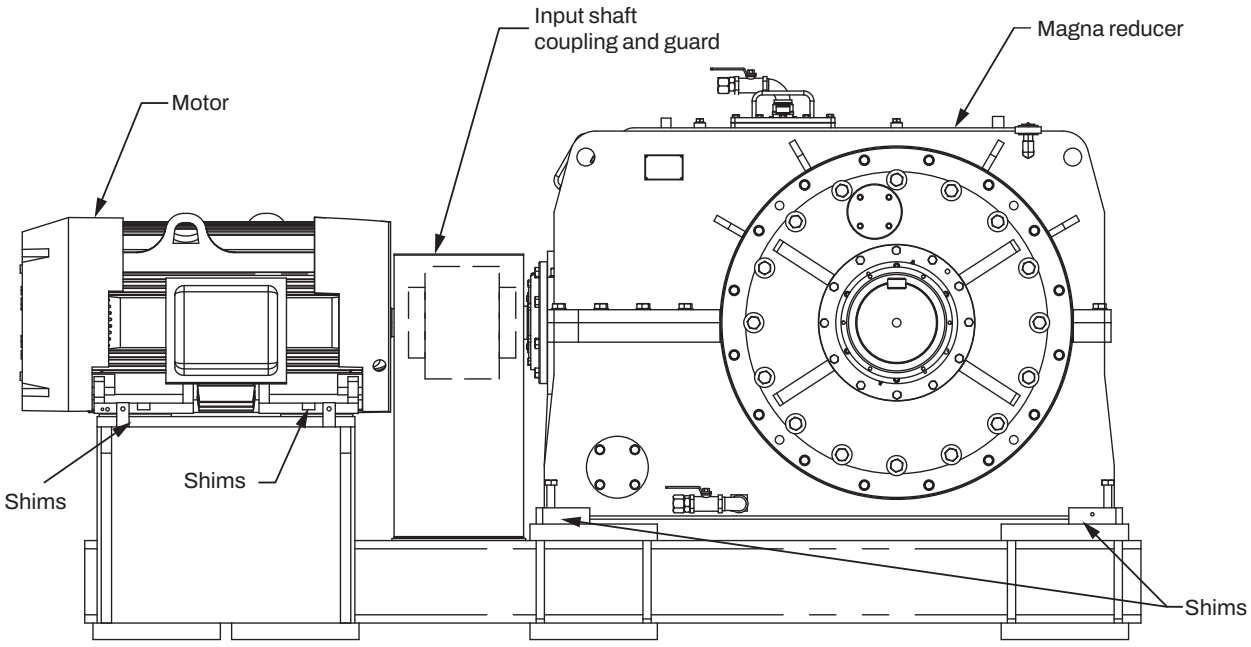


Figure 2 - Typical HD Base Mounting

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 appropriate lifting devices. The lifting device 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.

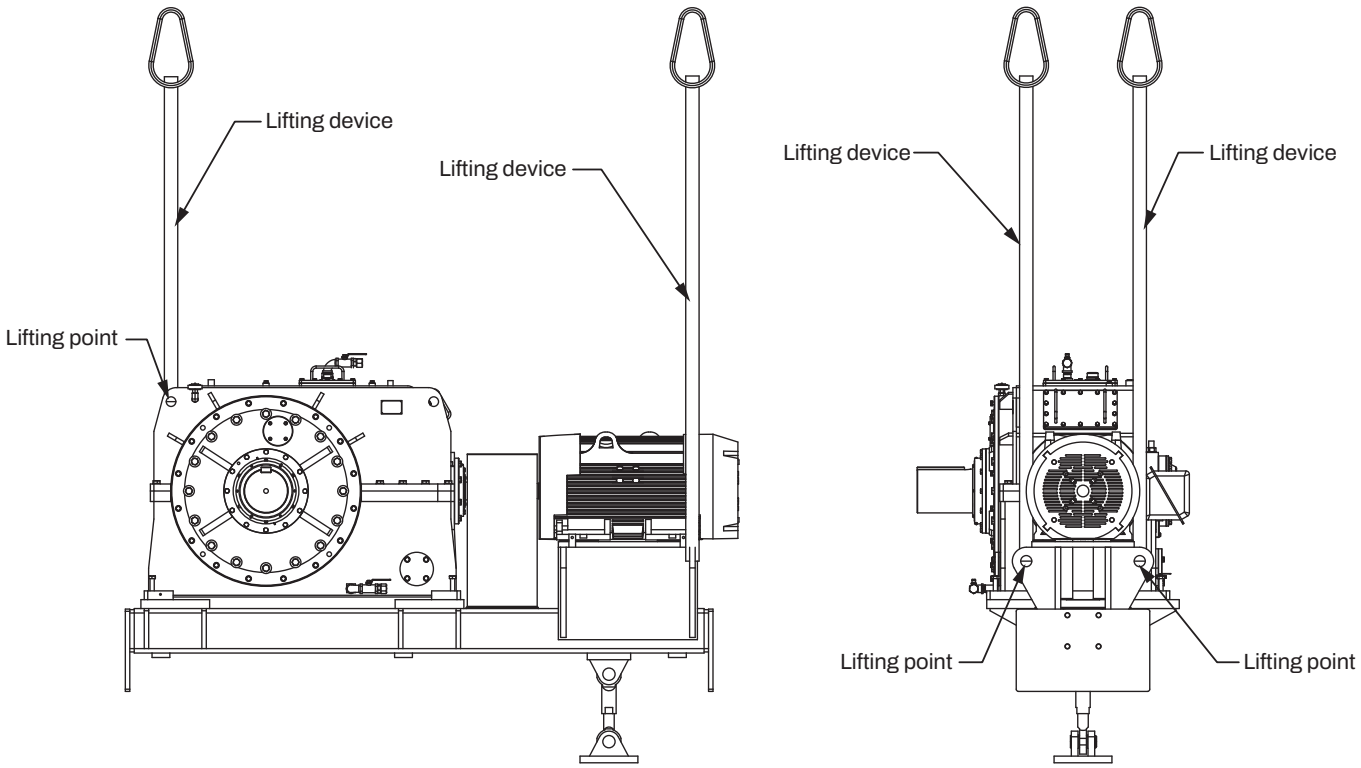


Figure 3 - MagnaGear Lifting Points

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. See Figure 4 for a typical swing base arrangement.

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

Attach and align the coupling mounted on the reducer/swing base assembly to the driven equipment coupling. Follow all recommendation of the coupling manufacturer and torque all bolts to the recommended specifications.

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 reducer was received mounted on a swing base, it was aligned at the factory. The possibility of misalignment in transit may occur and must be checked when mounting is complete. Recheck alignment to determine if misalignment has occurred.

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.

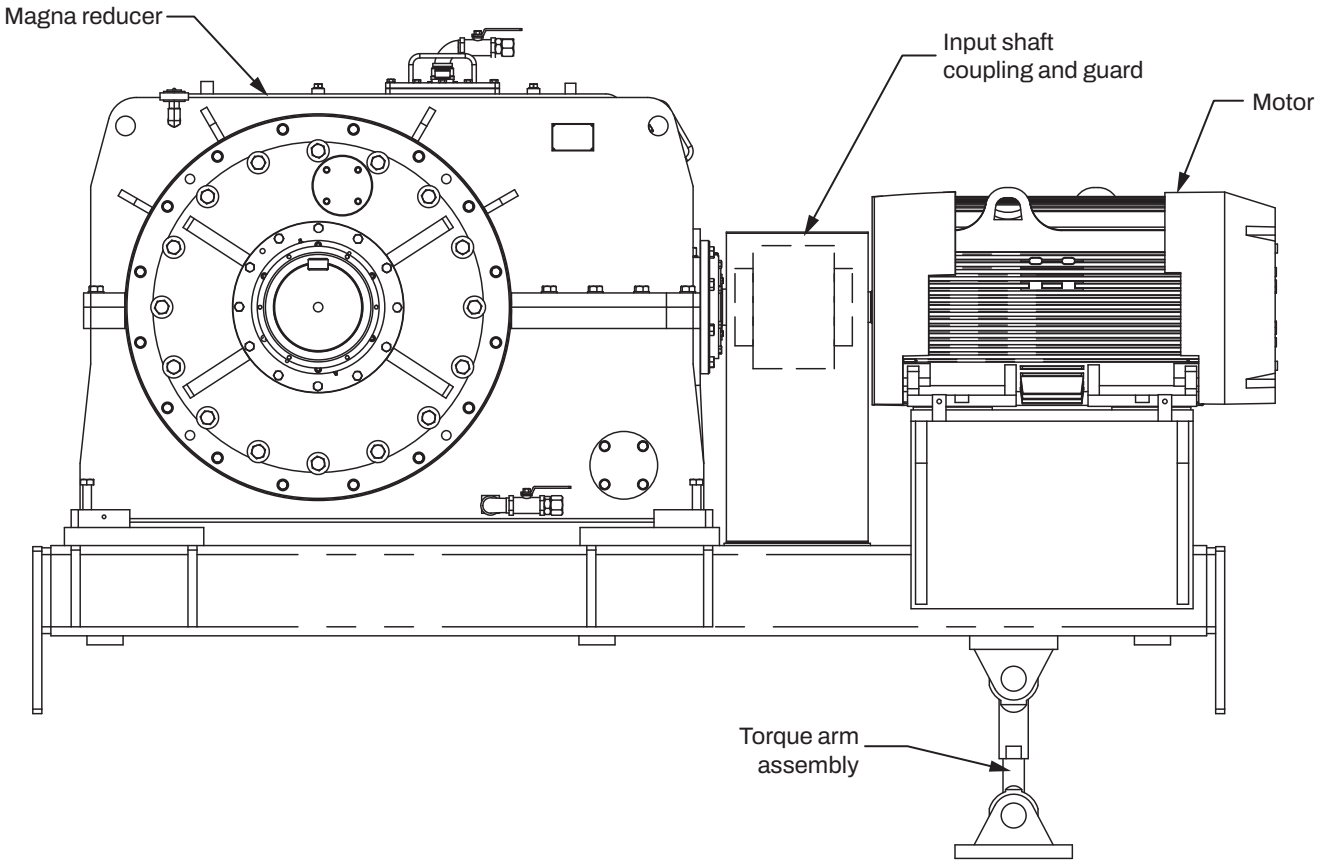


Figure 4 - Typical Swing Base Mounting

- 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.

  WARNING: 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.

SHEAVES AND SPROCKETS

Mount sheaves and sprockets as close to the reducer as possible. Overtightening may cause damage to the reducer, belts or chain or driven equipment. Adjust chains to manufacturer's recommendations.

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

Inch Fasteners		Metric Fasteners	
Nominal Diameter (in)	Grade SAE 5	Nominal Diameter (mm)	Class 8.8
0.2500	6.5	5	3.5
0.3125	13	6	5.5
0.3750	23	8	14
0.4375	37	10	27
0.5000	57	12	47
0.5625	82	16	120
0.6250	110	20	240
0.7500	200	24	420
0.8750	320	30	840
1.0000	480	36	1450
1.1250	600	42	2350
1.2500	840	48	3500
1.3750	1100	56	5650
1.5000	1450	64	8550
1.6250	2850	72	12400
1.7500	3300		
2.0000	4900		
2.2500	7200		
2.5000	9850		
2.7500	12100		
3.0000	15900		
3.2500	20500		
3.5000	26000		

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.

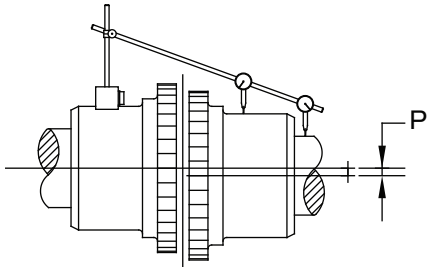


Figure 5

- 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)

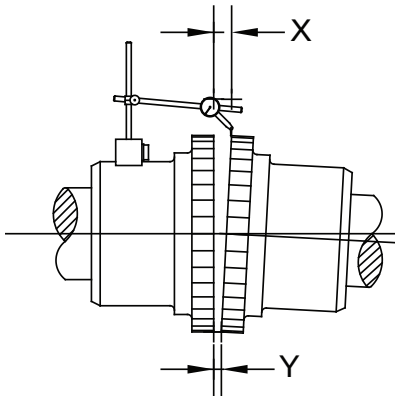


Figure 6

WARNING: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury.

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.

INSTALLATION OF ELECTRIC COOLING FAN

Mount and align gearbox before installing the electric fan kit. Remove the fan assembly and corresponding parts from the packing material. Most designs have 5 bolts holding the fan shroud onto the gear reducer, 7 bolts holding the airflow guides onto the fan shroud, and 4 bolts holding the electric fan assembly onto the fan shroud. See Figure 7.

Bolt the fan shroud onto the gear reducer.
Bolt the airflow guides onto the fan shroud.
Bolt the electric fan assembly onto the fan shroud.

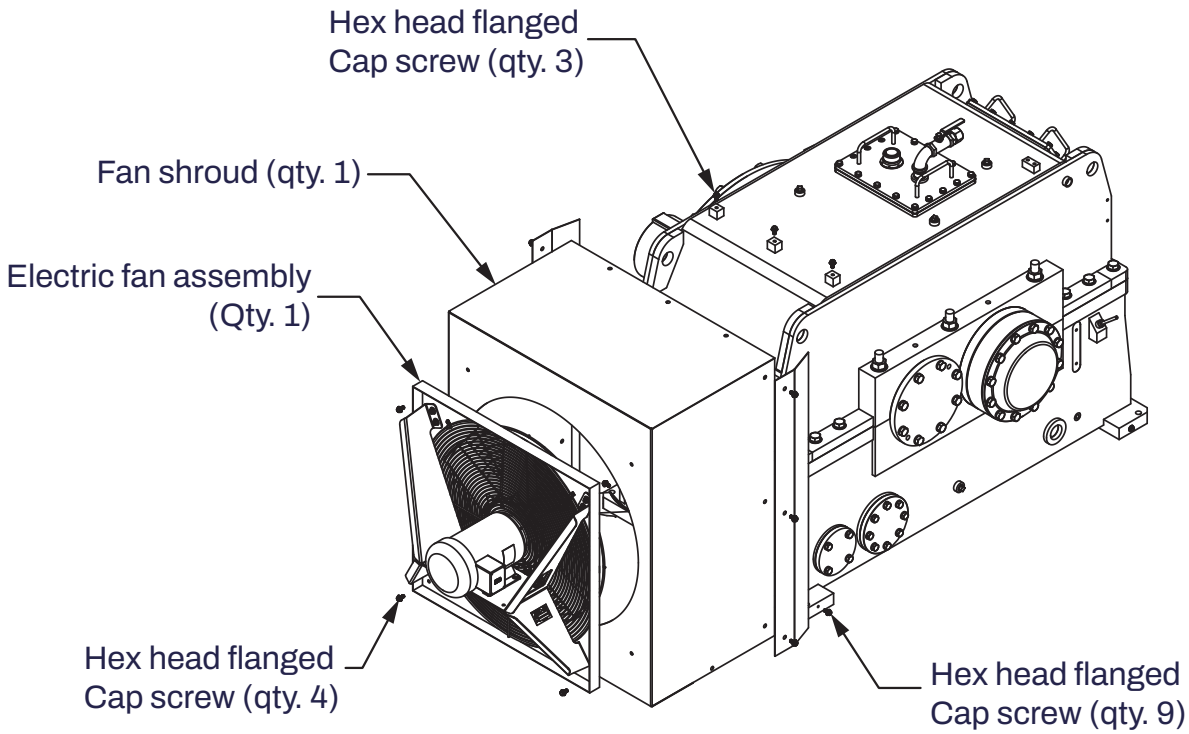


Figure 7 - Electric Cooling Fan Kit

INSTALLATION OF (RTD) TEMPERATURE SENSOR

The optional sump temperature RTD can be used to measure the temperature of the oil sump inside the gear reducer. Install the RTD into the port under the oil level sight gauge.

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 125.37 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.

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.

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 -15 °F (-26 °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.

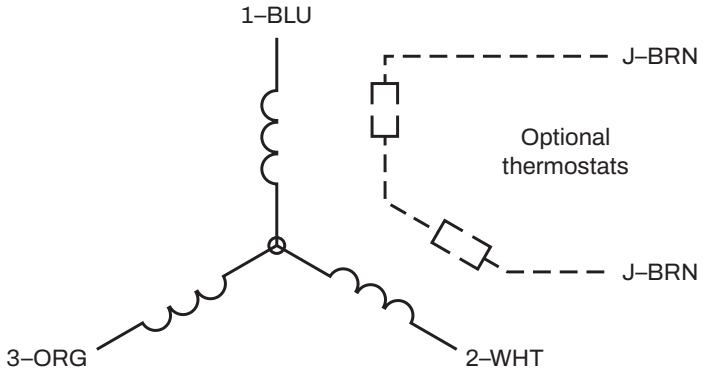
Approximate Oil Volume (in gallons):

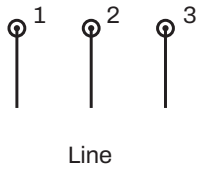
G1400 parallel	120	G1400 right angle	150
G2100 parallel	150	G2100 right angle	210
G3500 parallel	270	G3500 right angle	370

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

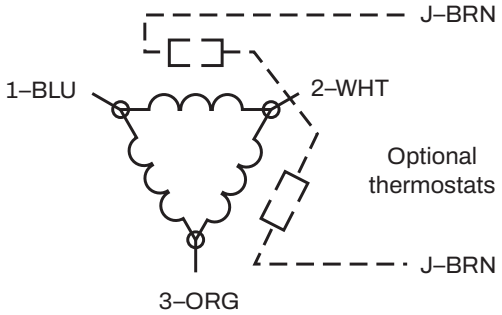
IMPORTANT: Because reducer is shipped without oil, it is necessary to add the proper amount of oil before operating reducer. Follow instructions on reducer warning tags and in the installation manual.

Typical WYE-connected motor





Typical delta-connected motor



Notes:
1. Three lead motor may be either WYE connected or delta connected.
2. Interchange any two line leads to reverse rotation.
3. Optional thermostats are provided when specified.
4. Actual number of internal parallel circuits may vary.
5. Lead colors are optiona. Leads must be numbered as shown.

Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. 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 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 220EP	150EP 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. 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 product support to determine whether other devices may be needed to protect your reducer.

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.

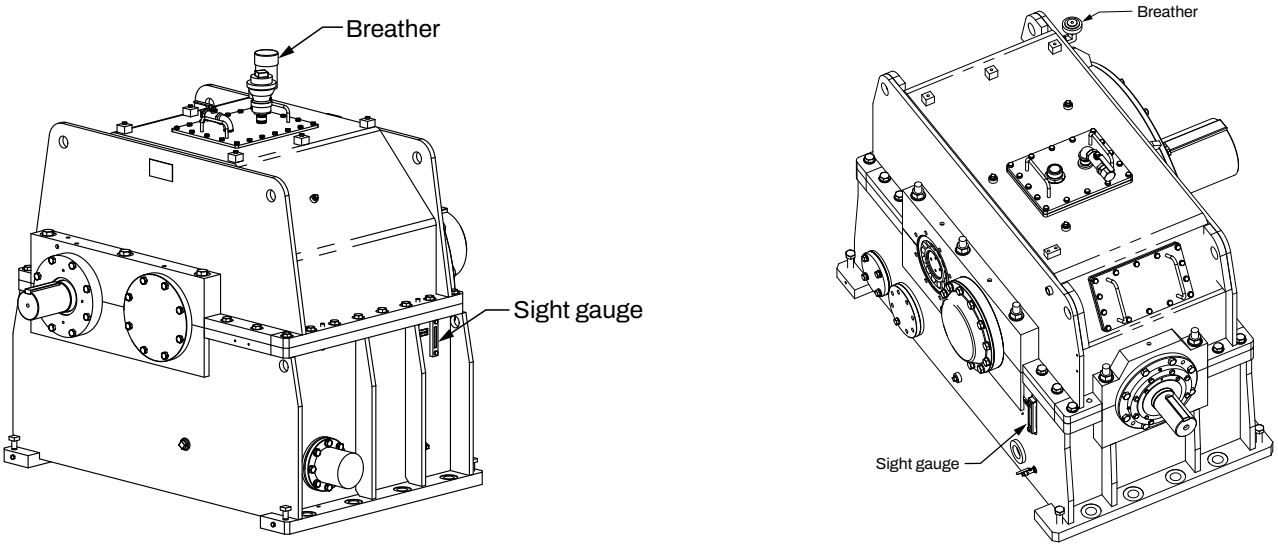


Figure 8 - Oil drain and dipstick / breather locations

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.

GUIDELINES FOR MAGNAGEAR REDUCER LONG-TERM STORAGE

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.

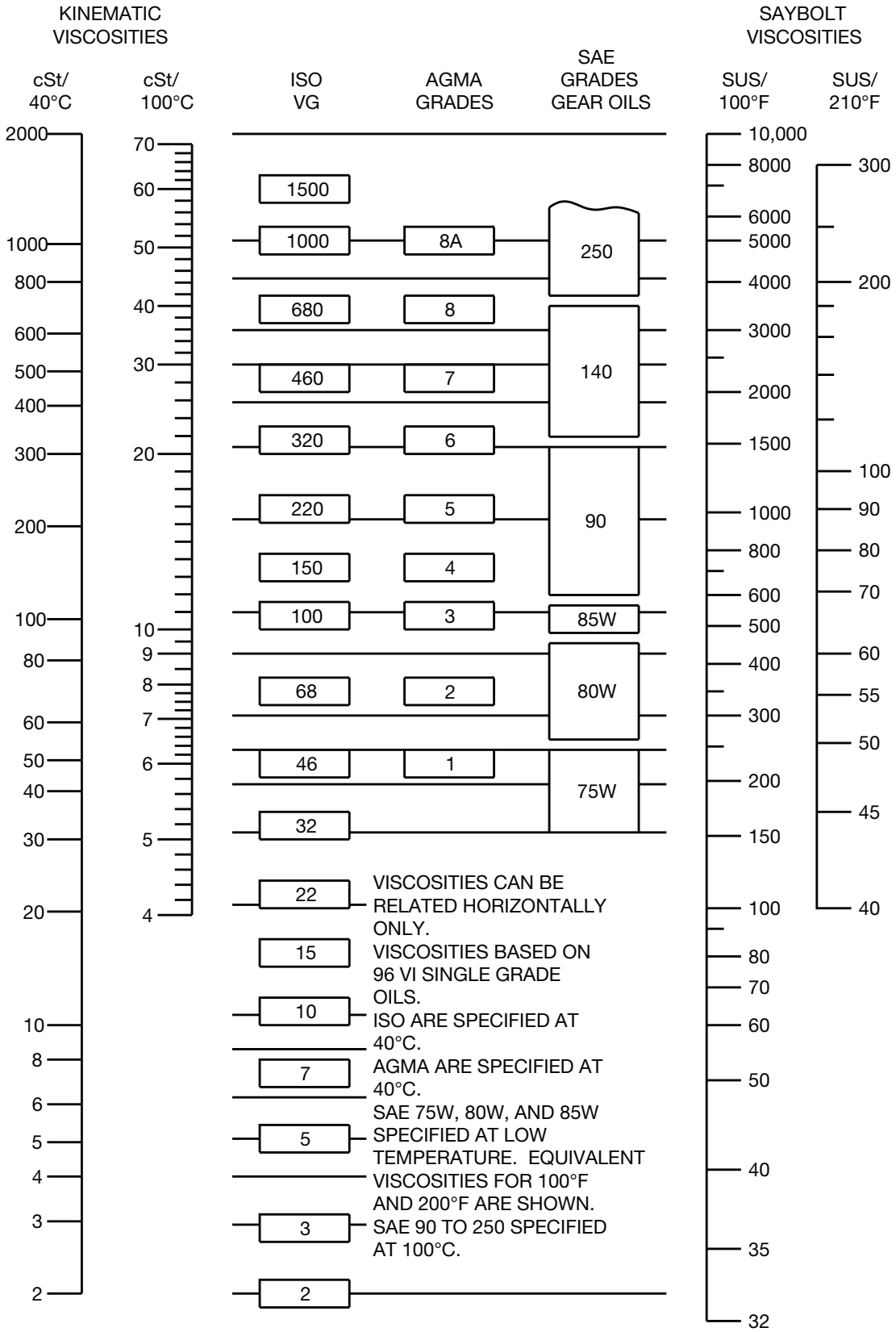
WHEN PLACING THE REDUCER INTO SERVICE

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)
G100	2 / 59
G150	3 / 89
G210	4 / 118
G285	6 / 177
G390	8 / 237
G525	8 / 237
G700	10 / 296
G920	12 / 355
G1400	14 / 413
G2100	16 / 472
G3500	18 / 531

OIL VISCOSITY EQUIVALENCY CHART



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.

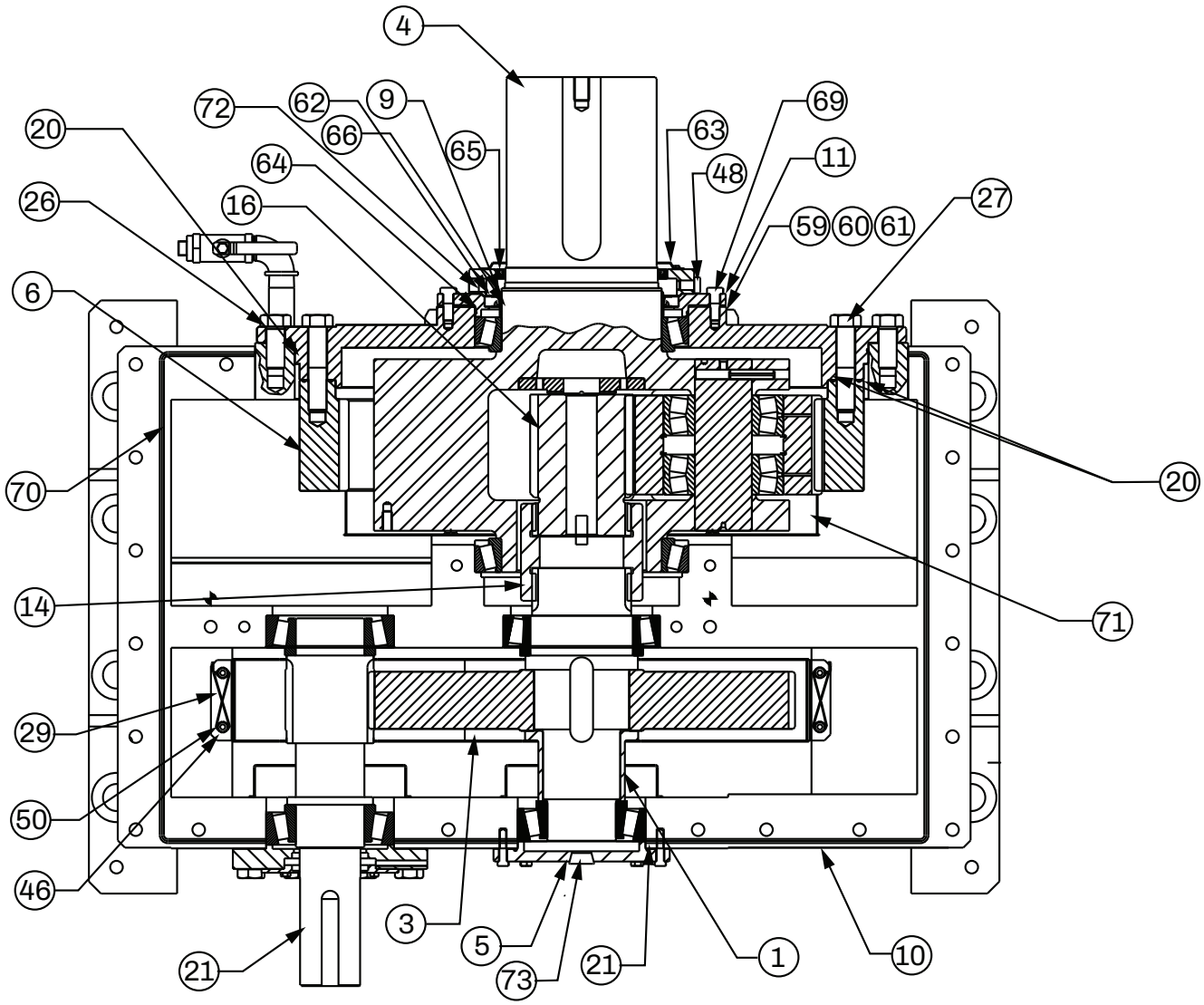
It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also.

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.

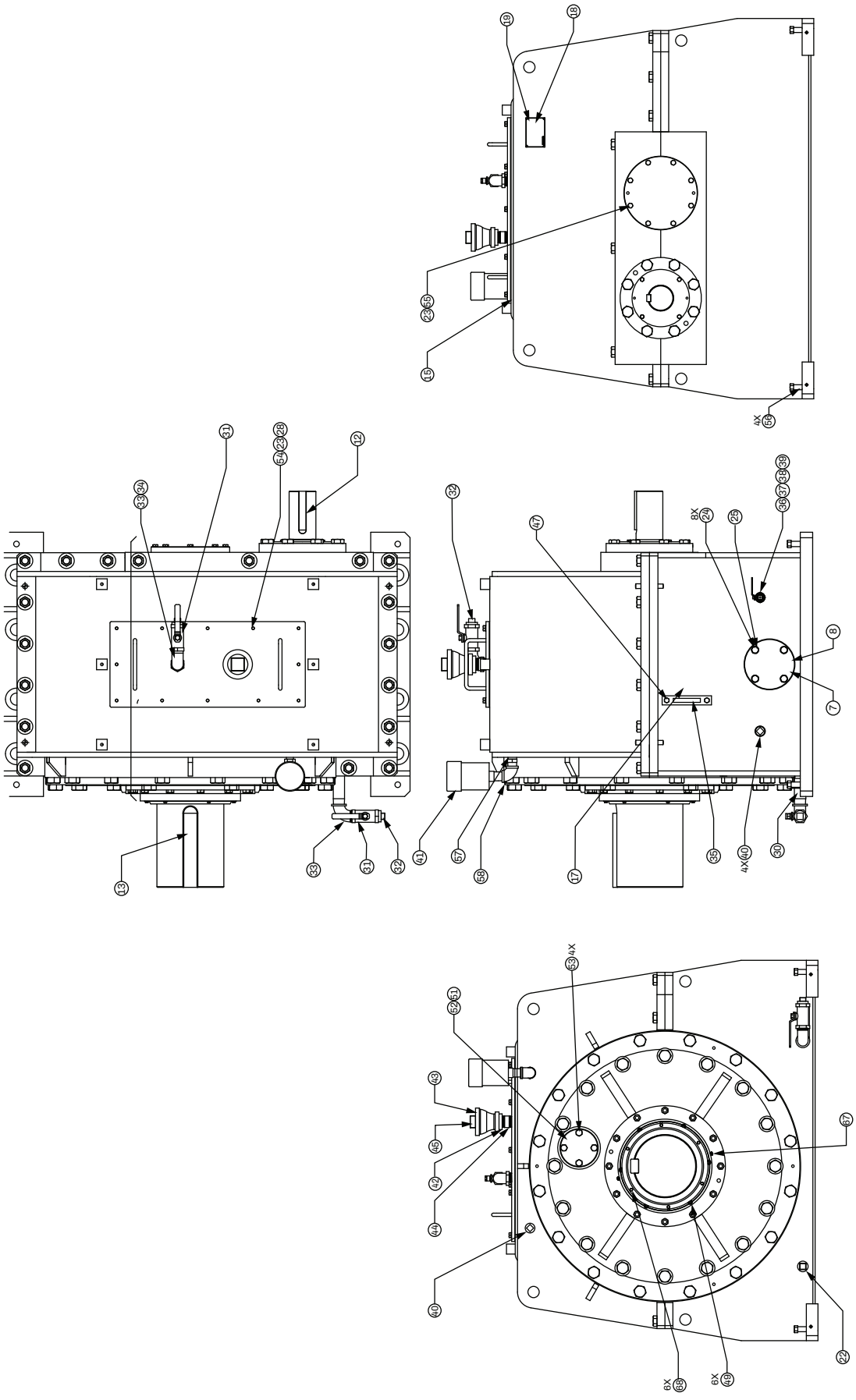
If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against the rollers or cage of any bearing.

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

PARTS REFERENCE FOR MAGNAGEAR G1400 PARALLEL SHAFT REDUCERS



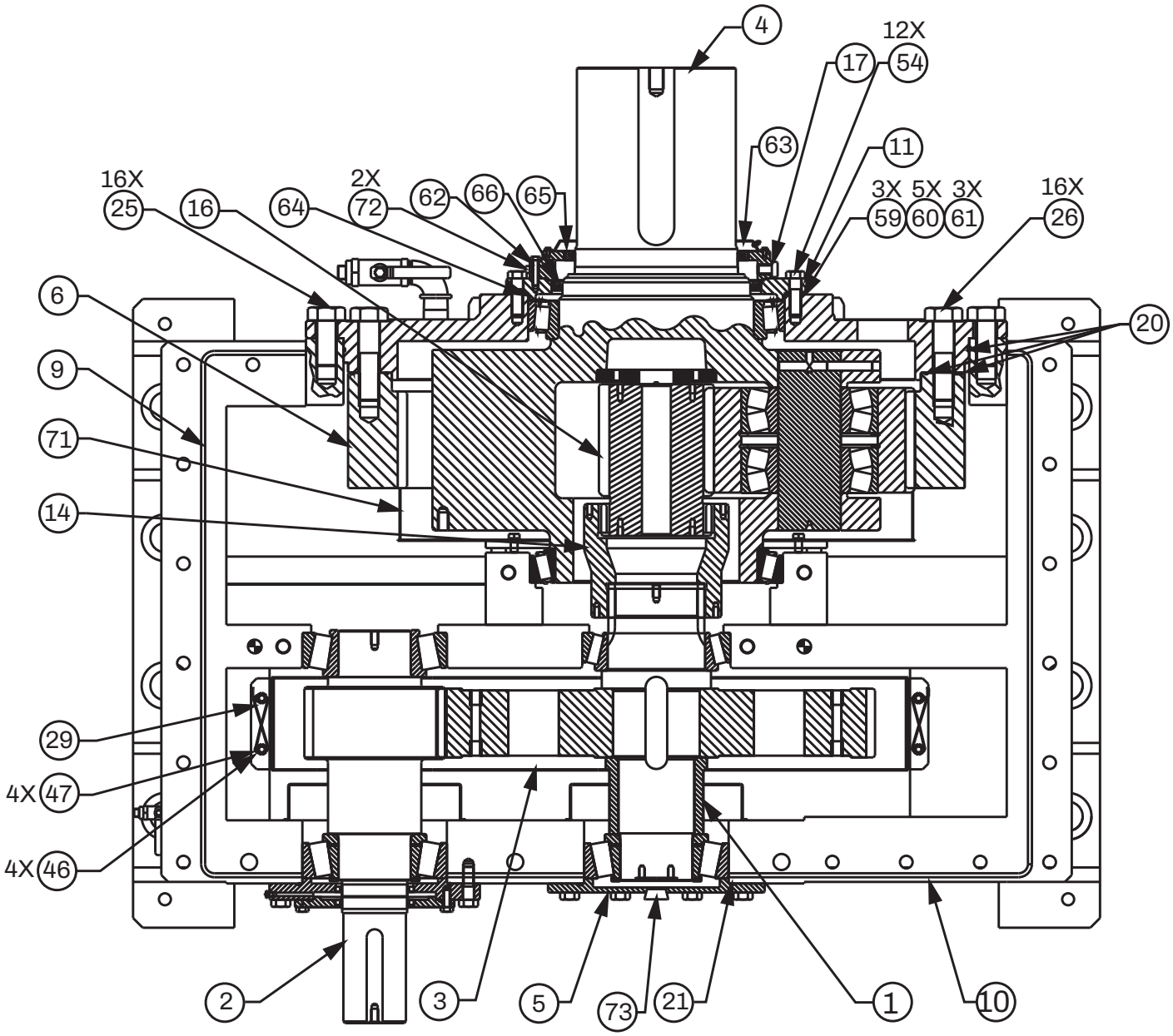
PARTS REFERENCE FOR MAGNAGEAR G1400 PARALLEL SHAFT REDUCERS



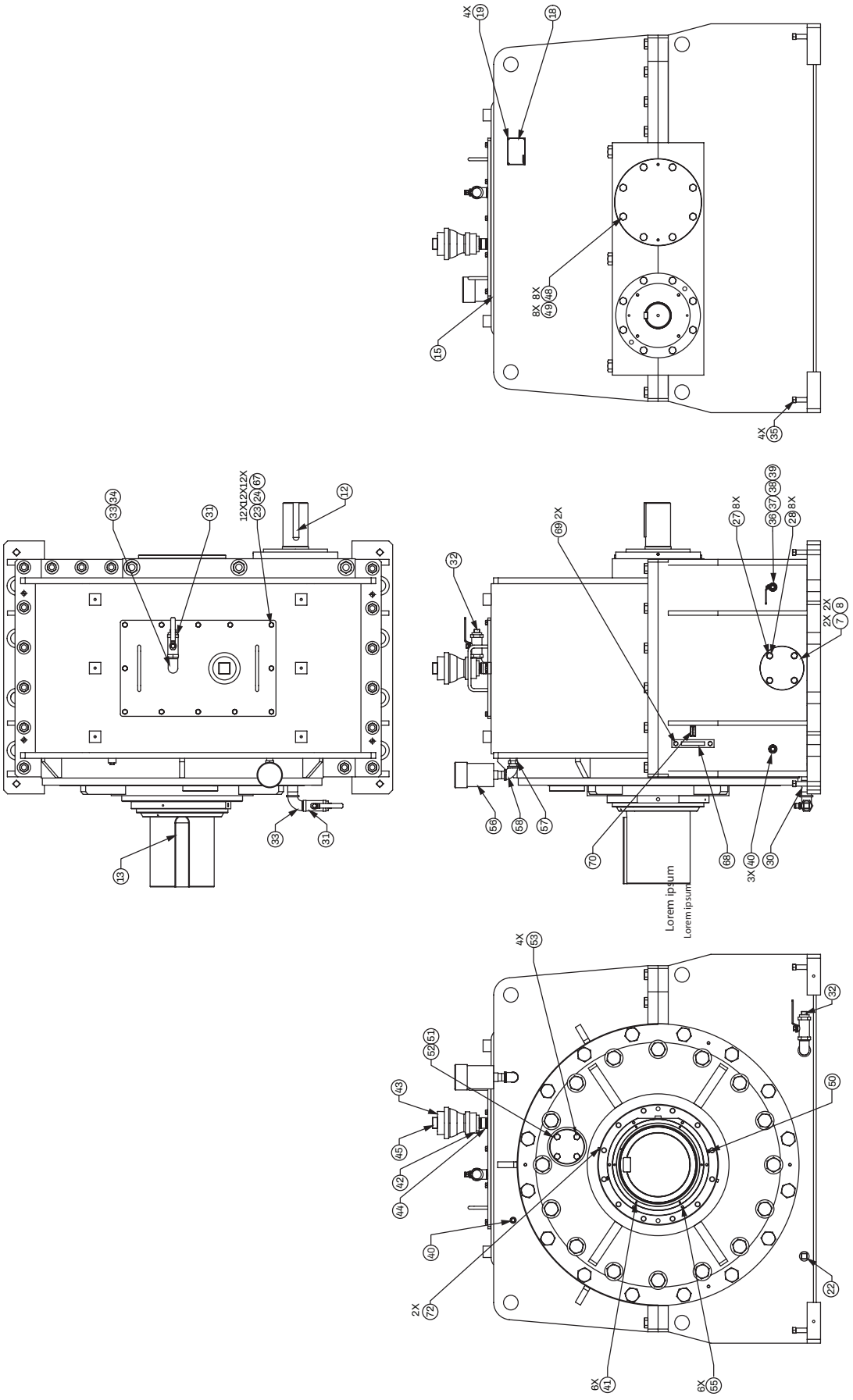
MagnaGear G1400 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	61416019_	Gear Assembly, 1st Reduction Includes shaft, gear, spacer, key, and front bearing cone 70788031A front bearing cup 70788031B rear bearing cone 70788029A rear bearing cup 70788029B	See Table 5	1
2	61416018_	Input Shaft Sub-Assembly Includes input shaft & pinion, bearing retainer, O-rings, seal retainer, grease fitting, relief fitting, inboard bearing cup 70788029B, inboard bearing cone 70788029A if overall ratio is ≤ 33.1714, inboard bearing cone 70788030A if overall ratio is ≥ 34.8095, outboard bearing cup 70788029B outboard bearing cone 70788029A outer seal 61160655 inner seal 61160656 2 x wear sleeve 61160714	See Table 5	1
3	70781459	Pan, Sump		1
4	61416021	Planetary Sub-Assembly Includes planet carrier, planet gears, planet gear shafts, thrust washer, retaining rings, roll pins, and 6 x planet bearing 70781819 2 x planet carrier bearing cone 70788032A 2 x planet carrier bearing cup 70788032B		1
5	70790104	Bearing Cap, 1st Reduction Shaft		1
6	80310833	Ring Gear		1
7	42000508A	3” Blank Pipe Flange		2
8	41970303G	Gasket, Pipe Flange		2
9	61160729	Wear Sleeve		1
10	80410224	Gearcase		1
11	70790101	Cover, Output Bearing		1
12	61313111	Key		1
13	61313112	Key		1
14	70780217	Splined Coupling		1
15	70780427	Gasket, Inspection Cover		1
16	70780627	Gear, Sun		1
17	41975830	Label		1
18	453301	Nameplate		1
19	03617003DA	Rivet		4
20	42002704FN	O-Ring		28 feet
21	61160405	O-Ring		1
22	42001308K	Plug, Magnetic		1
23	03661011AA	Lock-washer		20
24	03201816EC	Cap Screw, Hex Head		8
25	03401718AA	Lock-washer		8
26	036000070SG	Cap Screw, Hex Head		16
27	036000140SG	Cap Screw, Hex Head		16
28	61405010A	Washer		12
29	41970401E	Lockwire		AR
30	03453040GA	Nipple, Pipe		1
31	61310703F	Valve, Ball		2
32	03469007AA	Plug, Pipe		2
33	03467007AA	Elbow, Pipe		2

MagnaGear G1400 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
34	03453014GA	Nipple, Pipe		1
35	61166417	Indicator, Oil Level		1
36	61310703C	Valve, Ball		1
37	41974409A	Bushing		1
38	03453016DA	Nipple, Pipe		1
39	03469004AA	Plug, Pipe		1
40	03469006AA	Plug, Pipe		4
41	964368	Breather		1
42	03460025AA	Bushing		1
43	03463131AA	Coupling, Reducer		1
44	03453020GA	Nipple, Pipe		1
45	03469011AA	Plug, Pipe		1
46	03661010AA	Lock-washer		4
47	036000020KB	Cap Screw, Hex Head		2
48	03201908EC	Cap Screw, Hex Head		1
49	036100040KA	Cap Screw, Hex Head		6
50	03600120KA	Cap Screw, Drilled Hex Head		4
51	41970303E	Gasket, Pipe Flange		1
52	42000506A	Flange, Pipe		1
53	03201812EK	Cap Screw, Hex Head		4
54	03600040LA	Cap Screw, Hex Head		12
55	03600055LA	Cap Screw, Hex Head		8
56	41975752D	Screw, Set		4
57	03453019FA	Nipple, Pipe		1
58	03465006AA	Elbow, Pipe		1
59	70783932A	Shim, Output Bearing		5
60	70783932B	Shim, Output Bearing		2
61	70783932C	Shim, Output Bearing		2
62	80311221	Cover, Tach Wheel		1
63	70780316	Cover, Output Seal		1
64	61160485	O-Ring		1
65	61160684	Outer Seal, Output Shaft		1
66	61160692	Inner Seal, Output Shaft		1
67	41972310	Grease Fitting		2
68	03600008HA	Cap Screw, Hex Head		6
69	03600045NA	Cap Screw, Hex Head		12
70	42002704GN	O-Ring		9
71	70781451	Pan, Ring Gear		1
72	42009628	Screw, Set		1

PARTS REFERENCE FOR MAGNAGEAR G2100 PARALLEL SHAFT REDUCERS



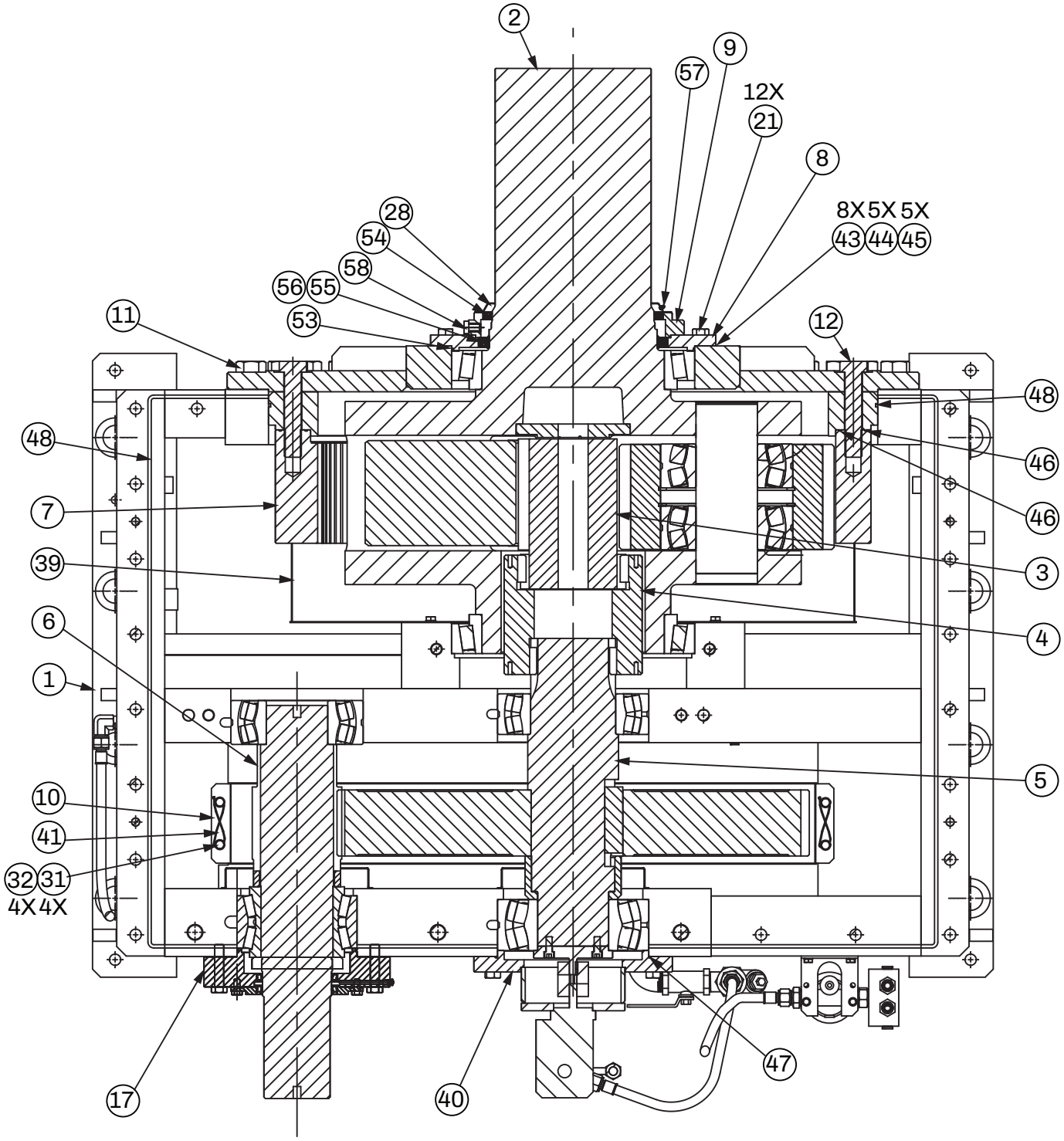
PARTS REFERENCE FOR MAGNAGEAR G2100 PARALLEL SHAFT REDUCERS

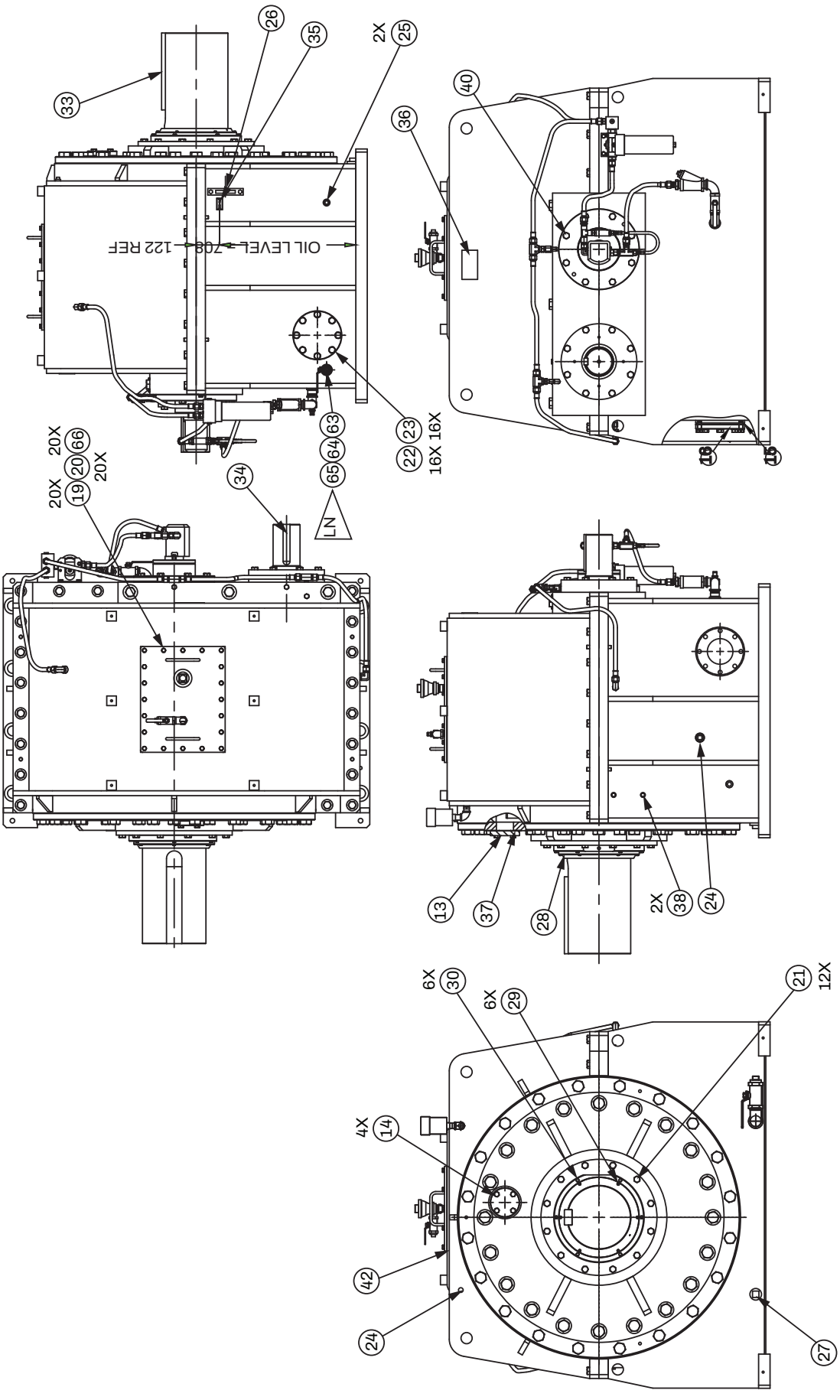


MagnaGear G2100 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	61416031_	Gear Assembly, 1st Reduction Includes shaft, gear, key, and front bearing cone 70788031A front bearing cup 70788031B rear bearing cone 70788034A rear bearing cup 70788034B	See Table 5	1
2	61416032_	Input Shaft Sub-Assembly Includes input shaft & pinion, bearing retainer, O-rings, seal retainer, grease fitting, grease relief, and 2 x bearing cup 70788034B 2 x bearing cone 70788034A outer seal 61160634 inner seal 61160620 2 x wear sleeve 61160707	See Table 5	1
3	70781460	Pan, Sump		1
4	61416030	Planetary Sub-Assembly Includes planet shafts, planet gears, roll pins, thrust washer, planet carrier, snap rings, and 6 x planet bearing 70781818 front planet carrier bearing cone 70788012A front planet carrier bearing cup 70788012B rear planet carrier bearing cone 70788009A rear planet carrier bearing cup 70788009B		1
5	70790105	Bearing Cap, 1st Reduction Shaft		1
6	80310835	Ring Gear		1
7	42000508A	3” Blank Pipe Flange		2
8	41970303G	Gasket, Pipe Flange		2
9	42002704GN	O-Ring Material		10 feet
10	80410226	Gearcase		1
11	70780173	Cover, Output Bearing		1
12	61313113	Key		1
13	61313114	Key		1
14	70780235	Splined Coupling		1
15	70780428	Gasket, Inspection Cover		1
16	70780625	Gear, Sun		1
17	03201906EC	Cap Screw, Hex Head		1
18	453301	Nameplate		1
19	03617003DA	Rivet		4
20	42002704FN	O-Ring Material		33 feet
21	61160437	O-Ring		1
22	42001308K	Plug, Magnetic		1
23	03661011AA	Lock-washer		12
24	03600040LA	Cap Screw, Hex Head		12
25	03600080TG	Cap Screw, Hex Head		16
26	36000140TG	Cap Screw, Hex Head		16
27	03201816EC	Cap Screw, Hex Head		8
28	03401718AA	Lock-washer		8
29	41970401E	Lockwire		AR
30	03453040GA	Nipple, Pipe		1
31	61310703F	Valve, Ball		2
32	03469007AA	Plug, Pipe		2
33	03467007AA	Elbow, Pipe		2
34	03453014GA	Nipple, Pipe		1
35	41975752D	Screw, Set		4

MagnaGear G2100 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
36	61310703C	Valve, Ball		1
37	41974409A	Bushing		1
38	03453016DA	Nipple, Pipe		1
39	03469004AA	Plug, Pipe		1
40	03469006AA	Plug, Pipe		4
41	03600010HA	Cap Screw, Hex Head		6
42	03460025AA	Bushing		1
43	03463131AA	Coupling, Reducer		1
44	03453020GA	Nipple, Pipe		1
45	03469011AA	Plug, Pipe		1
46	03661010AA	Lock-washer		4
47	03600116KA	Cap Screw, Drilled Hex Head		4
48	03600060PA	Cap Screw, Hex Head		8
49	03661014AA	Lock-washer		8
50	41972301	Grease Fitting		1
51	41970303E	Gasket, Pipe Flange		1
52	42000506A	Flange, Pipe		1
53	03201812EK	Cap Screw, Hex Head		4
54	03600065PA	Cap Screw, Hex Head		12
55	03600045KA	Cap Screw, Hex Head		6
56	964368	Breather		1
57	03453019FA	Nipple, Pipe		1
58	03465006AA	Elbow, Pipe		1
59	70783920A	Shim, Output Bearing		3
60	70783920B	Shim, Output Bearing		5
61	70783920C	Shim, Output Bearing		3
62	80311213	Cover, Tach Wheel		1
63	70780315A	Cover, Output Seal		1
64	61160423	O-Ring		1
65	61160629	Outer Seal, Output Shaft		1
66	61160630	Inner Seal, Output Shaft		1
67	61405010A	Seal Washer		12
68	61166417	Level Indicator, Sight		1
69	03600020KA	Cap Screw, Hex Head		2
70	41975853	Label, Arrow		1
71	70781450	Pan, Ring Gear		1
72	03213104BA	Cap Screw, Socket Head		1
73	430035	Plug, Pipe		1

PARTS REFERENCE FOR MAGNAGEAR G3500 PARALLEL SHAFT REDUCERS



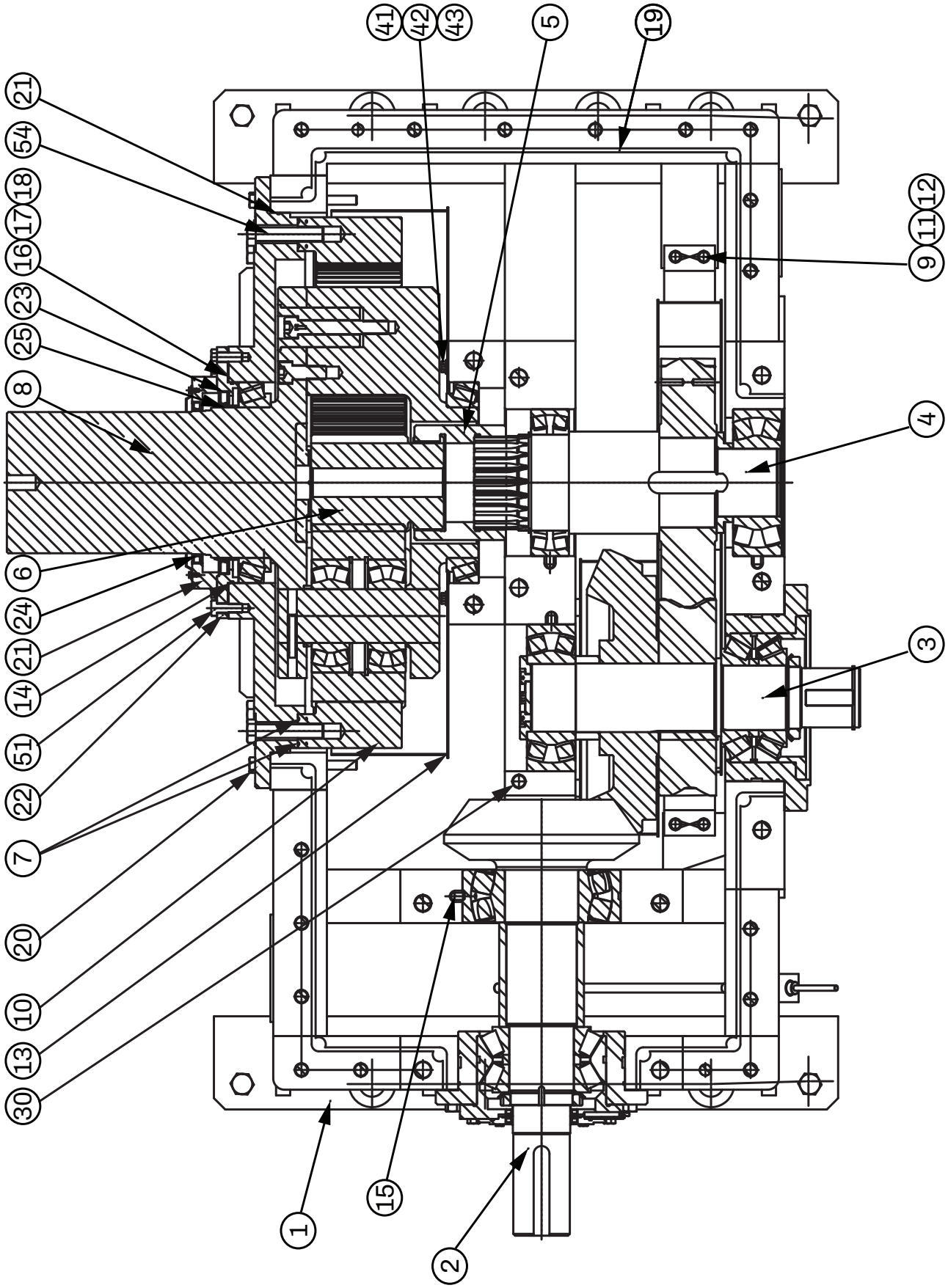

OIL LEVEL 208 122 REF
LN
16X 16X
2X
6X
6X
12X
4X
2X

MagnaGear G3500 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	80410228	Gearcase		1
2	61416044	Planetary Sub-Assembly Includes planet shafts, planet gears, roll pins, thrust washer, planet carrier, snap ring, and 6 x planet bearing 70781814 2 x planet carrier bearing cone 70788015A 2 x planet carrier bearing cup 70788015B		1
3	70780626	Gear, Sun		1
4	70780234	Splined Coupling		1
5	61316071_	Gear Assembly, 1st Reduction Includes shaft, gear, key, and rear bearing 70781816 front bearing 70781817	See Table 5	1
6	61416045_	Input Shaft Sub-Assembly Includes input shaft & pinion, outboard bearing assembly 70788028C inboard bearing assembly 70781814	See Table 5	1
7	80310837	Ring Gear		1
8	70780194	Bearing Cap, Output		1
9	80311217	Cover, Tach Wheel		1
10	70781448	Pan, Sump		1
11	036000-100TG	Cap Screw, Hex Head		20
12	036000-180TG	Cap Screw, Hex Head		20
13	42000506A	Flange, Pipe		1
14	032018-012EA	Cap Screw, Hex Head		4
15	41970303L	Gasket, Pipe Flange		1
16	42000511A	Flange, Pipe		1
17	61402712	Seal Sub-Assembly, Input		1
18	-	-		-
19	036610-011AA	Lock-washer		20
20	036000-040LB	Cap Screw, Hex Head		20
21	036000-055PB	Cap Screw, Hex Head		12
22	036610-014AA	Lock-washer		16
23	036000-045PB	Cap Screw, Hex Head		16
24	034690-006AA	Plug, Pipe		2
25	034690-005AA	Plug, Pipe		2
26	61166408	Level Indicator, Sight		1
27	42001308M	Plug, Magnetic		1
28	70780309	Cover, Output Seal		1
29	032018-003AK	Cap Screw, Hex Head		6
30	032018-014CK	Cap Screw, Hex Head		6
31	036600-010AA	Washer, Flat		4
32	036001-035KA	Cap Screw, Drilled Head		4

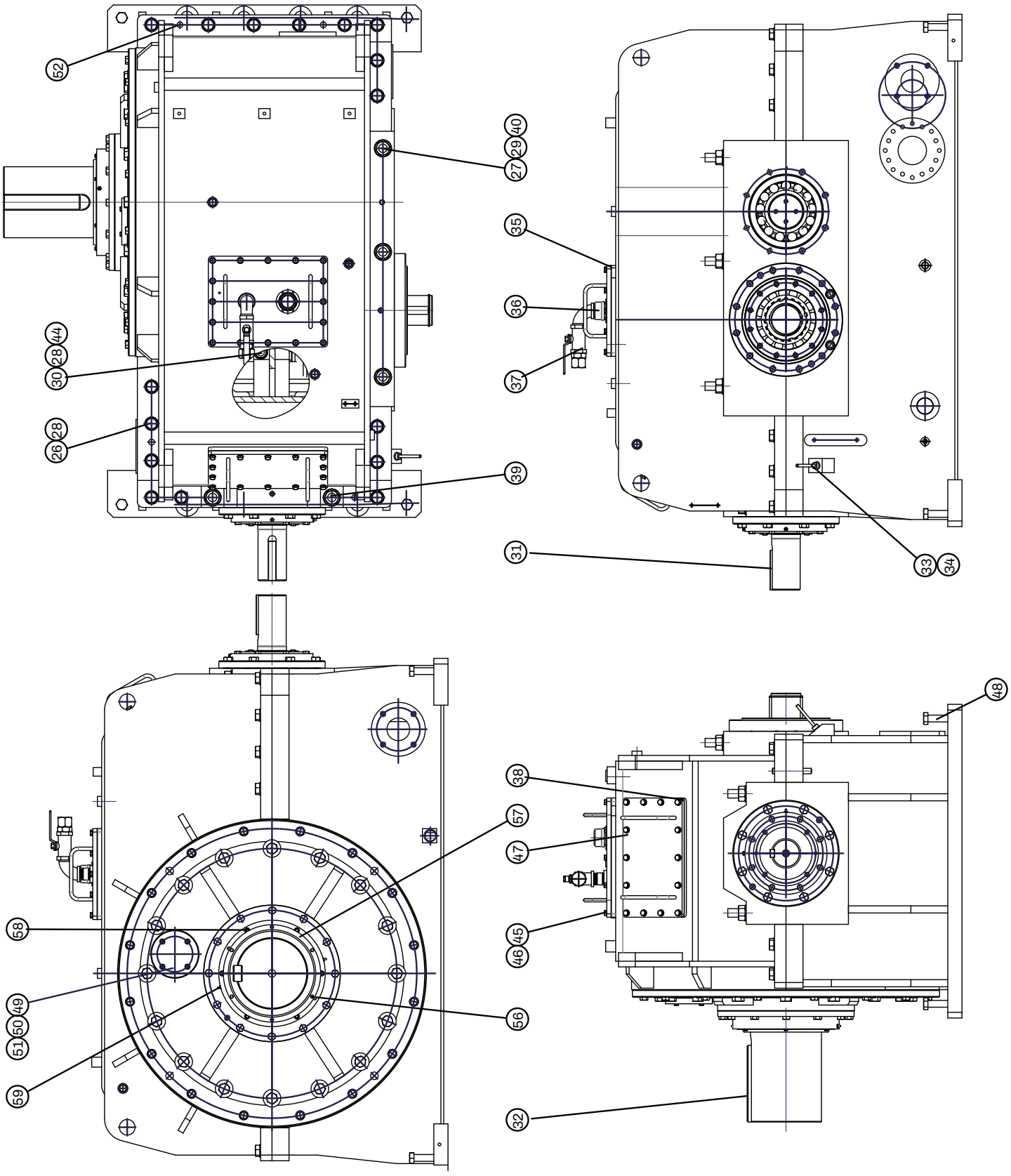
MagnaGear G3500 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
33	61313119	Key		1
34	61313118	Key		1
35	41975830	Label, Arrow		1
36	453301	Nameplate		1
37	41970303E	Gasket, Pipe Flange		1
38	032019-006DD	Cap Screw, Hex Head		2
39	70781449	Pan, Sump		1
40	61407984	Lubrication Sub-Assembly		1
41	-	-		
42	70780431	Gasket, Inspection Cover		1
43	70783926C	Shim, Output Bearing Cap		8
44	70783926B	Shim, Output Bearing Cap		5
45	70783926A	Shim, Output Bearing Cap		5
46	42002704FN	O-Ring Material		26 feet
47	61160409	O-Ring		1
48	42002704GN	O-Ring Material		26 feet
49	-	-		-
50	-	-		-
51	-	-		-
52	-	-		-
53	61160445	O-Ring		1
54	61160644	Outer Seal, Output Shaft		1
55	61160686	Inner Seal, Output Shaft		1
56	61160728	Wear Sleeve		1
57	41972301	Grease Fitting		1
58	03201906EC	Cap Screw, Hex Head		1
59	-	-		-
60	-	-		-
61	-	-		-
62	-	-		-
63	61310703C	Coupling, Reducer		1
64	41974409A	Nipple, Pipe		1
65	03453016DA	Plug, Pipe		1
66	61405010A	Seal Washer		12

Table 5 - Exact Ratio						
G1400 Parallel Input Pinion and 1st Gear Sub-Assemblies						
Exact Ratio	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assembly**		**Exact Ratio**	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assebly**
12.0582 : 1	61416019Z	61416018Z		19.0586 : 1	61416019M	61416018M
14.3333 : 1	61416019Y	61416018Y		17.8293 : 1	61416019L	61416018L
36.5901 : 1	61416019X	61416018X		16.7143 : 1	61416019K	61416018K
33.1714 : 1	61416019W	61416018W		38.5110 : 1	61416019J	61416018J
30.2593 : 1	61416019V	61416018V		34.8095 : 1	61416019H	61416018H
27.7488 : 1	61416019U	61416018U		31.6593 : 1	61416019G	61416018G
26.6190 : 1	61416019T	61416018T		28.9592 : 1	61416019F	61416018F
24.5714 : 1	61416019S	61416018S		25.5622 : 1	61416019E	61416018E
23.6407 : 1	61416019R	61416018R		22.7647 : 1	61416019D	61416018D
21.9388 : 1	61416019Q	61416018Q		20.4208 : 1	61416019C	61416018C
21.1587 : 1	61416019P	61416018P		18.4286 : 1	61416019B	61416018B
19.7218 : 1	61416019N	61416018N		17.2585 : 1	61416019A	61416018A
G2100 Parallel Input Pinion and 1st Gear Sub-Assemblies						
Exact Ratio	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assembly**		**Exact Ratio**	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assembly**
12.3673:1	61416031Z	61416032ZA		21.2727:1	61416031M	61416032MA
14.0000:1	61416031Y	61416032YA		19.7143:1	61416031L	61416032LA
15.9512:1	61416031X	61416032XA		18.3243:1	61416031K	61416032KA
-	61416031W	61416032WA		17.6842:1	61416031J	61416032JA
-	61416031V	61416032VA		34.9091:1	61416031H	61416032HA
-	61416031U	61416032UA		31.5000:1	61416031G	61416032GA
33.1304:1	61416031T	61416032TA		28.6154:1	61416031F	61416032FA
30.0000:1	61416031S	61416032SA		25.0345:1	61416031E	61416032EA
27.3333:1	61416031R	61416032RA		23.0323:1	61416031D	61416032DA
26.1429:1	61416031Q	61416032QA		20.4706:1	61416031C	61416032CA
24.0000:1	61416031P	61416032PA		19.0000:1	61416031B	61416032BA
22.1250:1	61416031N	61416032NA		17.0769:1	61416031A	61416032AA
G3500 Parallel Input Pinion and 1st Gear Sub-Assemblies						
Exact Ratio	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assembly**		**Exact Ratio**	**Item 1 1st Red Gear Assembly**	**Item 2 IP Shaft Assembly**
36.4304:1	61316071W	61416045W		17.6707:1	61316071K	61416045K
33.0120:1	61316071U	61416045U		38.3727:1	61316071J	61416045J
30.1000:1	61316071V	61416045V		34.6500:1	61316071H	61416045H
27.5897:1	61316071T	61416045T		31.5000:1	61316071G	61416045G
26.4600:1	61316071S	61416045S		28.8000:1	61316071F	61416045F
24.4125:1	61316071R	61416045R		25.4032:1	61316071E	61416045E
22.6059:1	61316071Q	61416045Q		23.4818:1	61316071D	61416045D
21.7800:1	61316071P	61416045P		21.0000:1	61316071C	61416045C
20.2622:1	61316071N	61416045N		18.9000:1	61316071B	61416045B
19.5632:1	61316071M	61416045M		17.1000:1	61316071A	61416045A
18.2700:1	61316071L	61416045L				

PARTS REFERENCE FOR MAGNAGEAR G1400 RIGHT ANGLE REDUCERS



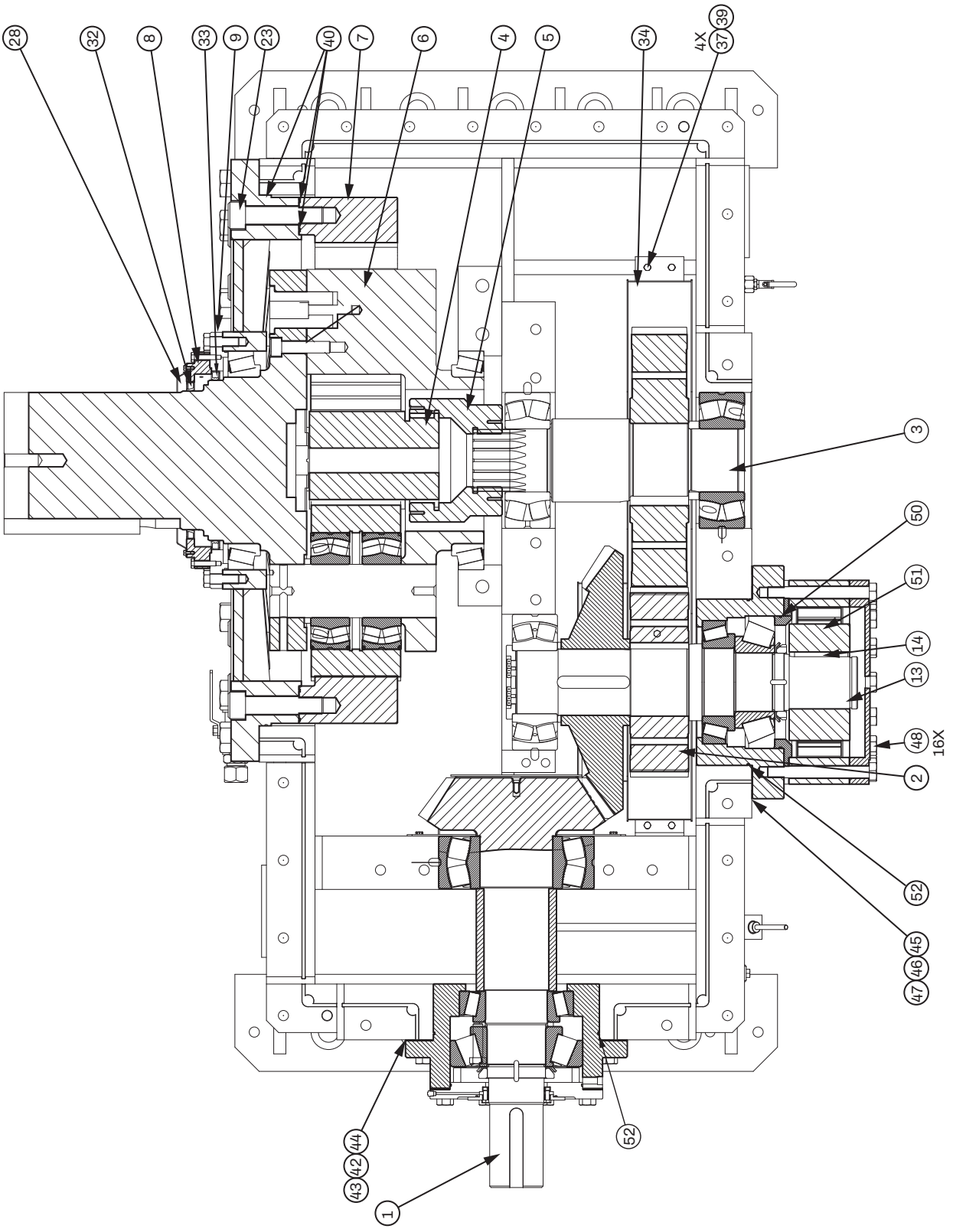
PARTS REFERENCE FOR MAGNAGEAR G1400 RIGHT ANGLE REDUCERS



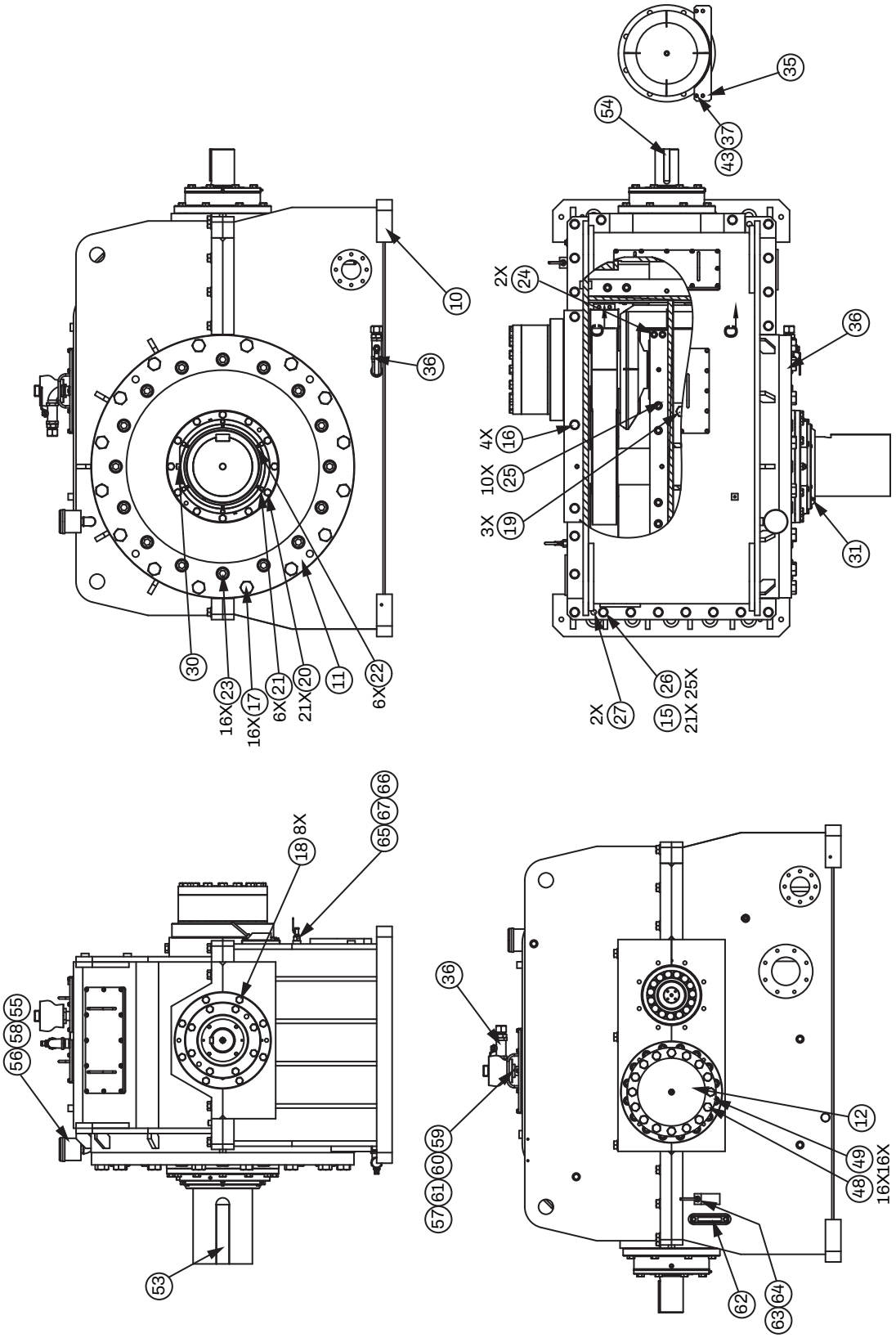
MagnaGear G1400 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	80410257	Gearcase		1
2	61602018_	Subassembly, Input Shaft Includes shaft & bevel gear, spacers, O-rings, bearing carrier, bearing cap, seal retainer, lockwasher, locknut, grease fitting, grease relief, and inboard bearing 70781814 2 x outboard bearing cone 70788019A 1 x outboard bearing cup 70788019B outer seal 61160655 inner seal 61160656 2 x wear sleeve 61160714	See Table 6	1
3	6160202__	Subassembly, 2nd Reduction Pinion Shaft Includes 2nd reduction pinion shaft, 2nd reduction pinion, bevel gear, spacer, bearing carrier, keys, bearing retainer, lockwasher, locknut, and front bearing 70781820 2 x rear bearing cone 70788019A 1 x rear bearing cup 70788019B	See Table 6	1
4	61602024_	Subassembly, 2nd Reduction Gear Shaft Includes shaft, gear, key, spacer, retaining ring, and front bearing 70781821 rear bearing 70781820	See Table 6	1
5	70780217	Splined Coupling		1
6	70780627	Gear, Sun		1
7	42002704FN	O-Ring Material		28 feet
8	61416057	Subassembly, Planetary Includes planet carrier, planet gears, planet shafts, thrust washer, retaining rings, roll pins, spacers, and 6 x planet bearing 70781819 2 x planet carrier bearing cup 70788032B 2 x planet carrier bearing cone 70788032A		1
9	70781463	Pan, Sump		
10	80310833	Gear, Ring		1
11	03600120KA	Cap Screw, Drilled Hex Head		6
12	41970401C	Lockwire		2 feet
13	70781467	Pan, Sump		1
14	61160485	O-Ring		1
15	61161903	Pin		4
16	70783932A	Shim, Output Bearing Cap		5
17	70783932B	Shim, Output Bearing Cap		2
18	70783932C	Shim, Output Bearing Cap		2
19	42002704GN	O-Ring Material		12 feet
20	03600080SG	Cap Screw, Hex Head		12
21	80311231	Cover, Tach Wheel		1
22	70790101	Cover, Output Bearing		1
23	61160692	Inner Seal, Output Shaft		1
24	61160684	Outer Seal, Output Shaft		1
25	61160729	Wear Sleeve		1
26	03600080RA	Cap Screw, Hex Head		16
27	36200350SB	Stud		7
28	03660015AA	Washer, Flat		17
29	03660016AA	Washer, Flat		11
30	36200300RB	Stud		1
31	61313111	Key		1
32	61313112	Key		1
33	61312609	Pipe Plug with Handle		1

MagnaGear G1400 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
34	61316204D	Tank Trapper, Magnetic		1
35	70780434	Gasket, Inspection Cover		1
36	61161014	Filler, Tank		1
37	61406094	Subassembly, Filler		1
38	70780435	Gasket		1
39	36200260SB	Stud		4
40	03650016AA	Nut		11
41	41970401E	Lockwire		AR
42	03660011AA	Washer, Flat		4
43	03600125LA	Cap Screw, Drilled Hex Head		4
44	03650015AA	Nut		1
45	03600035KA	Cap Screw, Hex Head		30
46	03661010AA	Washer, Flat		30
47	80410265	Cover, Inspection		1
48	36000120RA	Cap Screw, Hex Head		4
49	42000514A	Flange, Pipe		1
50	41970324E	Gasket, Pipe Flange		1
51	03600045NA	Cap Screw, Hex Head		16
52	61161293SA	Pin, Taper		1
53	-	Grease		1 lb
54	36000160SG	Cap Screw, Hex Head		16
55	-			
56	03600008HA	Cap Screw, Hex Head		6
57	70780316	Cover, Output Seal		1
58	03610045KA	Cap Screw, Hex Head		6
59	41972310	Grease Fitting		2

PARTS REFERENCE FOR MAGNAGEAR G2100 RIGHT ANGLE REDUCERS



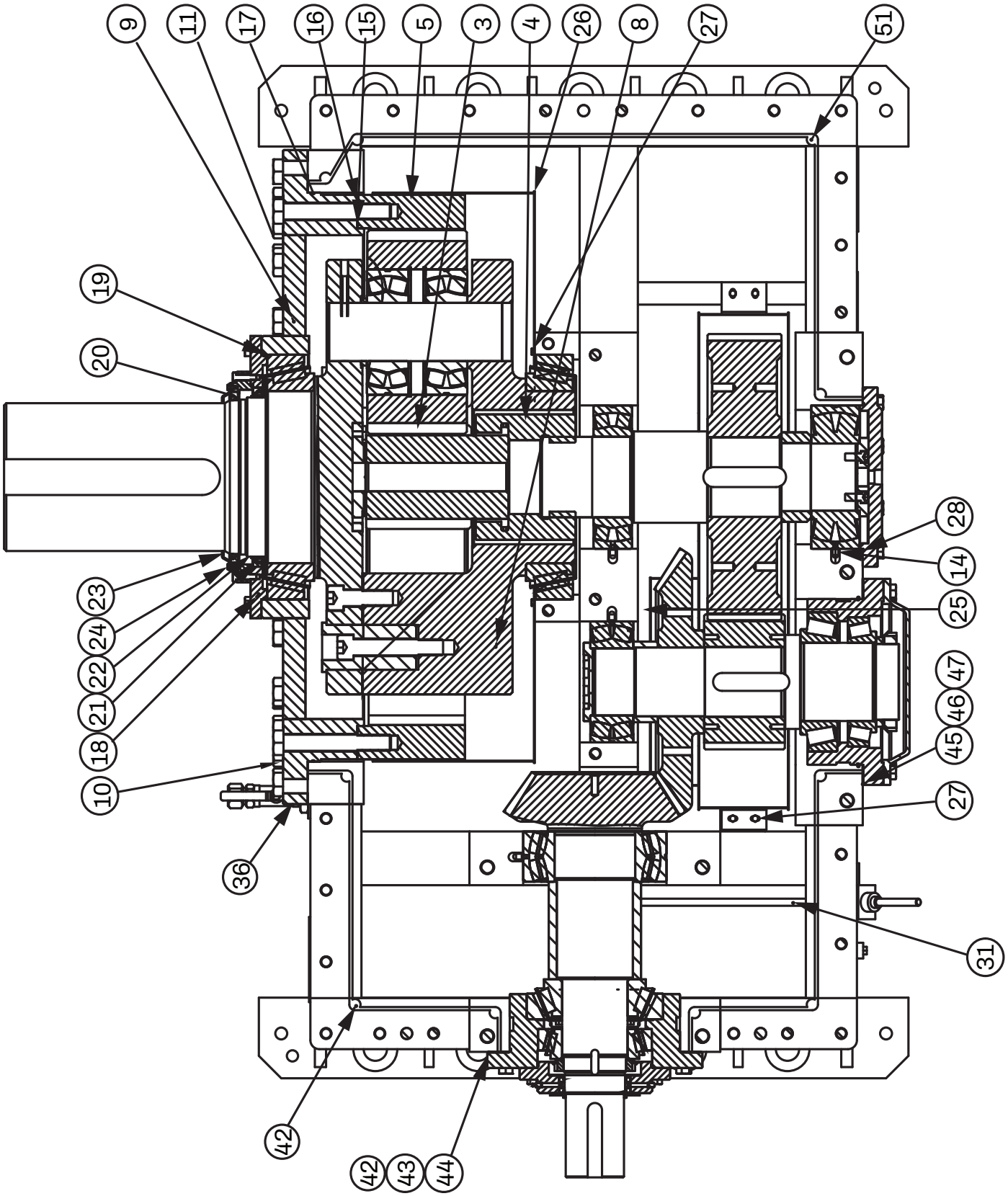
PARTS REFERENCE FOR MAGNAGEAR G2100 RIGHT ANGLE REDUCERS



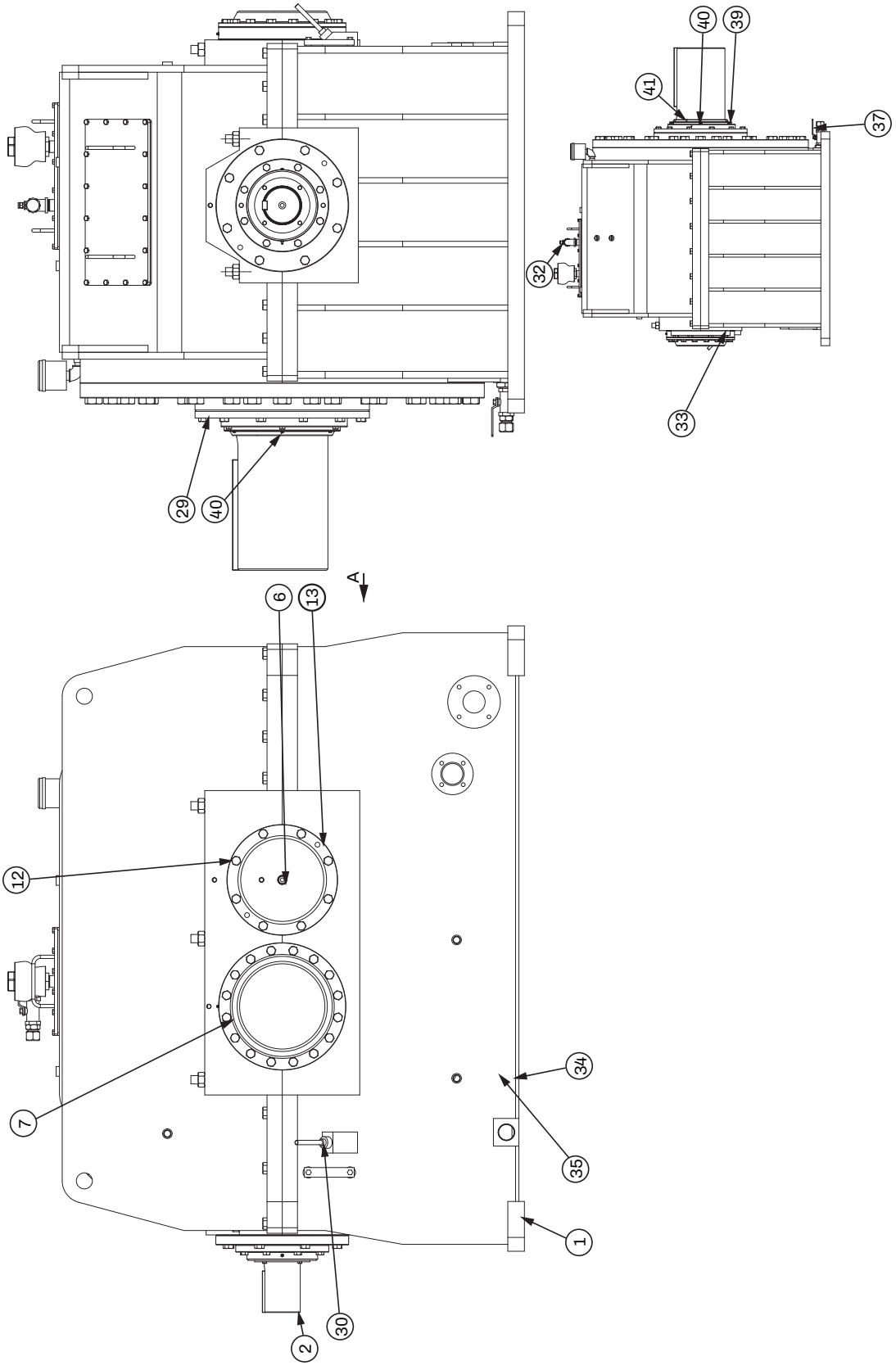
MagnaGear G2100 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	61602028_	Subassembly, Input Shaft Includes input shaft & bevel gear, spacer, bearing carrier, locknut, lockwasher, bearing retainer, input seal retainer, grease fitting, grease relief, O-rings, and inboard bearing 70781816 inner outboard bearing cone 70788025A inner outboard bearing cup 70788025B outer outboard bearing cone 70788013A outer outboard bearing cup 70788013B outer seal 61160634 inner seal 61160620 wear sleeve 61160707		1
2	6160203___	Subassembly, 2nd Reduction Pinion Shaft Includes shaft, bevel gear, locknut, lockwasher, spacer, bearing retainer, key, pinion, and inner rear bearing cone 70788014A inner rear bearing cup 70788014B outer rear bearing cone 70788013A outer rear bearing cup 70788013B front bearing 70781814	See Table 6	1
3	61602032_	Subassembly, 2nd Reduction Gear Shaft Includes shaft, gear, spacer, key, and 2 x bearing 70781814	See Table 6	1
4	70780625	Gear, Sun	See Table 6	1
5	70780237	Splined Coupling		1
6	61416056	Subassembly, Planetary Includes planet carrier, planet shafts, thrust washer, planet gears, spacers, roll pins, snap rings, and 2 x planet carrier bearing cone 70788012A 2 x planet carrier bearing cup 70788012B 6 x planet bearings 70781818		1
7	80310835	Gear, Ring		1
8	80311213	Cover, Tach Wheel		1
9	70780173	Cover, Output Bearing		1
10	80410280	Gearcase		1
11	80410285	Cover, Output		1
12	70780860	Cover, Backstop		1
13	61169930	Retaining Ring		1
14	036631-110PA	Key		1
15	036000-090RA	Cap Screw, Hex Head		21
16	036000-300RA	Cap Screw, Hex Head		4
17	036000-160TA	Cap Screw, Hex Head		16
18	036000-070PB	Cap Screw, Hex Head		8
19	036000-320SA	Cap Screw, Hex Head		3
20	036000-060PA	Cap Screw, Hex Head		12
21	036000-045KB	Cap Screw, Hex Head		6
22	036000-010HB	Cap Screw, Hex Head		6
23	036100-160TA	Cap Screw, Socket Head		16
24	036100-200PA	Cap Screw, Socket Head		2
25	036100-200RA	Cap Screw, Socket Head		10
26	036600-015AA	Washer, Flat		25
27	61161293SA	Taper Pin		2
28	70780315A	Cover, Output Seal		1
29	032131-004BA	Cap Screw, Socket Head		2
30	032131-008EA	Cap Screw, Socket Head		1
31	41972301	Grease Relief Fitting		1
32	61160629	Outer Seal, Output Shaft		1

MagnaGear G2100 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
33	61160630	Inner Seal, Output Shaft		1
34	70781472	Pan, Sump		1
35	70781471	Pan, Sump		1
36	61406094	Subassembly, Filler		2
37	036001-020JA	Cap Screw, Drilled Hex Head		8
38	41970401C	Lockwire		AR
39	42002704FN	O-Ring Material		33 feet
40		O-Ring		16
41	-	-		-
42	70783923	Shim, Bearing Carrier		AR
43	70783922	Shim, Bearing Carrier		AR
44	70783924	Shim, Bearing Carrier		AR
45	70783943A	Shim, Bearing Retainer		AR
46	70783943B	Shim, Bearing Retainer		AR
47	70783943C	Shim, Bearing Retainer		AR
48	036000-210RA	Cap Screw, Hex Head		16
49	036100-100RA	Cap Screw, Socket Head		16
50	61160418	O-Ring		1
51	61169203	Backstop		1
52	61160422	O-Ring		2
53	61313114	Key		1
54	61313113	Key		1
55	034651-011AA	Coupling, Pipe		1
56	964368	Breather		1
57	03453020GA	Nipple, Pipe		1
58	034530-016EA	Nipple, Pipe		1
59	03460032AA	Bushing, Pipe		1
60	034631-013AA	Coupling, Pipe		1
61	42005210	Plug, Pipe		1
62	61166417	Level Indicator, Sight		1
63	61316204D	Tank Trapper, Magnetic		1
64	61312609	Pipe Plug with Handle		1
65	41974408A	Bushing, Pipe		1
66	61310703B	Valve, Ball		1
67	41972404A	Hex Nipple, Pipe		1

PARTS REFERENCE FOR MAGNAGEAR G3500 RIGHT ANGLE REDUCERS



PARTS REFERENCE FOR MAGNAGEAR G3500 RIGHT ANGLE REDUCERS



MagnaGear G3500 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	80410248	Gearcase		1
2	61602015_	Subassembly, Input Shaft Includes shaft & bevel gear, input seal retainer, bearing retainer, bearing housing, spacer, locknut, lockwasher, grease fitting, grease relief, O-rings, 2 x seal 61612001 outer outboard bearing cone 70788046A outer outboard bearing cup 70788046B inboard bearing 70781831 inner outboard bearing cone 70788016A inner outboard bearing cup 70788016B	See Table 6	1
3	70780626	Gear, Sun	See Table 6	1
4	70780239	Splined Coupling	See Table 6	1
5	80310837	Gear, Ring		1
6	61602033_	Subassembly, 2nd Reduction Gear Shaft Includes shaft, gear, spacer, key, bearing retainer, and rear bearing 70781816 front bearing 70781817		1
7	6160202___	Subassembly, 2nd Reduction Pinion Shaft Includes bearing cover, locknut, spacer, bearing retainer, shaft & pinion, bevel gear, lockwasher, key, bearing housing, O-rings, and front bearing 70781832 inner outboard bearing cone 70788047A outer outboard bearing cone 70788048A outer outboard bearing cup 70788048B inner outboard bearing cup 70788047B		1
8	61416058_	Subassembly, Planetary Includes planet carrier, thrust washer, planet gears, planet shafts, spacers, spring pins, snap rings, and 6 x planet bearings 70781814 2 x planet carrier bearing cone 70788049A 2 x planet carrier bearing cup 70788049B		1
9	80410253	Cover, Output		1
10	036000-120TC	Cap Screw, Hex Head		20
11	036000-240TC	Cap Screw, Hex Head		20
12	036000-070PB	Cap Screw, Hex Head		16
13	70790109	Cover, Bearing		1
14	61161903	Pin		4
15	42002704GN	O-Ring Material		
16	42002704GN	O-Ring Material		
17	42002704GN	O-Ring Material		
18	70790122	Cover, Output Bearing		1
19	42002704FN	O-Ring Material		
20	61160644	Outer Seal, Output Shaft		1
21	61160686	Inner Seal, Output Shaft		1
22	61160728	Wear Sleeve		1
23	70780309	Cover, Output Seal		1
24	80311217	Cover, Tach Wheel		1
25	70781461	Pan, Sump		1
26	70781474	Pan, Sump		1
27	036000-014JE	Cap Screw, Hex Head		8
28	61160409	O-Ring		1

MagnaGear G3500 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
29	036000-060PB	Cap Screw, Hex Head		12
30	61312608	Pipe Plug with Handle		1
31	61316204A	Tank Trapper, Magnetic		1
32	61406094	Subassembly, Filler		1
33	61166417	Level Indicator, Sight		1
34	41974421A	Coupling, Pipe		1
35	61310703F	Valve, Ball		1
36	03453013GA	Coupling, Pipe		1
37	61162624A	Plug		1
38				
39	036000-045LA	Cap Screw, Hex Head		6
40	036000-012HA	Cap Screw, Hex Head		6
41	41972301	Grease Fitting		1
42	70783940A	Shim, Bearing Carrier		AR
43	70783940B	Shim, Bearing Carrier		AR
44	70783940C	Shim, Bearing Carrier		AR
45	70783944A	Shim, Bearing Carrier		AR
46	70783944B	Shim, Bearing Carrier		AR
47	70783944C	Shim, Bearing Carrier		AR
48	61313118	Key		1
49	61313119	Key		1
50	034530-016EA	Nipple, Pipe		1
51	034651-011AA	Coupling, Pipe		1
52	964368	Breather		1
53	03453020GA	Nipple, Pipe		1
54	034631-013AA	Coupling, Pipe		1
55	42005210	Plug, Pipe		1
56	03460032AA	Bushing, Pipe		1
57	42002704GN	O-Ring Material		16 feet

Table 6 - Exact Ratio

G2100 Right Angle Input Shaft, 2nd Reduction Pinion Shaft, and 2nd Reduction Gear Shaft Sub-Assemblies									
Exact Ratio	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**	**Exact Ratio**	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**
61.5049 : 1	61602018B	61602021R	61602025R	61602024R	25.2579 : 1	61602018A	61602021G	61602025G	61602024G
54.9490 : 1		61602021Q	61602025Q	61602024Q	22.1969 : 1		61602021F	61602025F	61602024F
49.4420 : 1		61602021P	61602025P	61602024P	19.6322 : 1		61602021E	61602025E	61602024E
44.7509 : 1		61602021N	61602025N	61602024N	18.1417 : 1		61602021D	61602025D	61602024D
40.7068 : 1		61602021M	61602025M	61602024M	16.1720 : 1		61602021C	61602025C	61602024C
37.1845 : 1		61602021L	61602025L	61602024L	13.9454 : 1		61602021B	61602025B	61602024B
35.5885 : 1		61602021K	61602025K	61602024K	12.0751 : 1		61602021A	61602025A	61602024A
31.3476 : 1		61602021J	61602025J	61602024J					
27.7764 : 1		61602021H	61602025H	61602024H					
G2100 Right Angle Input Shaft, 2nd Reduction Pinion Shaft, and 2nd Reduction Gear Shaft Sub-Assemblies									
Exact Ratio	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**	**Exact Ratio**	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**
56.6614 : 1	61602028B	61602030BM	61602031BM	61602032M	35.5647 : 1	61602028A	61602030AM	-	61602032M
53.7393 : 1		61602030BL	61602031BL	61602032L	33.7306 : 1		61602030AL	-	61602032L
51.4800 : 1		61602030BK	61602031BK	61602032K	32.3125 : 1		61602030AK	-	61602032K
49.3665 : 1		61602030BJ	61602031BJ	61602032J	30.9859 : 1		61602030AJ	-	61602032J
45.9491 : 1		61602030BH	61602031BH	61602032H	28.8409 : 1		61602030AH	-	61602032H
40.5600 : 1		61602030BG	61602031BG	61602032G	25.4583 : 1		61602030AG	-	61602032G
36.3600 : 1		61602030BF	61602031BF	61602032F	22.8221 : 1		61602030AF	-	61602032F
					20.7723 : 1		61602030AE	-	61602032E
					18.0082 : 1		61602030AD	-	61602032D
					16.3661 : 1		61602030AC	-	61602032C
					14.0347 : 1		61602030AB	-	61602032B
					12.4591 : 1		61602030AA	-	61602032A

Table 6 - Exact Ratio

G3500 Right Angle Input Shaft, 2nd Reduction Pinion Shaft, and 2nd Reduction Gear Shaft Sub-Assemblies										
Exact Ratio	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**		**Exact Ratio**	**Item 2 Input Shaft Assembly**	**Item 3 2nd Reduction Pinion Shaft Assembly with Backstop**	**Item 3 2nd Reduction Pinion Shaft Assembly without Backstop**	**Item 4 2nd Reduction Gear Shaft Assembly**
60.30	61602015_	61602022BY	61602023BY	61602013Y		38.11	61602015_	61602022AY	61602023AY	61602013Y
55.28	61602015_	61602022BV	61602023BV	61602013V		36.46	61602015_	61602022AW	61602023AW	61602013W
50.88	61602015_	61602022BT	61602023BT	61602013T		34.93	61602015_	61602022AV	61602023AV	61602013V
45.23	61602015_	61602022BQ	61602023BQ	61602013Q		33.50	61602015_	61602022AU	61602023AU	61602013U
40.46	61602015_	61602022BM	61602023BM	61602013M		30.89	61602015_	61602022AS	61602023AS	61602013S
						29.70	61602015_	61602022AR	61602023AR	61602013R
						28.58	61602015_	61602022AQ	61602023AQ	61602013Q
						27.52	61602015_	61602022AP	61602023AP	61602013P
						26.52	61602015_	61602022AN	61602023AN	61602013N
						25.57	61602015_	61602022AM	61602023AM	61602013M
						24.67	61602015_	61602022AL	61602023AL	61602013L
						23.00	61602015_	61602022AK	61602023AK	61602013K
						22.23	61602015_	61602022AJ	61602023AJ	61602013J
						21.49	61602015_	61602022AH	61602023AH	61602013H
						20.79	61602015_	61602022AG	61602023AG	61602013G
						20.11	61602015_	61602022AF	61602023AF	61602013F
						19.47	61602015_	61602022AE	61602023AE	61602013E
						18.85	61602015_	61602022AD	61602023AD	61602013D
						18.26	61602015_	61602022AC	61602023AC	61602013C
						17.69	61602015_	61602022AB	61602023AB	61602013B
						17.15	61602015_	61602022AA	61602023AA	61602013A

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 °F to 165 °F (65 °C 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 2.3
	3. Bearing adjustment	See "Overheating"--Item 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 NOISE	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 3.1
	5. Oil level	See "Overheating"--Item 1.2
	6. Type of oil	See "Overheating'' --Item 1.5
	7. Coupling lateral float	See "Shaft Failure" --Item 2.1
	8. Rust formation	See "Bearing Failure"--Item 3.5
	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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MN16015 REV-A 02/24