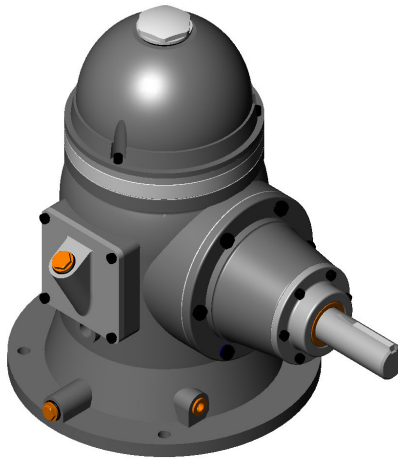


OMNI GEAR®
Right Angle Gearheads
Service Manual



Cautions

Following are some general cautions. All personnel shall use safe and sound practices and take all necessary precautionary measures to ensure safety.

- ◆ Transport, installation, plumbing, operation, maintenance, and inspections should be handled by properly trained technicians.
- ◆ The unit should be operated only within its design and performance specifications.
- ◆ Do not remove the name plate.
- ◆ Any modifications or alterations of any kind, to the unit, will void the warranty and all subsequent claims.
- ◆ Do not operate the unit without all safety covers in place.
- ◆ The reducer and the lubricant will get very hot during operation. Take safety precautions when handling the Bevel Gear unit and the lubricant.
- ◆ Never approach or touch any rotating parts during operation.
- ◆ Damaged units should be taken off-line and not put back in operation until properly serviced.
- ◆ If the unit performs abnormally, in any way, stop the unit immediately.



OMNI RIGHT ANGLE GEARHEAD Selection

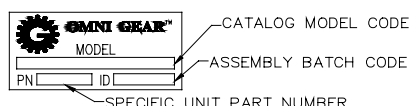
The life and field performance of the OMNI RIGHT ANGLE GEARDRIVE is dependent on the appropriate unit size and features being selected properly for the specific application. Careful consideration should have been given to the duty cycle, ambient conditions, actual loads, severity of service, reliability, and safety factor. If you have any concerns relative to the suitability of your OMNI RIGHT ANGLE GEARDRIVE for your application, please contact OMNI Gear or your OMNI Gear representative.

Delivery Inspection

Upon receipt of your OMNI Gear Products, check and document any handling damage to the shipment packing, product packing, or the product itself. During transit, contents of the shipment packing may have moved. Prior to removing the product from the shipment packing, ensure the product is stable and it is safe to unpack the shipment packing.

OMNI RIGHT ANGLE GEARHEAD Verification

Each OMNI RIGHT ANGLE GEARDRIVE has a nametag attached to the unit. Check the nametag and verify the nametag unit data corresponds to your product requirements.



- Refer to OMNI RIGHT ANGLE GEARDRIVE Catalogs for detailed information on model codes designations.
- Always supply complete nametag data when referencing your OMNI RIGHT ANGLE GEARDRIVE unit.

Storage

OMNI RIGHT ANGLE GEARDRIVE units are shipped prepared for a minimum of 6 months storage upon receipt. The storage environment should be clean, dry, protected from the elements, free from vibration, and not subject to large temperature changes in short intervals. For units requiring longer storage times or being stored in conditions other than those stated above, contact OMNI Gear or your OMNI Gear Representative.

Installation

The OMNI RIGHT ANGLE GEARDRIVES should be properly aligned and secured to the mating equipment for proper performance. All fasteners should be properly tightened and secured against loosening during operation. The male and female interface threads on all standard units have been designed to accept a minimum torque values of 90% of the proof load of a ISO grade 10.9 fastener based on a minimum thread engagement of 110% of the nominal thread size. Some threaded holes are also used as oil ports. These threads need to be sealed against oil leaks when installing the fastener.

Gear drives for domestic shipment are shipped with lubricant installed. Air freight shipments are packaged with the oil in a separate container. Inspect and clean top of discharge base and bottom of gear drive to assure removal of burrs or foreign material that might cause misalignment.

Install gear drive on discharge base and install non-reverse clutch over head shaft. The non-reverse clutch should fit on the head shaft and engage the drive block without springing the head shaft. Lubricate head shaft threads and bottom of adjusting nut before raising the pump impellers. Cooling coils are provided so they must be connected to water. Not doing so will void your Omni Gear warranty.

Remove protective material from the input shaft extension and clean the shaft. Install coupling half or flange. Hammering the flange or coupling into place may damage bearings and change gear adjustment. This is not permissible and will void the warranty. Interference fits are permissible if coupling can be heated for installation and fitted without hammering to install on the input shaft. Check the run out of the aligning surfaces on both coupling halves before installing the connecting members.

Align driver with gear drive to obtain parallel and angular alignment within coupling or drive shaft manufacturers specifications. Misalignment should be as close to zero as possible for maximum life and smoothest operation. Correct tools and procedures are a must when aligning the gear drive. Improper alignment will void your warranty.

Excessive noise and vibration in a new gear drive is almost always an indication of misalignment or poor installation. All drives are test run and checked for noise and vibration. Failure to correct the installation can result in damage to the pump and gear drive. Our warranty will not apply unless the drive is properly installed. Proper installation includes alignment of the power unit, the right angle gear drive, and the pump. Adequate foundation must be provided for engine and pump to prevent shifting or settling of either member. Positive alignment must be maintained. Recheck alignment at regular intervals after starting operation of the system and correct if settling or drifting has occurred.

Start-Up

The following is a short list of various checks and actions to be taken prior to or during start-up to ensure the safety of personnel and lessen the risk damage to equipment.

- ❖ Verify correct rotation of all equipment.
- ❖ Check for proper lubrication (even on Factory filled units) on all equipment.
- ❖ Check that all plugs and fasteners have been installed
- ❖ Ensure all guards and other safety devices are in place and operational.

It is recommended the units be run for a period of time (4 to 10 hours) under no or light load conditions as installed. This will promote proper wear-in and alignment of all mating components.

Torsional Vibration

With engine drive systems, it is not uncommon for one or more resonate speeds to exist between zero RPM and the operating speed of the system. Continued operation at a resonate speed will result in torsional vibration which can be damaging to all components in the system. Unusual rumbling or clattering noise from the gear drive at a sharply defined speed is the most common indication of torsional vibration. As the speed is increased or decreased, the noise will disappear. This noise is the result when the vibratory torque exceeds the drive torque causing the gear teeth in the gear drive to separate and clash together very rapidly. Transition through a resonate speed range to operating speed is not normally damaging, but operation of the system close to a resonate speed should be avoided. To avoid operation at a resonate speed it may be necessary to

change the speed of the engine with respect to the pump. This can be accomplished by changing the gear ratio of the gear drive.

During the past 25 years, engines have changed. These changes have been accelerated during the past three years and are not limited to the following: 1) Reduction in weight and number of cylinders 2) Increase in speed to deliver horsepower 3) Increase in peak cylinder pressure with turbo charging 4) Lower fuel consumption and exhaust emission. Due to competition, engines now deliver 200 hp with 4 cylinders where 6 cylinders and even 8 cylinder used to be required. The end result is that the transfer of power from the engine to the driven equipment is not as fluid as it was. Along with the new engine innovations, has come the premature failure of the components in the pump system caused by operating at or near a torsional resonant speed (+/- 10%). Typical modes of failure are broken crank shafts, drive line shafts twisting in two, broken input shafts, broken gear teeth, bearing cage failure, and broken head shafts.

Torsional problems are generated by the engine. Even after the torsional analysis is performed, the gear drive manufacturer and the pump manufacturer do not change or modify their products in any way to address the torsional vibrations generated by the engine. Modern lightweight engines produce much higher torsional disturbances than engines produced three to four years ago. The resulting higher vibratory stresses determine the limiting fatigue life of the pumping system components. Vibratory stresses induce fatigue cycles, which destroy the pumping system components. The component in the system with the least amount of allowable fatigue cycles fails first.

Torsional analysis by computer simulation is the most reliable alternative to actual testing. Analysis by computer simulation during system design and application is preferable. Three sources of analysis are coupling manufacturers, engine manufacturers, and independent service firms. When specified in advance of purchase, the engine manufacturer will perform the torsional analysis as a service to sell the engine. Omni Gear recommends that a torsional analysis be done on the system before it is installed. This is a common practice in industry, government and municipal applications. For Gear Drives, Lloyds Register will not accept vibratory torques across gears exceeding 33% of full load torque, while Military Std – 167 will not accept vibratory torques across gears exceeding 25% of full load torque.

With the increase in torsional impulses, the pumping system must be carefully tuned by means of a torsionally soft component (torsional coupling, torsionally resilient drive line), that should be located between the engine flywheel and the driven equipment. With the current diesel engines you have about a 1% chance of a pumping system running successfully without the incorporation of a soft coupling in the pumping system. The pump manufacturer and the gear drive manufacturer will not warranty products that have been subject to torsional damage. Omni Gear is a supplier of only one component in the pumping system. We have no control over system design, or engine selection. It is the responsibility of those who select the equipment for the pumping project to assure that damage to any component does not occur due to torsional vibration.

Lubrication

The use and maintenance of the proper lubrication is critical to the successful operation and performance of the OMNI RIGHT ANGLE GEARDRIVE . Refer to table 1 to select the appropriate oil for the unit's ambient operating temperature and table 2 for approximate oil quantity. OMNI Gear recommends the use of EP additives for Right Angle Geared Units. However, when the unit is used with other components with shared oil baths, check EP

compatibility with the other component manufacture. Also, for some special designed OMNI RIGHT ANGLE GEARDRIVE, EP additives may not be compatible with special internal components. Contact OMNI Gear or your Lubricant supplier for more details.

Use of rust and oxidation inhibited (R&O) gear oils in your Omni Gear Drive is required or your warranty will be voided. For general operating conditions, lubricant number and corresponding viscosity range see lubricant chart below:

Table 1

Ambient Temp. F°	10-40	30-60	50-125
Celsius C°	-12 to +5	-1 to +16	+10 to +52
ISO Viscosity Grade	68	150	220
SAE Grade	20	40	50
AGMA Lubricant #	3	4	5
Viscosity Range			
SSU @ 100 F	417-510	25-765	918-1122
CST @ 40 F	90-110	135-165	198-242
Castrol	Alpha EP 100	Alpha EP 150	Alpha EP 220
Chevron-USA	AW Mach. 100	AW Mach. 150	AW Mach. 220
Citgo	Pacemaker 100	Pacemaker 150	Pacemaker 220
Shamrock		Indigo 150	Indigo 220
Exxon-USA	Terresstic 100	Terresstic 150	Terresstic 220
FINA		Pontonic N 150	Pontonic N 220
Mobil	Mobile Gear 627	Mobile Gear 629	Mobile Gear 630
Pennzoil		Pennzgear 150	PennzGear 220
Phillips	Magnus 100	Magnus 150	Magnus 220
Shell-USA	Omala 100	Omala 150	Mala 220
Texaco	Meropa 100	Meropa 150	Meropa 220

Contact the factory for lubricant recommendations for operation under extremely hot or cold ambient conditions. Gear drives operating in extremely cold weather must be provided with an oil which will flow through the oil lines at start up. Oil flow must be immediate, otherwise the bearing and gears will not be properly lubricated. An oil heater may be required for consistent cold weather starting.

Change oil at least every 1000 hours of operation. If gear drive is operated intermittently less than 1000 hours per year in a season of two or three months, change oil at the end of that period of operation to eliminate water formed in the gear case due to condensation. More frequent oil changes are necessary for units operating at temperatures above 190 F° (82C°). Oil temperatures of 200F° (93C°) are not dangerous, but will require changes of oil every 500-750 hours. To drain oil, remove plug below sight gage. To refill, replace drain plug and tighten securely. Fill through plug located above the sight glass.

Cooling

All Omni Gear drives are equipped with cooling coils. The water cooling coils must be hooked up to reduce excessive heat generation. Failure to properly use the water cooling system will void the warranty. The amount of fresh water required at 70F° (21C°) will be 3 gallons per minute (11.4 liters per minute) for the C-30 and C-50 case/frame size. The C-100 case/frame size uses 7 gallons per minute (26.5 liters per minute). Oil temperature

will rise with increase of speed above 1760 RPM or in enclosures with limited air circulation. Check with Omni Gear before installing under these conditions.

Pin Type Non-Reverse Clutch

Pins are provided for the non-reverse clutch. They are to be installed in the drilled holes of the clutch. Pins must be clean and free from oil so they will fall freely. The non-reverse protection is not guaranteed. Settings of over 400 feet (122 meters) deep may require special procedures and in some cases they may not work. Consult supplier for proper procedure for shutting down the well.

Important Notice

All rotating shafts and coupling must be properly guarded before operating the gear drive. The top dome supplied for the drive must be installed over the non-reverse clutch before operating the gear drive.. An OSHA approved driveline cover must be installed between the gear drive and engine. Failure to install a PTO and clutch between the engine and gear drive, and failure to disengage same on pump shut down may cause damage to the gear drive pin type clutch assembly. Repeated engine roll back into the drive will damage the clutch assembly.

Caution

Lifting bolts provided are designed to lift the gear drive only. Do no attempt to lift discharge head and or pump assembly with the gear drive.

Limited Warranty

Omni Gear's right angle gear drive is warranted to be free from defects in material and workmanship under normal use for a period of two (2) years from the date of factory shipment by us for the original purchaser and then only when operated within the rated capacity for which it was sold. Our obligation under this warranty is limited to the replacement of any part which shall be returned to us with transportation prepaid. This warranty shall not apply to a drive which has been altered or repaired outside our factory without our written consent and approval. No warranty is made regarding oil seals, minor oil leaks, not changing the oil or draining condensation, not connecting water to cooling coils when provided as called for in this manual, overloading the rated horsepower of the drive or rated capacity of the thrust bearings, or torsional vibration. We make no warranty of any kind, expressed or implied regarding bearings or other merchandise not manufactured by us. The express warranties and guarantees contained herein are exclusive and are made in lieu of any of other representation by Omni Gear or its agents. Any implied warranty of merchantability of fitness for a particular purpose are expressly disclaimed. The language contained herein shall be the final and exclusive expression of agreement with respect to sale of equipment by Omni Gear. Should any part of Omni Gear product be found, under normal use and service, during the warranty period, to be defective, Omni Gear shall repair or replace, at its sole option, said part FOB Omni Gear's facilities provided the defective gear drive, in whole, is returned to Omni Gear's facilities, charges prepaid, accompanied by a Return Goods Authorization (RGA) and defect report detailing the claimed defect, and provide inspection of the original product establishes the claimed defect to the satisfaction of Omni Gear. In the event a warranty claim is denied, an Omni Gear Customer Service representative shall contact the customer and advise of the cost to repair the Product not covered under warranty. If the customer requests the Product be repaired, the repaired Product shall carry as Manufacturers Remanufactured Warranty of 6 months from date of remanufacture. Contact Omni Gear for Warranty Disclaimer and Limitations of Liability.

Assembly Information:

Assembled by _____

Assembly Date _____

Backlash set at _____ inches or mm

Noise Level @1750 rpm no load test _____

Assembled Per G-30 G-50 G-100 Instructions Circle One

Assembly Instructions Rev. Date _____

Lube Type _____

Lube Amount _____

Serial Number _____

Model Code _____

Assembly # _____

Clutch Size _____

Bolt Torques Foot Lbs.:

Ratchet Plate _____

Drive Block _____

Input Shaft housing to case _____

Input Seal Retainer cap _____

Inspection Cover _____



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Dear Valued Customer:

Standard Terms and Conditions of Sale

The following letter serves to define Omni Gear's Warranty policy effective January 1, 2006. Omni Gear warrants its Products to be free defects in materials and workmanship when installed and maintained consistent with Omni Gear's specifications. Unless otherwise specified below, each Product is warranted for a period of 12 months from the date of retail delivery or 18 months from the date of shipment from Omni Gear's facility, whichever shall first occur. All replacement or spare parts supplied by Omni Gear are warranted for a period of 3 months from the date of shipment from Omni Gear's Facility.

Should any part of an Omni Gear Product be found, under normal use and service, during the warranty period, to be defective, Omni Gear shall repair or replace, at its sole option, said part FOB Omni Gear's facility, Houston, Texas, provided the defective gear drive, in whole, is returned to Omni Gear's facility, charges prepaid, accompanied by a Return Goods Authorization Number ("RGA") and defect report detailing the claimed defect, and provided inspection of the original Product establishes the claimed defect to the satisfaction of Omni Gear. In the event a warranty claim is denied, an Omni Gear Customer Service representative shall contact the customer and advise of the cost to repair the Product not covered under warranty. If the customer requests the Product be repaired, the repaired Product shall carry a Manufacturer's Remanufactured Warranty of 6 months from the date of remanufacture.

Warranty Disclaimer and Limitations of Liability

Omni Gear makes no other warranties. No warranty of merchantability or fitness for a particular purpose is implied. Omni Gear's liability under this warranty is limited to the conditions stated herein. OMNI GEAR SHALL NOT IN ANY EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGE including, but not limited to expenses, attorney fees, loss of income or profits due to delay or defective material or workmanship and no allowance will be made for repairs, replacements, transportation or freight charges, or alterations UNLESS authorized in writing by

Omni Gear. Omni Gear's warranty is subject to change without notice. This warranty shall not apply to any Product upon which repairs or alterations have been made, improper lubrication including type and frequency, excessive shock loading, improper application or for misused, neglected or incorrectly installed Product. This warranty shall not apply in the event proper gearbox lubrication and service is not maintained.

All gearbox Product lubrication must be flushed and refilled after the first 100 hours of service, and then every 1000 hours thereafter. This warranty shall not apply to seals in the event they have been subjected to heat in excess of 200 degrees, paint, solvents or other chemicals in the assembly or painting processes. Any Omni Gear Product that remains unused for a period of 6 consecutive months during the warranty period shall not be warranted for leakage due to seal aging. The warranty for bearings shall be limited to the warranty provided by the bearing manufacturer. No Product will be eligible for warranty if rust or corrosion has started on internal surfaces.

The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Omni Gear in writing, shall constitute the entire Agreement concerning the Product sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Texas. Legal proceedings arising out of the terms of Omni Gear's warranty must be commenced within one (1) year of the accrual of the cause of action or be forever barred.

Note: The information shown online and in all catalogs is for general purposes only. Not to be used for manufacture, design or application review. OMNI GEAR reserves the right to update or change its products; therefore the information shown is subject to change. Bearing curves are supplied for design reference purposes only. They are intended to help illustrate the importance of radial load position relative to the gearbox. For detailed analysis or application review, contact OMNI GEAR engineering.

Exceptions

Exceptions to Omni Gear's stated Warranty Policy must be in writing, and made a part of this Limited Warranty. Customer Product Group Limited Warranty Effective Date