

# UNIMINER-P4

## Installation and Operating Instructions





# Installation and Operating Instructions for HANSEN UniMineR-P4 Gear Reducers

## **1. General:**

UniMineR-P4 Speed Reducers were designed primarily for the demanding mine environment but can also be used for other applications. Standard features include flippable housing arrangement, grease purgeable seal arrangement, and 3° tilting angle in any direction without lubrication modifications.

This manual is written to help the users of UniMineR-P4 reducers install, operate and maintain this equipment with the same care given to it in the factory. If you have questions that are not answered in this manual, please contact **HANSEN Transmissions**.

All speed reducers are factory tested. Internal parts are coated with rust preventive run-in oil before shipment. Seals are grease lubricated. Shaft projections and hollow shaft bores are coated with protective coating. **Speed reducers are shipped from the factory without lubricating oil.**

**Warning:** Please read and follow the enclosed instructions. Your failure to adhere to these procedures may result in serious personal injury and cause equipment damage and may void the warranty.

## **2. Installation and Mounting:**

**Warning:** Safety is the basic factor to consider at all times, in the operation of these drives. Through the use of proper clothing and tools with proper application and methods of handling, you can prevent serious accidents and injury to yourself and your fellow workers.

**Warning:** Never operate drive at speeds, horsepower, or loads higher than nameplate ratings, or personal injury can result. Consult HANSEN Transmissions if there is any change of operating conditions from that for which the unit was sold, as stamped on nameplate specifications. Failure to comply could result in personal injury and/or machinery damage.

## **2.1 Mounting:**

Foot mounted units must be positioned horizontally within  $\pm 3^\circ$  from end to end and side to side unless specifically ordered for another mounting position. Avoid overloading shafts, bearings and housings by using a rigid flat support foundation such as a HANSEN Transmissions supplied baseplate, and providing accurate initial alignment. All housing feet must rest firmly on supports before being bolted down. Use the proper size mounting bolts with a flat washer under the head of each bolt. Mounting bolts must be tightened only after the unit, motor and / or other auxiliary equipment has been carefully aligned. Care should be taken to ensure that the drive rests properly on the foundation and that the input and output shafts are aligned in accordance with the coupling manufacturer's specifications with the corresponding shafts of the driving and driven equipment.

Alignment and leveling of the unit is accomplished by careful shimming between the mounting feet and foundation. Dowel pins or shear blocks should be provided on the mounting feet to maintain proper alignment.

If the reducer and other drive components are mounted on a Hansen Transmissions Steel Baseplate, recheck the factory alignment of all component shafts to insure nothing has been misaligned during shipment and installation.

**Warning:** For safe handling, use only proper lifting equipment such as crane or hoist, having ample load carrying capacity. Hand lifting is dangerous. Use the lifting eye on the reducer, where provided to lift reducer only. When necessary to lift reducer and attached accessories, use proper placed slings of suitable capacity.

**Warning:** When the drive is connected to motor or driven equipment through the use of couplings, sprockets, gears or belt drive, proper guards meeting requirements of OSHA must be used to prevent personal injury or property damage.

### **2.1 continued:**

The protective coating on the shaft projections should be removed using a suitable non-flammable solvent.

In the case of hollow shaft units, the protective coating must also be removed from the bore using a suitable non-flammable solvent. Under no circumstances should abrasive paper or cloth be used for this cleaning procedure. The hollow bore should be coated with an anti-seize type compound where a keyed connection is used. Shrink Disc connections must be absolutely dry and free of all lubricant for proper operation. Please refer to separate Shrink Disc installation instructions for this type of connection. Hollow shaft units with a keyway connection are to be secured against axial movement with a keeper plate bolted in place using the corresponding tapped holes in the mating shaft.

With all shaft mounted reducers, a flexible torque arm must be provided to prevent counter rotation of the speed reducer.

Care must be taken to ensure that the unit is readily accessible, particularly the oil filler and drain plugs, the oil sight glass or dipstick, and the inspection cover. If the speed reducer is supplied with a cooling fan, there must be an unrestricted airflow over the reducer housing.

### **2.2 Torque Arms:**

**Warning:** Both the components of the torque arm and the frame to which it is connected must be of proper size and material to withstand the applied loads or personal injury and machinery damage may occur.

Various design codes may dictate the safety factor that must be employed in torque arm and frame design. When supplying your own torque arm, the following describes typical design guidelines:

1. It should be positioned far from L.S.S., no closer than the front of the reducer housing, so that the torque arm is 90 degrees to a line through the hollow shaft and to the point of attachment

farthest away. This will keep the force on the torque arm to a minimum.

2. It should be mounted so that the reaction force of the torque arm is in tension and not in compression. Although some torque arm designs will work in compression, a better design is to have the torque arm in tension.
3. The torque arm mounting should be free to articulate and, if possible, adjustable. There should be only one connection point to act as the reaction point. Connections at more than one point may restrict free movement as the unit operates.

**Caution:** A rigidly mounted torque arm may preload parts of the speed reducer as well as the connecting frame and driven machinery, and could very well result in fatigue failure of the output shaft or driven shaft.

### **2.3 Mounting of Couplings, Gears, Sprockets or Sheaves:**

**Caution:** Only components that were specified and approved at the time the drive was ordered should be attached to the reducer shafts. The use of other components may cause personal injury or damage to the drive system. If other components must be used, contact HANSEN Transmissions for review and approval prior to installation.

To prevent possible damage to reducer internal parts, avoid hammer blows when mounting couplings, gears, sprockets, sheaves etc. on the shaft projections. These components should be mounted onto the shafts using proper shop practices. To facilitate this, the shafts can be greased and the taps in the shaft ends used for pulling components on. When a tight fit occurs, the component will slide on easily after pre-heating it in oil to 150° F to 200° F to expand its bore.

### **2.4 Speed Reducer Accessories:**

For units with other additional equipment, such as backstops, clutches, etc. refer to separate operating instructions.

## **2.5 Shrink Disc Installation and Removal Instructions**

Shrink Discs are supplied ready for installation. However, prior to tightening of locking screws it is necessary to remove wooden spacers located between outer collars, which are used during shipment of Shrink Discs.

### **2.5.1 Installation**

Important: Never tighten locking screws before shaft installation, since inner ring of Shrink Disc as well as hub bore can be permanently contracted even at relatively low tightening torques.

1. Clean hub O.D. and Shrink Disc Bore and lightly lubricate hub O.D. before assembly of Shrink Disc on hub.
2. Carefully clean shaft and hub bore from *any lubricant* prior to mounting hub onto shaft. **THIS STEP IS VERY IMPORTANT**, since it will greatly affect the torque transmitting capability of a Shrink Disc connection.
3. After checking correct position of Shrink Disc and hub, handtighten 3 or 4 equally spaced locking screws and make sure that outer collars of Shrink Disc are in a parallel position. Afterwards handtighten rest of locking screws.
4. Use torque wrench and equally tighten all screws one after another in a clock or counterclockwise sequence by approx. 1/4 turns (even if initially some screws will require a low tightening torque) until specified tightening torque  $M_A$  is reached. NOTE: To compensate for torque reduction due to setting of screws adjacent to a screw just being torqued, a tightening torque approx. 5% higher than specified is recommended for the final round.
5. Reset torque wrench and make sure that no screw will turn at specified tightening torque  $T_A$ . NOTE: It is not necessary to check tightening torque again after installation is completed or equipment has been in operation.

### **2.5.2 Removal**

1. Loosen locking screws in several stages by using approx. 1/2 turns; following either a clock or counterclockwise

sequence till Shrink Disc can be moved on hub. DO NOT remove locking screws completely.

2. Make sure any rust buildup in front of hub is removed before hub is pulled from shaft.

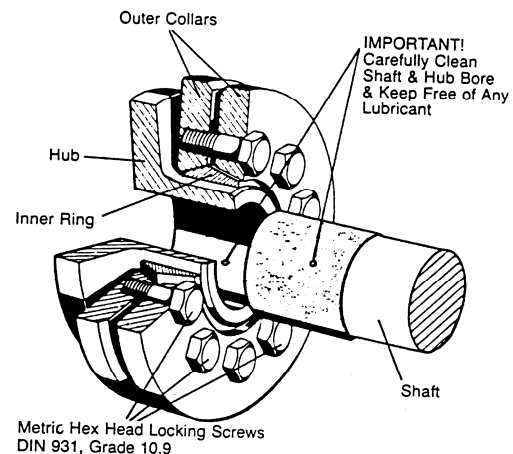
### **2.5.3 Re-Installation of Shrink Discs**

In relatively clean operating conditions, Shrink Discs can be re-used without prior cleaning. Severe conditions, however, require thorough cleaning and re-lubrication with the following or similar lubricants:

Tapers of inner rings and outer collar bores:  
Molykote 321R-spray or  
Molykote G RAPID- spray or paste

Screw threads and head contact area:  
Multipurpose grease such as Molykot BR-2

Damaged O-rings should be replaced.



### **LOCKING SCREW-TIGHTENING TORQUES " $M_A$ "**

#### **SCREW**

SIZE	M5	M6	M8	M10	M12	M16	M20	M24	M27
mm	8	10	13	17	19	24	30	36	41
$M_A$ (Nm)	5	12	29	58	100	240	470	800	1100
$M_A$ (ft. lb)	3.6	8.7	21	42	73	174	340	593	795

## **2.6 Electrical Connections:**

**(When using motor)**

**Warning: Do not connect motor without making sure power supply is disconnected. Failure to comply can cause injury to personnel and / or damage to equipment.**

Do not connect motor without first determining that power supply (voltage, cycles and phase) corresponds to the motor nameplate specifications. Wiring, controls and overload devices must comply with National Electrical Code, local and OSHA requirements.

## **2.7 Check Direction of Rotation**

After determining compatibility of the motor, connect motor as shown on diagram on the motor nameplate.

To change rotation of three-phase motors, interchange any two line leads. Refer to motor manufacturer's instructions for more detailed information.

**Caution: If reducer is supplied with an integral backstop check for proper rotation of motor and reducer before connecting motor to reducer.**

Speed reducers, which are not lubricated, may be operated only a few seconds without causing damage.

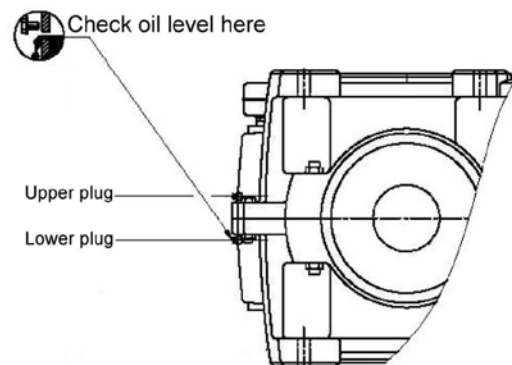
## **3. Initial Start-Up**

UniMineR-P4 Parallel Shaft Reducers have been test-run at the factory. However, during initial start-up the following procedures are recommended:

1. Prime mover electrical starting equipment should be arranged to start unit slowly to avoid impact loads. Across the line starting of motors should be applied with caution to prevent instantaneous gear loads that could greatly exceed the rating of the speed reducer or other components.

2. If the reducer is equipped with an integral backstop, an arrow plate on the housing indicates the direction of rotation. Make certain the motor shaft rotation is correct before coupling the motor to the reducer. If necessary, reverse leads on motor to make shaft rotation conform to those shown.
3. Prior to starting the unit, check the oil level by removing the dipstick. Oil level must be located between two marks on the dipstick. Adjust oil level, if necessary.

**Warning: Speed reducers that are equipped with oil level fill plugs in place of dipsticks MUST be checked on a flat level surface with no degree of tilt. Oil is to be filled just until it begins to drain from the lower of the two fill plugs.**



**Caution: Never remove the breather, dipstick, or inspection cover while the unit is in operation, or personal injury may result.**

4. Start the reducer under as light a load as possible. As the unit is brought up to normal operating speed, it should be checked for unusual noise, excessive vibrations, excessive heat and oil leakage. If any of these symptoms develop, the unit should be shut down immediately, and the cause determined and corrected. The unit should be run for a minimum of 4 hours with only partial load, and the load should be increased gradually.
5. After approximately 40 hours of operation, check all foundation bolts and mounting bolts and tighten as required. *Always recheck alignment after tightening.*

### **3.1 On Site Storage**

When speed reducers are to be stored, full protection will best be obtained indoors in a clean, dry place, under relatively even, moderate temperatures. When outdoor storage is unavoidable, provide adequate protection from the elements.

Housing interiors and operating parts of the speed reducer are protected by a rust inhibitor.

Proper indoor storage of drives will permit protection for approximately six months against corrosion from condensation. For longer periods follow the Long Term Storage Instructions or consult HANSEN Transmissions.

**Caution: Improper storage of drives may cause damage to internal parts. The storage procedure outlined in the following paragraphs must be followed; otherwise the standard warranty may be voided.**

### **3.2 Standby**

If the unit is taken out of operation for an extended period of time, it should be run for ½ hour minimum (with or without load), at rated speed every three (3) weeks, to maintain an oil film on all machined internal surfaces. If this is not possible, it must be retreated with a rust inhibitive agent and prepared for storage as noted in these instructions under Long Term Storage Procedures.

If the drive is to be stored for an extended period, one year or more, the Long Term Storage Procedure must be followed. If storage will be less than one year the breather on top of the housing should be replaced with a pipe plug to prevent escape of oil vapors and entrance of moisture until the drive is put into service. Storage should be indoors in a clean, dry atmosphere under even, moderate temperatures. If outdoor storage is necessary, the drive must be under cover with adequate protection from the elements. (Refer to Long Term Storage Procedure). Before putting the drive into service, replace the pipe plug with the breather provided, and fill with the proper type and quantity of oil. Proper storage will help protect against corrosion from condensation.

### **3.3 Outdoor and Long Term Storage of Speed Reducers**

It is always preferable to store speed reducers indoors. When this is not possible, or when storage is for a period longer than one year, follow these instructions:

1. Reducers should never be exposed to the elements. They must be protected from the elements in some manner. If stored outdoors, cover with a tarp that can be secured to the base of the reducer housing.
2. Remove plug from breather hole and attach a sufficient length of pipe to extend above the highest part of the speed reducer.
3. Cap the pipe (pipe cap should be drilled and tapped for alemite fitting) and install alemite #317400 fitting to relieve potential internal pressure.
4. Fill reducer completely with a heavy rust inhibitor such as Gulf No-Rust Engine Oil, Grade 3, which conforms to Military Specification MIL-L-21260.
5. At least every three months rotate input shaft. Be sure the output shaft rotates more than one revolution. This is done to insure all internal parts are coated with fresh oil and that the shaft seals are free and the seal journals are coated with oil.
6. At least every three months check the speed reducer for water condensation by removing lowest drain plug and allowing small amount of oil to drain from the oil sump. All water that may have accumulated will be at the bottom of reducer housing and will drain out first.
7. Check all exposed fittings and shaft projections every three months for integrity of the protective coating. Reapply coating if required, to prevent possible corrosion of shafts. Use Cosmoline 1102 MIL-C-16173 Grade 2 or equivalent.
8. When standby unit or unit prepared for long term storage is put into service drain the preservative oil and refill with proper amount of lubricant listed in the lubrication instructions. Reinstall the supplied breather.

## 4. Lubrication

Proper lubrication and lubricant maintenance are very important factors that will result in a long, effective, trouble-free speed reducer operation. Lubricant must be of proper viscosity, its level must be monitored and maintained, and it must be changed periodically. It must be free from dirt and water contamination.

Splash lubrication is the standard method of delivering oil to all internal components of UniMineR-P4 reducers. Gears and low speed bearings are lubricated by immersion in the oil bath. Oil splash from gears fill oil pockets in the housing and by gravity feed the lubricant to all other bearings and internal components.

Oil seals are grease lubricated through grease ports located on the outside of bearing retainers. Grease acts not only as a seal lubricant but also as a shield against outside contaminants.

For grease lubrication of oil seals use the following long fibered grease or its equivalent:

Mobil                      Mobility SHC 220

**Table 1:**  
**AGMA Lubricant Numbers**  
**Ambient Temperatures**

32°F– 90°F	50°F–120°F	Other
5EP	6EP	Consult factory

**Table 2:**  
**Typical Oils Meeting AGMA**  
**Recommendations**

Lubricant MFG.	AGMA Grade			
	150 4 EP	220 5 EP	320 6 EP	460 7 EP
Exxon	Spartan EP-150	Spartan EP-220	Spartan EP-320	Spartan EP-460
Mobile	Mobilgear 629	Mobilgear 630	Mobilgear 632	Mobilgear 634
Shell	Omala 150	Omala 220	Omala 320	Omala 460
Texaco	Meropa 100 Rando Oil HDE100	Meropa 220	Meropa 320	Meropa 460

**Table 3:**

**\*Approximate Oil Quantities – US Gallons**

Unit Size	Parallel	Right Angle
C	5	5.3
D	7.9	8.2
E	10	10.6
F	14.5	15.3
G	19.8	21.1

\*These quantities are approximate and the information should be used for oil ordering purposes. Proper level of oil is indicated by dipstick markings.

### 4.1 Initial Oil Change

The oil used at initial start-up and operation of a new reducer should be thoroughly drained after 500 hours of operation. A thorough cleaning of the gear case using flushing oil should be performed to remove any foreign matter during the first oil change. This is most important to insure trouble free, long life of the speed reducer. Under normal operating conditions, subsequent oil changes should be made every 1500 to 5000 hours of operation, depending on the severity of the application, or eighteen months, whichever occurs first.

In extremely dusty, dirty, corrosive atmospheres, or where there is a rapid rise and fall in temperature producing condensation, there may be a build-up of sludge, dust, dirt, chemicals, condensation, or fumes, in the oil sump, contaminating the oil. High sump temperatures will also result in accelerated oil breakdown. Under these conditions the oil should be changed at shorter intervals. Cleaning debris off the housing could extend the useful life of the oil. Oil sampling and analysis can be helpful in determining the correct oil change interval for your speed reducer.

When running under load the oil in the unit will warm up to its normal operating temperature which may be as high as 175-200°F depending on the reducer size, ratio, and percent of full HP rating being transmitted. Higher operating temperatures can be avoided if special measures are taken, such as external cooling or the use of special lubricants. Consult HANSEN Transmissions for details.



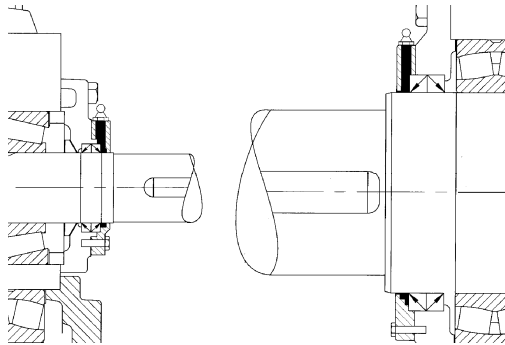
## **4.2 Draining the Oil**

The oil should be drained while the reducer is at operating temperature.

All parts belonging to the lubrication system must be checked periodically to ensure they are functioning correctly and are properly sealed.

At each oil change, while the inspection cover is removed, inspect the internal assembly of the reducer – particularly the condition of the gear teeth. New sealing compound should be applied to the inspection cover each time it is removed. The outside of the reducer housing should be cleaned at each oil change to maintain proper heat dissipation.

UniMineR-P4 oil seal systems are initially grease lubricated in the factory prior to shipping reducers to the customer. The high-speed Oil-Guard™ seal system consists of two spring loaded lip seals, an oil deflector and a dynamic drain-back provision. The low speed seal system consists of two spring loaded lip seals and a pressure relief passage. Both arrangements are additionally protected by a grease chamber, which excludes outside contaminants.



To remain effective, the protective grease must be purged periodically. The regreasing schedule should be based on the severity of the operational and environmental conditions. In severe conditions the regreasing should be performed every 1 to 2 months. Under more favorable conditions regreasing schedule could be extended to 3 to 6 months.

With a grease gun, pump the recommended grease through a fitting located at the outside of the bearing retainer until the old grease is forced out in the area of the shaft

seal and a new grease collar is formed. Foreign material, which may have accumulated in the seal area, will be forced out together with the old grease.

It is important that only the recommended grease or its equivalent be used for purging out the old grease. Lighter greases, such as bearing greases, may liquidify within the chamber and flow out, resembling an oil leak.

## **5. Backstops**

UniMineR-P4 backstops are designed to prevent reverse rotation of the driven equipment and holding back the load on such equipment as inclined conveyors, bucket elevators, fans, rotary pumps and kilns.

**Warning:** Backstops are not approved for use on systems that are designed for handling of people such as elevators, manlifts, ski tows and ski lifts.

**Warning:** Do not use a backstop as a substitute for a brake. Do not use a backstop for indexing application.

**Backstops are designed to prevent reverse rotation of five times or less in a period of eight hours. For more frequent operation consult HANSEN Transmissions.**

When ordered from the factory, the backstop will be assembled to result in proper shaft rotation.

**Caution:** To avoid damage to the backstop, determine the proper direction of motor rotation prior to connecting motor coupling or drive to the reducer.

Manually rotate the shaft in the overrunning direction. Before connecting the motor, run it to determine that it rotates in the same direction as an overrunning direction of the input shaft of the speed reducer.

### **5.1 To reverse backstop rotation:**

**Warning:** Disconnect power to the motor. Disconnect reducer from the load and unload the backstop or serious personal injury or equipment damage may result.

- ◆ Unbolt backstop and clutch cover
- ◆ Remove backstop cover and outer race
- ◆ Remove retaining ring
- ◆ Remove the backstop, inner ring, and sprag assembly from the shaft by sliding it along the shaft
- ◆ Flip the inner race and sprag assembly so the side near the reducer is now outboard. The free wheel direction indicated on the sprag assembly will now point in the opposite direction.
- ◆ Be sure to clean and apply sealant to both sides of the backstop outer race to prevent oil leaks.

Field installation of the UniMineR-P4 backstops is possible. When installing a backstop to a unit, which was not originally furnished with one, additional parts will be required. Consult HANSEN Transmissions. Such installation must be performed by an experienced service mechanic.

Follow the backstop manufacturer installation and maintenance instructions furnished with the gearbox.

## **6. Disassembly and Reassembly:**

### **6.1 Flipping:**

UniMineR-P4 Speed Reducers are designed to be flippable in the field. New units can be flipped by removing a dipstick, oil breather and two pipe plugs and changing them from top to bottom. Use proper sealer to seal the pipe plugs.

When unit in service needs to be flipped use the following procedure:

**Warning:** Before beginning any work on the reducer, disconnect the driving means (lockout motor starter and unload brakes, backstops, etc.) to insure against accidental start-up that could cause personal injury.

Disconnect unit from driven equipment and from the motor. Drain the oil. When applicable, remove any external accessories such as pumps, coolers, strainers, etc. Unbolt foot-mounted unit from the foundation. Remove dipstick, oil breather and two pipe plugs and change them from top to bottom. Use proper sealer to seal the pipe plugs. Refill the unit with the proper amount of oil.

### **6.2 Replacing Internal Parts:**

UniMineR-P4's split housing design permits removal of all internal parts without disturbing the mounting or alignment of the reducer base.

**Caution:** Only experienced mechanics, knowledgeable in heavy machinery and especially gear reducer products, should attempt to replace internal parts of the UniMineR-P4 Reducers.

### **Warning:**

**For safe handling, use only proper lifting equipment such as cranes and hoists having ample load carrying capacity. Hand lifting is dangerous.**

Drain the oil to the level below the lowest bearing bore. Disconnect all external equipment as described in "Flipping" above. Remove the capscrews that fasten the bearing retainers to the housing cover. (Upper part of the housing). Loosen the capscrews that fasten the bearing retainers to the housing base. Remove the threaded studs, two dowel pins, which fasten the housing cover to housing base lift the cover from the base using slings and a hoist. If necessary, use a jack-off tap on the low end of the speed reducer. Inspect all internal parts for damage and wear. If part replacement is required remove the complete shaft assembly from the unit, and remove bearings and gears as applicable using proper size pullers and presses.

**NOTE:** Refer to the appropriate parts drawing for the particular size and type drive on the following pages for parts location prior to disassembly to familiarize yourself with the internal parts of the speed reducer.

Reassembly of parts should be made in the reverse order of disassembly. Before replacing the housing cover, the mating surfaces of both the cover and base should be cleaned and new sealing compound applied.

### **6.3 Recommended Spare Parts:**

One set of spare parts is usually adequate for one to five identical reducers operating in the same general area, under average conditions, where a possible breakdown will affect only one reducer. Where continued operation is extremely vital and / or type of service is unusually severe, consideration should be given to carrying additional sets of spare parts.

For installations having five to ten identical reducers and where continued operation is extremely vital, and type of service is unusually severe, we recommend you carry a complete spare reducer, in addition to spare parts.

For installations having more than ten identical reducers or for large quantities of same size reducers regardless whether identical or not, consult HANSEN Transmissions for spare parts recommendation. State the exact nature of the application, its importance regarding continued operation, and any other factors, which will aid us in making proper recommendations.

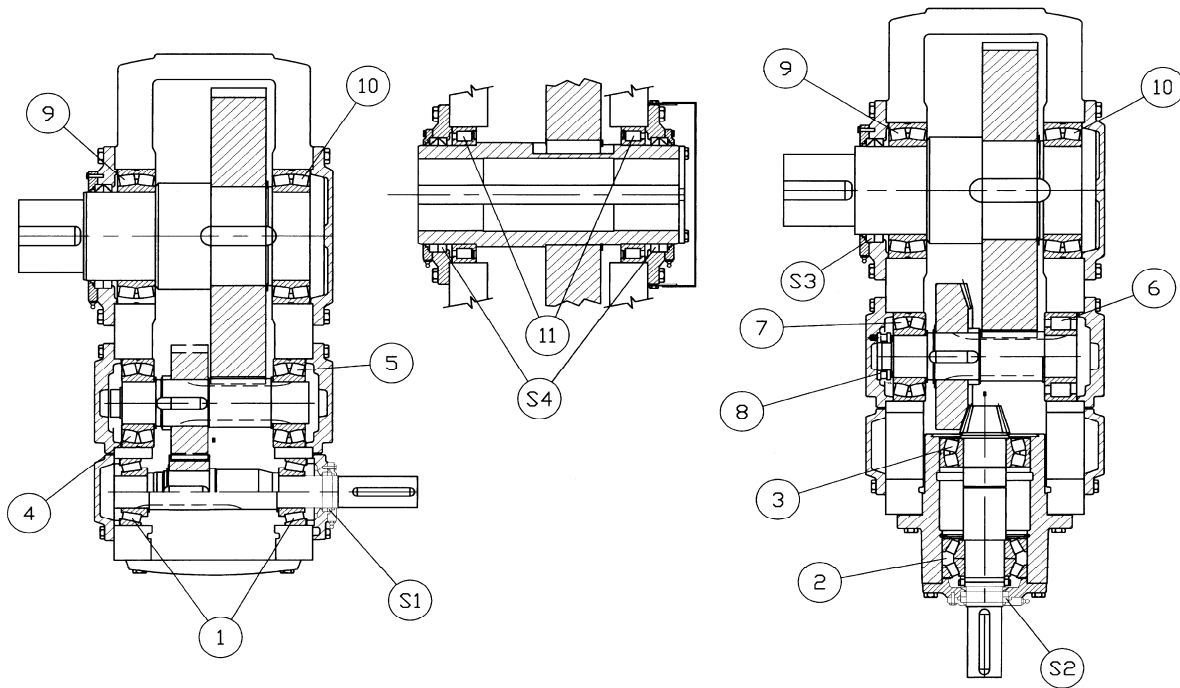
One set of recommended spare parts for a HANSEN Transmissions UniMineR-P4 Reducer consists of: One high speed shaft and pinion, one set high speed shaft bearings, and one set of high speed and low speed oil seals.

Model:

Serial Number:

Installation Date:

## Bearing and Seal List



Bearing No.	Unit Size				
	C	D	E	F	G
1	T2EDO45	32310	32312	32314	32316
2	2-31311	2-31312	2-31314	2-31315	2-31317
3	22312E-C3	22313E-C3	22315E-C3	22316E-C3	22318E-C3
4	32312	32314	32316	22317E	22320E
5	32312	32314	32316	ZSL192317-C3	22320E
6	32312	32314	32316	ZSL192317-C3	22320E
7	32312B	32314B	32316B	22317E	22320E
8	-	-	-	81211	81213
9	22226E-C3	22228-C3	23034-C3	23036-C3	23040-C3
10	22226E-C3	22228-C3	23034-C3	23036-C3	23040-C3
11	NCF2934V	NCF2936V	NCF2938V	NCF2940V	NCF2952V
S1	45x60x8	50x65x8	60x75x8	70x90x10	80x100x10
S2	50x65x8	55x70x8	65x85x10	70x90x10	80x100x10
S3	130x160x12	140x170x15	170x200x15	180x210x15	200x230x15
S4	170x200x15	180x210x15	190x220x15	200x230x15	250x280x15

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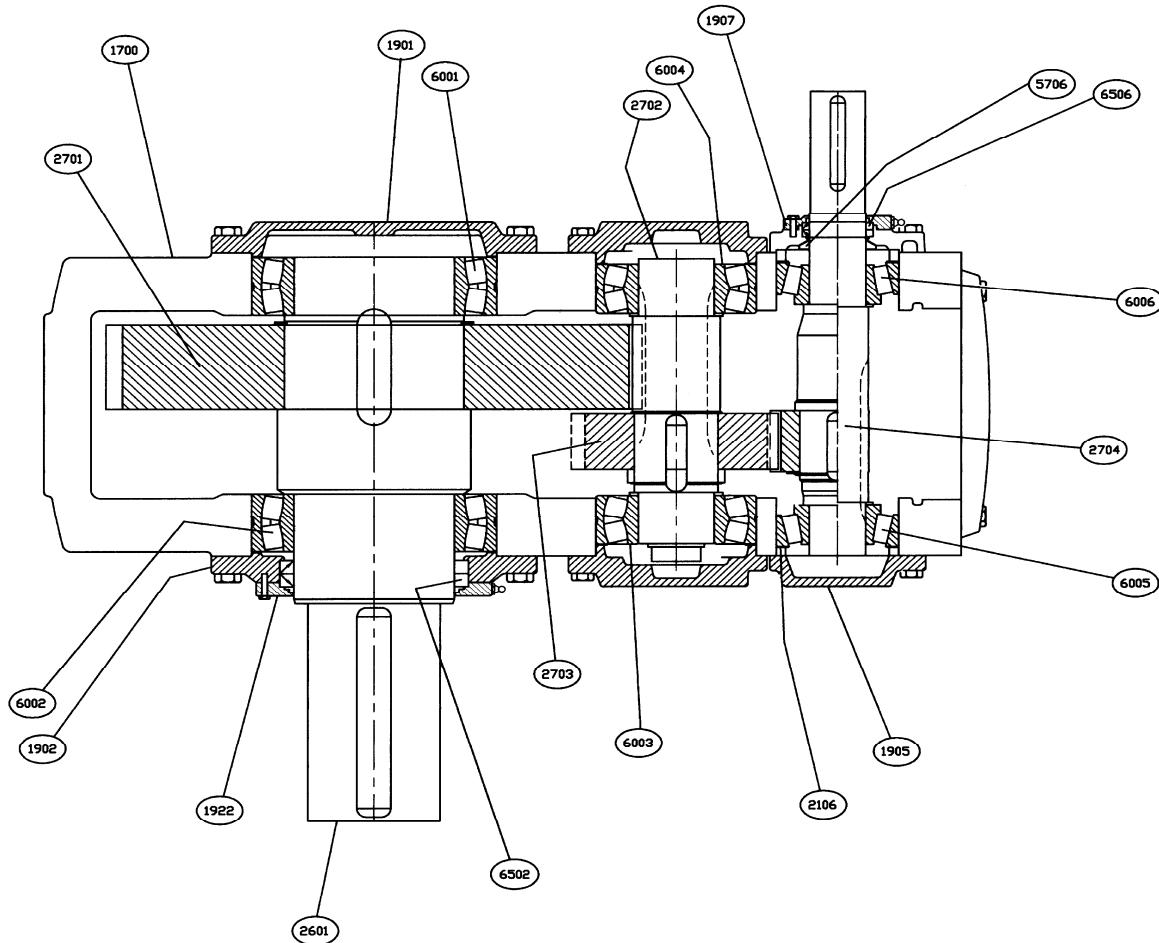
### Bearing Shimming Instructions:

**All Low Speed Bearings: .008" - .020"**

**High Speed and Intermediate Speed Parallel: .003" - .005"**

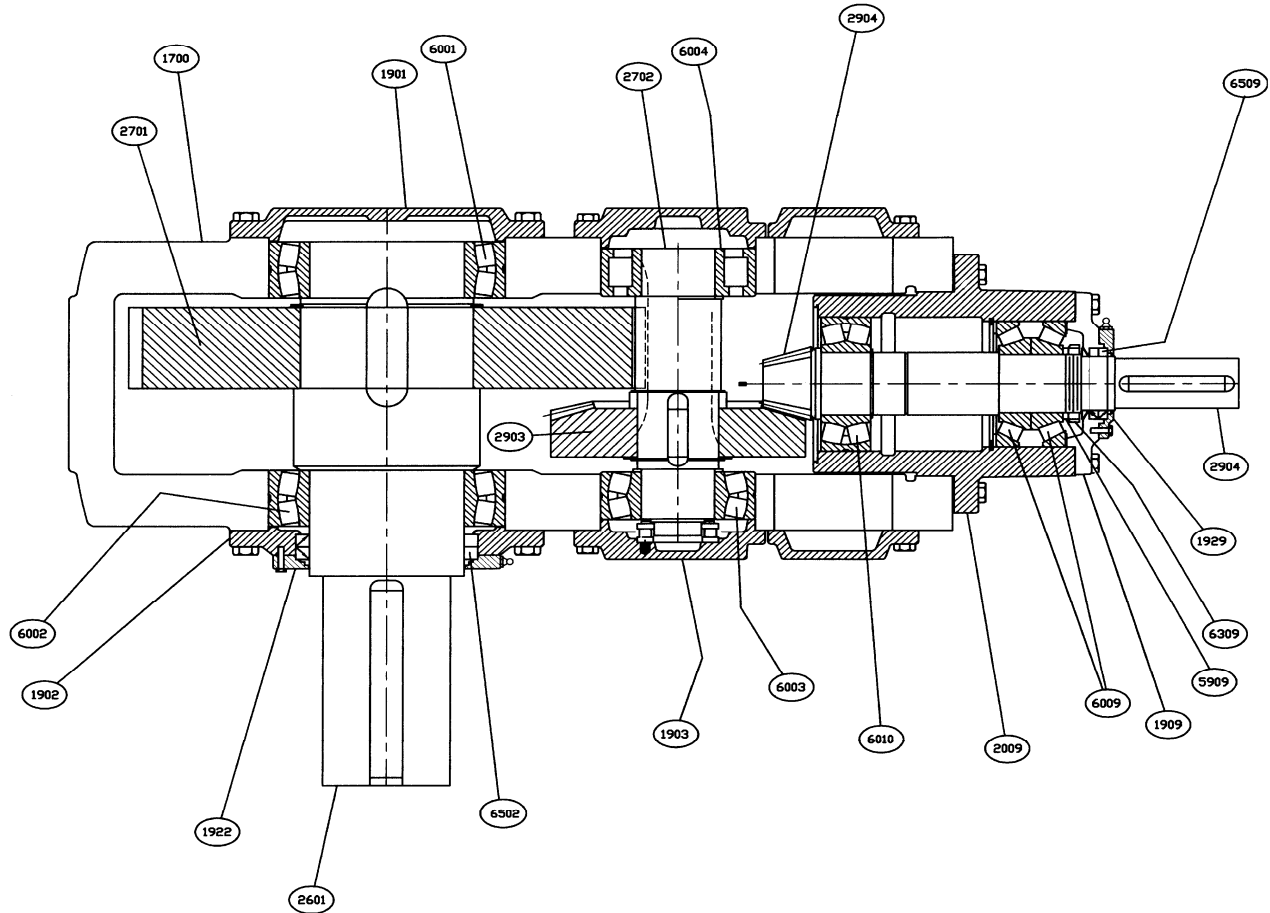
**High Speed and Intermediate Speed Right Angle: .000" - .002"**

## Part Drawing for MHP-2 UniMineR-P4 Parallel Shaft Speed Reducer



LOC NO.	NAME OF PART	QTY.	LOC NO.	NAME OF PART	QTY.
1700	Housing Assembly	1	5706	Pump Ring	1
2106	Spacer / Shim	1	6502	Low Speed Seals	1
1905	High Speed Bearing Retainer	1	1922	Low Speed Split Cover	1
2601	Low Speed Shaft	1	2704	High Speed Pinion	1
1902	Low Speed Bearing Retainer	1	2703	High Speed Gear	1
1901	Low Speed Bearing Retainer	1	2702	Low Speed Pinion	1
6006	High Speed Bearing	1	2701	Low Speed Gear	1
6005	High Speed Bearing	1			
6004	Intermediate Bearing	1			
6003	Intermediate Bearing	1		<b>Hardware Group</b>	
6001	Low Speed Bearing	1		Dipstick	1
6002	Low Speed Bearing	1		Breather	1
6506	High Speed Seal	1		Pipe Plugs (Set)	1
1907	High Speed Split Cover	1		Retainer Rings (Set)	1
				Keys (Set)	1

## Parts Drawing for MHR - UniMineR-P4 Right Angle Speed Reducer



LOC NO.	NAME OF PART	QTY.	LOC NO.	NAME OF PART	QTY.
1700	Housing Assembly	1	6309	Pump Ring	1
2009	High Speed Bearing Cartridge	1	5909	Lock Nut	1
1909	High Speed Bearing Retainer	1	6502	Low Speed Seals	1
1903	Intermediate Speed Retainer	1	1922	Low Speed Split Cover	1
1902	Low Speed Bearing Retainer	1	2904	Bevel Pinion	1
1901	Low Speed Bearing Retainer	1	2903	Bevel Gear	1
6009	High Speed Bearings	1	2702	Low Speed Pinion	1
6010	High Speed Bearing	1	2701	Low Speed Gear	1
6004	Intermediate Bearing	1	2601	Low Speed Shaft	1
6003	Intermediate Bearing	1		<b>Hardware Group</b>	
6001	Low Speed Bearing	1		Dipstick	1
6002	Low Speed Bearing	1		Breather	1
6509	High Speed Seal	1		Pipe Plugs (Set)	1
1929	High Speed Split Cover	1		Retainer Rings (Set)	1
				Keys (Set)	1

## **Service Notes**

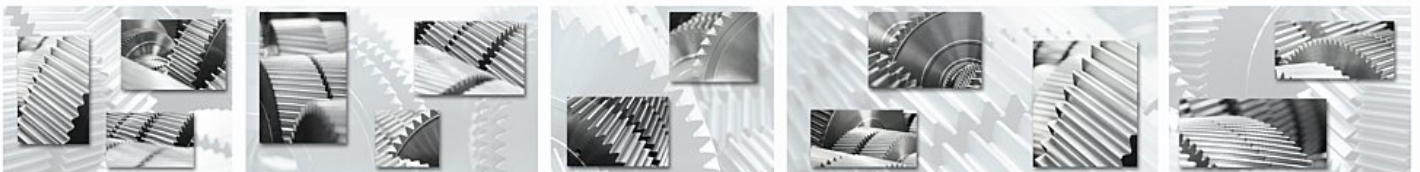
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# WARNING

**UNIT SHIPPED WITHOUT OIL  
FILL TO PROPER LEVEL  
BEFORE OPERATION**

***Please follow the enclosed instructions for  
installation, operation, and maintenance.  
Your failure to adhere to these procedures  
may result in personal injury or property  
damage, and may void the warranty!***



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