

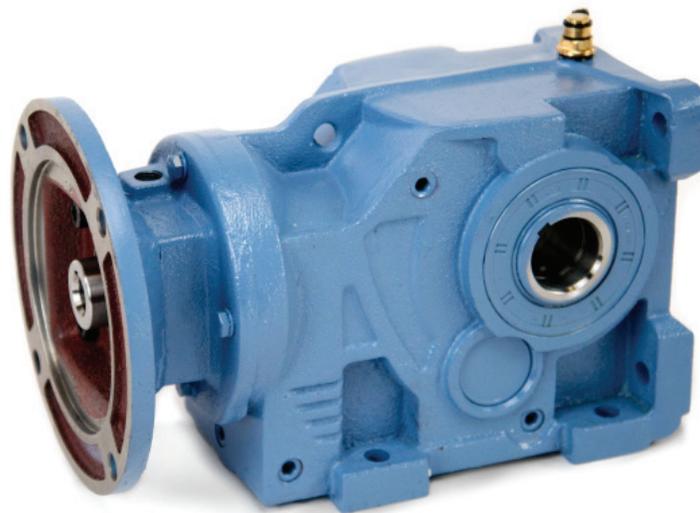
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OPERATION
MANUAL

KHN SERIES HELICAL & BEVEL SPEED REDUCER



OPERATION MANUAL

This operation manual includes important information for the installation, assembly, operation and maintenance of the WorldWide Electric Corporation helical & bevel speed reducer. Please read this manual carefully in its entirety before you start using this product. Please contact WorldWide Electric's customer service department at 1-800-808-2131 if you have any questions regarding this documentation.

Failure to follow the instructions outlined in this manual may result in loss of your right to fulfillment of any claim under limited product warranty and potentially may cause injury to personnel, equipment and/or property, including loss of life.

WorldWide Electric Corporation assumes no liability for injury to persons or damage to equipment or property resulting from failure to observe these operating instructions. In such cases, any liability for defects is excluded.

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Safety Notification



WARNING: Please read this entire manual before the assembly or operation of this helical & bevel speed reducer to ensure that all safety considerations have been exercised and that care and concern for persons and equipment have been fully understood.



WARNING: FAILURE TO ADHERE TO THE INSTRUCTIONS IN THIS OPERATING MANUAL MAY RESULT IN SEVERE INJURY, INCLUDING DEATH AND DISMEMBERMENT.

1. During the operation of this unit, to avoid harm to personnel, please take all necessary actions to protect personnel from all moving and rotating parts, and high temperature sections. There is a risk of burns caused by hot surfaces when this product is in use. Use properly rated protective gear when working with this unit.
2. Only qualified personnel should transport, store, install, assemble, connect, start-up, operate and maintain this unit.
3. When you first receive the helical & bevel speed reducer, please immediately inspect the outside packaging. If damage is apparent from shipping and transportation, please refuse shipment from the carrier and contact WorldWide Electric customer service immediately for unit replacement. Never install and operate damaged products.
4. Before physically moving the helical & bevel speed reducer, please ensure the lifting hole in the reducer casting has not been compromised during shipment. The lifting hole of this reducer is designed to bear the reducer's own weight. Please do not hang or suspend other items from any part of this unit, including the lifting hole. Before lifting, please make sure the lifting equipment to be used is properly rated for the weight load of this speed reducer.
5. Use the speed reducer only for its intended purpose.
6. Never operate or energize the unit without the necessary protection covers or housing firmly in place.
7. Always remove power to the motor before removal or replacement of the speed reducer.

Speed Reducer Installation

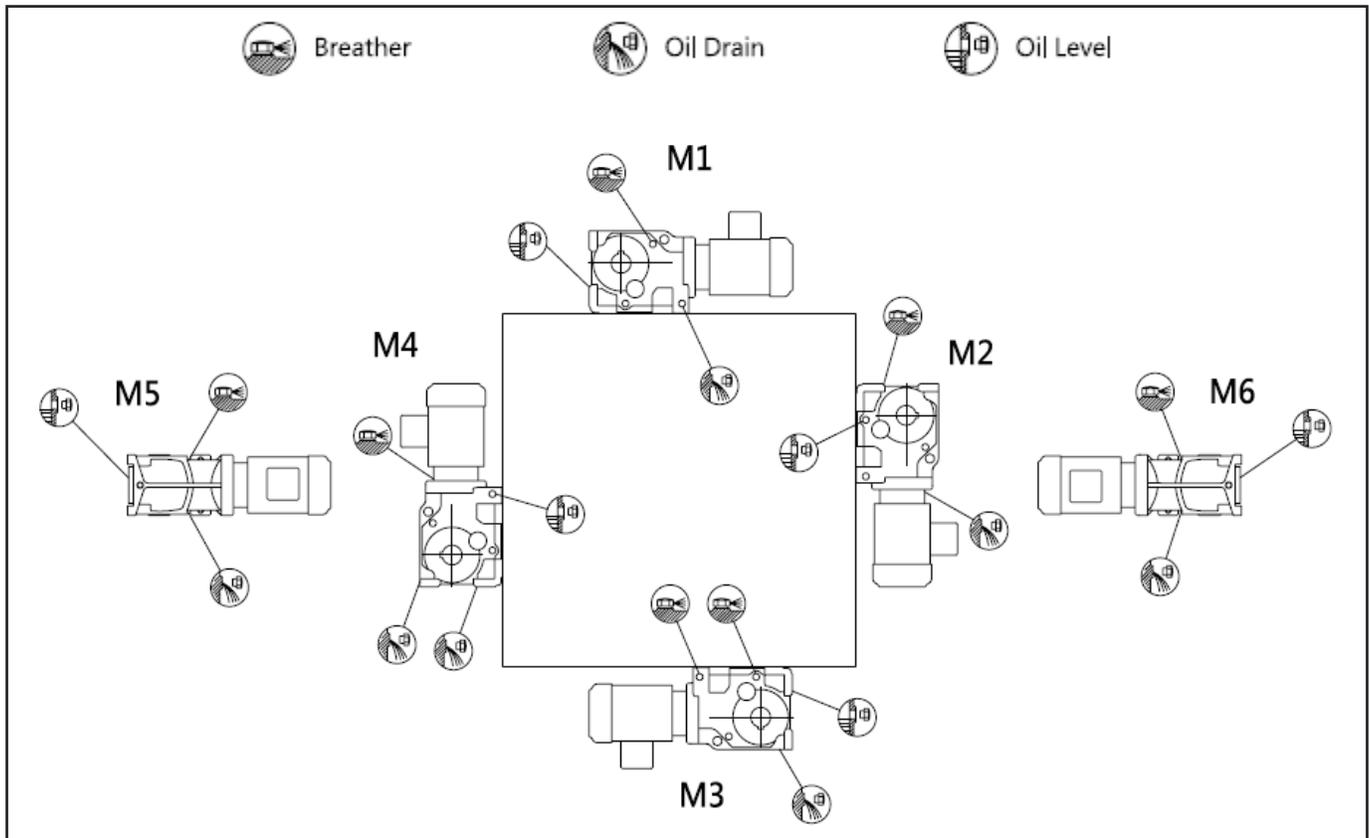


NOTICE: Improper installation will cause damage to the speed reducer. Please read and familiarize yourself with every step of these installation instructions before beginning the installation process.

1. Before installation, please check the input horsepower and ratio and verify that they match the ratings on the punched nameplate of the speed reducer.
2. Clean all dirt from the surface of the flange before installation. During cleaning, be careful not to get cleaning solvents on any seals as cleaning solvents may damage the seals and void product limited warranty.
3. This speed reducer can be mounted in any of six install positions (M1, M2, M3, M4, M5, M6). Positions M5 and M6 require an oil fill baffle plate, which is preinstalled by the factory and will not affect mounting positions M1 –M4. See MOUNTING POSITIONS for the definition of mounting positions M1 –M6.
4. Install the speed reducer on a flat, stable and rigid foundation for accurate alignment to prevent damage to the reducer housing and the motor. The installation location should provide good air ventilation for the unit and allow for convenient oil filling and draining during unit maintenance. The suggested tolerance of flatness on the base is:

For size 77 or smaller: < 0.1mm/m
For size 87 or larger: <0.2mm/m
5. Once the reducer is installed, before connecting the motor, turn the input quill of the reducer by hand to ensure it is turning freely and is not in a dead-lock condition.
6. WorldWide Electric speed reducers connect with NEMA frame motors using a quill style mount. Paint or spray the motor shaft with anti-seize compound before inserting the motor shaft into the speed reducer input quill. **NOTE:** on some reducers, the flange size will extend below the base of the speed reducer.
7. Once the motor and speed reducer are connected, run a no-load test on the motor and the speed reducer. Correct any abnormalities regarding misalignment before connecting the gearbox load and beginning regular operation.
8. To prevent the factory filled oil lubricant from splashing out during transportation, the brass vent breather plug has a rubber ring installed. Remove the rubber ring from the brass vent breather plug before start-up. This will allow the speed reducer to breathe to atmosphere and is necessary to ensure proper operation and prevent overheating.
9. To avoid an overload on the bearings of the output shaft, please refer to the overhung load (OHL) ratings in the catalog and ensure the reducer is sized properly for the overhung load.

Mounting Positions



Startup Procedure

1. **Check reducer oil level before starting up.** Please refer to the lubrication section on the next page for further introductions on proper unit lubrication. Unit lubrication requirements vary depending on mounting positions.
2. Run In Procedure - This helical & bevel speed reducer **does not require** a run in procedure; however, the oil should be changed after the first 500 hours of operation.

Inspection and Maintenance

NOTICE: To ensure proper operation, please check oil quality and perform oil changes regularly.

1. Change the oil after the first 500 hours of use; subsequent oil changes are needed every 2,500 hours of operation. Regular checks on oil level and conditions are recommended on a more frequent basis.
2. Regularly inspect all seals for leaks. If leaks are present, discontinue use until seals have been replaced.
3. During regular operation, check for noise. Noise coming from the unit may indicate a broken bearing. Discontinue use until bearings have been replaced.
4. Regularly check the brass breather vent holes of the speed reducer and ensure sure all openings are free of clogs and debris. The exterior of the inline speed reducer should be kept clean. The unit housing dissipates heat and must be kept free of debris to reduce heat buildup.
5. Check installation bolts regularly and tighten as required.
6. Any replacement parts used should be equivalent to the original factory standards. When replacement parts are used, a running test should be conducted without load before the unit is returned to full operation.
7. **This equipment requires regular maintenance.** Keep a log of oil changes and bolt tightening. Log any equipment issues and all corrective actions taken for warranty records.

Lubrication Schedule

1. All WorldWide Electric helical & bevel speed reducers arrive filled with the proper quantity lubricant for an M1 mounting position. If it is necessary to change the reducer mounting position, move the brass vent plug, oil gauge and drain plug to the correct position and fill or decrease the quantity of oil to the correct fill level specifications. The brass vent breather plug should always be located at the highest point above the oil fill level.



NOTICE: Failure to move the brass breather plug to the correct position for the selected mounting position may result in overheating of the unit, potentially causing damage to seals and bearings, and leading to leaks and eventual product failure.

2. A certain brand and specification of oil is required and unique to a particular helical & bevel speed reducer. Do not mix different brands or specifications of oils. Oil suggestions for WorldWide Electric units are shown on page 6.
3. Before replacing existing oil, completely flush and drain the interior of the reducer.
4. During the operation, if the unit heats up over 80°C or if any abnormal noise occurs, please shut down the unit immediately. Check for proper oil fill, oil type, leaking seals and broken bearings and fix or replace as necessary before restarting the unit again. Do not run the unit if problems exist.

Lubricant Selection

STANDARD LOAD, 1750 RPM INPUT

| Temperature (Deg C) | CPC | ISO VG | Mobil | Shell |
|---------------------|--------|--------|---------------|-----------|
| -30 to -15 | HD 100 | VG 100 | Mobilgear 627 | Omala 100 |
| -15 to -3 | HD 150 | VG 150 | Mobilgear 629 | Omala 150 |
| -3 to 23 | HD 220 | VG 220 | Mobilgear 630 | Omala 220 |
| 23 to 40 | HD 320 | VG 320 | Mobilgear 632 | Omala 320 |
| 40 to 80 | HD 460 | VG 460 | Mobilgear 634 | Omala 460 |

HEAVY LOAD, 1750 RPM INPUT

| Temperature (Deg C) | CPC | ISO VG | Mobil | Shell |
|---------------------|--------|--------|---------------|-----------|
| -30 to -15 | HD 150 | VG 150 | Mobilgear 629 | Omala 150 |
| -15 to -3 | HD 220 | VG 220 | Mobilgear 630 | Omala 220 |
| -3 to 23 | HD 320 | VG 320 | Mobilgear 632 | Omala 320 |
| 23 to 40 | HD 460 | VG 460 | Mobilgear 634 | Omala 460 |
| 40 to 80 | HD 680 | VG 680 | Mobilgear 636 | Omala 680 |

NOTE: On **Standard Loads** with output speeds > 100 RPM, please use CPC HD-220 E.P. lubricant or equivalent. On **Heavy Loads** with output speeds < 100 RPM, please use CPC HD-320 E.P. lubricant or equivalent.

LUBRICANT (unit: liter)

| Position | Box Size | | | | | | |
|----------|----------|------|------|------|-------|-------|-------|
| | 37 | 47 | 67 | 77 | 87 | 97 | 107 |
| M1 | 0.50 | 0.80 | 1.10 | 2.10 | 3.70 | 7.00 | 10.00 |
| M2 | 1.00 | 1.30 | 2.40 | 4.10 | 8.20 | 14.70 | 20.50 |
| M3 | 1.00 | 1.60 | 2.70 | 4.60 | 8.80 | 15.70 | 24.00 |
| M4 | 1.40 | 2.15 | 3.70 | 5.90 | 11.10 | 20.00 | 32.40 |
| M5 | 1.00 | 1.60 | 2.60 | 4.40 | 8.00 | 15.70 | 24.00 |
| M6 | 1.00 | 1.60 | 2.60 | 4.40 | 8.00 | 15.70 | 24.00 |

NOTE: Units ship from the factory prefilled with HD320 mineral oil for an M1 mounting position. Operator must add or take away oil if alternative mounting positions are required. Recommended oil fill volumes are shown in the table above, but these values are estimates and should not be used exclusively to correctly set the reducer oil level – **ALWAYS** fill the reducer to the correct oil level plug and recheck after one (1) week of use.

NOTE: For more information, including oil drain / fill / gauge plug locations please refer to manual GD-LS-KHN0418.R01, available at the WorldWide Electric website: wwec.co/KHN-LS, or scan the QR code to the right.



Recommended Lubricants: CPC E.P. Lubricant HD

NOTE: Units ship from the factory filled with CPC E.P. Lubricant HD. More information about CPC Lubricants is available below.

CPC E.P. Lubricants HD are engineered for exceptional metal surface adhesion and are formulated from highly refined base oils and special additives, including EP (extreme pressure) additives, anti-oxidation, anti-rust, anti-foamers, and more. CPC Lubricants also contain sulfur-phosphorus EP additives to form tenacious oil film on metal surfaces that can endure high E.P. and vibration load to prevent gear surface overheating and premature, excessive wear. These oils pass FZG gear test (DIN 51354) with pass load stage 12+.

These oils possess excellent oxidative stability, and effectively prevent gum formation and oil degradation for extended service. Suitable for lubrication of heavily loaded bearings and gears.

CPC E.P. Lubricants are available in three packages:

- Bulk (HD320, HD460, and HD680)
- 200 liter drum
- 19 liter pail (HD150, HD220, HD320 and HD460)

CPC E.P. LUBRICANT HD DATA

| Grade Number | HD32 | HD68 | HD100 | HD150 | HD220 | HD320 | HD460 | HD680 |
|---------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Gravity API, 15.6°C | 30.4 | 28.5 | 27.8 | 27.1 | 26.5 | 25.9 | 25.3 | 24.4 |
| Viscosity, Kin. cSt @40°C | 31.15 | 67.2 | 98.1 | 143.6 | 212.2 | 310.5 | 440.4 | 656.2 |
| @100°C | 5.26 | 8.62 | 11.16 | 14.38 | 18.59 | 23.70 | 29.80 | 38.68 |
| Viscosity Index | 99 | 99 | 99 | 98 | 97 | 96 | 96 | 96 |
| Pour Point °C | -18 | -18 | -18 | -18 | -18 | -18 | -18 | -12 |
| Flash Point, COC, °C | 224 | 240 | 256 | 264 | 278 | 290 | 310 | 316 |
| Color, DI500 | L3.0 | 3.0 | L4.0 | 4.0 | L4.5 | 4.5 | 4.5 | L5.0 |
| TAN, mgKOH/g | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| Timken EP, OK Load, Lbs | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 70 |
| Carbon Residue, Rams, % | 0.25 | 0.27 | 0.34 | 0.40 | 0.45 | 0.51 | 0.56 | 0.64 |
| Sulfated Ash, % | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Product Number | LA82032 | LA82068 | LA82100 | LA82150 | LS82220 | LS82320 | LS82460 | LS82680 |

Extended Storage - For Periods Longer than Six Months



NOTICE: If the speed reducer will not be installed immediately and will be in storage for a period of time that exceeds six months, follow these specific special storage requirements, as outlined below.

1. If it is known in advance of placing an order that the reducer unit will be stored for an extended period, please notify WorldWide Electric prior to order placement. WorldWide Electric can arrange to have units shipped with special corrosion inhibitors and special packaging for long-term storage. If long-term storage preparation from WorldWide Electric is not an option, or preparation must be handled after delivery, apply anti-corrosion inhibitors on all non-coated parts, including the input shaft, output shaft, flange, and foot mounts. **All units placed in long term storage, regardless of who prepared the units, should be stored under a waterproof cover and care should be taken to keep the units free of dust and debris.**
2. Units should be stored in a dry, dust free environment. Avoid exposing the units to sunlight during storage. Keep the units away from humidity and heat sources.
3. All units should be stored in a temperature-controlled environment, between 5 degrees and 40 degrees Celsius.
4. If the storage time exceeds 2 years, units must be examined carefully before use. Examine units for rust. **Do not place units with rust present into operation.** Check all bearings, seals, oil fill levels and oil specifications before use. Refer to the Lubrication section (page 4) of this manual for proper oil specifications. Contact WorldWide Electric if new replacement parts are required to restore the unit to original condition.

Troubleshooting

| Problem | Cause | Remedy |
|--|--|---|
| Overheating | <ol style="list-style-type: none"> 1. Overload 2. Lubricant oil overfill or shortage 3. Improper lubricant oil 4. Extra friction on oil seal (lack of lubricant) | <ol style="list-style-type: none"> 1. Adjust to proper loading 2. Add or remove lubricant to the level of oil gauge 3. Change lubricant oil to proper oil 4. Apply oil at the oil seal |
| Noise | <ol style="list-style-type: none"> 1. Consistent noise <ul style="list-style-type: none"> • improper gear contact • bearing damaged 2. Screaming noise <ul style="list-style-type: none"> • bearing gap too small • lubricant oil shortage 3. Inconsistent noise <ul style="list-style-type: none"> • debris object inserted • bearing damaged | <ol style="list-style-type: none"> 1. Repair gears or replace bearing 2. Replace bearing or replace oil lubricants to proper specification level 3. Remove debris & replace lubricant oil or replace bearing |
| Vibration | <ol style="list-style-type: none"> 1. Gear wear 2. Debris inside 3. Bearing worn out or otherwise damaged 4. Bolt loose | <ol style="list-style-type: none"> 1. Replace gear 2. Remove debris & replace lubricant oil 3. Replace bearing 4. Tighten bolt |
| Oil Leakage | <ol style="list-style-type: none"> 1. Oil seal damage 2. Gasket damage 3. Loose drain plug 4. Loose covers or flange | <ol style="list-style-type: none"> 1. Replace oil seal 2. Replace gasket 3. Tighten drain plug 4. Tighten bolts |
| Input and Output Shaft Failure | <ol style="list-style-type: none"> 1. Gear-bound caused by overheat 2. Bearing damage 3. Debris between gears | <ol style="list-style-type: none"> 1. Adjust or replace gears 2. Replace bearing 3. Remove debris, clean inside, replace lubricant oil |
| Input Shaft Fails to Drive Output Shaft | <ol style="list-style-type: none"> 1. Gear wear 2. Damage to key connecting gear and output shaft 3. Input shaft broken 4. Output shaft broken | <ol style="list-style-type: none"> 1. Replace gears 2. Replace key 3. Replace input shaft 4. Replace output shaft |
| Gear Worn Out | <ol style="list-style-type: none"> 1. Overload 2. Improper lubricant oil 3. Insufficient lubricant oil 4. Excessive ambient temperature | <ol style="list-style-type: none"> 1. Adjust to proper loading 2. Change to proper lubricant oil 3. Refill lubricant oil 4. Improve ventilation |

Limited Warranty

WorldWide Electric Corporation (The Company) warrants its helical & bevel (KHN series) speed reducer to be free from defects in materials or workmanship to the original purchaser for a period of two years from the date of sale (invoice).

For this warranty to be effective, this product must be installed, used and maintained by the original purchaser in accordance with good industry standards. The warranty does not cover normal wear, tear and erosion from use, misuse, abuse or corrosion.

In the event of failure, it shall be the responsibility of the original purchaser to notify The Company either in writing or by telephone to make arrangements for correction of the problem. The purchaser shall be responsible for transportation charges connected with the return, exchange or repair of parts. Returns found defective upon inspection by our warranty department or authorized warranty service agent will be replaced free of charge.

The Company shall not be liable for any labor cost connected with the replacement of the equipment, the replacement of the parts or adjustments to the equipment by the purchaser or their contractor without the Company's prior written approval.

The Company, as exclusive remedy under this warranty, shall at its option repair or replace defective items or, if agreed upon, refund the purchase price less reasonable allowance for depreciation in exchange for the product.

THE COMPANY MAKES NO OTHER WARRANTIES AND ALL IMPLIED OR EXPRESSED WARRANTIES AND REPRESENTATIONS, EXCEPT THAT OF TITLE, ARE DISCLAIMED. ALL IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE OR USE BUT NOT LIMITED TO JUST THOSE THAT ARE DISCLAIMED. LIABILITY FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES AND LOSSES UNDER ANY AND ALL WARRANTIES WHETHER IN CONTRACT, TORT OR OTHERWISE, ARE EXCLUDED TO THE EXTENT EXCLUSION IS PERMITTED BY LAW.



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