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IMPORTANT INFORMATION

PLEASE READ CAREFULLY



The following and information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your HUB CITY product.

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.



- Written authorization from HUB CITY is required to operate or use reducers in man lift or people moving devices.
- Check to make certain application does not exceed the allowable load capacities published in the current catalog.
- Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.
- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot oil and reducers can cause severe burns. Use extreme care when removing lubrication plugs and vents.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Reducers are not to be considered fail safe or self-locking devices. If these features are required, a properly sized, independent holding device should be utilized. Reducers should not be used as a brake.
- Any brakes that are used in conjunction with a reducer must be sized or positioned in such a way so as to not subject the reducer to loads beyond the catalog rating.
- Lifting supports including eyebolts are to be used for vertically lifting the gearbox only and no other associated attachments or motors.
- Use of an oil with an EP additive on units with backstops may prevent proper operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.



- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the speed reducer cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranty or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

Resellers/Buyers agree to also include this entire document including the warnings and cautions above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by HUB CITY.



IMPORTANT INFORMATION

PLEASE READ CAREFULLY



This catalog is not intended to provide operational instructions. Appropriate Marathon Electric instructions provided with the motor and precautions attached to the motor should be read carefully prior to installation, operation and/or maintenance of the equipment. Injury to personnel or motor failure may be caused by improper installation, maintenance or operation.

The following  and  information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your Marathon Electric product:



- Disconnect power and lock out driven equipment before working on a motor.
- Always keep hands and clothing away from moving parts.
- The lifting support on the motor is not to be used to lift the entire machine. Only the motor attached directly to the support may be safely lifted by the support.
- Install and ground per local and national codes.
- Discharge all capacitors before servicing a single phase motor.
- Misapplication of a motor in a hazardous environment can cause fire or an explosion and result in serious injury. Only the end user, local authority having jurisdiction, and/or insurance underwriter are qualified to identify the appropriate class(es), group(s), division and temperature code. Marathon Electric personnel can not evaluate or recommend what motors may be suitable for use in hazardous environments. If a motor is nameplated for hazardous locations, do not operate the motor without all of the grease and drain plugs installed.
- Never attempt to measure the temperature rise of a motor by touch. Temperature rise must be measured by thermometer, resistance, imbedded detector or thermocouple.
- Motors with automatic reset thermal protectors will automatically restart when the protector temperature drops sufficiently. Do not use motors with automatic reset thermal protectors in applications where automatic restart will be hazardous to personnel or equipment.
- Motors with manual reset thermal protectors may start unexpectedly after the protector trips when the surrounding air is at +20°Fahrenheit or lower. If the manual reset protector trips, disconnect motor from its power supply. After the protector cools (five minutes or more), it can be reset and power may be applied to the motor.
- Connect all protective device leads, marked P1, P2, etc., per instructions supplied with the motor.
- Operation of a motor at other than its nameplate rating may result in fire, damage to equipment or serious injury to personnel.
- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.



- Consult qualified personnel with questions and all electrical repairs must be performed by trained and qualified personnel only.
- For motors nameplated as "belted duty only", do not operate the motor without belts properly installed.
- Motors and/or driven equipment should not be operated faster than their rated speed.
- For inverter applications, follow the inverter manufacturer's installation guidelines.
- Make sure the motor is properly secured and aligned before operation.

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranty or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

Resellers/Buyers agree to also include this entire document including the warnings and cautions above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by Marathon Electric. For more information contact: **Marathon Electric**, Regal Beloit Manufacturing Corporation, 100 E. Randolph St., Wausau, WI 54401
Phone: 715-675-3311 or Fax: 715-675-8030.

CALL: (605) 225-0360 • FAX: (605) 225-0567



GEAR DRIVE WARNINGS & CAUTIONS

IMPORTANT SELECTION INFORMATION

The system of connected rotating parts must be free from critical speed, torsional, or other type vibration, regardless of how induced. The responsibility for this system analysis lies with the purchaser of the gear unit.



SHIELD ALL ROTATING PARTS

For safety, purchaser or user must provide protective guards over all shaft extensions and any moving apparatus mounted on the unit. The user is responsible for checking and complying with all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.



Wear protective clothing and eye shields when installing or maintaining unit and machine.



A unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted, or by any shaft mounted power transmitting device such as sprockets, pulleys, or couplings.



Make certain that all tools and other items are clear from rotating parts before starting machine. Stand clear, and start machine slowly to be sure all components are secure and operating properly.



For safe operation and to continue the unit warranty, when installing, reinstalling, or replacing a factory installed fastener for servicing purpose, or to accommodate the mounting of guards, shields or other light load imposing devices, or for mounting the unit, it becomes the responsibility of the purchaser or user to properly determine the quality, grade of fastener, thread engagement, load carrying capacity, tightening torque, and the means of torque retention.

COUPLINGS – Flexible couplings to input and output shafts are recommended because they minimize bearing and gear wear caused by slight misalignment. Follow coupling manufacturer's recommendations for installation and shielding.

SHEAVES AND SPROCKETS – When mounting sheaves or sprockets, the center of the load should be located as close to the reducer as possible. Excessive overhung loading could result in early failures of bearing or shaft. Refer to the general catalog or contact Hub City for overhung load ratings. Follow manufacturer's recommendations for installation and shielding.



Do not operate the unit without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, unit, or other equipment may result.



Oil should be changed with greater frequency if unit is used in a severe environment such as dusty or humid or high or low temperatures.



Do not mix nonsynthetic and synthetic oil in the unit.



If unit is used in the food or drug industry (including animal food) consult the petroleum supplier or HUB CITY for recommendations of lubricants which meet the specifications of FDA, USDA and/or other authoritative bodies having jurisdiction. Standard lubricants are not suitable for these applications or these industries.



Inspect shafts and components for paint, burrs, or other imperfections before installing components. Do not use excessive force or pounding to install components onto unit shafts, as this may cause damage to shafts, bearings, or gears.

PREVENTATIVE MAINTENANCE – Keep shafts and vent plug clean to prevent foreign particles from entering seals or gear case. Inspect periodically for oil leaks.



STORAGE OF HUB CITY REDUCERS: A gearbox does not have a definable shelf life. The main points of deterioration are rusting of non-painted surfaces and drying out of the seal lips. Proper storage of drives in a cool dry place in a carton away from exposure to ultraviolet light should permit protection for approximately one year.

If the unit is to be inoperative for a longer period of time, completely fill the gear case with regular lubricant containing rust and oxidation inhibitors, tag the gear case and any connected motor to prevent operation until the proper oil level is obtained. Do not operate a completely filled gear case. Coat external shafts with a rust preventative oil or grease. At least every three months, rotate the input shaft until the output rotates at least one revolution to ensure all internal parts are coated and that the shaft seals are free and the seal journals are coated with oil.

The most sensitive part of the gearbox is the radial lip seals. Even under ideal storage conditions, the seal lips may deteriorate or take a set, losing their sealing effect and reducing service life. Therefore, it may be necessary to replace the seals prior to putting the units in service depending upon the length and conditions of storage.



WORM GEAR SPEED REDUCERS

WORM GEAR SPEED REDUCERS -

SINGLE & DOUBLE REDUCTION LUBRICATION

General Note – These instructions contain information for the standard Worm Gear Speed Reducer product line. For Instructions specific to the Hub^{3™} Worm Gear Speed Reducers see the CleanLine Products pages R-25 and R 26.



ALL WORM GEAR SPEED REDUCERS ARE SHIPPED DRY. OIL MUST BE ADDED PRIOR TO OPERATION.

All HUB CITY Worm Gear Speed Reducers are splash lubricated. The unique design of the reducers permits nearly universal mounting by placing a fill, drain and oil level plug at the proper location for mounting positions. Figures W1-W12 show common mounting positions for the different style reducers.

PowerCube Reducers with “L” suffix, i.e., 211L, are filled at the factory with PAG 460 H1 synthetic oil. The mounting position must be specified on the order. See figures B3 through V5. Only PAG synthetic oil can be used in these reducers, other oils are not compatible and may cause the unit to fail.



WORM GEAR SPEED REDUCERS: Review the approved mounting positions and lubrication levels identified in Figures W1-W12 on this sheet. Do not deviate from the mounting positions or lubrication levels shown without contacting the factory.

DOUBLE REDUCTION WORM GEAR SPEED REDUCERS: If the final mounting position of the Double Reduction Reducer is such that either the input shaft of the Primary Unit or the input (high speed) shaft of the Secondary Unit is in a vertical position, consult HUB CITY for special lubrication instructions.

The Primary Unit and the Secondary Unit (Figure W13) each have independent oil reservoirs. Each unit must be filled to the specified level of oil indicated in Figures W1-W12.

WORM GEAR SPEED REDUCERS: After selecting the position that the unit will be mounted but before operating: Remove Fill and Breather Plug (1, Figures W1-W12) and Oil Level Plug (2, Figures W1-W12). Clean threads on removed plugs and plug holes with degreaser.

Fill gearbox with recommended lubricant (see APPROXIMATE OIL CAPACITY CHART in these instructions and GEAR LUBRICANT page of these instructions) to a level near the centerline of the uppermost horizontal shaft or until lubricant starts coming out oil level plug hole. Install plugs

securely in gear case. Note – Plug with breather (1, Figures W1-W12) must always be installed in the top of gear case, opposite Drain Plug (3, Figures W1-W12). HUB CITY Worm Gear Speed Reducers Series 60, 70 and 80 have drain plug at 3A position.

Figures W1-W4 show four common mounting positions of the shaft output and hollow bore units. Figures W5-W8 show four common mounting positions of Drop Bearing Units. Figures W9-W12 show four common mounting positions of vertical mount Units.

VARIATIONS FROM NORMAL CONDITIONS – Input speeds of more than 1,800 RPM may require an adjustment in oil level. Refer to figures B6 to V5 for worm gear reducers with vertical shafts. For vertical input, factory modifications are required, unless the input is a quill-type c-flange mounted vertical up. For vertical output, factory modifications (grease pack and nilos ring) are required.

When position selected is Output Vertical-Up (Figures W5 & W9) or Output Vertical Down (Figures W7 & W11) an adequate amount of lubrication must be supplied to the upper Bearing through Grease Fitting (4, Figures W5, W7, W9 & W11).

All Worm Gear Speed Reducer Drop Bearing Models are equipped with Double Seals on the Output Shaft. Periodically the Pipe Plugs should be removed (5, Figures W5-W8) a Grease Fitting inserted in one plug hole and enough grease injected to purge all of the old grease from between the seals.

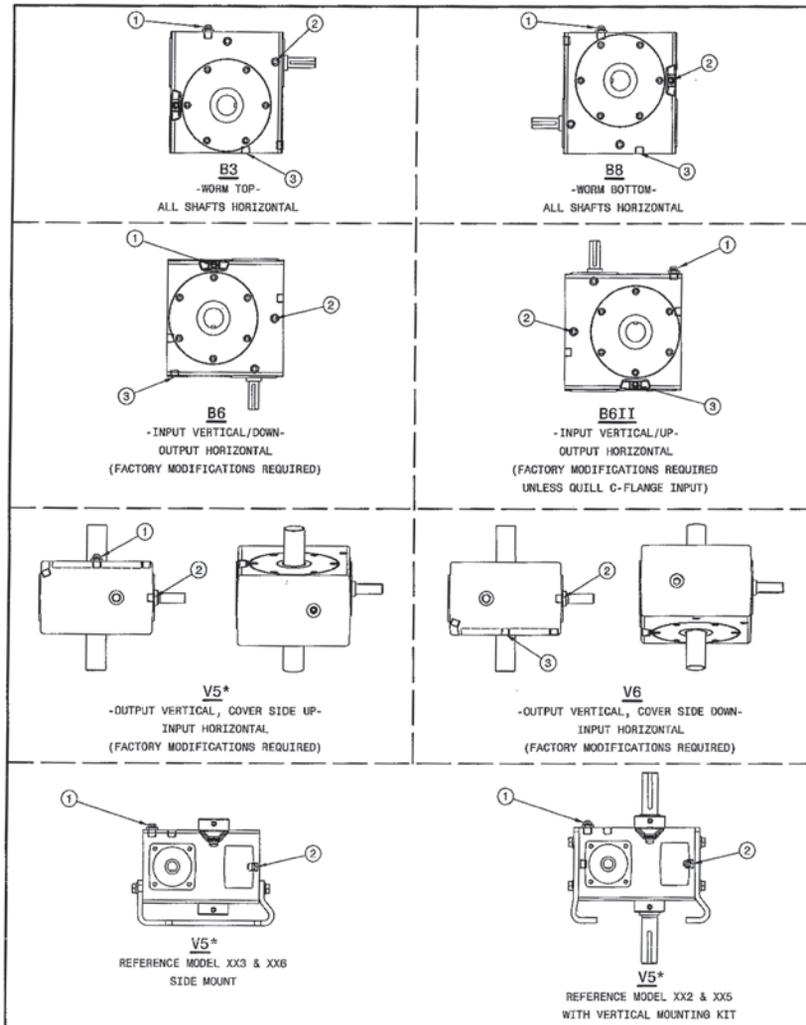
LUBRICANT – Use only lubricants which are recommended for enclosed bronze worm gears, with ISO viscosity Grade 460, or AGMA 7. (Extreme ambient or operating temperature may require different viscosities, consult factory for recommendations.) Choose conventional oil, PAO synthetic oil, or PAG synthetic oil, depending on the application. Refer to page R-30 to R-32 for Hub City lubricants.



CHANGING LUBRICANT – After the first 100 hours of operation, drain out initial oil, flush out the worm gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 2,500 operating hours (5,000 for synthetic oil lubricant) or every 6 months (12 months for synthetic oil lubricant), which ever occurs first.

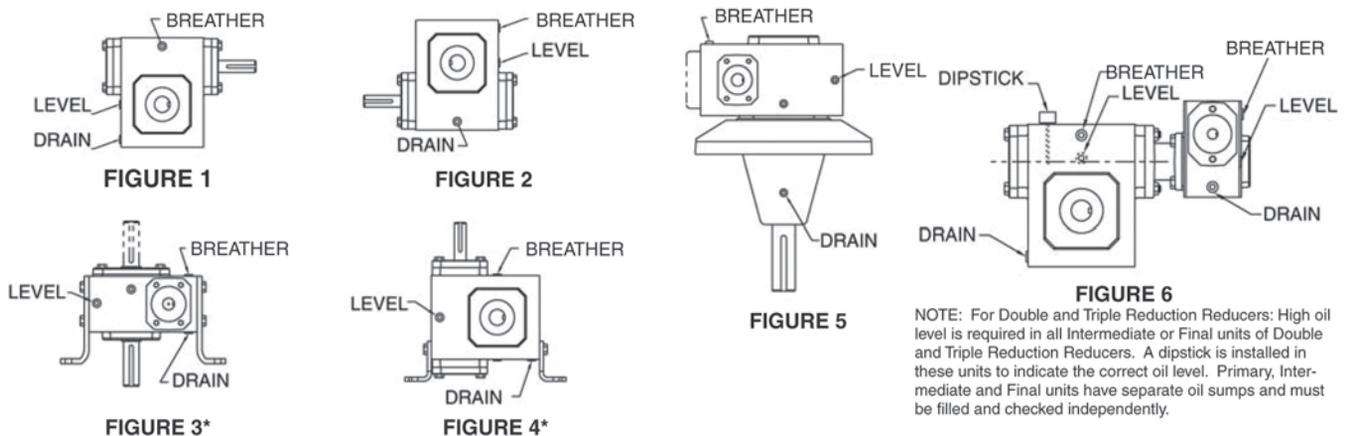


POWERCUBE MOUNTING POSITIONS (130-380 SERIES)



* V5 IS THE PREFERRED MOUNTING POSITION FOR VERTICAL OUTPUT

GW60 TO GW100 SERIES MOUNTING POSITIONS



*Factory Modifications are Required.

NOTE: For Double and Triple Reduction Reducers: High oil level is required in all Intermediate or Final units of Double and Triple Reduction Reducers. A dipstick is installed in these units to indicate the correct oil level. Primary, Intermediate and Final units have separate oil sumps and must be filled and checked independently.



WORM GEAR SPEED REDUCERS

WORM GEAR SPEED REDUCERS - SINGLE & DOUBLE REDUCTION INSTALLATION

MOUNTING POSITIONS 450-520

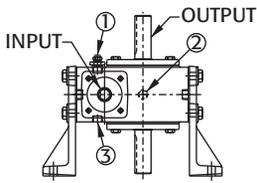


FIGURE W1: SIDE MOUNT

NOTE: This mounting position requires factory modifications.

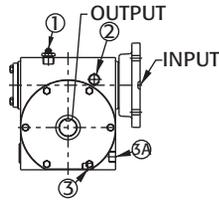


FIGURE W2: WORM TOP

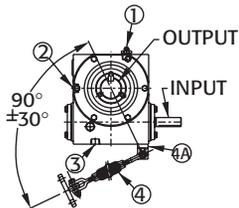


FIGURE W3: SHAFT MOUNT

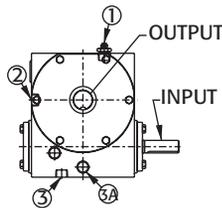


FIGURE W4: WORM BOTTOM

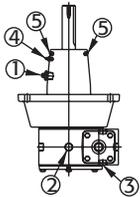


FIGURE W5: OUTPUT VERTICAL-UP

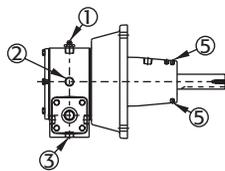


FIGURE W6: WORM BOTTOM

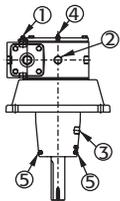


FIGURE W7: OUTPUT VERTICAL DOWN

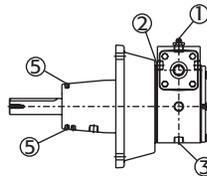


FIGURE W8: WORM TOP

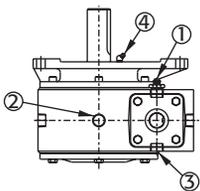


FIGURE W9: OUTPUT VERTICAL-UP

NOTE: This mounting position requires factory modifications.

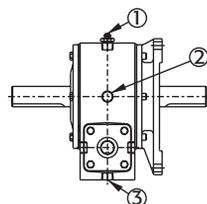


FIGURE W10: WORM BOTTOM

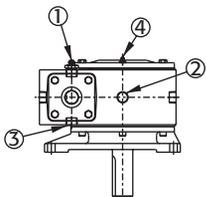


FIGURE W11: OUTPUT VERTICAL DOWN

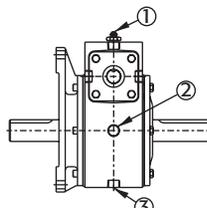


FIGURE W12: WORM TOP

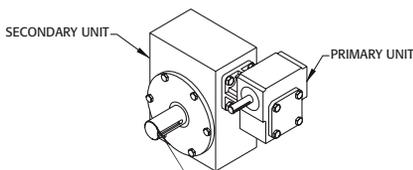


FIGURE W13: DOUBLE REDUCTION

OPERATING POSITIONS – Normal Worm Gear Speed Reducer positions are shown in Figures W1-W12. For special applications, mounting position may be inclined. However, if position varies more than 15°, it may be necessary to make some adaptations to maintain a sufficient oil level. Contact your local distributor or HUB CITY for recommendations. Input rotation of Speed Reducers can be either clockwise or counterclockwise.



SHAFT MOUNT WORM GEAR UNITS – The Torque Arm Pad Ref. 4A (Figure W3) can be attached to any of the four available mounting surface locations of the unit.

Install and position Torque Arm Ref. 4 at 90° to the place (a line drawn) between the center of the output hollow bore and the bolt that attached the Torque Arm 4 to the Torque Arm Pad 4A of the unit, Ref. (Figure W3). The Torque Arm should be positioned to be in tension, NOT compression, based on output rotation of the gear drive.



Excessive setscrew torque may cause damage to the output sleeves in hollow bore Worm Gear Reducers. Please refer to the following table for recommended tightening torque.

SIZE	RECOMMENDED TORQUE
1/4-20 NC	87 LB.-IN
5/16-18 NC	165 LB.-IN
3/8-16 NC	290 LB.-IN

Shaft Mount Worm Gear Reducers equipped with QD bushings utilize a bushing on both sides to provide shaft support. However the keyways on QD bushings are not timed to the mounting holes, therefore it is not possible to install keys in both bushings. One key is sufficient to carry the transmitted torque.



When installing Q/D Bushing Kits on Worm Gear Reducers, follow the Q/D Bushing manufacturer recommendations for bolt tightening torque and installation methods. Failure to do so could result in damage to the bushings and unit.



RUN-IN PERIOD – A new Worm Gear Reducer will not operate at maximum efficiency during the run-in period. Increased current draw or heat rise may be seen during this time.



WORM GEAR SPEED REDUCERS

SPARTAN ALUMINUM WORM GEAR DRIVES LUBRICATION

APPROXIMATE OIL CAPACITIES - WORM GEAR SPEED REDUCERS				
SERIES	MOUNTING POSITION	QUANTITY (pints)		DROP BEARING MODELS
		SHAFT OUTPUT MODELS	HOLLOW BORE MODELS	
130	WORM TOP	0.53	N/A	N/A
	WORM BOTTOM	0.44	N/A	N/A
	VERTICAL INPUT ***	0.31	N/A	N/A
	VERTICAL OUTPUT ---	0.31	N/A	N/A
180	WORM TOP	1.00	0.81	N/A
	WORM BOTTOM	0.81	0.75	N/A
	VERTICAL INPUT ***	0.56	0.56	N/A
	VERTICAL OUTPUT ---	0.56	0.56	N/A
210	WORM TOP	1.38	1.50	N/A
	WORM BOTTOM	1.25	1.12	N/A
	VERTICAL INPUT ***	1.12	1.00	N/A
	VERTICAL OUTPUT ---	1.00	0.88	N/A
240	WORM TOP	2.25	1.88	N/A
	WORM BOTTOM	2.13	1.88	N/A
	VERTICAL INPUT ***	1.75	1.63	N/A
	VERTICAL OUTPUT ---	1.69	1.44	N/A
260	WORM TOP	2.75	2.50	N/A
	WORM BOTTOM	2.50	2.25	N/A
	VERTICAL INPUT ***	2.12	1.87	N/A
	VERTICAL OUTPUT ---	2.00	1.63	N/A
320	WORM TOP	5.00	4.00	7.50
	WORM BOTTOM	3.88	3.38	5.50
	VERTICAL INPUT ***	3.38	2.75	4.50
	VERTICAL OUTPUT ---	3.12	2.75	5.0 VERTICAL DOWN 3.0 VERTICAL UP
380	WORM TOP	5.38	5.50	8.50
	WORM BOTTOM	4.50	4.50	7.00
	VERTICAL INPUT ***	3.88	4.00	5.75
	VERTICAL OUTPUT ---	3.63	3.75	6.0 VERTICAL DOWN 4.0 VERTICAL UP
450	WORM TOP	7	5.2	9
	WORM BOTTOM	4.8	4	5.7
	VERTICAL OUTPUT	3.8	3	5.8 VERTICAL DOWN 3.8 VERTICAL UP
520	WORM TOP	10.6	7.3	14.5
	WORM BOTTOM	7.5	5.1	9.3
	VERTICAL OUTPUT	5.5	3.8	9.4 VERTICAL DOWN 5.5 VERTICAL UP
W300	WORM TOP		0.70	
	WORM BOTTOM	N/A	0.40	N/A
	VERTICAL OUTPUT		0.40	
W50B	WORM TOP		3.2	
	WORM BOTTOM	N/A	2	N/A
	VERTICAL OUTPUT		3.5	
W516	WORM TOP	5.25	5.25	
	WORM BOTTOM	2.75	2.75	N/A
	VERTICAL OUTPUT	2.6	2.6	

*** This quantity of oil will fill the unit to the centerline.
 Factory modifications required to provide sealed top bearing.
 No modifications needed if quill-type C-Flange is mounted up.
 --- This quantity of oil will fill the unit to the centerline.
 Factory modifications required to provide grease pack and Nilos ring at top bearing.

GW Series Lubricant Capacities (Pts)

Mounting Position	GW60	GW70	GW80	GW100
Single Reduction Units				
Worm Over	19 1/2	35	48	72
Worm Under	20 1/2	32 3/4	51 1/4	80
Vertical Output*	20	20 3/4	28 3/4	40
Vertical Input*	20 1/3	36 1/2	50	75
Extended Bearing	27	40	63	102
Double Reduction Primary Unit				
Worm Over	4 1/2	4 1/2	7	11 3/4
Worm Under	6 3/4	6 3/4	9 1/2	19
Vertical Output*	5 1/2	5 1/2	8	15 1/2
Vertical Input*	5 3/4	5 3/4	8	15 1/2
Extended Bearing	8	8	12	17
Sec.Unit Worm Over	30 1/3	50 1/3	71 1/2	107 1/4

* Factory modifications required.

Carefully follow lubrication instructions and installation manual furnished with the gear reducer. All standard Spartan reducers are properly filled at Factory with sufficient lubricant quantity for any mounting position. Change oil only when performing maintenance that requires gearbox disassembly or if the reducer is operated in a severe environment. If oil must be replaced, use only PAG 460. PAG 460 is H1 Food Grade approved lube. **NOTE: PAG SYNTHETIC LUBRICANTS ARE NOT COMPATIBLE WITH ANY OTHER LUBRICANTS, AND MUST NEVER BE MIXED. TOPPING OFF WITH THE WRONG LUBRICANT COULD CAUSE UNIT FAILURE.**

SPECIAL LUBRICATION REQUIREMENTS – Sizes AL450-AL850

- Reducer is mounted with input worm shaft vertical
- Input speed is sustained less than 900 RPM

NOTE: The reducer may require modifications to assure proper lubrication in these applications. Contact Factory for more detail.

For lubrication requirements of helical reducers (primaries of helical worm reducers and ratio multipliers), contact Factory.

Lubrication type	Series			
	AL450	AL500	AL630	AL850
Oil (pints)	0.2	0.3	0.8	2.6

Installation Instructions

The following instructions apply to standard Spartan Worm type reducers with base or flange mounting in motorized and non-motorized single and double reduction options.

1. Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting hole. Shim as required under flange or base feet which do not lie flat against the mounting surface.
 2. Carefully follow lubrication instructions and installation manual furnished with the gear reducer. All standard Spartan reducers are properly filled at Factory with sufficient lubricant quantity for nearly any mounting position.
- SPARTAN aluminum gear reducers:** Series AL450-AL850 utilize a vent-free design and are Factory filled with synthetic oil formulated for lifetime lubrication & wide operating temperature range (+5F to +220F). It is not necessary to change the lubricant unless the reducer is used in a severe environment. If these reducers will be used in severe environment or if lubricant must be replaced, contact Factory.
3. Connect motor to speed reducer.



DO NOT CHANGE MOUNTING POSITIONS WITHOUT CONTACTING FACTORY. Altering the mounting position may require special lubrication provisions which must be factory installed.



BEVEL GEAR DRIVES

BEVEL GEAR DRIVES LUBRICATION

General Note – These instructions contain information for the standard Bevel Gear Drive product line. For Instructions specific to the Hub3™ Bevel Gear Drives and the CleanLine Plus Bevel Gear Drives see the CleanLine Products page R-25.

BEVEL GEAR DRIVES General Note – These instructions contain information common to more than one model of Bevel Gear Drive. To simplify reading, similar models have been grouped as follows:

GROUP 1 – Models 44, 11, 150, 165, 165M, 175, 175M, 66, 66M, 65, 65M, 600, 88, 800, 800M, 810, 850, 850M, 1000, 1010, 101M, 1200, 120M, 1700 and 2200.

GROUP 2 – Models 790, 920, 950, 1050, 105M, 1250 and 125M.

GROUP 3 – Models M2, M3 and M3M.

GROUP 4 – Models AD1, AD2, AD3, AD3M, AD4, AD4M, AD5 and AD5M.

GROUP 5 – Models RA0, RA1, RA2, RA3, RA4



GROUP 1, 2, and 3 BEVEL GEAR DRIVES ARE SHIPPED DRY. OIL MUST BE ADDED PRIOR TO OPERATION. GROUP 4 and 5 DRIVES ARE PREFILLED AT FACTORY.

All HUB CITY Bevel Gear Drives are splash lubricated. Typical mounting positions with all shafts in horizontal position are shown in Figures B1 & B2. Fill/breather, level and drain plugs have been provided to meet most mounting requirements. Group 4 Drives may be mounted in any position and are prefilled at factory with a semi-fluid grease designed for a wide variety of applications. Group 5 drives are factory filled with a Lubricant, which has an AGMA Number 4EP and an ISO-ASTM Viscosity Grade 150, for horizontal shaft mounting as shown in figure B1.



BEVEL GEAR DRIVES: Review the approved mounting positions and lubrication levels identified in Figures B1 & B2 on this sheet. Do not deviate from the mounting positions or lubrication levels shown without contacting the factory.

BEFORE OPERATING BEVEL GEAR DRIVES (Except Group 4 and Group 5 Drives) – Remove Breather and/or fill Plug (1, Figures B1 & B2) and Oil Level Plug (2, Figures B1 & B2). Fill gearbox with a recommended lubricant (see APPROXIMATE OIL CAPACITY CHART in these instructions) and GEAR LUBRICANT page of these instructions) until lubricant starts coming out oil level plug hole. Clean thread on the removed plugs and the plug holes with degreaser. Install plugs securely in gear case. Note – Breather and/or fill Plug (1, Figure B1 & B2) must always be installed in the top of gear case, opposite Drain Plug (3, Figure B1 & B2). Note – Models 790, 920 and 950 have the breather (4, Figure B2) installed in the pinion housing.



Do not change lubricants in Group 4 Bevel Gear Drives unless they are disassembled for service. Groups 1, 2, 3 & 5 Bevel Gear Drives should have lubricant changed as described below.



CHANGING LUBRICANT – After the first 500 hours or (4) weeks of operation, drain out initial oil, flush out the bevel gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant), which ever occurs first.

VARIATIONS FROM NORMAL CONDITIONS – Bevel Gear Drives: Input speeds that exceed the maximum speeds recommended for a given ratio, which are listed in the general catalog specifications, may require an adjustment in the oil level. Consult HUB CITY for special lubricant recommendations when operating at higher speeds. All HUB CITY Bevel Gear Drives (except Group 4 Drives) are designed for installation with all shafts in a horizontal position.

If either shaft is in a vertical position or mounted on an incline (except Group 4 Drives) zerk fittings may be required to lubricate upper bearings. It may also be necessary to make some oil plug modification. Consult HUB CITY for recommendations.

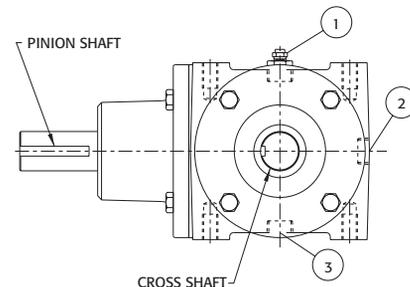


FIGURE B1 - MOUNTING POSITION, GROUP 1, 3 & 5

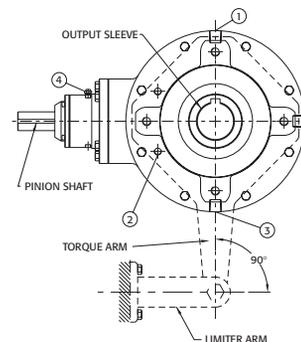


FIGURE B2 - MOUNTING POSITION, GROUP 2





BEVEL GEAR DRIVES & COOLING TOWER DRIVES

APPROXIMATE OIL CAPACITIES - BEVEL GEAR DRIVES

MODEL	QUANTITY	MODEL	QUANTITY
GROUP 1			
44	0.50 pint	790	2.75 pints
11	0.40 pint	920	5 pints
150	0.75 pint	950	10 pints
165 & 165M	0.75 pint	1050 & 105M	10 pints
175 & 175M	0.70 pint	1250 & 125M	18 pints
66 & 66M	1.50 pints	GROUP 3	
65 & 65M	1.40 pints	M2	0.25 pints
600	1.50 pints	M3 & M3M	0.25 pints
88	5 pints	GROUP 4	
800 & 800M	5 pints	(ALL PRELUBED AT FACTORY)	
810	5 pints	AD1	.5 oz
850 & 850M	4.5 pints	AD2	1.5 oz
1000	10 pints	AD3 & AD3M	8.0 oz
1010 & 101M	10 pints	AD4 & AD4M	.5 oz
1200 & 120M	20 pints	AD5 & AD5M	1.5 oz
1700	10 gallons	GROUP 5	
2200	14 gallons	(ALL PRELUBED AT FACTORY)	
		RA0	10 oz
		RA1	28 oz
		RA2	37 oz
		RA3	75 oz
		RA4	154 oz

BEVEL GEAR DRIVES INSTALLATION



Power may be applied (drive shaft) to either the cross or pinion shaft providing that the gear reduction does not exceed 3:1. On models that have greater than 3:1 gear ratio, the input must be on the pinion shaft such as Models 790, 920 and 950. Also, input rotation on these models should be clockwise.



SHAFT MOUNTED BEVEL GEAR DRIVES, Group 2 Drives – Driven shaft should be supported independently with pillow block bearings, located as close to Bevel Gear Drive as possible. A suitable Torque Arm, shown in dotted line (Figure B2) must be provided (not supplied) to keep unit from rotating. A rigid torque arm will cause bearings to “load up” and cause excessive wear. To prevent this, provide a slight amount of “float” at the pivot point. Note that torque arm must be fastened to all mounting pads.



BEVEL GEAR DRIVES configured with the Hub City “Counter Flow” lubrication system. models 1010, 101M, 1050, 105M, 1200, 120M, 1250, 125M, 790, 920 and 950, may require the pinion housing and/or the end caps to be rotated as

part of the installation, depending on the drives mounting position. With the drive in it’s required mounting position, the word “TOP” that appears on the pinion housing and/or end caps must be in a vertically up position, to maintain proper bearing lubrication.

To reposition the pinion housing or cap, remove all capscrews, rotate the housing or cap with out removing it from the main housing. Apply Loctite® to the capscrews, reinstall and torque proper specifications. Units are assembled at the factory with pinion housings and/or end caps positioned for style “A”, “C” and “E” units mounted with all shafts in a horizontal plane.

COOLING TOWER DRIVES LUBRICATION



ALL COOLING TOWER DRIVES ARE SHIPPED DRY. OIL MUST BE ADDED PRIOR TO OPERATION.

All HUB CITY Cooling Tower Drives are splash lubricated. The design of the Cooling Tower Drive permits uniform lubrication of all moving parts and bearing surfaces. After installation, and prior to operation, the gear case must be filled to the proper level with a recommended lubricant (see APPROXIMATE OIL CAPACITY CHART in these instructions and GEAR LUBRICANT page of these instructions).

INITIAL LUBRICANT FILL – Clean threads on removed plugs and plug holes with degreaser. Fill gear case with approved lubrication until the oil level is within 1/4 inch from the top of the filling elbow. Allow several minutes for the oil to stabilize at a static level. Coat plugs with thread sealant and replace in gear case.

If a remote oil gage has been installed, be sure that the oil level in the remote oil gage matches the oil level in the Cooling Tower Drive filling elbow.



CHANGING LUBRICANT – The initial lubricant should be changed after the first 2 weeks of operation. Drain the original oil, fill the cooling tower gear case to the proper level with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore’s Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), start Cooling Tower Drive and allow to reach operating speed, then remove power immediately. Drain flushing oil and refill to proper level with recommended lubricant. Thereafter, oil changes should be every 6 months (12 months for synthetic oil lubricant) unless operating under extreme operating conditions. Extreme operating conditions are described under Variations From Normal Conditions.

The original oil may be strained and replaced. Do not use a strainer finer than 25 micro inches to avoid filtering out oil additives.



COOLING TOWER DRIVES

COOLING TOWER DRIVES INSTALLATION

COOLING TOWER DRIVES LUBRICATION CON'T

VARIATIONS FROM NORMAL CONDITIONS – Input speeds not to exceed 1800 RPM.

IMPORTANT – The Cooling Tower Drive should not be operated when internal temperature is above 225° F (107° C) or the starting ambient temperature is below 15° F (-9° C). (See cold temperature operation.) Reduced seal life or lubrication failure could be caused unless special duty lubricants are used.

COLD TEMPERATURE OPERATION – For cold temperature operation, below 15° F (-9° C), where the initial oil viscosity is greater than 5000 SUS, either heaters or low temperature gear oil must be used. Thermostatically controlled heaters are available from HUB CITY. Lubricants with a normal operating viscosity range of 90 to 400 SUS at operating temperature are normally unsatisfactory for cold temperature starting. Hub City 75W-90 synthetic oil has performed satisfactorily as a lubricant for most cold temperature starting and operating conditions, and can be used where heaters are not practical.

EXTREME OPERATING CONDITIONS – Extreme operating conditions include unusually high ambient temperatures combined with intermittent high loads causing rapid changes in gear case temperature, continuous oil temperature above 180° F, or operation in high humidity. Under these conditions the oil should be changed at one, two, or three month intervals depending on severity of operating conditions.

APPROXIMATE OIL CAPACITIES - COOLING TOWER DRIVES

MODEL	QUANTITY (PINTS)
5000	5.50
8000	8.50
9000	14.0

OPERATION POSITION – The Cooling Tower Drive must be mounted with the output shaft vertical. This position is required to achieve uniform lubrication to shafts, gears and bearings.

Because of varying requirements, mounting hardware is not supplied with this unit. Good quality cap screws with lock washers should always be used. Base and fasteners for motor and Cooling Tower Drive must be rigid enough to maintain alignment between the Cooling Tower Drive and motor. Adjust mounting position of the Cooling Tower Drive so that high speed shaft is properly aligned with motor shaft.

The gears are carefully adjusted by the factory during assembly for proper tooth contact and backlash. No further adjustment during installation is necessary or recommended.

COUPLING – A flexible coupling is required for input shaft to minimize bearing and gear wear caused by slight misalignment. Follow coupling manufacturer's recommendations for installation. Check coupling connections for minimum parallel and angular misalignment. If an alignment adjustment is required, shimming of the drive or motor might be necessary but care must be taken to prevent distortion of the reducer housing.

NOTE: Coupling and unit alignment should be rechecked after two weeks operation.

CAUTION

If any noticeable resistance is encountered when installing fan hubs or couplings on shafts, inspect bore for paint, weld burrs or imperfections and hone smooth. Force fitting can easily damage gears, shafts, and bearings.

WARNING

All rotating shafts and couplings must be adequately shielded by the user for maximum safety.

CAUTION

Any noticeable vibration due to fan imbalance could cause damage to the Cooling Tower Drive gear set or bearings. Check the fan mounting, and if vibration persists, contact fan manufacturer.

SHUTDOWN – For shutdowns exceeding one week, operate fan for ten minutes once a week to minimize rust formation inside gear housing. If unit is to be inoperative for a long period, completely fill gear case with regular lubricant containing rust and oxidation inhibitors. Tag gear case and motor to prevent operation until proper oil level is obtained. Do not operate completely filled gear case.



PARALLEL SHAFT REDUCERS & HELICAL RATIO MULTIPLIERS

PARALLEL SHAFT REDUCERS and HELICAL RATIO MULTIPLIERS LUBRICATION



ALL PARALLEL SHAFT REDUCERS (EXCEPT HELICAL RATIO MULTIPLIERS) ARE SHIPPED DRY AND OIL MUST BE ADDED PRIOR TO OPERATION.

HELICAL RATIO MULTIPLIERS ARE FACTORY FILLED WITH THE PROPER AMOUNT OF PAG460 SYNTHETIC OIL FOR UNIVERSAL MOUNTING EXCEPT FOR VERTICAL SHAFTS. NO LUBRICATION CHANGE IS NECESSARY. FOR VERTICAL SHAFT APPLICATIONS CONSULT FACTORY. NOTE: PAG SYNTHETIC LUBRICANTS ARE NOT COMPATIBLE WITH ANY OTHER LUBRICANTS, AND MUST NEVER BE MIXED. TOPPING OFF WITH THE WRONG LUBRICANT COULD CAUSE UNIT FAILURE.

All HUB CITY Parallel Shaft Reducers are splash lubricated. Figures P1, P2, and P3 indicate oil levels for three basic mounting positions. Shaded area indicates the recommended oil level when input speeds are **greater than 800 RPM**. Dashed lines indicates the recommended oil level when input speeds are **less than 800 RPM**. Always determine mounting position before installing lubricant.

NOTE: When Parallel Shaft Reducer is mounted so that shafts are in a vertical position (Figure P3), see "VARIATIONS FROM NORMAL CONDITIONS – Parallel Shaft Reducers".

BEFORE OPERATING Parallel Shaft Reducer – Remove uppermost plug and fill Reducer with a recommended lubricant (see APPROXIMATE OIL CAPACITY CHART in these instructions and GEAR LUBRICANT page of these instructions) Clean threads on removed plugs and plug holes with degreaser; coat with thread sealant and install securely into Reducer case. If fill, level and drain plugs are not located conveniently for your mounting position, additional plugs may be installed. Consult HUB CITY for recommendations.



VARIATIONS FROM NORMAL CONDITIONS –Parallel Shaft Reducers: When operating High Speed Shaft (Figures P1, P2 and P3) at speeds above 1800 RPM or below 400 RPM, special adjustment in oil level may be required. Consult HUB CITY for recommendations.

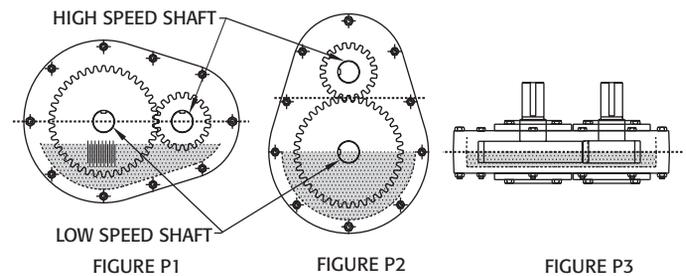
If either shaft is in a vertical position or inclined more than 15°, zerk fittings may be required to lubricate upper bearings. It may also be necessary to make some oil level or plug modifications. Consult HUB CITY for recommendations.



CHANGING LUBRICANT –Parallel Shaft Reducers: After the first 100 hours of operation, drain out initial oil, flush out the parallel shaft gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore’s Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant), which ever occurs first.



IMPORTANT - HELICAL RATIO MULTIPLIERS: Unit should not be operated when internal temperature exceeds 225° F or below 40° F unless a special duty lubricant is used. Reduced seal, bearing and gear life due to lubrication failure could result.



APPROXIMATE OIL CAPACITIES Parallel Shaft Reducers & Helical Ratio Multipliers

MODEL	QUANTITY	MODEL	QUANTITY
22	0.50 pints	1	2.10 pints
230	0.75 pints	2	2.90 pints
240	1.50 pints	3	3.60 pints
280	1.75 pints	4	4.30 pints
85L	1.40 pints	5	4.90 pints
200	1.50 pints	6	20.0 pints
95L	2.50 pints	75	31.0 pints
95H	3.50 pints	8	42.0 pints
290	12.0 pints	HT100	2.75 pints
52	1.60 pints	ARM1 & RM1	(Prelubed) 0.6
83L & 83S	1.80 pints	ARM2 & RM2	(Prelubed) 0.9
89	1.90 pints	RM3	(Prelubed) 1
		SSRM1	(Prelubed) 0.6



PARALLEL SHAFT REDUCERS & HELICAL RATIO MULTIPLIERS

PARALLEL SHAFT REDUCERS INSTALLATION

The basic design of HUB CITY Parallel Shaft Reducers allows operation in virtually any position. However, if your Reducer has a fill/breather plug and/or pipe plugs, the ideal position would be: Fill/breather plug at the top of the Reducer, drain plug at the bottom of the Reducer and a level plug located where oil level is desired according to shaft position and input speed.

Because mounting positions can vary greatly along with the location and availability of plugs in certain model Reducers, it may be necessary to install additional plugs as needed or level gages in level plugs.

Power may be applied (drive shaft) to either the high speed or the low speed shafts providing that the high speed shaft does not rotate more than 1750 RPM. Shafts may rotate in either direction.

Because of varying requirements, mounting hardware is not supplied with these units. Good quality cap screws with lock washers should be used. Base and fasteners for motor and Reducer must be rigid enough to maintain alignment between Reducer and motor and between Reducer and couplings.



SHAFT MOUNTED PARALLEL SHAFT REDUCERS – The driven shaft must extend through the full width of the Reducer and shaft should be independently supported with pillow block bearings, located as close to the Reducer as possible.

A torque arm must be installed on shaft mounted Reducers to prevent unit from rotating. Figure P4 shows the suggested installation. A rigid torque arm will cause bearings to “load up”, causing excessive wear. To prevent this, provide a slight amount of “float” at the pivot point. Install Torque Arm so that it is approximately 90° to a line drawn through the low speed sleeve centerline and torque arm pivot point. Brackets must be fashioned by using a minimum of three attaching points on case.

No flexible coupling is required to connect low speed shaft on shaft mounted models but a clutch or torque limiting device is advisable somewhere in the drive train.

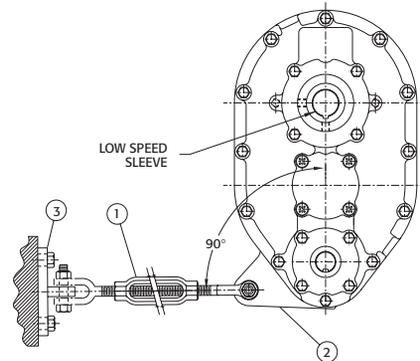


FIGURE P4

HELICAL RATIO MULTIPLIERS INSTALLATION

OPERATING POSITIONS – Normal speed reducer mounting positions are shown in Figures HRM1-HRM5. Because of varying requirements, mounting hardware is not supplied with these units, however foot mounting kits are available. Grade 5 or stronger cap screws should always be used. Base and fasteners for motor and reducers must be rigid enough to maintain alignment between reducer and motor, and between reducer and couplings. Input rotation of the speed reducer can be either clockwise or counterclockwise.



FIGURE HRM1 -
FOOT MOUNTING
AVAILABLE

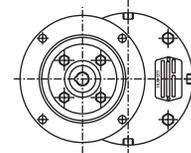


FIGURE HRM2 -
FOOT MOUNTING
AVAILABLE

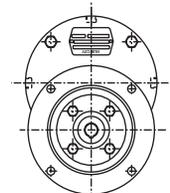


FIGURE HRM3

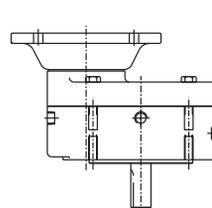


FIGURE HRM4 -
VERTICAL SHAFT
Mounting requires factory
modification

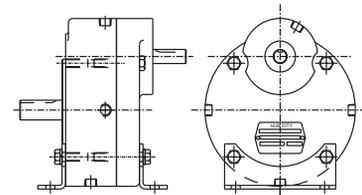


FIGURE HRM5 -
SHAFT VERSION
(Optional mounting
feet shown)





POWERTORQUE® SHAFT MOUNT REDUCERS

POWERTORQUE® SHAFT MOUNT REDUCERS LUBRICATION



ALL POWERTORQUE® SHAFT MOUNT REDUCERS ARE SHIPPED DRY AND OIL MUST BE ADDED PRIOR TO OPERATION.

BEFORE INSTALLATION: All Hub City PowerTorque® Shaft Mount Reducers are splash lubricated. Review the mounting positions and lubrication levels identified in Figure SM1. Below 15 RPM output speed, the oil level must be adjusted to reach the highest oil level plug. If the reducer mounting position is to vary from the positions shown in Figure SM1, either more or less oil may be required. Consult HUB CITY for recommendations.

BEFORE OPERATING PowerTorque® Shaft Mount Reducers: After final installation, install the magnetic drain plug in the drain location specified in Figure SM1. Remove the fill/vent plug and level plug. Fill the reducer with recommended lubricant (see APPROXIMATE OIL CAPACITY CHART in these instructions and GEAR LUBRICANT page of these instructions) until oil starts coming out the oil level plug hole specified in Figure SM1. Clean threads on removed plugs and plug holes with degreaser, coat plugs with thread sealant and install plugs securely in gear case. Install the vent plug in the location specified in Figure SM1 for the appropriate mounting position. Remove the tape used to cover the vent plug during shipment and discard.



The oil level is correct when the surface of the oil is level with the lowest point of the level plug shown in Figure SM1.

VARIATIONS FROM NORMAL CONDITIONS -

PowerTorque® Shaft Mount Reducers: Input speeds that exceed the maximum speeds recommended for a given ratio, which are listed in the general catalog specifications, may require an adjustment in the oil level. Consult HUB CITY for special lubricant recommendations when operating at higher speeds.

Hub City PowerTorque® Shaft Mount Reducers may be mounted in any of the positions shown in Figure SM1. These positions may vary up to 5° for positions "A" or "C" and 20° for positions "B" or "D" in either direction and still have adequate lubrication. If these angles of inclination are exceeded consult HUB CITY for special lubrication instructions. Because mounting positions can vary greatly along with the location and availability of plugs in certain applications, it may be necessary to install additional plugs as needed or level gages in place of level plugs.



CHANGING LUBRICANT – After the first 100 hours of operation, drain out initial oil, flush out the PowerTorque® gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant), which ever occurs first.

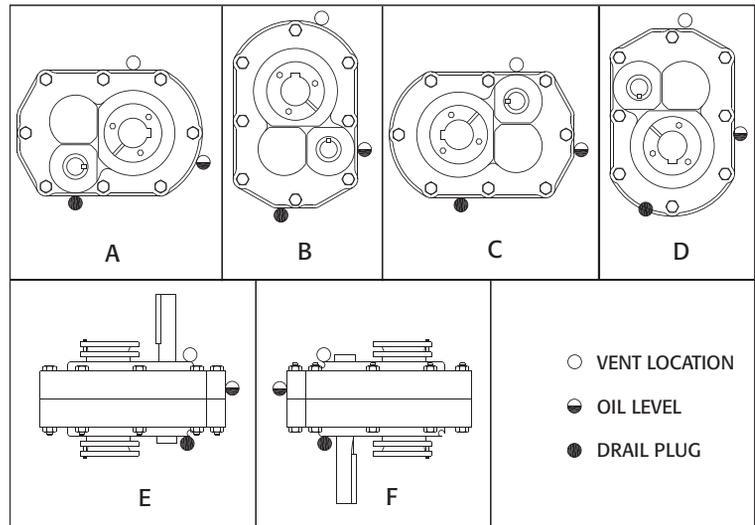


Do not use GL-90, 75W-90 or other extreme pressure (EP) lubricants containing friction modifiers such as graphite or molybdenum disulfide in gear drives containing internal backstops. Lubricants with EP additives may produce coatings which adversely affect operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.

POWER TORQUE SHAFT MOUNT REDUCERS Approximate Oil Capacities (pints)

MODEL	MOUNTING POSITION					
	HORIZONTAL SHAFTS				VERTICAL SHAFTS	
	A	B	C	D	E	F
PT1107	1.0	1.0	1.3	1.5	2.0	2.5
PT2115	1.8	2.0	1.3	2.0	3.3	3.5
PT3203	3.0	3.0	1.5	4.5	5.3	6.0
PT4207	3.8	4.5	2.5	6.0	6.8	8.5
PT5215	6.5	5.0	6.5	5.0	14.0	17.3
PT6307	8.5	10.0	8.5	10.0	17.3	18.3
PT7315	13.0	16.0	14.5	18.5	30.8	32.8
PT8407	17.0	22.0	21.0	17.0	38.3	38.3
PT9415	26.0	26.0	25.0	28.5	50.8	50.8
PT10507	46.0	28.0	31.5	37.5	82.0	82.0

MOUNTING POSITIONS FIGURE - SM1





POWERTORQUE® SHAFT MOUNT REDUCERS

POWERTORQUE® SHAFT MOUNT REDUCERS INSTALLATION

⚠ CAUTION

The lifting eye included on this drive is to be used to vertically lift the drive only and no other associated attachments or motors.

⚠ WARNING

For high momentum loads, if coasting to a stop is undesirable, a braking mechanism should be applied to the reducer output or driven mechanism.

1. INSTALL REDUCER ON DRIVEN SHAFT

The driven shaft must extend through the full length of the reducer sleeve and the shaft should be independently supported with pillow block bearings located as close to the reducer as possible. The driven shaft must be installed in the sleeve with a bushing at each end. Refer to installation instructions provided with tapered bushings.

2. INSTALL TORQUE ARM

The Torque Arm must be installed on shaft mounted reducers to prevent the unit from rotating. Install and position the Torque Arm at a 90° angle to a line drawn through the center of the low speed sleeve and the bolt that attaches the Torque Arm to the Torque Arm brackets on the unit. (Refer to Figure SM2). The Torque Arm should be positioned to be in tension, NOT compression, based on output rotation of the gear reducer. A rigid Torque Arm can cause bearings to "load up" and cause premature bearing failure. To prevent this, provide a slight amount of "float" at the torque arm pivot points.

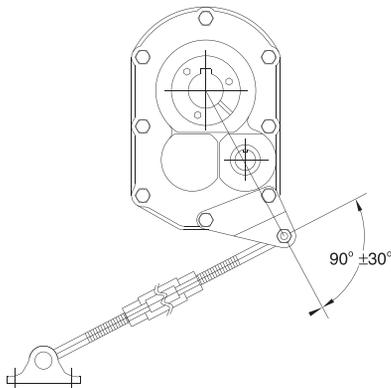


FIGURE SM2

3. INSTALL SHEAVES AND SPROCKETS

When mounting sheaves or sprockets, they should be located as close to the Gear Drive as possible. Excessive overhung load could result in premature failures of bearings or shaft. Refer to the general catalog or contact your local distributor for overhung load ratings.

4. INSTALL MOTOR AND V-BELT DRIVE

Install the motor and V-belt drive with the V-belt at a right angle approximately to the centerline between the driven and input shaft. This will allow using the torque arm to tighten the V-belt. (See Figure SM3.)

If using a motor mount that is installed directly to the reducer, refer to the Installation Instructions provided with the motor mount.

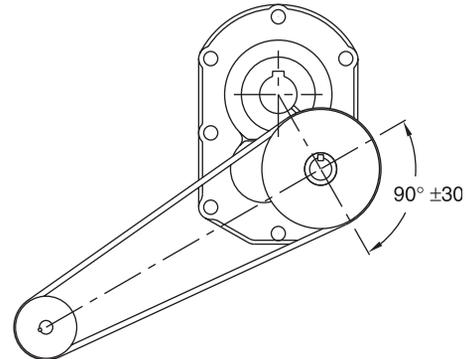


FIGURE SM3

⚠ WARNING

SHIELD ALL ROTATING PARTS

For safety, purchaser or user should provide protective shields over the V-belt drive, all shaft extensions and any moving apparatus mounted on the unit. The user is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.

5. FILL REDUCER WITH LUBRICANT

Refer to the PowerTorque® Shaft Mount Reducers Lubrication section for recommended lubricants and oil levels for the various mounting positions.

⚠ CAUTION

FLANGE MOUNTED PowerTorque® Shaft Mount Reducers: Units with the flange mount accessory are to be mounted and supported by the mounting flange only. The mounting pads on the housing are not to be used in conjunction with the mounting flange to support the unit.

SHAFT MOUNTED PowerTorque® Shaft Mount Reducers WITH MOUNTING FLANGE: There must be concentricity between the driven shaft and the machine register that accepts the mounting flange pilot to prevent misalignment between the hollow shaft of the drive and the driven shaft.

SHAFT OUTPUT PowerTorque® Shaft Mount Reducers WITH MOUNTING FLANGE: If coupling to shaft – flexible couplings are recommended to minimize excessive bearing and shaft loading caused by misalignment. Follow coupling manufacturer's installation directions.



SPARTAN AND POWERATIO® 2000 & 4000 HIGH EFFICIENCY DRIVES

SPARTAN ALUMINUM HELICAL INLINE GEAR DRIVES LUBRICATION

CAREFULLY FOLLOW LUBRICATION INSTRUCTIONS AND INSTALLATION MANUALS FURNISHED WITH THE GEAR REDUCER. ALL STANDARD SPARTAN™ INLINE REDUCERS ARE FACTORY FILLED WITH THE PROPER AMOUNT OF PAG460 SYNTHETIC OIL. SPECIFY MOUNTING POSITION OF REDUCER FOR CORRECT OIL FILL AT FACTORY. THE MOUNTING POSITION IS STAMPED ON ALL SPARTAN™ REDUCER NAMEPLATES. POSITION B3 IS STANDARD. POSITIONS B3-B8 ARE HORIZONTAL MOUNTS. POSITIONS V5 AND V6 ARE VERTICAL MOUNTS. NOTE: PAG SYNTHETIC LUBRICANTS ARE NOT COMPATIBLE WITH ANY OTHER LUBRICANTS, AND MUST NEVER BE MIXED. TOPPING OFF WITH THE WRONG LUBRICANT COULD CAUSE UNIT FAILURE.

SPARTAN ALUMINUM HELICAL INLINE
Approximate Oil Capacities (pints)

MODEL	MOUNTING POSITION (SEE FIG HI 1)				
	B3	B6	B7	B8	V5
ALHI4032	0.5	0.6	0.8	0.8	0.8
ALHI4033	0.6	0.8	0.9	0.9	0.9
ALHI4042	0.5	0.6	0.8	0.8	0.8
ALHI4043	0.6	0.8	0.9	0.9	0.9
ALHI4052	0.9	1.2	2.1	2.3	2.3
ALHI4053	1.6	1.6	2.2	2.4	2.5
ALHI4062	1.2	1.8	2.3	2.5	2.5
ALHI4063	1.6	1.9	2.4	2.6	2.8

POWERATIO 2000 & 4000 HIGH EFFICIENCY HELICAL IN-LINE, COMPACT HELICAL PARALLEL, HELICAL BEVEL, and HELICAL WORM GEAR DRIVES LUBRICATION

IMPORTANT SELECTION INFORMATION

Check to verify that the application does not exceed the capacities published in the current catalog, and printed on the gear unit name plate. All capacity ratings are based on proper application of AGMA Service Factors listed in the current catalog.



All POWERATIO 2000 & 4000 HIGH EFFICIENCY gearmotors and gear reducers are supplied with the correct quantity of lubricating oil for the mounting position specified at time of order.

BEFORE INSTALLATION – Review the approved mounting positions and lubrication levels identified in Figures HI1 & HI2, CPS1, HB1, or HW1 & HW2. Do not deviate from the mounting positions or lubrication levels shown without contacting the factory.

For transportation, the units are supplied as sealed gearcases. In place of the breather plug, a pipe plug is installed. The breather plug accompanies the unit in the lubrication instructions and hardware envelope.

BEFORE OPERATING – After final installation, install the breather plug in the locations specified in Figures HI1 & HI2, CPS1, HB1, or HW1 & HW2 for the appropriate mounting position.

After installation, the actual mounting position should be confirmed against the mounting position shown on the gear reducer nameplate. Adequate lubrication is only guaranteed if the unit is mounted in the specific nameplated mounting position.



If the mounting position is changed, the oil quantity must be adjusted to obtain the proper oil level per the Lubrication Instruction enclosed with each unit. Mounting position must be one shown in Figures HI1 & HI2, CPS1, HB1, or HW1 & HW2. Consult the factory if you are not certain of the correct oil level or quantity. Consult the factory for mounting positions not shown.

VARIATIONS FROM NORMAL CONDITIONS - Input speeds that exceed the maximum speeds recommended for a given ratio, which are listed in the general catalog specifications, may require an adjustment in the oil level. Consult HUB CITY for special lubricant recommendations when operating at higher speeds.



Do not use GL-90, 75W-90 or other extreme pressure (EP) lubricants containing friction modifiers such as graphite or molybdenum disulfide in gear drives containing internal backstops. Lubricants with EP additives may produce coatings which adversely affect operation of the backstop. Injury to personnel, damage to the reducer or other equipment may result.

POWERATIO 4000 HIGH EFFICIENCY HELICAL IN-LINE GEAR DRIVES LUBRICATION



QUAD REDUCTION UNITS – The primary and secondary units are independent units, with separate fill, vent, level and drain holes. Use the double reduction drawings in Figures HI1 & HI2 for the mounting positions and lube hole locations. The mounting position designation is based on the secondary unit, which can be foot mount or flange mount. The primary unit is always flange mount type.



POWERATIO® 4000 HIGH EFFICIENCY DRIVES

CAUTION

The clear sight glass plug should be installed in the proper oil level hole. The oil level is correct when the surface of the oil is at the center of the plug. When a solid plug is provided for the oil level, the oil level is correct when the surface of the oil is level with the lowest point of the level plug, shown in Figures HI1 & HI2, for the appropriate mounting position.

CAUTION

CHANGING LUBRICANT - After the first 100 hours of operation, drain out initial oil, flush out the helical in-line gear case with an approved nonflammable, non-toxic

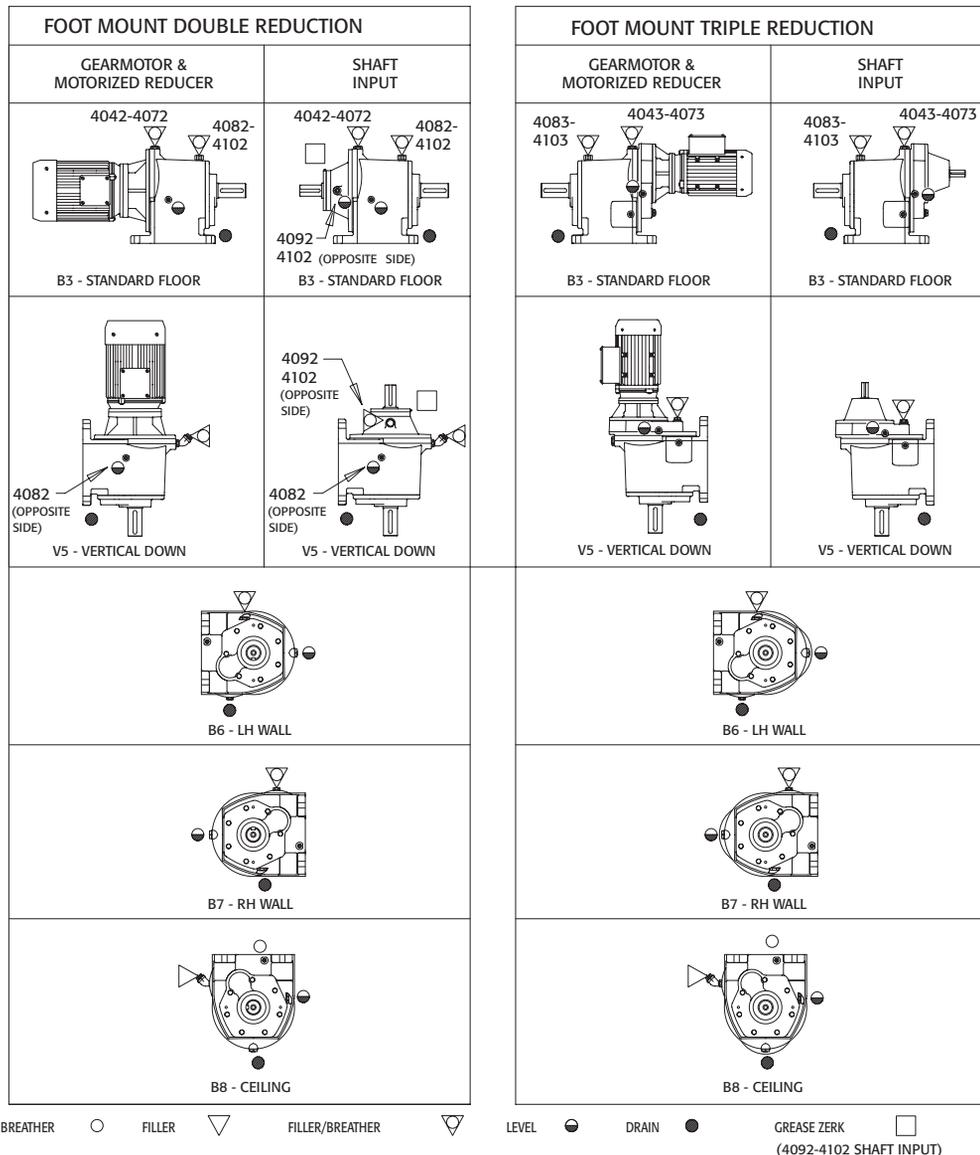
solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 7,500 operating hours (15,000 for synthetic oil lubricant) or every 18 months (36 months for synthetic oil lubricant) – whichever occurs first.

CAUTION

INPUT BEARING GREASE – The outer bearing on shaft input models of Helical In-Line Gear Drives is grease lubricated at the factory and sealed with a Nilos Ring for operation in all mounting positions. Pump 3 pumps of grease into the grease zerk after every 3000 hours of operation, to lubricate the bearing and input seal.

FIGURE - HI 1

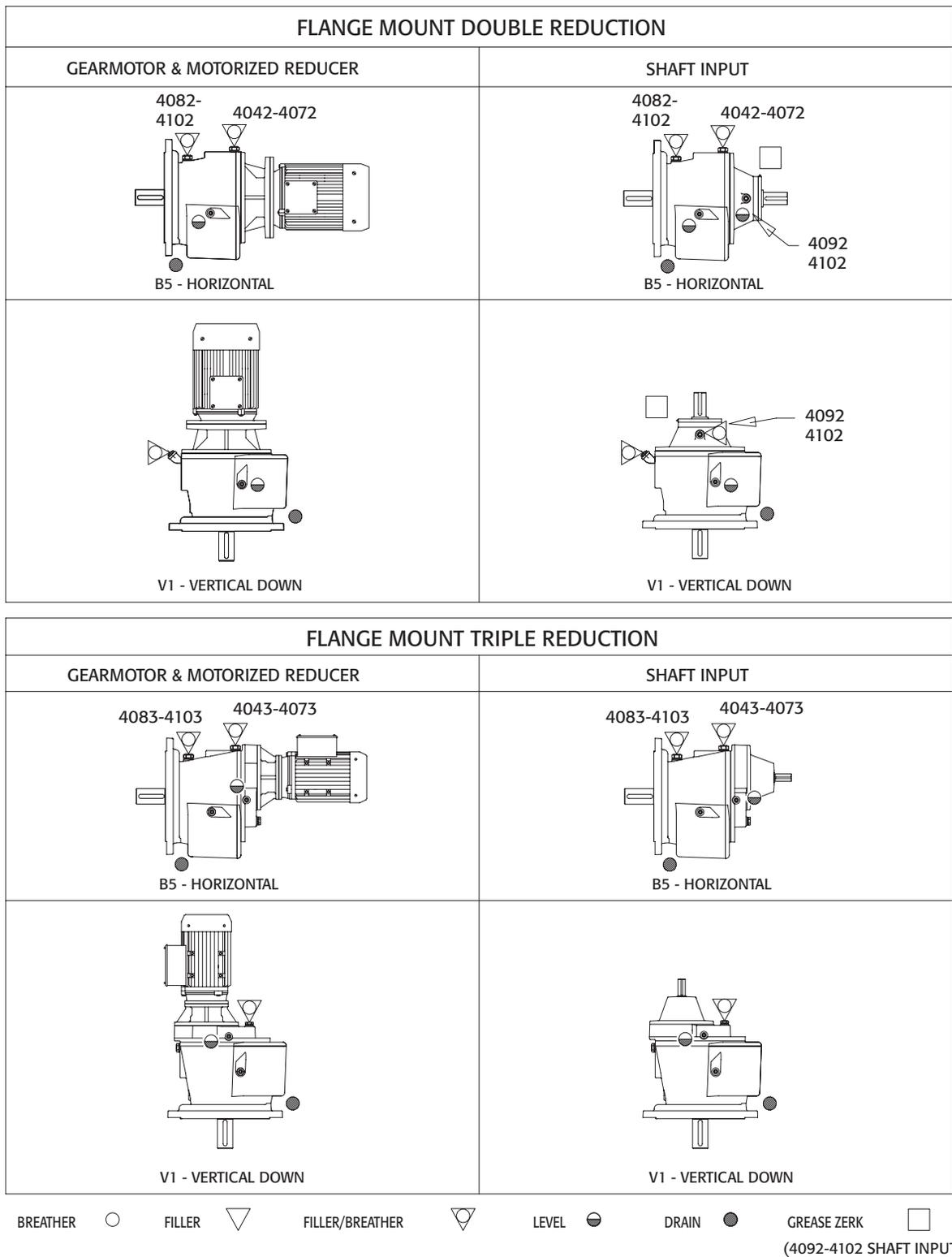
HELICAL IN-LINE MOUNTING POSITION, FILL, LEVEL AND DRAIN LOCATIONS





POWERATIO® 4000 HIGH EFFICIENCY DRIVES

FIGURE - HI 2 HELICAL IN-LINE MOUNTING POSITION, FILL, LEVEL AND DRAIN LOCATIONS





POWERATIO® 2000 & 4000 HIGH EFFICIENCY DRIVES

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL IN-LINE DOUBLE AND TRIPLE REDUCTION

MODEL TYPE	MOUNTING POSITION	UNIT SIZE (FOOT OR FLANGE MOUNT)													
		4042	4043	4062	4063	4662	4663	4072	4073	4082	4083	4092	4093	4102	4103
C-Frame or Gearmotor Models (HI40XXE) (HI40XXG)	B3, B5 Floor	1	2	1.6	4.1	3.3	6.1	4.3	8.1	6.8	11.6	16.9	29.6	22.5	39.4
	B8 Ceiling	1.8	2	3	4.2	5.2	5.9	7.4	7.6	11.4	11.8	20.1	20.3	28.4	29.0
	B6, B7 Wall	1.5	1.7	2.3	3	4.2	4.3	6.1	5.5	10.1	10.1	19.6	19.6	25.5	25.5
	V5, V1 Vertical	1.4	2.8	2.5	4.7	4.0	7.1	5.5	9.5	10	15.8	13.6	21.7	19.4	30.0
Shaft Input Models (HI40XXA) (HI40XXC)	B3, B5 Floor	1	2	1.6	4.1	3.3	6.1	4.3	8.1	6.8	11.6	16.9	29.6	22.5	39.4
	B8 Ceiling	2.2	2.2	3.1	4.3	5.4	6.4	7.8	8.6	13.2	12.9	23.3	22.3	33.3	31.0
	B6, B7 Wall	1.6	1.9	2.4	3.1	4.2	5.1	6.1	7.1	11	10.8	21.6	20.6	30.0	26.5
	V5, V1 Vertical	1.4	2.8	2.5	4.7	4.0	7.1	5.5	9.5	10	15.8	13.6	21.7	19.4	30.0

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL IN-LINE QUAD REDUCTION

Quad reduction units are compound units, and the primary and secondary units are filled separately. Refer to the model table below and use the oil capacities in the table above.

UNIT SIZE	4064	4664	4074	4084	4094	4104	
PRIMARY UNIT SIZE	4042	4042	4062	4072	4082	4082	(use primary oil capacities for desired Input type)
SECONDARY UNIT SIZE	4062	4662	4072	4082	4092	4102	(use secondary oil capacities for C-Frame Input)

POWERATIO® 2000 HIGH EFFICIENCY COMPACT HELICAL PARALLEL GEAR DRIVES LUBRICATION



QUIN REDUCTION UNITS – The primary and secondary units are independent units, with separate fill, vent, level and drain holes. Use the Figure CPS1 for the mounting positions and lube hole locations for the secondary unit. The primary unit is a Helical In-Line drive. Refer to the Helical In-Line Lubrication and Installation instructions for the primary unit.



The oil level is correct when the surface of the oil is level with the lowest point of the level plug, shown in Figure CPS1, for the appropriate mounting position.



CHANGING LUBRICANT - After the first 100 hours of operation, drain out initial oil, flush out the compact helical parallel gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant) – whichever occurs first.

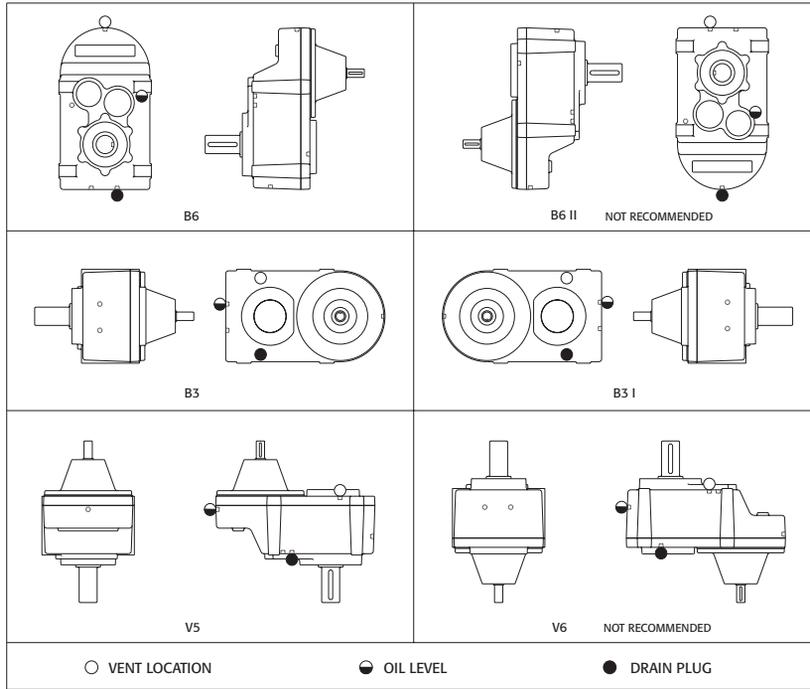
MODEL	APPROXIMATE OIL CAPACITY (PINTS) COMPACT HELICAL PARALLEL					
	MOUNTING POSITION					
	B3	B3 I	B6	B6 II	V5	V6
HP2030	2.1	2.4	2.1	1.5	2.8	2.6
HP2040	3.2	3.6	3.0	2.4	4.0	3.9
HP2060	6.2	6.8	5.7	4.3	8.0	8.0
HP2070	12.8	13.3	10.8	9.2	17.2	15.5



POWERATIO® 2000 HIGH EFFICIENCY DRIVES

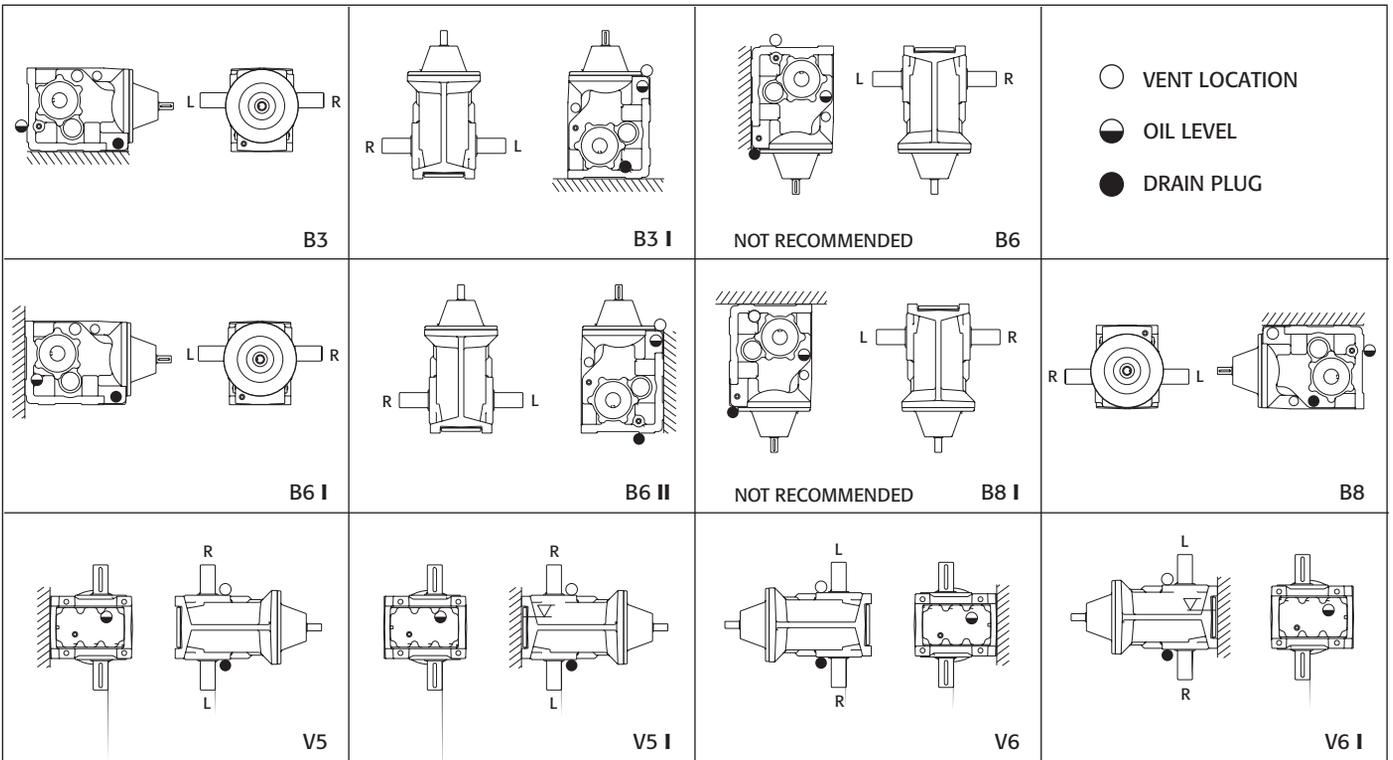
COMPACT HELICAL PARALLEL GEAR DRIVES MOUNTING POSITIONS

FIGURE - CPS 1



HELICAL BEVEL MOUNTING POSITIONS

FIGURE - HB1





POWERATIO® 2000 HIGH EFFICIENCY DRIVES

POWERATIO® 2000 HIGH EFFICIENCY HELICAL BEVEL GEAR DRIVES LUBRICATION



QUIN REDUCTION UNITS – The primary and secondary units are independent units, with separate fill, vent, level and drain holes. Use the triple reduction drawings in Figure HB1 for the mounting positions and lube hole locations. The mounting position designation is based on the secondary unit, which can be foot mount or flange mount. The primary unit is always flange mount type.



The clear sight glass plug should be installed in the proper oil level hole. The oil level is correct when the surface of the oil

is at the center of the plug. When a solid plug is provided for the oil level, the oil level is correct when the surface of the oil is level with the lowest point of the level plug, shown in Figure HB1, for the appropriate mounting position.



CHANGING LUBRICANT - After the first 100 hours of operation, drain out initial oil, flush out the helical bevel gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore’s Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant) – whichever occurs first.

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL BEVEL TRIPLE REDUCTION

MODEL	MOUNTING POSITION					
	B3 AND B6 I*	B3 I AND B6 II	B6 AND B8 I	V5 AND V5 I	V6 AND V6 I	B8
HB2043A or E	1.3	3.5	Consult Factory	2.6	2.7	2.9
HB2063A or E	2.4	7.2	Consult Factory	5.5	5.7	6.0
HB2073A or E	3.6	10.8	Consult Factory	8.3	8.6	9.0
HB2083A or E	6.7	20.1	Consult Factory	15.4	16.1	17.4
HB2093A or E	15	37.8	Consult Factory	29.0	30.3	32.7
HB2103 A or E	21	71	Consult Factory	51	51	54

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL BEVEL QUIN REDUCTION

Quin reduction units are compound units. The primary and secondary units are filled separately. Refer to the model table below and use the oil capacities shown.

MODEL	UNIT	MOUNTING POSITION					
		B3 AND B6 I*	B3 I AND B6 II	B6 AND B8 I	V5 AND V5 I	V6 AND V6 I	B8
HB2065A	Primary	1.0	1.4	Consult	1.6	1.6	2.2
	Secondary	2.4	7.2	Factory	5.5	5.7	6.0
HB2065E	Primary	1.0	1.4	Consult	1.5	1.5	1.8
	Secondary	2.4	7.2	Factory	5.5	5.7	6.0
HB2075A	Primary	1.6	2.5	Consult	2.4	2.4	3.1
	Secondary	3.6	10.8	Factory	8.3	8.6	9.0
HB2075E	Primary	1.6	2.5	Consult	2.3	2.3	3.0
	Secondary	3.6	10.8	Factory	8.3	8.6	9.0
HB2085A	Primary	4.3	5.5	Consult	6.1	6.1	7.8
	Secondary	6.7	20.1	Factory	15.4	16.1	17.4
HB2085E	Primary	4.3	5.5	Consult	6.1	6.1	7.8
	Secondary	6.7	20.1	Factory	15.4	16.1	17.4
HB2095A	Primary	6.8	10.0	Consult	11.0	11.0	13.2
	Secondary	15.0	37.8	Factory	29.0	30.3	32.7
HB2095E	Primary	6.8	10.0	Consult	10.1	10.1	11.4
	Secondary	15.0	37.8	Factory	29.0	30.3	32.7
HB2105A	Primary	6.8	10.0	Consult	11.0	11.0	13.2
	Secondary	21.0	71.0	Factory	51.0	51.0	54.0
HB2105E	Primary	6.8	10.0	Consult	10.1	10.1	11.4
	Secondary	21.0	71.0	Factory	51.0	51.0	54.0

*REFER TO FIG. HB1 FOR MOUNTING POSITIONS.



POWERATIO® 2000 HIGH EFFICIENCY DRIVES

POWERATIO® 2000 HIGH EFFICIENCY HELICAL WORM GEAR DRIVES LUBRICATION



QUAD REDUCTION UNITS – The primary and secondary units are independent units, with separate fill, vent, level and drain holes. Use the double reduction drawings in Figure HW1 for the mounting positions and lube hole locations for the secondary unit. The primary unit is a Helical In-Line drive, which requires a different lubricant from the Helical-Worm secondary unit. Refer to the Helical In-Line Lubrication and Maintenance Instructions for the primary unit.



The oil level is correct when surface of the oil is level with the lowest point of the level plug shown in Figures HW1 & HW2.



CHANGING LUBRICANT - After the first 200 hours of operation, drain out initial oil, flush out the helical worm gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 2,500 operating hours (5,000 for synthetic oil lubricant) or every 6 months (12 months for synthetic oil lubricant) – whichever occurs first.

FIGURE - HW1

HELICAL WORM DOUBLE REDUCTION MOUNTING POSITIONS

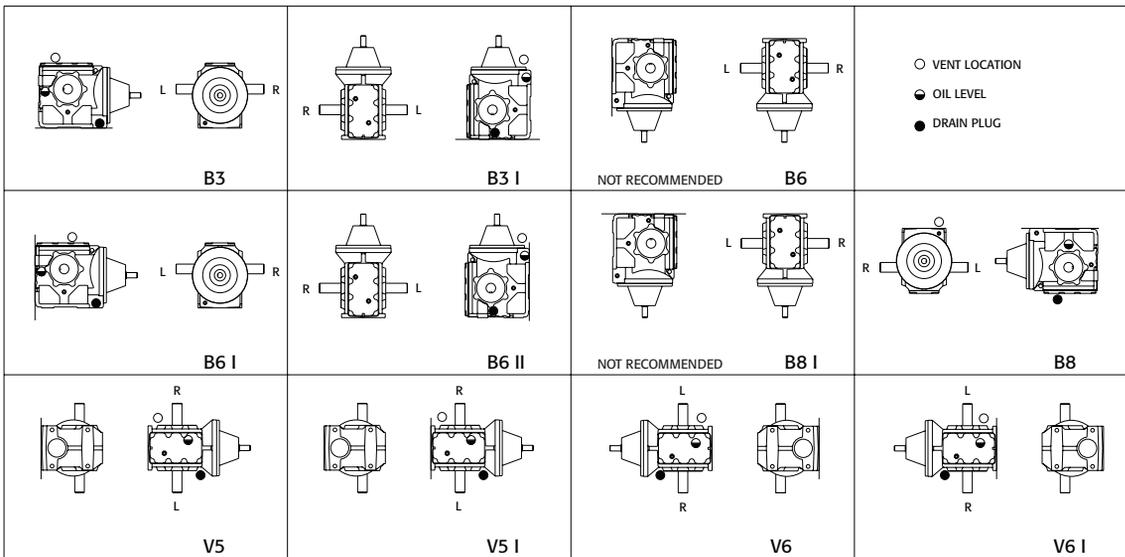
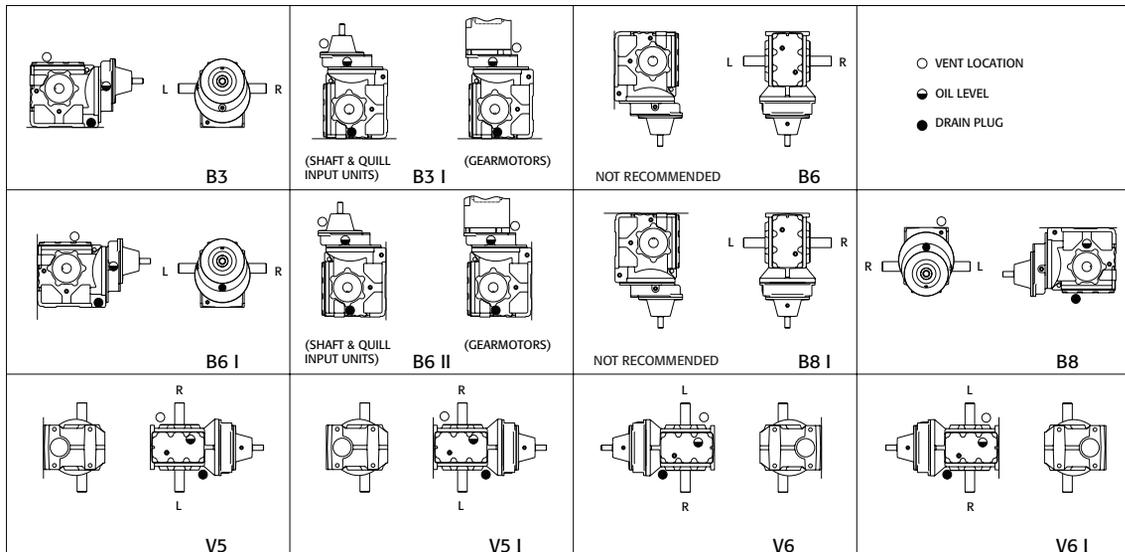


FIGURE - HW2

HELICAL WORM TRIPLE REDUCTION MOUNTING POSITIONS





POWERATIO® 2000 HIGH EFFICIENCY DRIVES

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL WORM DOUBLE REDUCTION

MODEL	MOUNTING POSITION					
	B3 AND B6 I*	B3 I AND B6 II	B6 AND B8 I	V5 AND B5 I	V6 AND V6 I	B8
HW2042A or E	1.7	2.1	Consult Factory	1.9	1.9	2.4
HW2052A or E	2.0	3.7	Consult Factory	3.3	3.3	3.9
HW2062A or E	4.3	6.0	Consult Factory	5.3	5.3	5.6
HW2072A or E	7.7	12.7	Consult Factory	11.6	11.6	14.0

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL WORM TRIPLE REDUCTION

MODEL	MOUNTING POSITION					
	B3 AND B6 I*	B3 I AND B6 II	B6 AND B8 I	V5 AND B5 I	V6 AND V6 I	B8
HW2043A or E	2.1	2.8	Consult Factory	2.2	2.2	2.8
HW2053A or E	2.8	4.8	Consult Factory	3.9	3.9	4.5
HW2063A or E	6.3	8.0	Consult Factory	7.3	7.3	8.3
HW2073A or E	11.2	16.2	Consult Factory	15.1	15.1	18.0

APPROXIMATE OIL CAPACITIES (PINTS) HELICAL WORM QUAD REDUCTION

Quad reduction units are compound units. The primary and secondary units are filled separately. Refer to the model table below and use the oil capacities shown.

MODEL	UNIT	MOUNTING POSITION					
		B3 AND B6 I*	B3 I AND B6 II	B6 AND B8 I	V5 AND B5 I	V6 AND V6 I	B8
HW2064A	Primary	1.0	1.4	Consult	1.6	1.6	2.2
	Secondary	4.3	6.0	Factory	5.3	5.3	5.6
HW2064E	Primary	1.0	1.4	Consult	1.5	1.5	1.8
	Secondary	4.3	6.0	Factory	5.3	5.3	5.6
HW2074A	Primary	1.6	2.5	Consult	2.4	2.4	3.1
	Secondary	7.7	12.7	Factory	11.6	11.6	14.0
HW2074E	Primary	1.6	2.5	Consult	2.3	2.3	3.0
	Secondary	7.7	12.7	Factory	11.6	11.6	14.0

*REFER TO FIGURES HW1 & HW2 FOR MOUNTING POSITIONS.

POWERATIO® 2000 HIGH EFFICIENCY HELICAL IN-LINE GEAR DRIVES INSTALLATION

FLANGE MOUNT UNITS – If coupling to shaft, there must be concentricity between the driven shaft and the machine register that accepts the mounting flange pilot to prevent misalignment. Flexible couplings are recommended to minimize excessive bearing and shaft loading caused by misalignment. Follow coupling manufacturer’s installation directions.

POWERATIO® 2000 HIGH EFFICIENCY HELICAL IN-LINE, COMPACT HELICAL PARALLEL, HELICAL BEVEL, and HELICAL WORM GEAR DRIVES INSTALLATION



The lifting eye included on this drive is to be used to vertically lift the drive only and no other associated attachments or motors.



For high momentum loads, if coasting to a stop is undesirable, a braking mechanism should be applied to the reducer output or driven mechanism.



MOTORS – Check to be certain that the voltage range specified on the motor corresponds to the supply voltage. Follow the motor manufacturer’s wiring instructions, and adhere to all local electrical codes.

Run the motor to check the direction of rotation. Follow the motor manufacturer’s instructions for reversing direction of rotation.

MOUNTING – Mount the unit to a rigid flat surface using grade 5 or higher fasteners. The mounting fasteners should be the largest standard size that will fit in the base mounting holes. Shim as required under flange or base feet which do not lie flat against the mounting surface.

When the units are used in conjunction with any auxiliary equipment, care must be taken to be certain that proper alignment is achieved.



POWERATIO® 2000 HIGH EFFICIENCY DRIVES

POWERATIO 2000 HIGH EFFICIENCY COMPACT HELICAL PARALLEL, HELICAL BEVEL and HELICAL WORM GEAR DRIVES INSTALLATION

SHAFT MOUNTED MODELS - HUB CITY recommends application of an antiseize compound, such as Dow-Corning® 1000 High Temperature Anti-seize Paste or Never-Seez®, to the driven shaft during installation. This assists in preventing fretting corrosion and aids in unit removal. Driven shaft should be supported independently with pillow block bearings. A suitable Torque Arm must be provided and can be ordered separately (not supplied) to keep unit from rotating. A torque arm pad can be attached to any of the four available mounting surface locations of the unit. Install and position Torque Arm at 90° angle to a line drawn between the center of the output hollow bore and the bolt that attaches the Torque Arm to the Torque Arm Pad of the unit. The Torque Arm should be positioned to be in tension, NOT compression, based on output rotation of the gear drive. (Figures CPS2, HB2, and HW3). A rigid torque arm can cause bearings to “load up” and cause premature bearing failure. To prevent this, provide a slight amount of “float” at the torque arm pivot points.

FIGURE - CPS2

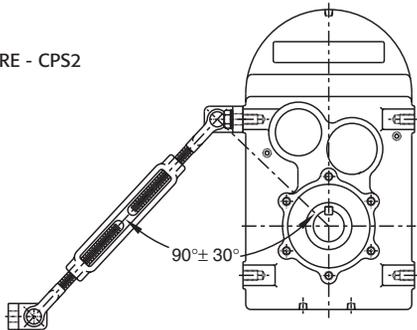


FIGURE - HB2

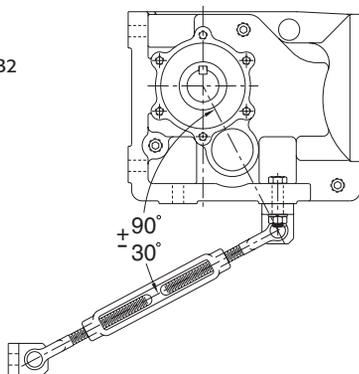
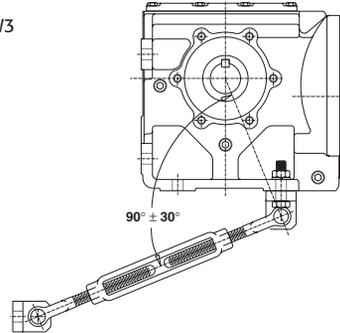


FIGURE - HW3



FLANGE MOUNTED UNITS - Units with the flange mount accessory are to be mounted and supported by the mounting flange only. The mounting pads on the housing are not to be used in conjunction with the mounting flange to support the unit.

SHAFT MOUNTED UNITS WITH MOUNTING FLANGE: There must be concentricity between the driven shaft and the machine register that accepts the mounting flange pilot to prevent misalignment between the hollow shaft of the drive and the driven shaft.

SHAFT OUTPUT UNITS WITH MOUNTING FLANGE: If coupling to shaft – flexible couplings are recommended to minimize excessive bearing and shaft loading caused by misalignment. Follow coupling manufacturer’s installation directions.

POWERATIO® 2000 HIGH EFFICIENCY HELICAL WORM GEAR DRIVES INSTALLATION



RUN-IN PERIOD – A new Helical Worm Gear Drive will not operate at maximum efficiency during the run-in period. Increased current draw or heat rise may be seen during this time.



CLEANLINE™ HUB CUBE

HUB³™ BEVEL GEAR DRIVES LUBRICATION

General Note – These instructions contain information specifically for the Hub³™ Bevel Gear Drives, models SSM3, SS165, SS175, SS65 and SS66.



Hub³™ Bevel Gear Drives are lubricated at the factory, for the application service life of the unit, with food-grade lubricant conforming to the demands of USDA H1 regulations. The ingredients used in the formulation of this lubricant are on the FDA list of allowable substances in accordance with the Guidelines of Security CFR 21², section 178.3570.



All Hub³™ Bevel Gear Drives are configured and supplied with the correct quantity of lubricating oil for the mounting position specified at time of order. Refer to Figure SSB1 for mounting positions and styles.

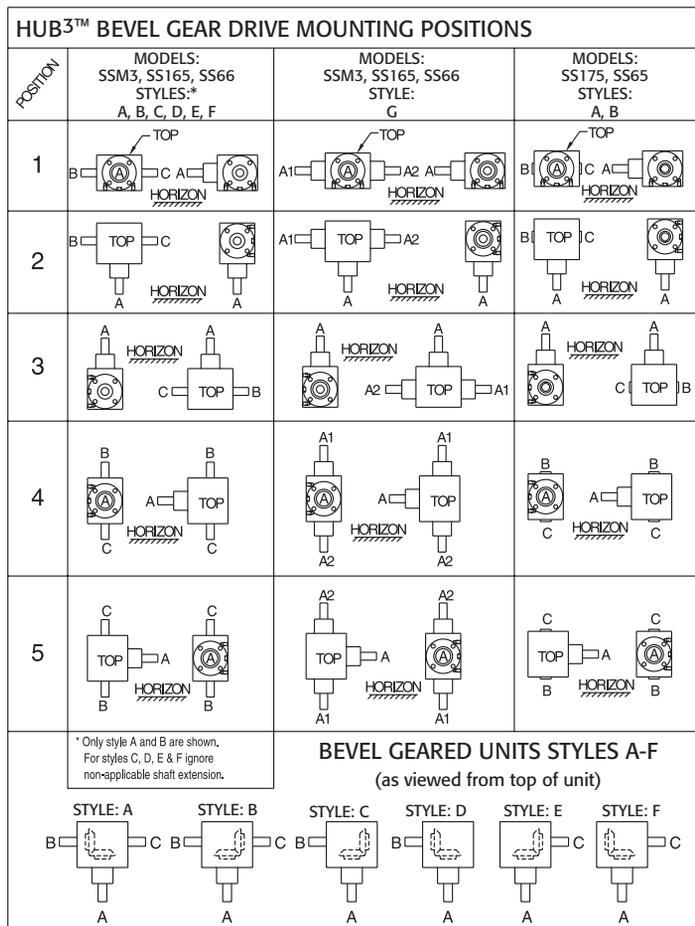


FIGURE - SSB1

AFTER INSTALLATION – the actual mounting position should be confirmed against the mounting position shown on the gear reducer nameplate. Correct configuration and lubrication is only guaranteed if the unit is mounted in the specific nameplated mounting position.

HUB³™ BEVEL GEAR DRIVES INSTALLATION



Power may be applied (drive shaft) to either the cross or pinion shaft.



SHAFT MOUNTED HUB³™ BEVEL GEAR DRIVES – Driven shaft should be supported independently with pillow block bearings, located as close to Bevel Gear Drive as possible. A suitable Torque Arm must be provided (not supplied) to keep unit from rotating. A rigid torque arm will cause bearings to “load up” and cause excessive wear. To prevent this, provide a slight amount of “float” at the pivot point.

HUB³™ WORM GEAR SPEED REDUCERS LUBRICATION

General Note – These instructions contain information specifically for the Hub³™ Worm Gear Speed Reducers, models SS181, SS182, SS184, SS185, SS211, SS212, SS214, SS215, SS261, SS262, SS264, SS265, SS321, SS322, SS324, and SS325.



Hub³™ Worm Gear Speed Reducers are lubricated at the factory, for the application service life of the unit, with food-grade lubricant conforming to the demands of USDA H1 regulations. The ingredients used in the formulation of this lubricant are on the FDA list of allowable substances in accordance with the Guidelines of Security CFR 21², section 178.3570.



All Hub³™ Worm Gear Speed Reducers are configured and supplied with the correct quantity of lubricating oil from the factory for all Horizontal and Vertical Mounting Positions, EXCEPT for the THREE UNAPPROVED mounting positions shown in Figure SSW1. For mounting in any of these THREE UNAPPROVED mounting positions, CONSULT HUB CITY.

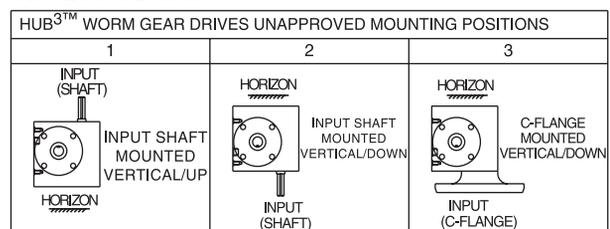


FIGURE - SSW1



CLEANLINE™ PRODUCTS

HUB³™ WORM GEAR SPEED REDUCERS INSTALLATION

OPERATING POSITIONS – Hub³™ Worm Gear Speed Reducers can be mounted in all Horizontal and Vertical Mounting Positions, EXCEPT for the THREE UNAPPROVED mounting positions shown in Figure SSW1. For mounting in any of these THREE UNAPPROVED mounting positions, CONSULT HUB CITY.

For special applications, mounting position may be inclined. However, if position varies more than 15°, it may be necessary to make some adaptations to maintain a sufficient oil level. Contact HUB CITY for recommendations.

Input rotation of Speed Reducers can be either clockwise or counterclockwise.



WARNING

SHAFT MOUNTED HUB³™ WORM GEAR SPEED REDUCERS – Driven shaft should be supported independently with pillow block bearings, located as close to the Hub³™ Worm Gear Speed Reducer as possible. A suitable Torque Arm must be provided (not supplied) to keep unit from rotating. A rigid torque arm will cause bearings to “load up” and cause excessive wear. To prevent this, provide a slight amount of “float” at the pivot point.



CAUTION

Excessive setscrew torque may cause damage to the output sleeves in hollow bore Hub³™ Worm Gear Speed Reducers. Please refer to the following table for recommended tightening torque.

SIZE	RECOMMENDED TORQUE
1/4-20 NC	87 LB.-IN
5/16-18 NC	165 LB.-IN
3/8-16 NC	290 LB.-IN



CAUTION

RUN-IN PERIOD – A new Hub³™ Worm Gear Speed Reducer will not operate at maximum efficiency during the run-in period. Increased current draw or heat rise may be seen during this time.

HUB³™ SSHI & SSHB GEAR DRIVES LUBRICATION

General Note – These instructions contain information specifically for the Hub³™ SSHI4042, SSHI4062, SSHB2043 AND SSHB2063



CAUTION

Hub³™ Helical Gear Drives are lubricated at the factory, for the application service life of the unit, with food-grade lubricant conforming to the demands of USDA H1 regulations. The ingredients used in the formulation of this lubricant are on the FDA list of allowable substances in accordance with the Guidelines of Security CFR 21², section 178.3570.



CAUTION

All Hub³™ Helical Gear Drives are configured and supplied with the correct quantity of lubricating oil for the mounting position specified at time of order. Refer to Figures HI1, HI2, HB1 on pages R-17 to R-22 for mounting positions and styles.

AFTER INSTALLATION – the actual mounting position should be confirmed against the mounting position shown on the gear reducer nameplate. Correct configuration and lubrication is only guaranteed if the unit is mounted in the specific nameplated mounting position.

CLEANLINE™ PLUS BEVEL GEAR DRIVES LUBRICATION

General Note – These instructions contain information specifically for the CleanLine Plus™ Bevel Gear Drives, models CPAD3, CPAD4, and CPAD5.



CAUTION

CleanLine Plus™ Bevel Gear Drives may be mounted in any position and are lubricated at the factory, for the application service life of the unit, with food-grade lubricant conforming to the demands of USDA H1 regulations.



WARNING

Do not change lubricants in CleanLine Plus™ Bevel Gear Drives unless they are disassembled for service.

CLEANLINE PLUS™ BEVEL GEAR DRIVES INSTALLATION



WARNING

Power may be applied (drive shaft) to either the cross or pinion shaft.



330 PUMP DRIVE

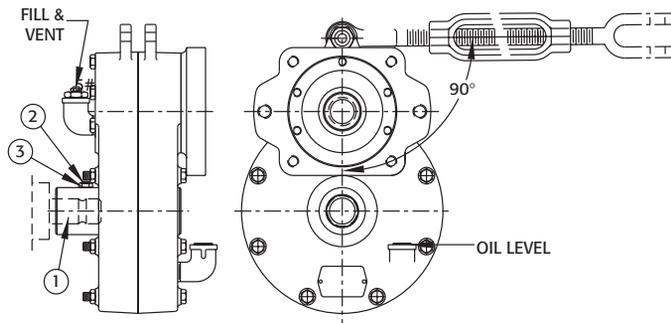
MODEL 330 PUMP DRIVE LUBRICATION

⚠ CAUTION

ALL MODEL 330 PUMP DRIVES ARE SHIPPED DRY.

Oil must be added prior to operation. Hub City 330 Pump Drive units are splash lubricated and require 1.25 pints to fill to the recommended level. Do not overfill – this causes excessive heat build-up. See Figures PD1 & PD2 for fill and level check points.

BEFORE OPERATING 330 Pump Drive – Remove uppermost plug and fill Reducer with a recommended lubricant (see GEAR LUBRICANT page of these instructions). Clean threads on removed plugs and plug holes with degreaser; coat with thread sealant and install securely into Reducer case. If fill, level and drain plugs are not located conveniently for your mounting position, additional plugs may be installed. Consult HUB CITY for recommendations.



FIGURES PD1 AND PD2

⚠ WARNING

VARIATIONS FROM NORMAL CONDITIONS – Model 330 Pump Drive: When operating High Speed Shaft at speeds above 1800 RPM or below 400 RPM, special adjustment in oil level may be required. Consult HUB CITY for recommendations.

If either shaft is in a vertical position or inclined more than 15°, zerk fittings may be required to lubricate upper bearings. It may also be necessary to make some oil level or plug modifications. Consult HUB CITY for recommendations.

⚠ CAUTION

CHANGING LUBRICANT – After the first 100 hours of operation, drain out initial oil, flush out the 330 pump drive gear case with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill. Thereafter, oil should be changed at least every 5,000 operating hours (10,000 for synthetic oil lubricant) or every 12 months (24 months for synthetic oil lubricant), which ever occurs first.

MODEL 330 PUMP DRIVE INSTALLATION

IMPORTANT: Check tractor PTO shaft for nicks and burrs.

Slide the pump drive onto the PTO shaft (1, Figure PD1). Center the setscrews over the groove in the PTO shaft. With a torque wrench tighten setscrews (2, Figure PD1) to 300 in-lb (25 ft-lb). Torque jam nuts (3, Figure PD1) to 120 in-lb torque. Pump drive should be mounted with SAE pump flange directly above the PTO shaft.

TORQUE ARM:

It is recommended that torque arm be fabricated from flat cold-rolled steel (800 lbs. capacity, compression or tension). It must be a minimum of 3/4" wide and 1/2" thick. Torque arm must be able to swivel in both torque arm housing bracket and pivot bracket mounted on tractor.

Connection of the torque arm to the pivot bracket should be made with a 3/8" heat-treated bolt with double jam nuts. Connection of the torque arm to the pump drive housing bracket should be made in the same manner. Torque arm should be mounted at 90° (or as close to 90° as possible) to a line between the tractor PTO shaft and gearbox torque arm housing bracket. (See Figure PD2.)

NOTE: Flexibility in torque arm connection is necessary to prevent undue load on pump drive and shaft. Stress is placed on housing if torque arm is clamped too tightly.



390 SERIES PTO SPEED CHANGER

MODEL 390 SERIES PTO SPEED CHANGER LUBRICATION

NOTE: The 390 Units with 1.48:1 ratio are intended for use with stationary pumps, generators or grain elevators where the tractor horsepower capacity far exceeds the horsepower requirement of the driven device. Test programs have shown that in those applications engine RPM can be dropped to maintain a tractor PTO shaft speed of 800 RPM, a gear drive output shaft speed of 540 RPM, and still provide adequate horsepower for the driven device. Applying the 1.48:1 ratio 390 in this fashion can result in considerable fuel savings.

Features: The new 390 PTO Speed Changer features a cast iron housing, tapered roller bearings, heat treated gears, hi-temperature gaskets, seals and lubricant, a universal mounting configuration and adaptability to **most** tractors. The new 390 Unit has a rating of 125 HP continuous operation.

SPECIAL PRECAUTIONS AND REQUIREMENTS (See also safety label)

- A. ASAE Standards provide that tractor PTO shafts be designed for a limited amount of overhung load. The approved mounting positions of the 390 Speed Changer shown, will not exceed this limit at the maximum 125 HP rating. (See also Mounting Instructions.)
- B. Keep drive lines as straight as possible and reduce speed and horsepower requirements of the driven machine when cornering to minimize PTO shaft loads and vibration.
- C. Keep telescoping drive lines well lubricated to reduce end thrust on 390 bearings.
- D. Shorten drive lines where required to compensate for the additional PTO shaft length created by the 390.
- E. In most cases it will be necessary to remove the **tractor** PTO shield to install the 390 unit. The **390** PTO shield must **always** be kept in place. It should never be used as a step.



- F. The main housing of the 390 Speed Changer may reach a surface temperature of 300° F during operation. Avoid physical contact with the housing.
- G. The 390 Speed Changer is shipped with Hub City 75W-90 Synthetic Oil installed. This oil is specially formulated to cope with the high temperatures generated in this unit. **Do NOT substitute other lubricants.**

MOUNTING POSITIONS

Before purchasing the 390 Speed Changer check to see that the unit will fit the tractor it is to be mounted on. The 390

is designed to function on **most** farm tractors. On some tractors the PTO shield is not removable. It is impossible to mount the Series 390 on these tractors.

Two different methods of mounting the speed changer on the tractor are recommended.

(Figures referenced are found on page Q-21)

1. The unit may be mounted directly on PTO shaft and supported by a torque arm. In accordance with ASAE guidelines for overhung load ratings on the PTO shaft two acceptable positions for the speed reducer have been determined. See Figures SC1 and SC2 and Figures SC5 and SC6. **NOTE:** When unit is mounted as shown in Figures SC5 and SC6, the housing must be rotated 90° clockwise in relation to the cover to keep the breather and PTO shield in proper alignment. One position for the speed increaser has been approved. See Figures SC3 and SC4.

Similarly, the approved torque arm positions for the speed reducer and the speed increaser are shown in Figures SC9, SC10 and SC11. The solid black lines illustrate the recommended positions while the dotted lines illustrate the other approved positions. The torque arm should be mounted perpendicular to a line through the center of the torque arm bracket as shown.

Construction of torque arm may be accomplished by using any general purpose steel with a minimum of 1/2" to 1" section of 3/4" diameter. Torque arm must be equipped with a clevis at one end. Connect the torque arm to the torque arm bracket and tractor with a 1/2" heat treated bolt and double jam nuts. The torque arm must be free to swivel in both the torque arm bracket and in the tractor connection or pivot.

NOTE: Flexibility in the torque arm connection is necessary to prevent undue load on the gear box and tractor PTO shaft. Excessive stress may be imposed on housing and tractor PTO shaft if the torque arm is clamped tightly.



Do not substitute chain for the torque arm. Doing so may induce excessive shock loads and cause equipment damage or injury to the operator.

2. The second mounting alternative involves the use of a mounting adaptor and fastens the 390 Speed Changer solidly to the tractor. The 390 is constructed with flats and bolt circles on both cover and housing sides. This allows the unit to be easily adapted to alternative mountings. One possible mounting adaptor is illustrated in Figures SC7 and SC8, but ingenuity will provide a variety of different adaptor brackets to use with the



390 SERIES PTO SPEED CHANGER

MAINTENANCE

The Hub City 390 PTO Speed Changer is a compact, durable unit capable of long life with a minimum of maintenance. Because of the universal application of Hub City Gear Units in mounting and positioning, the user must assume responsibility for assuring adequate lubrication in any gear box installation. The 390 Speed Changer is splash lubricated and may attain an operating temperature of 300° F (149° C). These temperatures will produce no harmful effects to internal parts as long as unit is properly lubricated with Hub City 75W-90 Synthetic Oil. Recommended ambient operating temperature range for the 390 is -20° F to 100° F.

IMPORTANT: Units are shipped with Hub City 75W-90 Synthetic Oil installed. Using lubricant other than Hub City Synthetic Oil will void any warranty. Hub City will not assume responsibility for inadequate or contaminated lubricant. Oil may be added to the speed changer through either of the plugged ports on the top half of the unit. The average oil capacity to fill the unit to the oil level check hole is 2-1/4 quarts when unit is mounted in an approved position. Do not overfill as this causes excessive heat build-up. It is normal to experience some oil loss from breather as temperature of unit rises during operation. Check periodically to be sure that proper oil level is maintained.

BREAK-IN PERIOD

After first 50 hours of operation drain oil in a new unit. Flush case thoroughly with an approved nonflammable, non-toxic solvent, such as Lubriplate Syn Flush, Lubriplate Pure Flush, Whitmore's Flushing Oil (#06802030) or Medallion™ Flushing Oil Kosher (#06812010), and refill with Hub City 75W-90 Synthetic Oil. At the same time thoroughly clean magnetic drain plug in bottom of housing. After initial 50 hour period, change oil every season of operation or every twelve months, whichever comes first. Where operating conditions are severe it may be necessary to change oil at more frequent intervals.

OFF-SEASON MAINTENANCE

If a 390 Drive Unit is to be stored or not in use for a period of several months, it should be drained, flushed, and filled completely with a light rust-inhibiting oil. Drain and refill unit with Hub City 75W-90 Synthetic Oil before unit is put back in operation.

R

various makes and models of tractors. Because of the variety of tractors available, it is impossible to illustrate or manufacture all the different adaptors. Fabrication of such adaptor brackets is left to the customer.

Mounting the unit in this way avoids the majority of the loading problems on the PTO shaft by transferring them to the 390 housing and the tractor frame.

MODEL 390 SERIES PTO SPEED CHANGER INSTALLATION

Refer to Figures SC1 and SC2 or Figures SC5 and SC6 for the mounting positions for the 1000 RPM to 540 RPM and the 800 RPM to 540 RPM speed reducers. Refer to Figures SC3 and SC4 for the mounting position of the 540 RPM to 1000 RPM speed increaser. (Figures referenced are found on page Q-21) See the Service Parts Manual enclosed with each unit for diagrams showing specific parts called out in the following instructions.

1. **IMPORTANT:** Check tractor PTO shaft for nicks, burrs, and undue wear. Repair or replace worn or damaged PTO shafts.
2. Remove the pipe plug (ref. A-34, B-35, or C-38) from the female spline side of the speed changer. Keep in mind the unit is shipped with oil installed.
3. Use your hand to turn the unit shaft and rotate the sleeve. Locate the (2) socket setscrews (ref. A-30, B-30, OR C-34) and (2) locknuts (ref. A-31, B-31 OR C-35) thru the pipe plug hole.
4. Use a socket and extension to loosen the setscrews. If you loosen the setscrews just enough to permit full spline engagement on PTO shaft oil will not run out through the open setscrew holes as the unit is maneuvered into position. **NOTE:** In some cases it may be necessary to remove the oil from the 390 unit during installation to avoid spilling it.
5. Slide the speed changer into position on the tractor PTO shaft.
6. Center setscrews over the groove in tractor PTO shaft. Use a torque wrench to tighten the setscrews to 240 in-lb (20 ft-lb). Torque the locknuts to 100 in-lb. **Note:** Setscrews must be installed to position and lock the unit on the PTO shaft and to prevent oil from escaping through the setscrew holes.
7. After the unit is installed on the PTO shaft replace the oil (if necessary) and the pipe plug. The pipe plug on the 540 RPM side of the unit should be replaced by the breather plug supplied with the unit.
8. Fasten the speed changer to the torque arm or the mounting adaptor as prescribed in the mounting instructions. Installation is then completed.



HUB CITY GEAR LUBRICANT

GEAR LUBRICANT GL-460

Part No. 8580001024(Qt.)

AGMA No: 7 Comp.

ISO Viscosity Grade: 460

A premium quality, heavy bodied lubricant formulated and recommended for enclosed worm gear drives. It is suitable for splash lubrication of worm gearing at moderate to high speeds and temperatures. This highly filtered oil has the following outstanding advantages and benefits:

- Excellent film forming characteristics.
- Superior load carrying capacity.
- Good oxidation stability.
- Minimizes friction and bulk oil temperature rise.
- Ideal for severe service conditions.

For worm gear reducers with ambient temperatures of 40° to 100°F (4° to 38°C) and operating temperatures To 225° F (107°C).

For ambient temperatures below or above these temperatures, or operating temperatures above this temperature, consult the factory.

Lubricants of this type and meeting the above specifications may be substituted where HUB CITY LUBRICANTS are recommended. Lubricant selected must be compatible with bronze gear materials and nitrile rubber seals.



If unit is used in the food or drug industry (including animal food) consult the petroleum supplier or HUB CITY for recommendations of lubricants which meet the specifications of FDA, USDA and/or other authoritative bodies having jurisdiction. Standard lubricants are not suitable for these applications or these industries.

ALL-TEMPERATURE PAO SYNTHETIC GEAR LUBRICANT

Part No. 8580001011(Qt.)

AGMA No: 7

ISO Viscosity Grade: 460

HUB CITY SYNTHETIC LUBRICANT is premium gearbox lubricant which is recommended for worm gear drives in most applications, especially those subject to low start-up temperature and/or high operating temperature. This lubricant is a synthesized hydrocarbon based material which provides longer lubrication intervals because of its increased resistance to thermal and oxidative degradation. This decreases maintenance costs. Further economy is realized because of the increased efficiency of units lubricated with HUB CITY SYNTHETIC LUBRICANTS.

It provides:

- Excellent wear protection and load carrying ability.
- Outstanding oxidation stability at elevated temperatures.
- Wide temperature range.
- Extended lubricant life, resulting in lower maintenance and lubrication costs.
- Outstanding foam stability.

For worm gear reducers with ambient temperatures of -10° to 125°F (-23° to 52°C) and operating temperatures To 225°F (107°C).

For ambient temperatures below or above these temperatures, or operating temperatures above this temperature, consult the factory.

This lubricant can be operated at temperatures considerably above 225°F (107°C). However, the gear drive manufacturer should always be contacted prior to operating at high temperatures as damage may occur to seals or other gear drive components.

Lubricant manufacturer and HUB CITY should be contacted when substituting a premium lubricant where HUB CITY SYNTHETIC is recommended.

NOTE: Although this synthetic lubricant is fully compatible with conventional lubricants, maximum benefits will be obtained when installed in a system that has been thoroughly cleaned and flushed.

PAG 460 H1 SYNTHETIC GEAR LUBRICANT

PART NO. 8580001049 (QT.)

ISO Viscosity Grade 460

HUB CITY PAG 460 H1 SYNTHETIC GEAR LUBRICANT is a Fully Synthetic PolyGlycol, which provides the ultimate efficiency and thermal capacity, and is recommended for worm gear drives in most applications, including lubed-for-life units. The exceptional anti-wear protection, high efficiency, and reduced oil temperature with HUB CITY PAG 460 H1 allow more torque to be transmitted through the reducer, and can often allow downsizing to a smaller, more economical gear drive. This lubricant has very high thermal and oxidative stability to reduce sludge and deposits, which provides longer lubrication intervals. This reduces maintenance costs, and the high efficiency reduces energy consumption and cost.

HUB CITY PAG 460 H1 is approved for USDA/NSF H-1 use in food processing facilities where there is the possibility of incidental contact with food.

HUB CITY PAG 460 H1 SYNTHETIC GEAR LUBRICANT provides:

- Exceptional EP/antiwear protection for gears and bearings.
- High viscosity index of 250 for wide operating temperature range. Viscosity of 460 cSt @ 100° F (40° C) and 77 cSt @ 212° F (100° C). Pour point of - 27° F (33° C).
- Protection against rust and corrosion in service.
- Resistance against foaming.
- Excellent lubricity inherent to this fully synthetic lubricant.
- Low traction coefficient resulting in increased energy efficiency and reduced oil temperature.
- Excellent thermal and oxidative stability to reduce sludge formation and deposits.

NOTE: PAG SYNTHETIC LUBRICANTS ARE NOT COMPATIBLE WITH MINERAL OIL AND OTHER TYPES OF SYNTHETIC LUBRICANTS and must never be mixed. Topping off with the wrong lubricant type could cause unit failure. Converting existing units in service with other lubricants to PAG synthetic is not recommended. If this is done, the housing must be thoroughly flushed out with PAG synthetic before being refilled. Converting existing units from PAG synthetic to other lubricants is not recommended, because the lower efficiency and thermal capacity may cause unit failure.

PAG SYNTHETIC LUBRICANTS are hygroscopic and absorb more water than mineral oils or PAO synthetic lubricants. Water does not drop to the bottom, but stays on top of the lubricant. Therefore, extra care should be taken not to expose the PAG lubricants to excessive moisture.

For Worm Gear Reducers with ambient temperatures of -10° F to 125° F (-23° C to 52° C) and operating temperatures to 225° F (107° C).

For ambient temperatures below or above these temperatures, or operating temperatures above this temperature, consult the factory.

Lubricant manufacturer and HUB CITY should be contacted before substituting any other lubricant. The lubricant must be a PAG synthetic lubricant, with ISO 460 viscosity. If used in a food processing facility, the lubricant must meet USDA/NSF H1 approval. Food grade lubricants must always be stored separately from non-food grade lubricants, to prevent the possibility of using the wrong lubricant. Separate pumps or containers must always be used with food grade lubricants, to prevent contamination.



HUB CITY GEAR LUBRICANT

GEAR LUBRICANT GL-90 Part No. 8580001009(Qt.)

AGMA No: 5EP
ISO Viscosity Grade: 220

A non-leaded, heavy-duty industrial gear lubricant designed for spur, helical, and bevel enclosed gear sets operating under severe service conditions. Ideal for both circulation and splash lubrication systems, GL-90 offers:

- Superior load-carrying capacity.
- Outstanding anti-wear properties.
- Excellent rust and corrosion protection.
- Good oxidation stability.
- Minimal friction and bulk oil temperature rise.
- Full protection against foaming.

For ambient temperatures of 15° to 125° F (-10° to 52° C) and operating temperatures To 185° F (85° C).

For ambient temperatures below or above these temperatures, or operating temperatures above this temperature, consult the factory.

GEAR LUBRICANT SYNTHETIC 75W-90 Part No. 8580001031(Qt.)

AGMA No: 4/5EP
ISO Viscosity Grade: 150/220

Formulated from synthesized hydrocarbon base oils and a sulfur phosphorus gear lubricant additive for severe operating conditions. Recommended for bevel, helical, and spur gear drives. Especially those subject to low startup temperature and/or high operating temperature. It provides the following outstanding advantages and benefits.

- Excellent wear protection and load carrying ability.
- Outstanding oxidation stability at elevated temperatures.
- Wide temperature range.
- Extend lubricant life resulting in lower maintenance and lubrication costs.
- Recommended for year-round lubrication.
- Not recommended for worm gear drives or gear drives with backstops.

The outstanding oxidation and thermal stability of this product results in a considerable extension of lubrication and oil change intervals.

For ambient temperatures of -25° to 125° F (-32° to 52° C) and operating temperatures To 225° F (107° C).

For ambient temperatures below or above these temperatures, or operating temperatures above this temperature, consult the factory.

Hub City synthetic 75W-90 gear lubricant can be operated at temperatures above 225° F however, the gear drive manufacturer should always be contacted prior to operation at high temperatures. As damage may occur to seals or other gear drive components. Although Hub City synthetic 75W-90 lubricant is fully compatible with conventional lubricants, maximum benefits will be obtained when installed in a system which has been thoroughly cleaned and flushed.



GEAR LUBRICANT

RECOMMENDED LUBRICANTS					
HUB CITY UNIT					
	GL-460 8580001024	PAO SYNTHETIC 8580001011	PAG460 SYNTHETIC 8580001049	GL-90 8580001009	SYNTHETIC 75W-90 8580001031
WORM GEAR SPEED REDUCERS (except Cleanline HUB3™)	X	X	X		
BEVEL GEAR DRIVES (except Group 4, Group 5, Cleanline Plus, and Cleanline HUB3™)				X	X
COOLING TOWER DRIVES				X	X
PARALLEL SHAFT (except Helical Ratio Multipliers)				X	X
POWERTORQUE®				X	X
HELICAL IN-LINE (factory filled)				X	X
COMPACT HELICAL PARALLEL (factory filled)				X	X
HELICAL BEVEL (factory filled)				X	X
HELICAL WORM (factory filled)	X EXCEPT PRIM. UNIT OF QUAD RED. UNITS	X EXCEPT PRIM. UNIT OF QUAD RED. UNITS	X EXCEPT PRIM. UNIT OF QUAD RED. UNITS	X PRIM. UNIT ONLY OF QUAD RED. UNITS	X PRIM. UNIT ONLY OF QUAD RED. UNITS
330 SERIES PTO SPEED CHANGER				X	X
390 SERIES PTO SPEED CHANGER (factory filled)					X do NOT Substitute other lubricants
CLEANLINE HUB3™ WORM GEAR DRIVES SPARTAN WORM AND HELICAL DRIVES RATIO MULTIPLIERS (ARM & RM SERIES) (ALL FACTORY FILLED)			X		

MOTOR INSTALLATION INSTRUCTIONS

MOTOR INSTALLATION INSTRUCTIONS:

1. Be sure all of the paint and masking has been removed from the face and pilot of the flange. Check the input bore to be sure it contains a small amount of anti-seize compound. If there isn't any, apply a small amount. This compound will inhibit fretting corrosion between the motor or pump shaft and the unit bore.
2. Install the key (if round bore) to the maximum depth of the keyway provided in the bore.
3. Align keyways or splines of motor or pump and bore of unit and install motor or pump into flange. Do not use excessive force or pounding to install motor or pump into flange, as this may damage shafts or bearings.



4. Hub City "C" flange reducers and Hydraulic Flange Reducers are designed to accept motors with shaft lengths that do not exceed the maximum specified by the N.E.M.A. or SAE standards. If the motor or pump shaft bottoms out before the motor flange seats against the reducer flange face, the motor or pump shaft length must be reduced to N.E.M.A. or SAE standards.
5. Secure the motor or pump to the unit. Capscrews and lockwashers are provided with "C" flange units.
6. Proper tightening torques for mounting bolts are provided in the chart below.

CAPSCREW TIGHTENING TORQUE GRADE 5 CAPSCREWS (DRY, WITHOUT LUBRICANT)	
CAPSCREW SIZE	TIGHTENING TORQUE (FT. LBS.)
1/4-20 NC	8
5/16-18 NC	16
3/8-16 NC	29
1/2-13 NC	71
5/8-11 NC	143
3/4-10 NC	251

A Parts List and Print for your Drive is available upon request. To obtain the proper Parts List and Print, you must accurately furnish the Assembly Number, Model Number, Ratio, Style and Shipping Code as shown on the metal tag attached to the Gear Drive. HUB CITY has Sales Offices and a network of Industrial Power Transmission Distributors that can serve your needs world wide. Check the Yellow Pages for one near you. For assistance, phone or write you Industrial Power Transmission Distributor, or the Hub City Factory Sales Office.



IMPORTANT INFORMATION

PLEASE READ CAREFULLY



The following  and  information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your HUB CITY mounted bearing product.

Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.



- Written authorization from HUB CITY is required to operate or use bearing units in man lift or people moving devices.
- Check to make certain application does not exceed the allowable load capacities published in the current catalog.
- Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which Buyer shall apply the product. The application by Buyer shall not be subject to any implied warranty of fitness for a particular purpose.
- For safety, Buyer or User should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Hot machinery and bearings can cause severe burns. Use extreme care when servicing or lubricating.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.
- Lifting supports including eyebolts are to be used for vertically lifting the bearing unit only and no other associated attachments or motors.
- Overhung loads subject shaft bearings and shafts to stress which may cause premature bearing failure and/or shaft breakage from bending fatigue, if not sized properly.



- Test run bearing unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- If the bearing unit cannot be located in a clear and dry area with access to adequate cooling air supply, then precautions must be taken to avoid the ingestion of contaminants such as water and the reduction in cooling ability due to exterior contaminants.
- Mounting bolts should be routinely checked to ensure that the bearing unit is firmly anchored for proper operation.

In the event of the resale of any of the goods, in whatever form, Resellers/Buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

The manufacturer makes no warranty or representations, express or implied, by operation of law or otherwise, as to the merchantability or fitness for a particular purpose of the goods sold hereunder. Buyer acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use. In no event will the manufacturer be liable for consequential, incidental or other damages. Even if the repair or replacement remedy shall be deemed to have failed of its essential purpose under Section 2-719 of the Uniform Commercial Code, the manufacturer shall have no liability to Buyer for consequential damages.

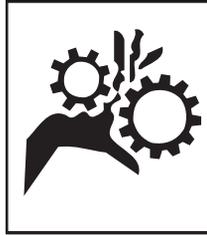
Resellers/Buyers agree to also include this entire document including the warnings and cautions above in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product.

This information should be read together with all other printed information supplied by HUB CITY.



MOUNTED BEARINGS WARNINGS & CAUTIONS

⚠ WARNING
Failure to observe safety precautions could cause personal injury or equipment damage.



⚠ WARNING
Do not operate without guards, Turn off power to install or service.



⚠ WARNING
High voltage and rotating parts may cause serious or fatal injury. Turn off power to install or service.

IMPORTANT SELECTION INFORMATION

The system of connected rotating parts must be free from critical speed, torsional, or other type vibration, regardless of how induced. The responsibility for this system analysis lies with the purchaser of the bearing unit.

⚠ WARNING

SHIELD ALL ROTATING PARTS

For safety, purchaser or user must provide protective guards over all shaft extensions and any moving apparatus mounted on the unit. The user is responsible for checking and complying with all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.

⚠ WARNING

Wear protective clothing and eye shields when installing or maintaining bearing unit and machine.

⚠ WARNING

A bearing unit cannot be used as an integral part of a machine superstructure which would impose additional loads on the unit other than those imposed by the torque being transmitted, or by any shaft mounted power transmitting device such as sprockets, pulleys, or couplings.

⚠ WARNING

Make certain that all tools and other items are clear from rotating parts before starting machine. Stand clear, and start machine slowly to be sure all components are secure and operating properly.

⚠ WARNING

For safe operation and to continue the bearing unit warranty, when installing or reinstalling a fastener for servicing purpose, or to accommodate the mounting of guards, shields or other light load imposing devices, or for mounting the bearing unit, it becomes the responsibility of the purchaser or user to properly determine the quality, grade of fastener, thread engagement, load carrying capacity, tightening torque, and the means of torque retention.

COUPLINGS – Flexible couplings are recommended because they minimize bearing wear caused by excessive misalignment. Follow coupling manufacturer's recommendations for installation and shielding.

SHEAVES AND SPROCKETS – When mounting sheaves or sprockets, the center of the load should be located as close to the bearing unit as possible. Excessive overhung loading could result in early failures of bearing or shaft. Refer to the general catalog or contact your local distributor for bearing load ratings. Follow manufacturer's recommendations for installation and shielding.

⚠ CAUTION

All Hub City bearing units are prelubricated with grease at the factory. Do not overgrease or undergrease, or injury to personnel, unit, or other equipment may result.

⚠ CAUTION

Grease should be added with greater frequency if unit is used in a severe environment such as dusty or humid or high or low temperatures.

⚠ CAUTION

Do not mix different grease types in the bearing unit.

⚠ CAUTION

If unit is used in the food or drug industry (including animal food) consult the petroleum supplier or HUB CITY for recommendations of lubricants which meet the specifications of FDA, USDA and/or other authoritative bodies having jurisdiction. Standard lubricants are not suitable for these applications or these industries.

⚠ CAUTION

Inspect shafts and components for paint, burrs, or other imperfections before installing components. Do not use excessive force or pounding to install components onto shafts, as this may cause damage to shafts or bearings.

⚠ CAUTION

Mounting bolts, coupling fasteners, and other power transmitting devices should be routinely checked to ensure that all parts of the unit are firmly anchored to provide proper operation (loose fasteners can cause alignment problems and excessive wear). Check end play in shafts. Noticeable movement might indicate service or parts replacement is necessary.

PREVENTATIVE MAINTENANCE – Keep shafts and zerk clean to prevent foreign particles from entering bearing unit. Inspect periodically for excessive grease leakage.

⚠ CAUTION

STORAGE OF HUB CITY BEARING UNITS: A bearing unit does not have a definable shelf life. The main points of deterioration are rusting of non-painted surfaces and drying out of grease and the seal lips. Proper storage of bearing units in a cool dry place in a carton away from exposure to ultraviolet light should permit protection for approximately one year. For extended shutdown under these conditions, extra grease should be added to the bearing and distributed by rotating the bearing. Coat external shafts with a rust preventative oil or grease. After extended storage periods, a little fresh grease should be added prior to running.



MOUNTED BEARINGS INDUSTRIALINE™ & DURALINE™

INDUSTRIALINE™ and DURALINE™ MOUNTED BEARINGS LUBRICATION

General Note – These Lubrication instructions contain information for the IndustrialLine™ and DuraLine™ Mounted Bearings. For Lubrication Instructions specific to the CleanLine UltraPlus™, CleanLine Plus™, & CleanLine™ Mounted Bearings see the CleanLine™ Products page, R-36.



The proper lubrication of ball bearing units is critical in order to attain maximum bearing life expectancy. All Hub City bearing units are lubricated at the factory. Non-relube type bearings have no grease fitting and should not require additional lubricant. Relube type bearings are equipped with a lubrication fitting and should be periodically lubricated when used in wet or dirty applications. The amount and type of lubricant used will affect bearing life. Lack of lubricant can lead to premature surface fatigue failures of balls and races. Over lubrication can damage seals and result in premature failure from contamination due to the inability of damaged seals to keep foreign material out of the bearing. Under normal operating conditions, there is no need to relubricate bearings at all.

The following table is a general guide for relubrication. Experience will determine the best interval for each specific application.

OPERATING CONDITIONS	BEARING TEMPERATURES	GREASE INTERVAL
Clean	32° F to 120° F	6-12 Months
	120° F to 150° F	1-3 Months
	150° F to 200° F	1-4 Weeks
Dirty	32° F to 150° F	1-4 Weeks
	150° F to 200° F	Daily – 1 week
Moisture	32° F to 200° F	Daily – 1 week

Some Recommended Greases:

Texaco Multifak #2, Shell Alvania #2, Sun Prestige #41, Humble L100K #2, Sinclair Litholine Multi-Purpose, Mobil Mobilux #2, Conoco Super-Sta, Amoco Lithium MP, Chevron Dura-Lith EP #2 or equivalent NLGI #2, Multi-Purpose Lithium Grease.



When lubricating bearings add grease slowly. When the first sign of grease appears at the seals, the bearing will contain the correct amount of lubricant.

Bearings should not run in steady operation over 200° F and should not exceed 225° F for intermittent operation.

For unusual lubrication requirements or severe duty applications, contact Hub City for recommendations.

INDUSTRIALINE™ and DURALINE™ MOUNTED BEARINGS MOUNTING INSTRUCTIONS



Proper mounting of ball bearing units is critical to unit performance. Failure to follow accepted mounting practice may result in poor performance and short bearing life. Good engineering and design practice does not recommend the application of more than two bearings to support any shaft. Where more than two bearings are used to support the same shaft, it is possible to induce heavy bearing overloads. In these cases extreme care must be taken to line up bearings in both the vertical and horizontal planes. When the recommended two bearing support designs are used, alignment is not as critical. Hub City self aligning mounted bearing units will compensate for minor differences in mounting structure and gradual changes due to the settling of foundations. Misalignment up to 1.5° is allowable.



For the best results use turned and ground shafting, free of rough spots and burrs. If old shafting is used, mount bearing unit on a smooth unworn section, if possible. For ultimate life, snug fit on shaft should be used. Refer to tables below for Bearing Bore Tolerances and recommended Shaft Tolerances.

SHAFT TOLERANCES

SHAFT DIA.	SHAFT TOLERANCE
1/2" - 1-15/16"	Plus .0000" to minus .0005"
2" - 3"	Plus .0000" to minus .0010"
3-3/16" - Up	Plus .0000" to minus .0015"

BEARING BORE TOLERANCES

BORE DIA.	BORE TOLERANCE
1/2" - 5/8"	Plus .0008" to minus .0000"
3/4" - 1-15/16"	Plus .0009" to minus .0000"
2" - 3"	Plus .0010" to minus .0000"
3-3/16" - Up	Plus .0012" to minus .0000"





MOUNTED BEARINGS INDUSTRIALINE™ & DURALINE™

Prior to mounting on shaft, clean mounting face, shaft and bearing bore. Coat shaft with a small amount of oil. Clean support surface and make sure it is flat.

INDUSTRIALINE™ and DURALINE™ MOUNTING PROCEDURES:

1. Slide bearing unit onto the shaft. For ECCENTRIC LOCK BEARINGS, if projecting side of the bearing is to be mounted toward the machine, put the locking collar on the shaft first. The eccentric locking collar should be opposing any thrust load.
2. Do not hammer the ends of the inner race. If it is necessary to apply force in mounting, use a soft metal bar or pipe against the inner race only. Tap the bearing unit into place.
3. It may be necessary to use shims to avoid shaft deflection and excessive misalignment. Bolt bearing housing securely to the support, by tightening capscrews alternately until tight.
- 4a. SETSCREW LOCKING BEARINGS: Align the setscrews on the two bearing units, and tighten setscrews alternately until tight.
- 4b. ECCENTRIC LOCKING COLLAR BEARINGS: Fit the eccentric locking collar on the inner race. Turn the collar in the direction of shaft rotation. Tighten the locking collar securely, using a spanner wrench, setscrew wrench, punch, or drift. Tighten the setscrew against the shaft. Refer to the setscrew tightening torque chart below.

SETSCREW TIGHTENING TORQUE

These torques are generally obtained when the setscrew stops turning and the hex socket wrench starts to spring.

SIZE	TORQUE IN-LBS.
10-32 NF	36
1/4-28 NF	87
5/16-24 NF	165
3/8-24 NF	290

CLEANLINE ULTRAPLUS™, CLEANLINE PLUS™, & CLEANLINE™ MOUNTED BEARINGS LUBRICATION



The proper lubrication of ball bearing units is critical in order to attain maximum bearing life expectancy. All Hub City CleanLine UltraPlus™, CleanLine Plus™, & CleanLine™ bearing units are lubricated at the factory with a grease that

meets USDA H-1 standards for incidental contact with food. Non-relube type bearings have no grease fitting and should not require additional lubricant. Relube type bearings are equipped with a lubrication fitting and should be periodically lubricated when used in wet or dirty applications. When relubricating CleanLine™ bearings, use only a grease which is approved for incidental contact with food. The amount and type of lubricant used will affect bearing life. Lack of lubricant can lead to premature surface fatigue failures of balls and races. Over lubrication can damage seals and result in premature failure from contamination due to the inability of damaged seals to keep foreign material out of the bearing.

The following table is a general guide for relubrication. Experience will determine the best interval for each specific application.

OPERATING CONDITIONS	BEARING TEMPERATURES	GREASE INTERVAL
Clean	32° F to 120° F	6-12 Months
	120° F to 150° F	1-3 Months
	150° F to 200° F	1-4 Weeks
Dirty	32° F to 150° F	1-4 Weeks
	150° F to 200° F	Daily – 1 week
Moisture	32° F to 200° F	Daily – 1 week

Recommended Grease or equivalent: Mobil Mobilgrease FM102, Chevron FM-2, Lubriplate FGL-2, SFL-2, Clearplex-2.



When lubricating bearings add grease slowly. When the first sign of grease appears at the seals, the bearing will contain the correct amount of lubricant.

Bearings should not run in steady operation over 200° F and should not exceed 225° F for intermittent operation.

For unusual lubrication requirements or severe duty applications, contact Hub City for recommendations.

CLEANLINE ULTRAPLUS™, CLEANLINE PLUS™, & CLEANLINE™ MOUNTED BEARINGS MOUNTING INSTRUCTIONS

Mounting Instructions for the CleanLine UltraPlus™, CleanLine Plus™, & CleanLine™ Mounted Bearings are the same as for the IndustrialLine™ and Duraline™ Mounted Bearings. See IndustrialLine™ and DuraLine™ Mounted Bearings Mounting Instructions, pages R-35.