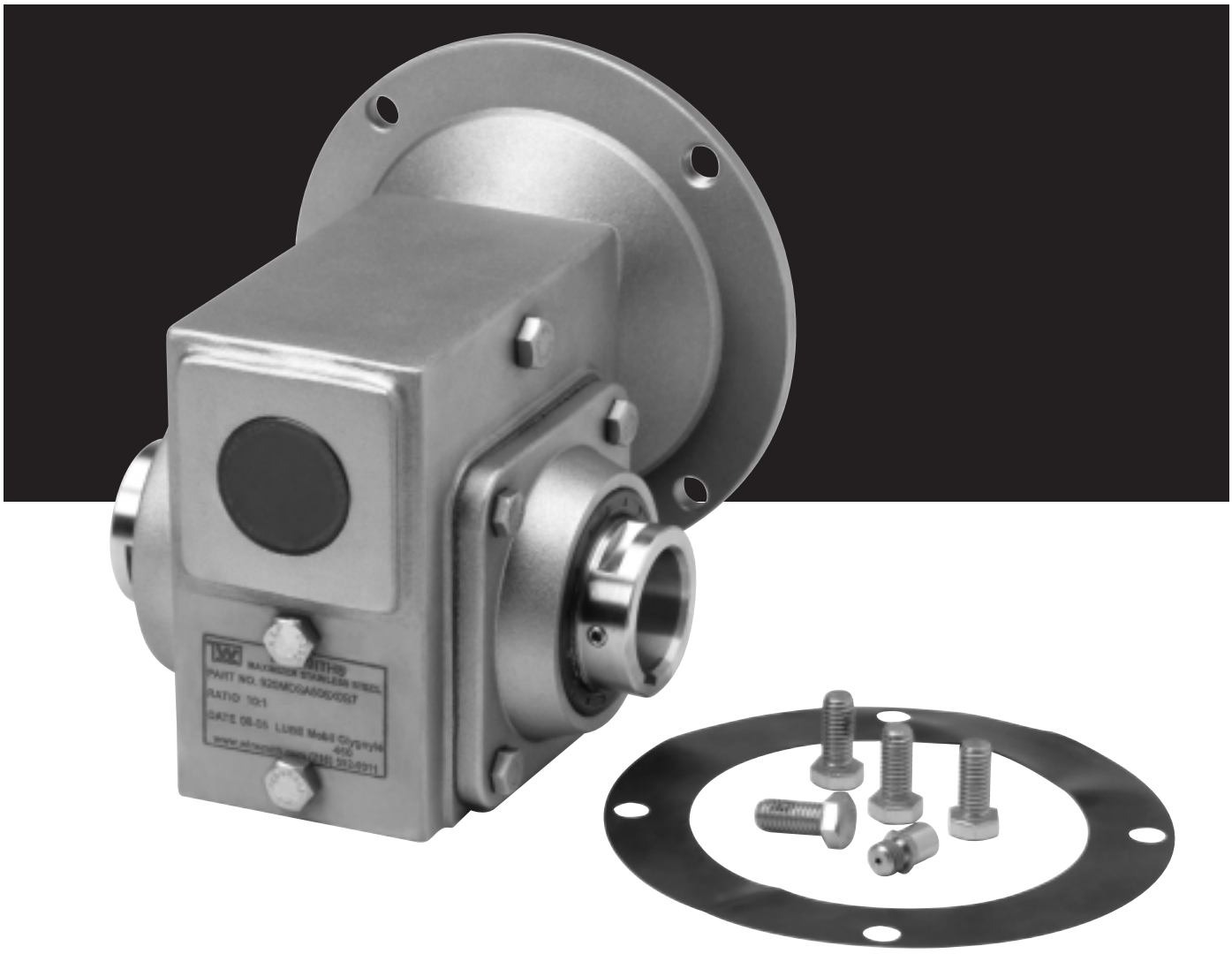
ENGINEERING
SERVICE BULLETIN

ILDSS-04

WINSMITH
PEERLESS-WINSMITH, INC.

D-90® TYPE SE®
STAINLESS STEEL SPEED REDUCERS



Installation, Operation, and Lubrication Instructions

This Engineering Service Bulletin is designed to enable users to obtain the best possible performance from their WINSMITH® Speed Reducers.

I. SELECTION

The selection of the appropriate stainless steel speed reducer for a given application requires that all factors affecting the operation of the unit be given careful consideration. Our standard stainless steel unit surface finish lies between 160 – 250 RA and meets ISO #N9 standards. A #4 pharmaceutical polished surface finish option is also available. Service factors must be applied to catalog ratings depending on the type of prime mover used, severity of the application and duration of daily service. Application horsepower requirements should be established to ensure the selection is proper. If you have any questions relative to the suitability of your WINSMITH® speed reducer for your particular application, refer to the selection section of the appropriate WINSMITH catalog, or contact your WINSMITH Sales Office or Authorized WINSMITH Distributor.

II. INSTALLATION

1. Shaft Alignment

A. The various drive members (motor, speed reducer, couplings, sprockets, sheaves, gears, etc.) should be aligned as accurately as possible to guard against unusual stresses and overloads imposed by misalignment.

B. If a prime mover shaft is to be directly connected to the high-speed (input) shaft or if the slow speed (output) shaft is to be directly connected to the driven shaft, flexible couplings should be used. It should be remembered that even flexible couplings have limited ability to accommodate misalignment. Care must be taken at installation to insure that shaft alignments are within the limits recommended by the coupling manufacturer. Use of a rigid coupling to connect speed reducer shafts to other drive components is not recommended as it is almost impossible to obtain exact alignment between two shafts.

C. A common base plate supporting the motor and reducer will help preserve the original alignment between reducer and motor shafts. If a structural steel base is used, the plate should be at least equal in thickness to the diameter of the bolts used to fasten the speed reducer to the base plate. Also, for sufficient rigidity, the design in general including angle or channel members should be substantial enough to prevent flexing under vibration. After the first week or two of operation all of the bolts and nuts used to fasten the reducer and motor, pedestal, etc., to the base plate should be retightened. Vibration tends to loosen the nuts even if tight initially. Doweling the motor and speed reducer to the base plate will help insure that alignment is maintained.

2. Mounting Positions

A. Single reduction units are designed to accommodate most standard mounting positions. To minimize bacteria traps, mounting holes are provided only on the bottom of the housing closest to the slow speed shaft. Figure 1 illustrates the utility plug locations for each unit based on model. All standard single reduction models are equipped with an internal splash shield located near the worm. This shield deflects the oil from the vent, preventing leakage when the vent plug is adjacent to the worm (as on the DT traditional mounting). When this location is used as a drain (as on the DT inverted mounting), drainage will be better facilitated if done at or near the operating temperature. Filling from this location is not recommended, as the shield will impede the oil flow rate. Bearings are splash lubricated, provided the input speed is 1160 RPM or greater. Contact the factory when input speeds fall below 1160 RPM.

B. Double reduction models are built to accommodate one mounting position as specified during order entry. Units do not have an oil level common to both housings; therefore it is necessary to check the plug location on both housings. The vent plug is also located in both housings. Grease fittings (not shown in Figure 1) are used to lubricate bearings when oil splash does not serve this purpose (as with the 935MDSYA upper slow speed bearing). When 2 or 3 units are ordered individually but assembled together in the field creating a double or triple reduction unit, follow Figure 1 for plug locations depending on the mounting position for each reduction stage. However, depending on ratio, if the input speed to any stage falls below 1160 RPM (see section III #6 Low Input Speeds), oil splash is not sufficient enough to lubricate all the bearings, and grease fittings may be required depending on the mounting position.

3. Venting

During operation, the heat generated by the gearbox will cause the air and lubricant inside the unit to expand. A vent is used to equalize the resulting pressure, and the location of the vent on the housing depends on the model and mounting position. Before putting the unit into service, review Figure 1 and relocate the vent as shown for the appropriate model and mounting position. **To prevent loss of oil during shipment, the vent plug location is blocked with a square head pipe plug, which must be removed and replaced with the supplied vent prior to operation** (A bushing is also supplied when required). For intermittent duty applications, where the operating temperature does not rise more than 20 to 40 degrees F, internal pressure build-up is minimal and venting is not necessary. **Caution! Current venting technology may not completely keep out all contaminants, therefore WINSMITH recommends monitoring the condition of the oil and replacing it as necessary** (see section III #3 Oil Changing).

4. C-Flange Motor Mounting Procedures

A. Mounting Motor to C-Flange Reducer with Hollow Input Shaft

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary. Remove protective plastic plug from reducer input shaft. The bore has been coated with an anti-seize compound. Attach the supplied gasket to the face of the motor adapter. Gasket sealant or grease may be used to hold the gasket in place. Align the motor shaft and key with keyway in bore and slide motor up to flange. **Note:** An input bushing with key may be installed in worm bore to eliminate the possibility of fretting corrosion. Position the motor conduit box as desired. Using the stainless steel fasteners supplied, secure the motor to the reducer. Draw down evenly so as not to bend the motor shaft. Tighten fasteners to 200 inch pounds.

B. Mounting Motor to C-Flange Reducer with a Plated Coupling Adapter

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary. When assembling the motor and coupling, the coupling halves should be equally spaced on each shaft to insure adequate engagement. The following describes a method for doing this: First determine the assembled shaft clearance by measuring the distance from the C-Flange face to the reducer shaft end and subtracting the motor shaft length. Mount and secure the motor shaft coupling half with the spider end extending one half the clearance distance beyond the motor shaft. Mount the reducer coupling half and coupling spider on reducer shaft in its approximate position but do not secure. Attach the supplied gasket to the face of the motor adapter. Gasket sealant or grease may be used to hold the gasket in place. Locate the motor conduit box in the desired position and secure the motor to the reducer flange using the stainless steel fasteners provided (except servo adapters). Tighten to about 200 inch pounds. Using the access hole in the flange, slide the coupling together and tighten the set screw.

5. Primary Helical Or Double Driver Unit Installation To Primary Housing

Follow the same instructions as if installing a motor to the reducer for double reduction helical worm and double worm units if the primary and secondary gearboxes are purchased separately and not assembled at the factory. See section II #2B Mounting Positions, for oil and vent plug locations for the primary and secondary gearboxes.

6. Hollow Output Shaft Bushing Installation

Determine which end of the hollow shaft will be the driving end. Slide the keyed or slotted bushing into this end of the shaft, while aligning the slot or keyway with the hollow shaft keyway, until the set screws in the shaft line up with the clearance holes in the bushing. A slotted type bushing may need to be squeezed together slightly to get started in the bore. For keyed type bushings, insert the key that fits between the bushing and hollow shaft and secure with the set screw. For slotted type bushings, turn the set screw into the clearance hole but not past the inside diameter. This will hold the bushing in place while assembling to the driven shaft.

If the driven shaft does not significantly extend beyond the keyed bushing, the plain bushing will not be needed. However, if the installation requires that the driven shaft extend through the hollow shaft and be supported on the opposite end, then the plain bushing must be installed. To do so, slide the plain bushing into the bore and align the clearance holes with the set screws in the output shaft. Turn one of the set screws into the clearance hole but not past the inside diameter. This will hold the bushing in place while assembling to the driven shaft.

Install the key in the driven shaft keyway. For slotted type bushings, this will be a rectangular or stepped key that engages directly with the output shaft keyway. Align the keyways and assemble the geardrive and driven shaft, being careful not to bend the shaft. Reposition the key as necessary to extend fully into the bushing for maximum engagement. Tighten all set screws.

III. LUBRICATION & MAINTENANCE

1. Factory Filling

WINSMITH stainless steel speed reducers are oil filled at the factory to the proper level with Mobil Glygoyle 460 (ISO viscosity grade 460) for the standard mounting position as shown in Figure 1. Mobil Glygoyle 460 oil is a polyalkyleneglycol-based (PAG) synthetic lubricant approved for incidental food contact, as defined by the FDA Title 21 CFR 178.3570 (formally USDA H1). PAG synthetic based lubricants can be advantageous over mineral in that they generally are more stable, have a longer life, operate over a wider temperature range, and consume less energy from improved efficiency. These oils are appropriate for any application but are especially useful when units are subjected to low start-up temperatures or high operating temperatures. However, continuous operation above 200°F (as measured on the external housing) may cause damage to seals or other components. **The oil level should be checked and adjusted (if necessary) prior to operation, using the oil level plug provided and while the unit is oriented in its operating position.**

2. Ambient Temperature

If the operating ambient temperature is other than -30 to110°F, then contact the factory to determine the correct grade based on actual ambient temperatures and operating speed. See item 3 for additional information regarding oil changes.

3. Oil Changing

When changing oil for any reason, it should be remembered that oils of various types might not be compatible. Mixing mineral oil with synthetic oil or mixing two different types of synthetic oils in concentrations greater than 5% could have a serious detrimental effect on performance and could result in damage to the internal components. Therefore, changing to different oil is not recommended. If your oil becomes contaminated, it is recommended that the housing be completely drained and thoroughly flushed with a light poly-glycol based USDA H1 flushing oil prior to refilling with the appropriate lubricant. The oil level should be rechecked after a short period of operation and adjusted, if necessary. **NOTE: WINSMITH's 2 YEAR WARRANTY is void if any other oil type is substituted or "topped off" than the oil originally supplied at the factory.**

A. Initial Oil Change

It is recommended that the initial oil be changed after the first 1500 hours of operation to remove metal particles that accumulate during break-in. (188 days for 8 hour per day service, 94 days for 16 hour service, or 63 days for 24 hour service). This is a good opportunity to inspect for foreign contamination to help determine an appropriate oil change interval.

B. Subsequent Oil Changes

Under ideal conditions, after the initial oil change, the oil should be changed after every 10000 hours operation when using factory supplied lubricant (amber in color), if units are operating in a clean environment, and the lubricant remains free of contamination over this period. Under severe conditions, common to stainless steel units

(rapid temperature changes, moist, dirty or corrosive environment), it may be necessary to change oil at intervals of one to three months. **Periodic examination of oil samples taken from the unit will help establish the appropriate oil change interval.**

4. Long Term Storage or Infrequent Operation

If a speed reducer is to stand idle for an extended period of time, either prior to installation or during use, it is recommended that the unit be filled completely with oil to protect interior parts from rust corrosion due to internal condensation. Remember to drain the oil to the proper level before placing the speed reducer in service. A long-term storage option is available on new units. Contact WINSMITH for details.

5. Grease Fittings

Some units are equipped with grease fittings to lubricate bearings not adequately lubricated by the oil splash. These fittings must be lubricated every 3-6 months depending on operating conditions. WINSMITH uses Mobilgrease FM 102, Chevron Poly FM grease, or equivalent (NLGI #2) oil, approved for incidental food contact, as defined by FDA 21 CFR 178.3570, (formally USDA H1). Bearing greases should be compatible with the type of gear lubricant being used (i.e. mineral, synthetic, food grade, etc.) Caution should be exercised when greasing because excessive grease may reduce the performance of the lubricant.

6. Low Input Speeds (Under 1160 RPM)

When input speeds are less than 1160 RPM, grease fittings will be required to lubricate any bearings not partially covered by the normal oil level. Such units are considered non-standard and require factory modification. If this low speed operating condition exists and units are without the appropriate grease fittings, please contact the factory.

7. Oil Temperature

Speed reducers in normal operation can generate temperatures up to 200°F (as measured on the external housing) depending on the type of reducer and the severity of the application (loading, duration of service, ambient temperatures).
Note: Initial operating temperatures may be higher than normal during the break-in period of the gear set. However, continuous operation above 200°F (as measured on the external housing) may cause damage to seals or other components and reduce the unit operating life. Excessive oil temperatures may be the result of one or more of the following factors:

A. Overloads

Overloads may be due to the original unit selection being too small for the application, or increased loads on the speed reducer to a point where its rating is exceeded after it has been in service for a period of time. Always check the speed reducer rating when increasing driven loads or increasing the horsepower rating of the motor or other prime mover.

B. Overfilling or Underfilling

If a speed reducer is overfilled with oil, the energy used in churning the excessive oil can result in overheating. If this occurs, shut down the drive, remove the oil level plug and allow oil to drain until oil ceases to drain from the level hole, reinstall the oil level plug and restart the drive. If the speed reducer is underfilled, the resultant friction can cause overheating and possible damage. If this occurs, fill the speed reducer to the oil level plug hole and check the gearing for excessive wear.

C. Inadequate Cooling

In order to dissipate internally generated heat, the speed reducer must be installed in such a way that air can circulate freely. Tightly confined areas (inside cabinets, etc.) should be avoided. If this is not possible, forced air cooling by means of a separate blower should be used. If possible the use of a fan-cooled motor is recommended to increase airflow.

8. Surface Treatments

Do Not Paint Unit! All exterior 300 series stainless steel surfaces have been passivated; no further treatment is required. Washing the unit can effectively clean the surface. Do not use steel wool pads that can induce rust. Thorough rinsing to remove any industrial solvent residue is highly recommended. Care should be exercised when rinsing with high-pressure techniques to avoid prolonged washdown of vents and seals. Drying after washdown is recommended to prevent mineral deposits. Abrasive techniques should be avoided especially on the optional #4 pharmaceutical surface finish units.

IV. UNIT ASSEMBLY/ DISASSEMBLY INSTRUCTIONS

1. Motor Disassembly from C-Flange Reducer with Hollow Input Shaft

- Use safe practices when handling, lifting, installing, operating, and maintaining motors and related equipment.
- See motor manufacturer installation instructions for complete information. This applies only to the mechanical removal of the motor from the reducer.
- The Gearbox C-Face adapters are machined with (2) 1/2-13 tapped holes to aid in motor removal. If necessary use (2) 1/2-13 x 2 1/2"L bolts to evenly jack the motor from the C-Face motor adapter. Be careful to apply even pressure on face of motor so as not to cock the motor shaft in the high-speed bore. It is not necessary or recommended to try to pry the motor from the reducer.

2. Oil Seals

Although WINSMITH uses high quality oil seals and precision ground shafts to provide a superior seal contact surface, it is possible that circumstances beyond WINSMITH's control can cause oil seal leakage (damage during shipment or installation, etc.). When replacing a shaft oil seal, using the following suggestions will help to insure leak-free operation and long seal life.

I. High-Speed Fluoroelastomer Oil Seals

A. When installing a new seal, cover the keyway and any other surface discontinuity with smooth tape to protect the seal lip from being damaged.

B. A sealant should be used between the O.D. of the seal and the I.D. of the bore into which the seal is installed. The seal bore should also be free of any burrs, nicks, or scratches.

C. Be sure that the seal is not cocked in the seal bore. The outer face of the seal should be flush with the surface into which it is mounted.

INPUT SHAFT SEALS

SIZE	SHAFT STYLE	WINSMITH P/N	C/R P/N
920	MOTORIZED	30166	13538
926	MOTORIZED	30160	17293
935	MOTORIZED	30160	17293
320	MOTORIZED	30160	17293

II. WINSHIELD® Slow-Speed Oil Seals

The WINSHIELD seal is designed to prevent contaminants from entering the gearbox during high-pressure wash down or operation in a hostile environment. To assure proper performance, the following disassembly and installation procedures must be followed. Because of the complexity of disassembly and the potential for seal damage, WINSMITH does not recommend field replacement without proper equipment and training. WINSHIELD seal installation should be the final operation during re-assembly.

A. DISASSEMBLY:

During assembly, the WINSHIELD seal is pressed both on the shaft and in the seal bore so traditional disassembly procedures will not apply. Recommended disassembly procedures will vary with the model and design of the unit as described below. A small amount of lubricant on the shaft will aid in the process. Prior to re-assembly, remove all residual sealant and rubber materials from the housing and cover bores and shaft surfaces.

Housing With One Cover and One Output Shaft Extension:

If the shaft extends out the housing side, first remove the cover, then press the shaft and gear assembly through the housing and off the seal sleeve. If the shaft extends out the cover side, remove the cover along with the shaft and gear assembly from the housing. Press the shaft through the seal assembly. Press the seal from the cover or housing.

Housing With Two Covers and One Output Shaft Extension:

Remove the Blind cover. Remove the other cover along with the shaft and gear assembly from the housing. Press the shaft through the seal assembly. Press the seal from the cover.

Housing With One Cover and Double Extended or Hollow Output Shaft:

Pry the cover from the housing until completely free of the shaft. Press the opposite shaft end through the housing and off the seal sleeve. Press the seals from the housing and cover.

Housing With Two Covers and Double Extended or Output Hollow Shaft:

Pry one cover from the housing until completely free of the shaft. Remove the other cover along with the shaft and gear assembly from the housing. Press the shaft through the seal assembly. Press the seals from each cover.

B. INSTALLATION:

Initial Preparation:

- The WINSHIELD seal assembly includes a seal sleeve with a rubber coated ID that must press on the reducer output shaft. To protect the coating during this operation, remove all sharp edges and burrs from keyways, puller slots, set screw holes and any other surface irregularities from the section of shaft that the sleeve must press over. Round off or blend all shaft features that will otherwise tend to peel off the sleeve coating.
- The outside diameter of the seal must be pressed into the housing or cover. Clean the bore area of all foreign material and remove any burrs. Provide a small chamfer leading in to the seal bore.
- Apply a light coating of Gasket Sealant on the outside diameter of the blue metal cased element of the seal assembly. Do not apply sealant to the rubber element.
- Apply a light coat of lubricant to the shaft surface that the sleeve will press over and rest against. The lubricant can be grease or oil but must be food grade if that type is being used in the gearbox.

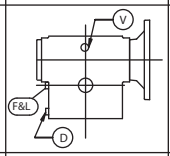
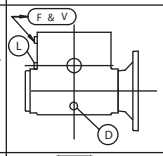
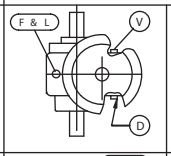
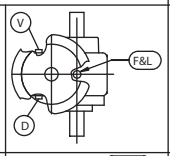
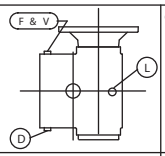
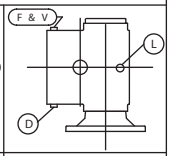
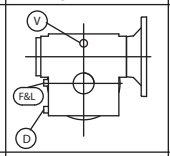
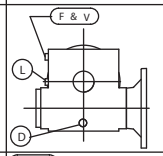
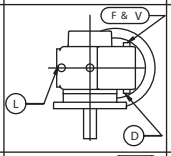
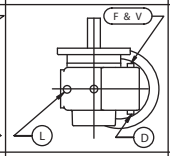
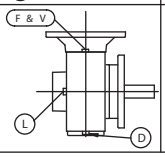
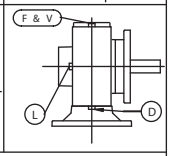
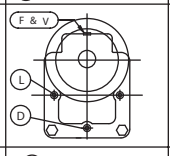
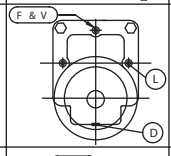
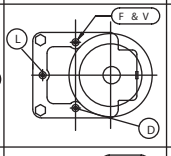
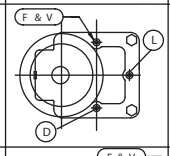
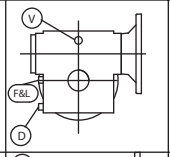
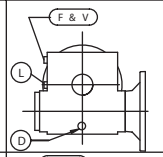
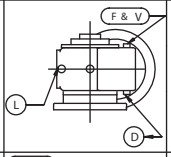
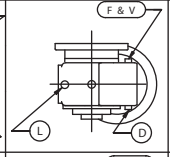
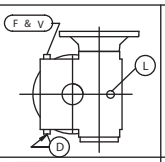
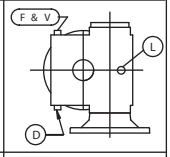
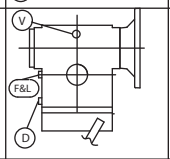
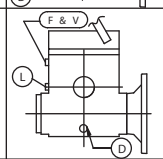
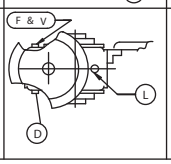
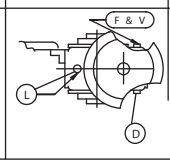
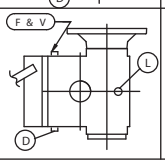
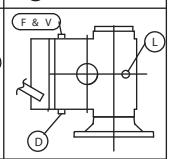
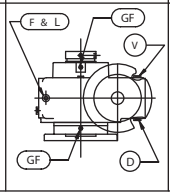
Installation:

- Position the unit squarely on the bed of a press.
- Position the seal assembly on the shaft with the rubber coated surface to the outside and manually slide the seal along the shaft as far as possible.
- Using a seal driver that makes contact at the outside perimeter and covers most of the rubber face, slowly and evenly press the seal along the shaft until flush with the cover face. **DO NOT** use a hammer or mallet to drive the seal onto the shaft. When pressure is released, the seal may spring outward a small amount. This will not affect seal performance.

WINSHIELD® OUTPUT SHAFT SEALS

SIZE	SHAFT STYLE	WINSMITH P/N	Dimension (inches)	
			ID	OD
920	SOLID	30628	1.00	1.63
926	SOLID	30629	1.25	2.00
935	SOLID	30630	1.75	2.44
920	HOLLOW	30631	2.00	2.63
926	HOLLOW	30632	2.50	3.25
935	HOLLOW	30633	2.88	3.88
320	SOLID	30628	1.00	1.63

STANDARD MOUNTING POSITIONS D-90® TYPE SE®

BASIC MODEL	STANDARD MOUNTING	INVERTED MOUNTING	ADDITIONAL MOUNTING POSITIONS			
			INPUT SHAFT HORIZONTAL		INPUT SHAFT VERTICAL	
MDBA MDJA NDNA MDTA MDUA						
MDDA						
MDHA					**SPECIAL** Contact the Factory	
MDSFA						
MDSNA MDSRA MDSUA						
MDSYA		**SPECIAL** Contact the Factory				

LEGEND

- (F) = Filler
- (V) = Vent
- (L) = Level
- (D) = Drain
- (F&V) = Filler & Vent
- (GF) = Grease Fitting

Contact the factory when input speeds are less than 1160 RPM to insure proper lubrication.

NOTE: Single Reduction 935 standard models are supplied with grease fittings on the input shaft to insure bearing lubrication for all mounting positions.

For SSTL. Double Reduction units, primary & secondary plug locations are determined individually according to model & orientation per this chart. Grease fittings may be required on the secondary stage.

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