WINSMITH
PEERLESS-WINSMITH, INC.

ENGINEERING
SERVICE BULLETIN

ILEQ-98

D-90® TYPE SE®
S·EQUALIZER®
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. The services of our Engineering Department are at your disposal at all times to help you solve any of your Speed Reducer problems.

The WINSMITH® S-EQUALIZER® has been developed to offer a sealed unit with the following features:

- Ventless worm gear speed reducer that prevents internal pressure build-up.
- Keeps the lubricant in and contamination out.
- Universal mounting flexibility.

By extending the high speed cap and providing an internal diaphragm, the increased volume of air and oil is easily accommodated in this internal chamber. This completely eliminates the need for an external breather while insuring against any internal pressure build-up during operation. The S-EQUALIZER® completely seals the unit from outside air. A light spring resting against the diaphragm supports the weight of the oil for any mounting position.

By using the S-EQUALIZER option you can be sure that your WINSMITH® worm gear reducer will not fall early victim to water and other contamination from the outside and at the same time be assured you are not subjecting shaft seals to damaging internal pressures.

I. Description and Operation

A pressure sensitive diaphragm is enclosed in a two piece metal housing. The housing is mounted on the high speed end of the speed reducer opposite the input shaft. The outer lip of the diaphragm is captured between the housing halves and bolted in place. Internal volume change resulting from temperature changes outside or inside the speed reducer is absorbed by the diaphragm. The unit can be mounted in any position without the use of a vent.

II. Selection

The selection of the appropriate speed reducer for a given application requires that all factors affecting the operation of the unit be given careful consideration. 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. 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, contact your WINSMITH representative or distributor, or contact WINSMITH directly.

III. 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 abilty 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. Dowelling the motor and speed reducer to the base plate will help insure that alignment is maintained.

2. Mounting Positions

A significant advantage of the S-EQUALIZER design is its total flexibility in mounting. The elimination of a vent plug allows for operation in any mounting position including situations where the housing is rotated during operation. As long as a minimum input speed of about 1160 RPM is maintained, all bearings will be provided with adequate lubrication at all times.

Because the oil volume in S-EQUALIZER units is somewhat greater than that of standard units, existing level plug locations are not applicable. See section IV-3 for a more complete discussion.

3. 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.

Align the motor shaft and key with keyway in bore and slide motor up to flange.

Position the motor conduit box as desired.

Using the 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 Coupling Adaptor.

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.

Locate the motor conduit box in the desired position and secure the motor to the reducer flange using the fasteners provided. Tighten to about 200 inch pounds.

Using the access hole in the flange, slide the coupling together and tighten the set screw.

4. Unit Assembly/Disassembly Instructions
Contact the factory for an instruction manual.

IV. Lubrication & Maintenance

1. Factory Filling & Oil Type
WINSMITH S-EQUALIZER units are factory filled with the proper amount of synthetic lubricant, SHC 629. Synthetic lubricants can be advantageous over mineral oils in that they generally are more stable, have a longer life, and operate over a wider temperature range. 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 may cause damage to the seals or other components.

2. Ambient Temperature
Synthetic oil SHC 629 is suitable for operation in an ambient range of −30° F to 110° F. If units operate continuously in ambients below 0° F, SHC 626 would be a suitable alternate lubricant.

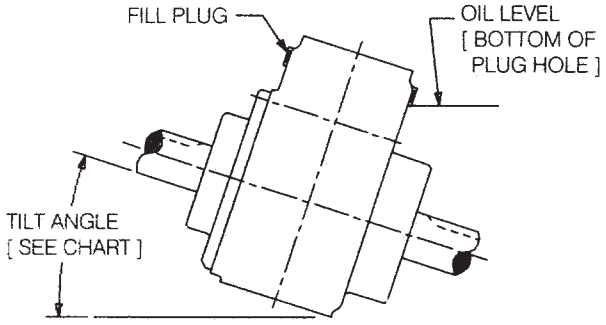
3. Oil Quantity
Because air expands at a greater rate than oil, the volume of oil used in S-EQUALIZER units will be greater than that of similar standard units, thereby keeping the equalizer feature to a minimum practical size. The oil volume shown in Table I will insure that no measurable pressure build-up occurs over a temperature change of up to 100° F. At lesser operating temperature differentials, a lesser volume of oil can be tolerated without building internal pressure, but this should be reviewed with the factory.

Because of the varying oil quantities, the normal level plugs are not appropriate for monitoring oil levels. See section III-2.

Size	Oil Volume*		Tilt Angle (Degrees)
	Milliliters	Fluid Oz.	
913	270	9.13	0
917	560	18.9	0
920	620	21.0	0
924	1180	39.9	18
926	1450	49.0	18
930	1770	59.8	37
935	2525	85.3	30
943	3540	119.6	18

1ml = .061 in^3/.0019 pts/.0338 fl oz.

*Correct oil volume can also be established by tipping unit and filling to oil level as shown



4. Oil Changing
When changing oil for any reason, it should be remembered that oils of various types may not be compatible. Therefore, if changing to a different oil, it is recommended that the housing be completely drained and thoroughly flushed with a light flushing oil prior to refilling with the appropriate lubricant. When changing double reduction models, each housing should be drained and filled independently.

Because the unit is sealed, it is protected from external contamination. This, coupled with the greater stability of synthetic oils, will significantly extend the time interval between oil changes. It is recommended that the initial oil be changed or filtered after the first 1500 hours of operation to remove metal particles that accumulate during break-in. Subsequent oil changes can be extended to 5000 hours or more depending on operating conditions. The condition of the oil can be monitored to establish an appropriate change interval. This assumes a continued use of synthetic oil.

Before draining, the unit should be allowed to cool to room temperature, allowing the diaphragm to retract to its normal position. Since the unit is not vented, removing the fill plug will expedite the drainage process. When refilling, the oil quantity in Table I for the appropriate unit size can be used as a guide, remembering that there may be a small amount of oil remaining in the housing after drainage. An optional approach for refilling would be to add an amount equal to that drained. The fill plug must be installed before the unit is put back in service.

Although the diaphragm should be in its normal (retracted) position, the following quick check will insure this. Using a set of blunt probes, insert one each in two opposing relief holes in the S-EQUALIZER housing far enough to seat the diaphragm (see picture on front page). Repeat the process in the other two holes. When doing so, apply a steady but minimal amount of pressure to the diaphragm to push any remaining oil out of the diaphragm cavity. This must be done BEFORE installing the fill plug.

5. Long Term Storage or Infrequent Operation

Units furnished with the long term storage option must give special attention to the proper amount of oil left in the unit before putting into service. Because there is no specific level plug available, it is recommended that the unit be completely drained and refilled with the proper amount based on the oil volume as shown in Table I. Please review section IV, items 3 and 4 before proceeding.

6. Low Input Speeds (Under 1160 RPM)

When input speeds are less than 1160 RPM and the uppermost bearing relies on splash lubrication, it may be necessary to further raise the oil level. Contact the factory if this condition exists. Grease fittings are not used in conjunction with this feature as they could allow the passage of air, thus defeating its purpose.

7. Oil Temperature

Speed reducers in normal operation can generate temperature up to 200° F depending on the type of reducer and the severity of the application (loading, duration of service, ambient temperatures). Excessive oil temperatures may be the result of one or both 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. 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.

8. 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 (defective seal 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.

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.

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MOTORS and GEARING
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PWS-18203—8/00—10M
Printed in U.S.A.