Instructions Manual

General Operation

- 1. Run the motor which drives the reducer and check the direction of reducer output rotation. Consult motor nameplate for instructions to reverse the direction of rotation.
- 2. Attaching the load: On direct coupled installations, check shaft and coupling alignment between speed reducer and loading mechanism. On chain/sprocket and belt/pulley installation, locate the sprocket or pulley as close to the oil seal as possible to minimize overhung load. Check to verify that the overhung load does not exceed specifications published in the catalog.
- 3. High momentum loads: If coasting to a stop is undesirable, a braking mechanism should be provided to the speed reducer output or the driven mechanism.



The system of connected rotating parts must be free from critical speed, torsional or other type vibration, no matter how induced. The responsibility for this system analysis lies with the purchaser of the speed reducer.

Installation

- 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. For shipment, pipe plugs are installed in the unit and a vent plug is packed separately. After mounting the unit in position, remove the appropriate pipe plug and install the vent plug in the location shown on page 166. On double reduction units both the primary and the secondary must be vented. Failure to vent the unit can cause premature seal wear or loss of seal and oil. These conditions are not covered by warranty. Check for correct oil level. Contact the factory for level and vent recommendations on non-standard mounting positions. Units with optional internal pressure compensating system do not use vents. See (internal pressure compensating system) under Lubrication for further information.
- 3. Connect motor to speed reducer.



Depending upon gear geometry and operating conditions worm gear reducers may or may not backdrive. Special consideration should be given to high inertia loads connected to the output shaft. Consult the factory for further details.



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



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

CAUTION:

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 either through a shaft-mounted arrangement, and any shaft mounted power transmitting device. (e.g. sprockets, pulleys, couplings)

CAUTION: For safe operation and to maintain the unit warranty, when changing a factory installed fastener for any reason, it becomes the responsibility of the person making the change to properly account for fastener grade, thread engagement, load, tightening torque and the means of torque retention.

Instructions Manual

Lubrication

All standard reducers ordered from the factory are shipped dry. Prior to startup, verify that the oil is at the level shown on the drawings on page 166. If the ambient temperature will be outside the range for the lubricant installed at the factory, drain and refill the reducer with the proper viscosity lubricant prior to use. Consult the chart on page 177 or the factory for alternate lubricants.

Change Intervals: Standard compounded lubricants should be changed every six months or 2500 operating hours, whichever comes first. Synthetic lubricants should be changed every two years or 6000 hours, whichever comes first.

CAUTION:

Oil should be changed more often if reducer is used in a severe environment. *(i.e. dusty, humid)*

CAUTION:

In the Food and Drug Industry (including animal food), consult the lubrication supplier for recommendation of lubricants which are acceptable to the Food and Drug Administration and/or other authoritative bodies having jurisdiction.

Special Lubrication Requirements - Sizes 218 & Larger

Units shipped from the factory are assembled to properly lubricate all internal components based on a specific assumed mounting orientation. The factory assumed mounting orientations are given below. If a size 218 or larger unit will be mounted in a different orientation than listed below, or run with sustained input speeds less than 900 RPM, it should be specified with the order. The unit can then be modified to assure proper lubrication.

Factory Assumed Mounting O	rientation Applicable Unit Styles*	
Worm Over	br, Ar, Fr, Hr, Fhr, Cr, Dwbr, Dwar, Dwfr, Dwhr, Dwfhr Hwbr, Hwar, Hwhr, Hwfhr, Twar	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm Triple Reduction Worm-Worm-
Worm		
Worm Under	UR DWUR	Single Reduction Double Reduction Worm-Worm
Vertical Output	VR, DBR DWVR, DWDBR HWVR, HWDBR	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
Vertical Input	JR DWJR HWJR	Single Reduction Double Reduction Worm-Worm Double Reduction Helical-Worm
	* Includes "C" and "Q" versions of all styles listed	

The precision-made gears and bearings in Sterling Electric Speed Reducers require high-grade lubricants of the proper viscosity to maintain trouble-free performance. For best results, use lubricants on the following chart for worm gear reducers:



800-866-7973 IN

Instructions Manual

Manufacturer	30° to 100° F Ambient Temperature AGMA Compounded No. 7	50° to 125° F Ambient Temperature AGMA Compounded No. 8
Amoco Oil Co.	Worm Gear Oil	Cylinder Oil #680
Chevron USA, Inc.	Cylinder Oil #460X	Cylinder Oil #680X
Exxon Co. USA	Cylesstic TK-460	Cylesstic TK-680
Gulf Oil Co.	Senate 460	Senate 680D
Mobile Oil Corp.	600 W Super Cylinder	Extra Hecla Super
Shell Oil Co.	Valvata Oil J460	Valvata Oil J680
Sun Oil Co.	Gear Oil 7C	Gear Oil 8C
Техасо	Honor Cylinder Oil	650T Cylinder Oil
Union Oil Co. of CA	Steaval A	Worm Gear Lube 140

Some gear lubricants contain E.P. additives that can be corrosive to gear bronze. Avoid lubricants that are compounded with sulfur and/or chlorine.

For temperature ranges not shown, contact factory.

For lubrication requirements of helical reducers of helical/worm combinations, contact factory.

Mounting	UNIT SIZE													
Position	213	215	217	220	224	226	230	232	242	252	260	270	280	2100
Worm Over	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8 1/4	12 1/2	19 1/2	35	48	72
Worm Under	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5 1/2	8	13 1/2	20 1/2	32 3/4	51 1/4	80
Vertical Output	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20	20 3/4	28 3/4	40
Vertical Input	1/2	3/4	1	1 1/2	1 3/4	3	3 3/4	5	8	13 1/2	20 1/3	36 1/2	50	75
Extended Bearing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	12	17	27	40	63	102
Worm over on Secondary L	Jnit of Do	ouble Rec	duction	N/A	N/A	N/A	N/A	12	19 1/4	20	30 1/3	50 1/3	71 1/2	107 1/4

Oil Capacities (pints)

Always check for proper oil level after filling. Capacities vary somewhat with model and mounting position. Oil should rise to bottom edge of level hole. Do not overfill.

Synthetic Lubricants

Synthetic lubricants provide the potential for numerous benefits including wider operating temperature range and increased interval between changes. Use of synthetics can cause problems if they are not compatible with the seals or the conventional lubricants they replace. For normal ambient temperatures (-10°F to 105°F) we recommend the use of Mobil SHC 634 which is compatible with the standard compounded oil shipped in our product and the Viton® seal material used through size 252. For other temperatures, contact factory for a recommendation.

For synthetic lubrication to be used in helical reducers of helical reducers of helical/worm combinations, contact factory.

Instructions Manual

Standard Speed Reducer Mounting Positions & Vent Plug, Level and Drain Locations



Maintenance

Your Sterling Electric reducer has been tested and adjusted at the factory. Dismantling or replacement of components must be done by Sterling Electric to maintain the warranty.

Frequently check the oil level of the reducer. If oil level is low, (refer to reducer vent and level position chart) add proper lubrication through the filler plug until it comes out the oil level plug.

Inspect vent plug often to insure it is clean and operating.

CAUTION:

Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.

Seals: The Sterling Electric line of speed reducers utilize premium quality seals which are the state-of-the-art in sealing technology. Seals are, however, a wear item and eventually need to be replaced. Replacement can be easily accomplished by following the steps below:

- 1. Remove the worn seal without damaging the shaft surface or the seal bore. This can be done by drilling a .062 diameter hole in the seal casing (being careful not to drill into the bearing behind the seal). Screw a #10 sheet metal screw into the hole and pry out the seal.
- 2. Clean the seal bore of sealant.
- 3. Before installing the new seal, use electrical tape to cover any keyways on the shaft to prevent seal lip damage.
- 4. Grease the seal lips with bearing grease and apply a sealant to the seal bore.
- 5. Slide the seal into the shaft being careful not to fold the inner lip over on any shaft steps.
- 6. Press the seal into its bore with a sleeve that presses on the seal casing, being careful to keep the seal square in its bore.

Class of Service

All capacity ratings are based on American Gear Manufacturers Association (AGMA) Standards. Load conditions be within cataloged ratings published in the current Sterling Electric Catalog (available upon request).



800-866-7973 IN

800-654-6220 CA

Engineering Data Parts List Index

Parts List Index

Style	Page
Single Reduction Parts List	- 160
Double Reduction Worm/Worm Parts List	
Primary Unit	161
Secondary Unit	- 160
Double Reduction Helical/Worm Parts List	
Primary Unit	163
Secondary Unit	- 160
Triple Reduction Worm/Worm/Worm Parts List	
Primary Unit	161
Secondary Unit	162
Tertiary Unit	- 160

Single Reduction Parts List

Item # Description

Basic Single Reduction Unit

- Gear Housing 1.
- 2. Pipe Plug
- 3. Vent Plug
- 4. Splash Guard
- 5. Input Cover
- 6. O-Ring
- 7. Hex Head Cap Screw
- 8. Input Oil Seal
- Input Bearing 9.
- 10. Input Bearing
- *11. Retaining Screw
- 12. Input Shaft
- 13. Output Cover
- 14. Output Cover
- 15. O-Ring
- 16. Output Cover Gasket (as required)
- 17. Output Oil Seal
- 18. Output Bearing
- 19. Hex Head Cap Screw
- ***20. Single Output Shaft
- ***21. Double Output Shaft
 - 22. Gear Spacer
 - 23. Gear Key (only used on size 2-5/8" center distance and larger units)
 - 24. Output Gear (supplied only with output gear on size 1-1/3" through 2-3/8" center distance units)
 - 25. Input Cover (only used on size 4-1/4" center distance and larger units)
 - 26. Input Cover
 - 27. Input Oil Seal
 - *28. Retaining Ring Shaft
 - 29. Double Input Shaft
 - 170. Internal Pressure Compensation Chamber (optional)
 - 171. Internal Pressure Compensation Chamber Stem Plug
 - 172. Internal Pressure Compensation Chamber Stem Nut

*not used on 4-1/4" center distance and larger units

Quill Motor Flange Unit

- 30. Double Input Shaft
- 40. Quill Motor Flange
- 41. Input Oil Seal
- 42. Hex Head Cap Screw
- 43. Retaining Ring Shaft
- 44. Retaining Ring - Housing (only used on size 4-1/4" center distance and larger units)
- 45. Quill Input Shaft

Hollow Output Shaft Unit

- 50. Gear Housing
- 51. Output Cover
- 52. Output Oil Seal
- 53. Output Bearing
- 54. Gear Spacer
- ***55. Output Shaft
 - 56. Setscrew
- 57. Gear Key (only used on size 2-5/8" center distance and larger units) STERLING 800-654-6220 CA 157

Item # Description

58. Output Gear (supplied only with output shaft on size 11/3" through 2-3/8" center distance units)

Mounting Bracket Options

- 70. Horizontal Mounting Foot
- 71. Cap Screw
- 72. High and Low Riser Bracket
- 73. Hex Head Cap Screw
- 74. "J" Mount Bracket
- 75. Output Flange
- 76. Machine Faced Output Cover (only used on size 2-3/8" center distance and larger solid output shaft units)
- 77. Hex Head Cap Screw
- 78. Torque Bracket
- 79. Hex Head Cap Screw

Extended Bearing Unit

- Flange 90.
- **Output Shaft** 91.
- Bearing 92.
- Output Oil Seal 93.
- Hex Head Cap Screw 94.
- 95. **Pipe Plug**
- 96. **Expansion Plug**
- *97. Flange Cover
- *98. Gasket
- Hex Head Cap Screw *99.

*only used on size 5-1/4" center distance and larger units

Long Motor Flange and Coupling Kit

- 110. "C" Face Motor Flange
- Hex Head Cap Screw 111.
- 112. Coupling Key - Reducer Shaft
- 113. Setscrew - Reducer Shaft
- **Coupling Gear Reducer Shaft** 114.
- **Coupling Sleeve** 115.
- 116. Setscrew - Motor Shaft
- 117. Coupling Gear - Motor Shaft
- 118. Coupling Key - Motor Shaft

Vertical Shaft Required Parts (Supplied only when mounting position involves a vertical shaft.)

- *129. **Output Cover**
- *130. **Output Cover**
- *131. **Output Bearing Grease Retainer**
- Grease Fitting 132.
- Sealed Ball Bearing (only used on size 1-3/4" 133. through 2-5/8" center distance units)
- **134. Input Cover

ELECTRIC, INC.

- **136. Input Bearing Grease Retainer
- Only used on size 4-1/4" center distance and larger units.
- ** Only used on size 3" center distance and larger units.

800-866-7973 IN

*** Supplied only with output gear on size 1-1/3" through 2-3/8" center distance units.

Parts List

Basic Single Reduction Unit



Multiple Parts List

Hollow Output Shaft Unit







800-866-7973 IN

Parts List

Primary Unit for Double Reduction Worm/Worm Styles & Triple Reduction Worm/Worm/Worm Styles



Item # Description

- 1. Gear Housing
- 2. Pipe Plug
- 3. Vent Plug
- 6. O-Ring
- 15. O-Ring
- 16. Output Cover Gasket (as required)
- 17. Output Oil Seal
- 18. Output Bearing
- 19. Hex Head Cap Screw
- 22. Gear Spacer
- 23. Gear Key (only used on size 2-5/8" center distance and larger primary units)
- 24. Output Gear (supplied only with output shaft on size 1-1/3" through 2-3/8" center distance primary units)
- *50. Gear Housing
- *52. Output Oil Seal
- *53. Output Bearing
- *54. Gear Spacer

Item # Description

- **55. Output Shaft
- *56. Setscrew
- *57. Gear Key (only used on size 2-5/8" center distance and larger primary units)
- *58. Output Gear (supplied only with output shaft on size 1-1/3" through 2-3/8" center distance primary units)
- 150. Double Reduction Adaptor
- 151. Stud
- 152. Hex Nut
- 153. Lock Washer
- 154. Primary Solid Output Key
- 155. Expansion Plug
- 156. Primary Solid Output Shaft
- *157. Primary Hollow Output Key
- *158. Hollow Shaft Plug
- 170. Internal Pressure Compensation Chamber (optional)
- 171. Internal Pressure Compensation Chamber Stem Plug
- 172. Internal Pressure Compensation Chamber Stem Nut

* Only used on size 7", 8", and 10" center distance secondary units for double reduction worm/worm styles.

**Supplied only with output gear on size 1-1/3" through 2-3/8" center distance units.

Parts List

Secondary Unit For Triple Reduction Worm / Worm / Worm Styles



Item # Description

- 1. Gear Housing
- 2. Pipe Plug
- 3. Vent Plug
- 6. O-Ring
- 15. O-Ring
- 16. Output Cover Gasket (as required)
- 17. Output Oil Seal
- 18. Output Bearing
- 19. Hex Head Cap Screw
- 22. Gear Spacer
- 23. Gear Key (only used on size 2-5/8" center distance and larger secondary units)
- 24. Output Gear (supplied only with output shaft on size 1-1/3" through 2-3/8" center distance secondary units)
- *50. Gear Housing
- *52. Output Oil Seal
- *53. Output Bearing
- *54. Gear Spacer

Item # Description

- *55. Output Shaft
- *56. Setscrew
- *57. Gear Key (only used on size 2-5/8" center distance and larger secondary units)
- *58. Output Gear (supplied only with output shaft on size 1-1/3" through 2-3/8" center distance secondary units)
- 150. Triple Reduction Adaptor
- 151. Stud
- 152. Hex Nut
- 153. Lock Washer
- 154. Secondary Solid Output Key
- 155. Expansion Plug
- **156. Secondary Solid Output Shaft
- *157. Secondary Hollow Output Key
- *158. Hollow Shaft Plug
- 170. Internal Pressure Compensation Chamber (optional)
- 171. Internal Pressure Compensation Chamber Stem Plug
- 172. Internal Pressure Compensation Chamber Stem Nut

* Only used on size 7", 8", and 10" center distance tertiary units for triple reduction worm/worm/worm styles. **Supplied only with output gear on size 1-1/3" through 2-3/8" center distance units.





800-866-7973 IN

Parts List

Helical Primary



Item # Description

- 1A. Bearing, Output (Ball) Extension End
- 1B. Bearing, Output (Ball) Inboard End
- 2. Shaft, Output (state output frame size)
- 3. Seal, Oil (Output)
- 4A. Bearing, Input (Ball) Extension End (N/A for HWAQ)
- 4B. Bearing, Input (Ball) Inboard End
- 5. Shaft, Input (state ratio); on HWAQ also state frame size.
- 6. Seal, Oil (Input)
- *7. Flange, Motor (HWAQ only)
- 8. Screw 8 req. on Model I & II; 11 req. on Model III
- 9. Key, Gear
- 10. Gear, Output (state ratio)

Item # Description

- 11. Pin, Dowel -2 req.
- 12. Spacer, Low Speed 2 req.
- 13. Cover, Housing
- 14. Housing, Gear
- 15. Gasket, Input Cover
- 16. Gasket, Housing
- 17. Plug, Pipe 2 req.
- 18. Plug, Vent
- 19. Key, Output Shaft
- 20. Cover, Input, Seal Retainer
- 21. Ring, Retaining, Internal, Input Shaft
- 22. Ring, Retaining, External, Input Shaft
- 23. Flange, Motor (HWAC only)

*Motor Flange replaces input cover on 'HWAQ' Model.

Include the complete model description and serial number of the reducer when ordering replacement parts.