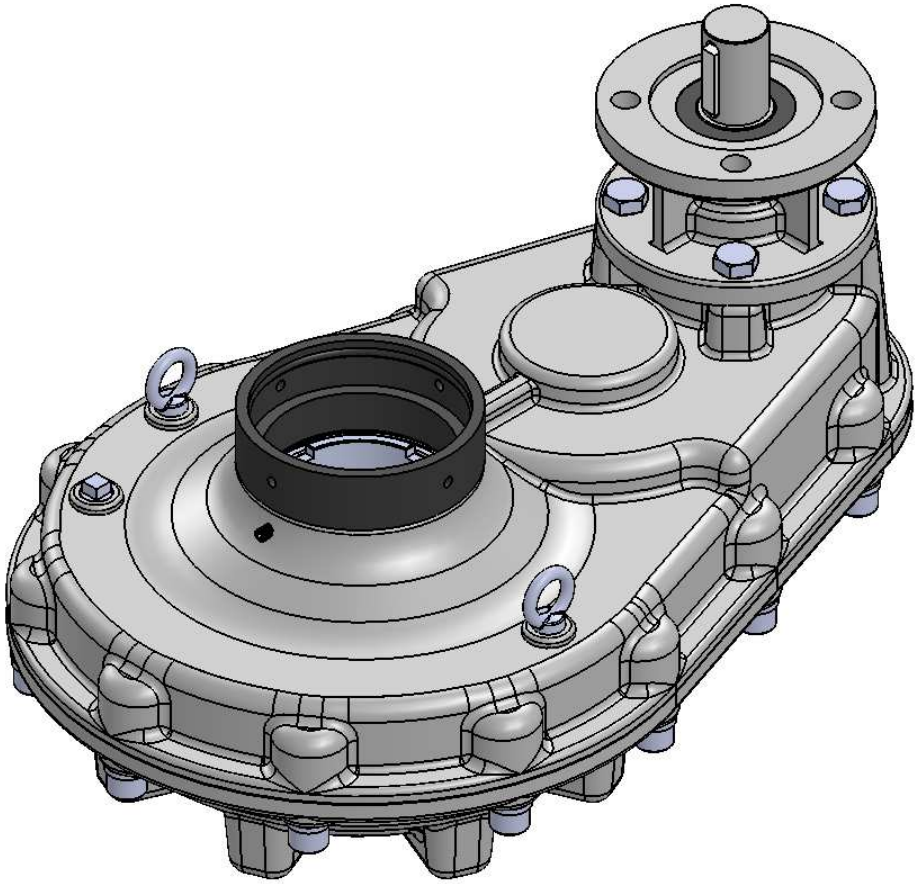
FLOWSERVE

USER INSTRUCTIONS

Limitorque™ SR Series

FCD LMENIM3701-00-AQ 11/14

Installation
Operation
Maintenance



Experience In Motion

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1 Introduction

1.1 Purpose

The installation and maintenance manual (IOM) explains how to install and maintain the Flowserve Limitorque SR gearbox. Information on installation, disassembly, reassembly, lubrication and product weights is provided.

1.2 User Safety

Safety notices in this manual detail precautions the user must take to reduce the risk of personal injury and damage to the equipment. The user must read and be familiar with these instructions before attempting installation, operation or maintenance. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, voiding of the warranty, or operational difficulty.

Safety notices are presented in this manual in three forms:

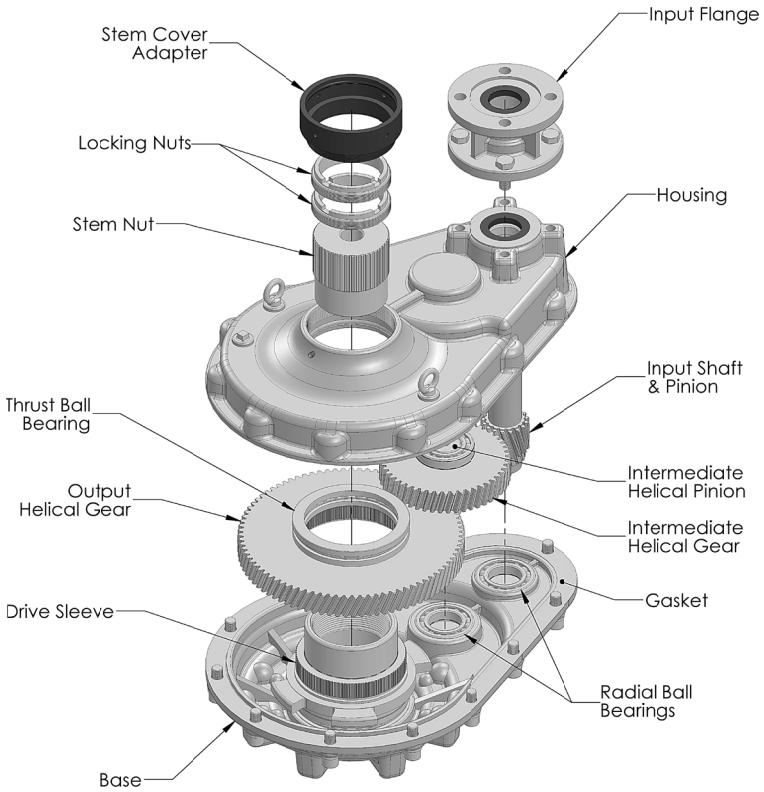
☠ **WARNING:** Refers to personal safety. Alerts the user to potential danger. Failure to follow warning notices could result in personal injury or death.

⚠ **CAUTION:** Directs the user's attention to general precautions that, if not followed, could result in personal injury and/or equipment damage.

NOTE: Highlights information critical to the user's understanding of the SR gearbox's installation and operation.

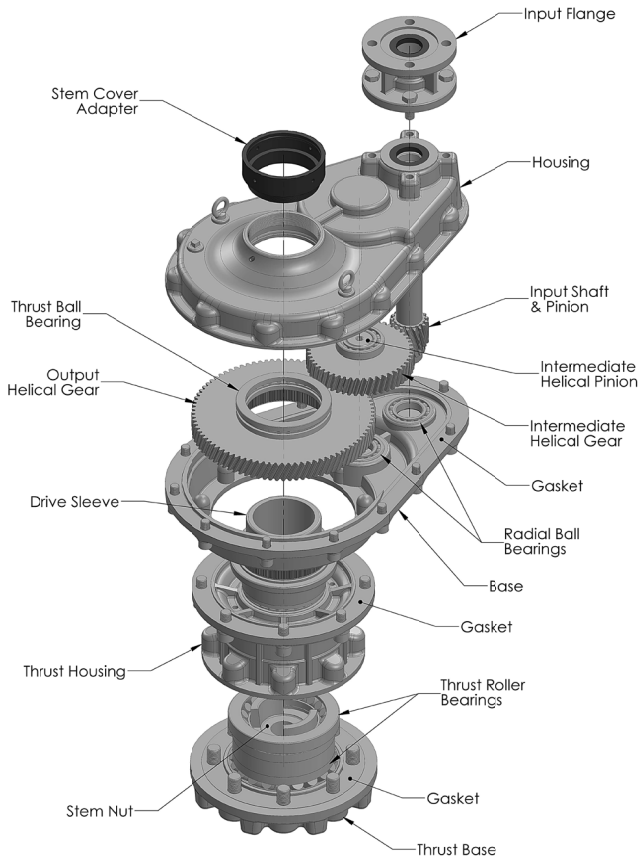
2 Inspection, Installation and Mounting Procedures

Figure 2.1 - SR Exploded View



WARNING: Do not manually operate the SR gearbox with devices other than the installed handwheel or wrench nut. Using additive force devices (cheater bars, wheel wrenches, pipe wrenches, or other devices of this nature) on the gearbox handwheel, wrench or wrench nut may cause serious personal injury and/or damage to the gearbox or valve.

Figure 2.2 - SRH Exploded View



2.1 Initial Inspection and Storage Instructions

WARNING: Read this installation and maintenance manual carefully and completely before attempting to store the gearbox. If an electric actuator is attached to the SR gearbox, be aware of the electrical hazards. Consult the electric actuator installation and maintenance manual for guidance.

2.2 Inspection and Recording

Upon receipt of the gearbox, inspect the condition of the equipment, and record nameplate information.

1. Carefully remove the gearbox from the shipping carton or skid. Thoroughly examine the equipment for any physical damage that may have occurred during shipment. If damaged, immediately report the damage to the transport company.

2. A nameplate is attached to each gearbox with the following information:

    - Gearbox size
    - Order number
    - Serial number
    - Customer tagging

Record this information for future reference, e.g., ordering parts, or obtaining further information.

2.3 Storage Procedure

NOTE: The following is the recommended storage procedure to retain maximum product integrity during storage. Failure to comply with recommended procedure will void the warranty.

Storage (less than one year)

Store the gearboxes on wooden skids to protect the machined mounting flange. Place the wooden skids containing the gearboxes in a clean, dry, protected warehouse. If the gearboxes must be stored outside, they must be covered in polyethylene protection with silica gel crystals to absorb moisture. If an electric actuator is attached to the SR gearbox, refer to the storage procedures in its respective manual for appropriate storage procedures. Rotate input shafts every three months to mix the lubricant.

2.4 Safety Precautions

☠ **WARNING:** Read this Installation, Operation and Maintenance manual carefully and completely before attempting to install, operate or trouble-shoot the Limitorque gearbox.

☠ **WARNING:** Potential HIGH-PRESSURE vessel — be aware of high-pressure hazards associated with the attached valve or other actuated device when installing or performing maintenance on the gearbox. Do not remove the gearbox mounting bolts from the valve or actuated device unless the valve or device stem is secured or there is no pressure in the line.

☠ **WARNING:** For maintenance and/or disassembly of the gearbox while installed on the valve, ensure that the gearbox is not under thrust or torque load. If the valve must be left in service, the valve stem must be locked in such a way as to prevent any movement of the valve stem.

☠ **WARNING:** Do not manually operate the gearbox with devices other than the installed handwheel. Using force beyond the ratings of the gearbox and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches, or other devices on the gearbox handwheel may cause serious personal injury and/or damage to the gearbox and valve.

☠ **WARNING:** Do not exceed any design limitations or make modifications to this equipment without first consulting Flowserve Limitorque.

☠ **WARNING:** Use of this product must be suspended any time it fails to operate properly.

⚠ **CAUTION:** If a motor actuator is driving the gearbox, do not operate the valve under motor operation without first checking and setting the limit switch and checking for correct motor rotation.

⚠ **CAUTION:** Do not use replacement parts that are not genuine Flowserve Limitorque parts, as serious personal injury and/or damage to the gearbox and valve may result.

2.5 Safety Practices

The following checkpoints should be performed to maintain safe operation of the SR gearbox:

• Set up a periodic operating schedule on infrequently used valves.

• Ensure that the limit and/or torque switches on any electric actuator fitted to the SR gearbox are correctly and appropriately adjusted.

2.6 General Mounting Instructions

The mounting instructions for the SR spur gearboxes are outlined below. The SR200 through SR600 gearboxes are designed with a splined top-entry Stem Nut which is retained in the Drive Sleeve by two Lock Nuts.

The SR200H through SR600H gearboxes are designed with a Stem Nut which is retained by two Thrust Roller Bearings within the Thrust Housing and Thrust Base. Partial disassembly of the Thrust Base is required for Stem Nut removal and/or installation.

2.6.1 Installing a Gearbox with a Threaded Stem Nut – SR200 through SR600 and SR200H through SR600H

1. Position the gearbox above the valve stem.
2. Rotate the gearbox handwheel or wrench nut several turns until there is positive engagement between the valve stem and the gearbox Stem Nut.
3. Rotate the handwheel to lower the gearbox onto the valve until contact has been made with the valve flange.
4. Bolt the gearbox securely to the valve mounting flange.

2.6.2 Installing a Gearbox with a Blank Stem Nut – SR200 through SR600

Refer to Figure 5.1

1. Remove the Stem Cover Adapter (pc# 28) by loosening the Set Screw (pc# 20).
2. Remove the two threaded Lock Nuts (pc# 7) from the Drive Sleeve (pc# 6), accessed through the top of the Housing (pc# 1).
3. Remove the Stem Nut (pc# 5) from the Drive Sleeve (pc# 6) through the top of the Housing (pc# 1).
4. Machine the Stem Nut (pc# 5) to suit the valve stem.

⚠ **CAUTION:** Care must be taken to ensure that the clamping devices used during machining do not damage splined surfaces of the Stem Nut.

5. Reinstall the Stem Nut (pc# 5) into the Drive Sleeve (pc# 6), ensuring the splines are properly engaged.
6. Reinstall the two threaded Lock Nuts (pc# 7) into the Drive Sleeve (pc# 6).
7. Install the Stem Cover Adapter (pc# 28) and tighten the Set Screw (pc# 20).
8. Mount the gearbox on the valve as detailed in Section 2.6.1 Installing a Gearbox with a Threaded Stem Nut.

2.6.3 Installing a Gearbox with a Blank Stem Nut – SR200H through SR600H

Refer to Figure 5.2

1. Place the gearbox upside down to access the mounting base.
2. Remove the Socket Head Cap Screws (pc# 34) which mount the Thrust Base (pc# 31) to the Thrust Housing (pc# 37).
3. Remove the Thrust Base (pc# 31) and Gasket (pc# 32) from the Thrust Housing (pc# 37).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 35) located in the Thrust Base (pc# 31) is not damaged during disassembly.

4. Remove the Stem Nut (pc# 5) and lower Thrust Roller Bearing (pc# 33).
5. Remove the upper Thrust Roller Bearing (pc# 33). Place all bearings in a clean, dry area until reassembly.
6. Machine the Stem Nut (pc# 5) to suit the valve stem.

⚠ **CAUTION:** Care must be taken to ensure that the clamping devices used during machining do not damage the outer surface of the Stem Nut (pc# 5) which seals against the O-ring (pc# 35).

7. Reinstall the upper Thrust Roller Bearing (pc# 33) into the Thrust Housing (pc# 37).

8. Install the Stem Nut (pc# 5) into the Thrust Housing (pc# 37) and upper Thrust Roller Bearing (pc# 33).
9. Install the lower Thrust Roller Bearing (pc# 33) onto the Stem Nut (pc# 5).
10. Place the Gasket (pc# 32) onto the Thrust Housing (pc# 37).
11. Separately, install the O-ring (pc# 35) in the Thrust Base (pc# 31).
12. Install the Thrust Base (pc# 31) with O-ring (pc# 35) onto the Thrust Housing (pc# 37) and Stem Nut (pc# 5), using Socket Head Cap Screws (pc# 34).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 35) located in the Thrust Base (pc# 31) is not damaged during installation.

13. Mount the gearbox on the valve as detailed in Section 2.6.1 Installing a Gearbox with a Threaded Stem Nut.

2.7 Stem Cover Mounting Instructions

Refer to Figure 5.1

The gearbox is supplied with a Stem Cover Adapter (pc# 28) which accepts unthreaded Stem Covers of standard NPS pipe sizes. Optionally, the adapter may be removed to access PF (BSPP) pipe threads, if required.

2.7.1 Installing an unthreaded Stem Cover using the supplied Stem Cover Adapter

⚠ **CAUTION:** Care must be taken to ensure the Stem Cover does not damage the O-ring during installation.

NOTE: Lubricate the O-ring (pc# 27) before installing the Stem Cover.

1. Loosen the quantity (4) set screws (pc# 30) in the Stem Cover Adapter (pc# 28).
2. Install the Stem Cover into the Stem Cover Adapter (pc# 28) and secure using the quantity (4) set screws (pc# 30).

2.7.2 Installing a threaded Stem Cover using the optional PF (BSPP) pipe threads

⚠ **CAUTION:** Care must be taken during installation to prevent damage to the Stem Cover and Housing threads.

NOTE: Apply thread sealant to external threads on Stem Cover before installing.

1. Loosen the set screw (pc# 20) in the Housing (pc# 1).
2. Remove the Stem Cover Adapter (pc# 28) with O-ring (pc# 27) by unthreading it from the Housing (pc# 1).
3. Remove and discard the O-ring (pc# 26).
4. Install the threaded Stem Cover into the Housing (pc# 1) and tighten.

3 Lubrication

Flowserve Limitorque SR gearboxes are shipped with the following lubricants:

Table 3.1 – Lubricants

Product	Lubricant	Soap Base	Temperature Range
SR200 through SR600	Zenith LH2	Calcium	-40°C to 90°C (-40°F to 194°F)
SR200H through SR600H	Zenith LH2	Calcium	-40°C to 90°C (-40°F to 194°F)

NOTE: The lubricant should be checked every 18 months for gearboxes.

⚠ **CAUTION:** Do not add a different lubricant to a Flowserve Limitorque gearbox unless it is of the same soap base as the existing lubricant, or you have received the approval of the lubricant manufacturer.

Quantity

Limitorque SR gearboxes are lubricated so that all bearings and gearing/gear contact areas are liberally coated with grease. The gearboxes do not require additional lubricant under normal operating conditions.

Quality

Remove a small amount of lubricant and inspect for any contaminant, including water. Should dirt, water, or other foreign matter be found, the lubricant must be replaced. Partial disassembly of the gearbox will be required. Contact Flowserve Limitorque with the gearbox order number or serial number for replacement parts, if required.

Consistency

The main gearbox lubricant should be slightly fluid, approximating a standard NLGI-2 grade consistency or less.

Alternate lubricants may be used in place of the standard lubricants supplied by Flowserve, provided they are of a formulation similar to those listed above for the respective product.

4 Product Weights

Table 4.1 - SR and SRH Gearbox Weights

	SR and SRH Gearbox Weights	
	Basic Gearbox	
	Lbs	Kg
SR200	110	50
SR300	154	70
SR400	322	146
SR500	567	257
SR600	807	366
SR200H	172	78
SR300H	243	110
SR400H	414	188
SR500H	732	332
SR600H	1058	480

5 Disassembly and Reassembly Instructions

WARNING: See Section 2.4 Safety Precautions and 2.5 Safety Practices before undertaking the steps below.

5.1 Disassembly and Reassembly of SR200 through SR600

Disassembly Instructions

Refer to Figure 5.1

1. Loosen the Set Screw (pc# 20) and remove the Stem Cover Adapter (pc# 28) with O-rings (pc# 26 and pc# 27) from the Housing (pc# 1).
2. Remove the two threaded Lock Nuts (pc# 7) from the Drive Sleeve (pc# 6), accessing through the top of the Housing (pc# 1).
3. Lift the Stem Nut (pc# 5) from the Drive Sleeve through the top of the Housing (pc# 1) using Eye Bolts (pc# 23) provided.
4. Separately, remove the O-rings (pc#26 and pc# 27) from the Stem Cover Adapter (pc# 28).

CAUTION: Care must be taken to ensure that the O-rings (pc# 26 and pc# 27) are not damaged during disassembly.

5. Remove the Key (pc# 24) from the Input Shaft & Pinion (pc# 4).
6. Remove the Cap Screws (pc# 10) and the Input Flange (pc# 8) with upper Oil Seal (pc# 25).
7. Separately, remove the upper Oil Seal (pc# 25) from the Input Flange (pc# 8).
8. Remove the Cap Screws (pc# 9) and lift the Housing (pc# 1) from the Base (pc# 2) using the Eye Bolts (pc# 23) provided.

CAUTION: Care must be taken to ensure that the O-ring (pc# 15) and Oil Seal (pc# 25) located in the Housing (pc# 1) are not damaged during disassembly.

9. Separately, remove the upper O-ring (pc# 15) and lower Oil Seal (pc# 25) from the Housing (pc# 1).
10. Remove the Gasket (pc# 22) from the Base (pc# 2).
11. Remove the two upper Radial Ball Bearings (pc# 12) from the Input Shaft & Pinion (pc# 4). Place all bearings in a clean, dry area until reassembly.
12. Remove the Input Shaft & Pinion (pc# 4) and lower Radial Ball Bearing (pc# 11) from the Base (pc# 2). Place bearing in a clean, dry area until reassembly.
13. Remove the upper Radial Ball Bearing (pc# 11) from the Intermediate Helical Pinion (pc# 17). Place bearing in a clean, dry area until reassembly.
14. Remove the Retaining Ring (pc# 29) and the Intermediate Helical Gear (pc# 16) from the Intermediate Helical Pinion (pc# 17).
15. Remove the Intermediate Helical Pinion (pc# 17) and lower Radial Ball Bearing (pc# 11) from the Base (pc# 2).
16. Remove the upper Thrust Ball Bearing (pc# 14) from the Drive Sleeve (pc# 6). Place bearing in a clean, dry area until reassembly.
17. Remove the Output Helical Gear (pc# 3) from the Drive Sleeve (pc# 6).
18. Remove the Drive Sleeve (pc# 6) from the Base (pc# 2) and lower Thrust Ball Bearing (pc# 13).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 15) located in the Base (pc# 2) is not damaged during disassembly.

19. Remove the lower Thrust Ball Bearing (pc# 13) from the Base (pc# 2). Place bearing in a clean, dry area until reassembly.
20. Remove the O-ring (pc# 15) from the Base (pc# 2).

Reassembly Instructions

Refer to Figure 5.1

1. Install the O-ring (pc# 15) in the Base (pc# 2).

NOTE: Lubricate all O-rings before installation

2. Install the lower Thrust Ball Bearing (pc# 13) in the Base (pc# 2).
3. Install the Drive Sleeve (pc# 6) into the Base (pc# 2) and Thrust Ball Bearing (pc# 13).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring located in the Thrust Base is not damaged during installation.

4. Install the Output Helical Gear (pc# 3) onto the Drive Sleeve (pc# 6), ensuring the gear is properly seated with splines fully engaged.
5. Install the upper Thrust Ball Bearing (pc# 14) onto the Drive Sleeve (pc# 6).
6. Install the lower Radial Ball Bearing (pc# 11) and Intermediate Helical Pinion (pc# 17) in the Base (pc# 2).
7. Install the Intermediate Helical Gear (pc# 16) and Retaining Ring (pc# 29) onto the Intermediate Helical Pinion (pc# 17).
8. Install the upper Radial Ball Bearing (pc# 11) on the Intermediate Helical Pinion (pc# 17).
9. Install the lower Radial Ball Bearing (pc# 11) and Input Shaft & Pinion (pc# 4) in the Base (pc# 2).
10. Install the two upper Radial Ball Bearings (pc# 12) on the Input Shaft & Pinion (pc# 4).

11. Place the Gasket (pc# 22) in position on the Base (pc# 2).

12. Separately, install the upper O-ring (pc# 15) and lower Oil Seal (pc# 25) in the Housing (pc# 1).

NOTE: Lubricate all O-rings before installation.

13. Lower the Housing (pc# 1) into position onto the Base (pc# 2) using the Eye Bolts (pc# 23) and secure with the Cap Screws (pc# 9).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 15) and Oil Seal (pc# 25) located in the Housing (pc# 1) are not damaged during reassembly.

14. Separately, install the upper Oil Seal (pc# 25) in the Input Flange (pc# 8).

15. Install the Input Flange (pc# 8) with upper Oil Seal (pc# 25) over the Input Shaft & Pinion (pc# 4) onto the Housing (pc# 1) and secure using the Cap Screws (pc# 10).

⚠ **CAUTION:** Care must be taken to ensure that the Oil Seal (pc# 25) located in the Input Flange (pc# 8) is not damaged during reassembly.

NOTE: Lubricate sealing surfaces of the Input Shaft (pc# 8) and Oil Seal (pc# 25) before reassembly.

16. Install the Key (pc# 24) onto the Input Shaft & Pinion (pc# 4).

17. Lower the Stem Nut (pc# 5) through the top of the Housing (pc# 1) and into position in the Drive Sleeve (pc# 6) using the Eye Bolts (pc# 23) provided.

⚠ **CAUTION:** Ensure splines are properly engaged and Stem Nut (pc# 5) fully seated in position in the Drive Sleeve (pc# 6).

18. Install the two threaded Lock Nuts (pc# 7) into the Drive Sleeve (pc# 6), accessing through the top of the Housing (pc# 1).

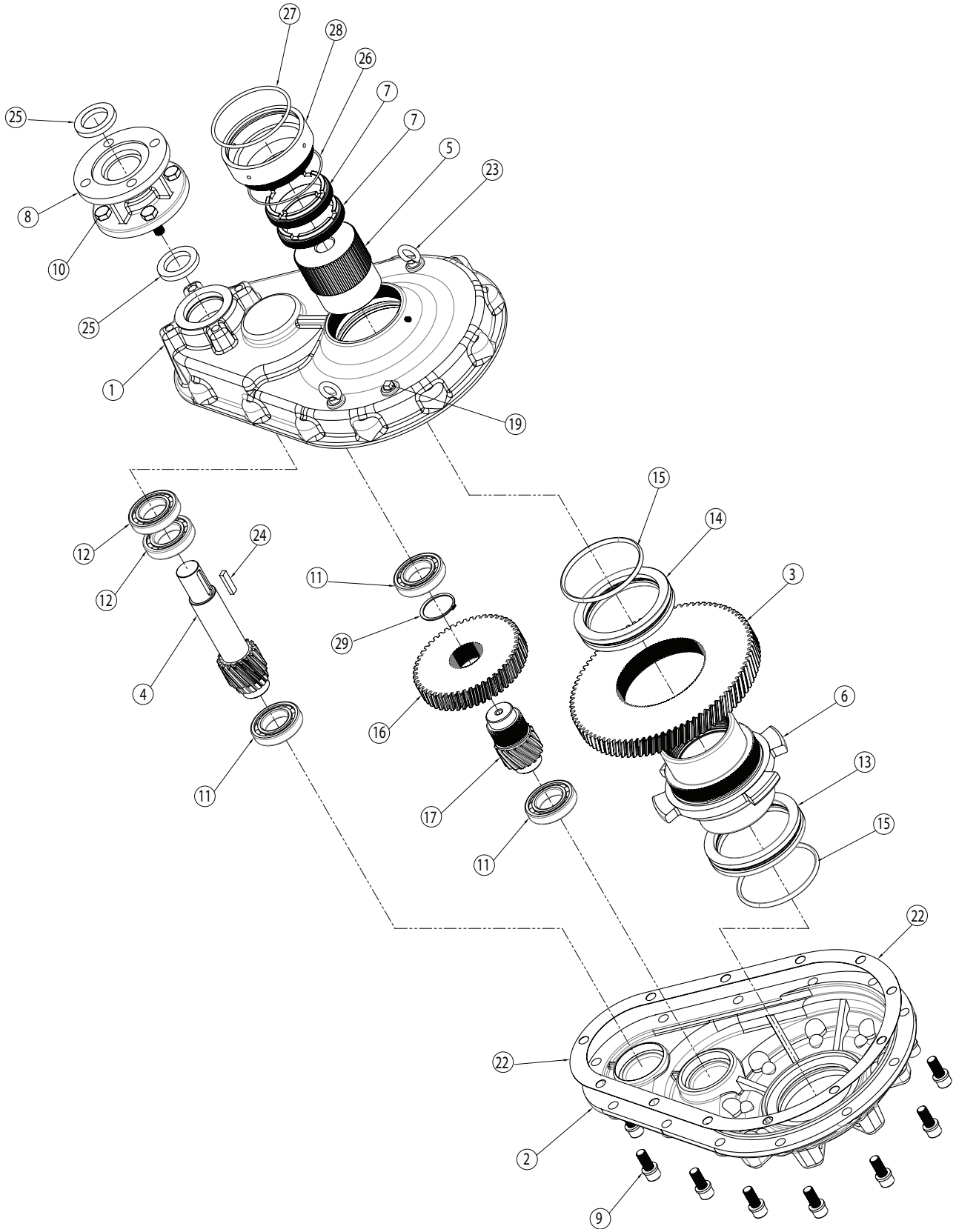
19. Separately, install the O-rings (pc# 26 and pc# 27) onto the Stem Cover Adapter (pc# 28).

NOTE: Lubricate all O-rings before installation.

20. Install the Stem Cover Adapter (pc# 28) with O-rings (pc# 26 and pc# 27) into the Housing (pc# 1). Tighten the Set Screw (pc# 20).

NOTE: Upon reassembly, ensure the Input Shaft can be rotated freely without binding.

Figure 5.1 - SR200 - SR600 Assembly View



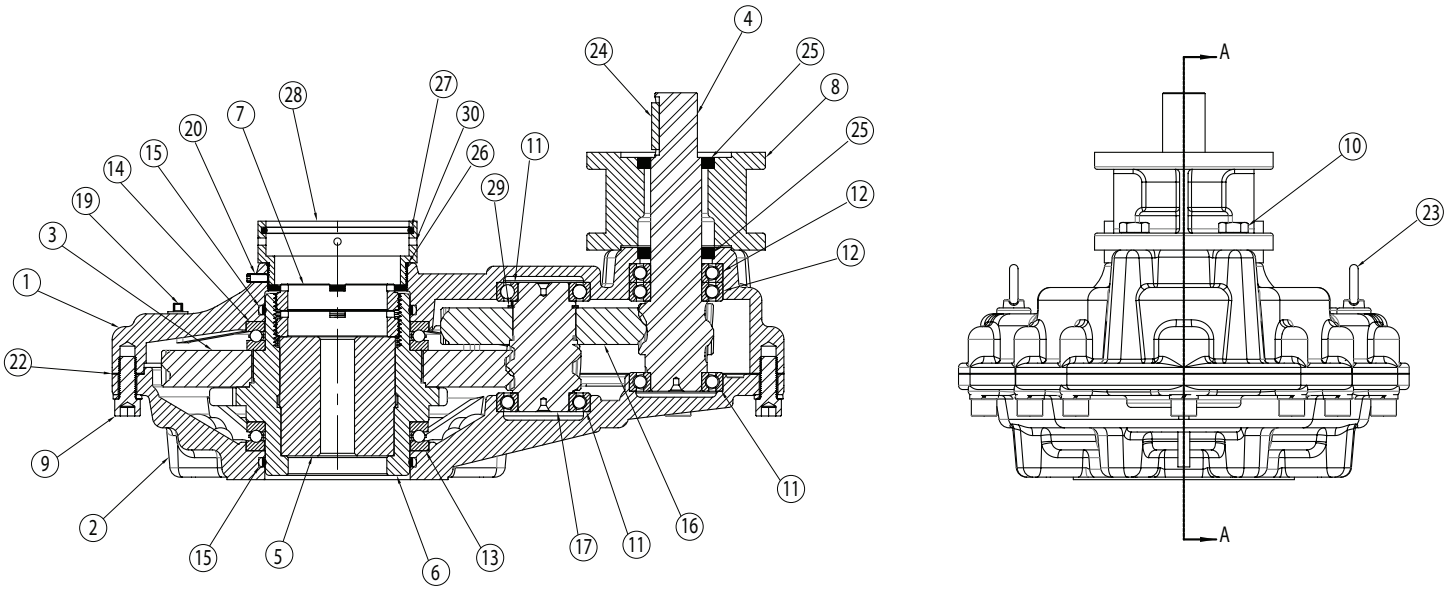


Table 5.1 - SR200 through SR600 Parts List

SR		
Item No.	Description	QTY
1	HOUSING	1
2	BASE	1
3	OUTPUT HELICAL GEAR	1
4	INPUT SHAFT & PINION	1
5	STEM NUT	1
6	DRIVE SLEEVE	1
7	LOCK NUT	2
8	INPUT FLANGE	1
9	CAP SCREW	12
10	CAP SCREW	4
11	RADIAL BALL BEARING	3
12	RADIAL BALL BEARING	2
13	THRUST BALL BEARING	1
14	THRUST BALL BEARING	1
15	O-RING	2

Item No.	Description	QTY
16	INTERMEDIATE HELICAL GEAR	1
17	INTERMEDIATE HELICAL PINION	1
18	N/A	N/A
19	PIPE PLUG	1
20	SET SCREW	1
21	N/A	N/A
22	GASKET	1
23	EYE BOLT	2
24	KEY	1
25	OIL SEAL	2
26	O-RING	1
27	O-RING	1
28	STEM COVER ADAPTER	1
29	RETAINING RING	1
30	SET SCREW	4

5.2 Disassembly and Reassembly of SR200H through SR600H

Disassembly Instructions

Refer to Figure 5.2

1. Loosen the Set Screw (pc# 20) and remove the Stem Cover Adapter (pc# 28) with O-rings (pc# 26 and pc# 27) from the Housing (pc# 1).
2. Separately, remove the O-rings (pc#26 and pc# 27) from the Stem Cover Adapter (pc# 28).

⚠ **CAUTION:** Care must be taken to ensure that the O-rings (pc# 26 and pc# 27) are not damaged during disassembly.

3. Remove the Key (pc# 24) from the Input Shaft & Pinion (pc# 4).
4. Remove the Cap Screws (pc# 10) and the Input Flange (pc# 8) with upper Oil Seal (pc# 25).
5. Separately, remove the upper Oil Seal (pc# 25) from the Input Flange (pc# 8).
6. Remove the Cap Screws (pc# 9) and lift the Housing (pc# 1) from the Base (pc# 2) using the Eye Bolts (pc# 23) provided.

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 15) and Oil Seal (pc# 25) located in the Housing (pc# 1) are not damaged during disassembly.

7. Separately, remove the upper O-ring (pc# 15) and lower Oil Seal (pc# 25) from the Housing (pc# 1).
8. Remove the Gasket (pc# 22) from the Base (pc# 2).
9. Remove the two upper Radial Ball Bearings (pc# 12) from the Input Shaft & Pinion (pc# 4). Place all bearings in a clean, dry area until reassembly.
10. Remove the Input Shaft & Pinion (pc# 4) and lower Radial Ball Bearing (pc# 11) from the Base (pc# 2). Place bearing in a clean, dry area until reassembly.
11. Remove the upper Radial Ball Bearing (pc# 11) from the Intermediate Helical Pinion (pc# 17). Place bearing in a clean, dry area until reassembly.
12. Remove the Retaining Ring (pc# 29) and the Intermediate Helical Gear (pc# 16) from the Intermediate Helical Pinion (pc# 17).
13. Remove the Intermediate Helical Pinion (pc# 17) and lower Radial Ball Bearing (pc# 11) from the Base (pc# 2).
14. Remove the upper Thrust Ball Bearing (pc# 14) from the Drive Sleeve (pc# 6). Place bearing in a clean, dry area until reassembly.
15. Remove the Output Helical Gear (pc# 3) from the Drive Sleeve (pc# 6).
16. Remove the Drive Sleeve (pc#6) from the Base (pc# 2) and lower Thrust Ball Bearing (pc# 13).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 15) located in the Base (pc# 2) is not damaged during disassembly.

17. Remove the lower Thrust Ball Bearing (pc# 13) from the Thrust Housing (pc# 37). Place the bearing in a clean, dry area until reassembly.
18. Remove the upper O-ring (pc# 35) from the Thrust Housing (pc# 37).
19. Remove the Cap Screws (pc# 38) and lift the Base (pc# 2) from the Thrust Housing (pc# 37).
20. Remove the Gasket (pc# 36) from the Thrust Housing (pc# 37).
21. Place the Thrust Base & Thrust Housing Subassembly upside down to access the Thrust Base (pc# 31).
22. Remove the Cap Screws (pc# 34) which mount the Thrust Base (pc# 31) to the Thrust Housing (pc# 37).
23. Remove the Thrust Base (pc# 31) with lower O-ring (pc# 35) from the Thrust Housing (pc# 37) and Stem Nut (pc# 5).

24. Remove the Gasket (pc# 32) from the Thrust Housing (pc# 37).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 35) located in the Thrust Base (pc# 31) is not damaged during disassembly.

25. Separately, remove the O-ring (pc# 35) from the Thrust Base (pc# 31).
26. Remove the lower Thrust Roller Bearing (pc# 33) from the Stem Nut (pc# 5).
27. Remove the Stem Nut (pc# 5) from the upper Thrust Roller Bearing (pc# 33) and Thrust Housing (pc# 37).
28. Remove the upper Thrust Roller Bearing (pc# 33) from the Thrust Housing (pc# 37). Place all bearings in a clean, dry area until reassembly.

Reassembly Instructions

Refer to Figure 5.2

1. Place the Thrust Housing (pc# 37) upside down for internal access.
2. Install the upper Thrust Roller Bearing (pc# 33) into the Thrust Housing (pc# 37).
3. Install the Stem Nut (pc# 5) into the Thrust Housing (pc# 37) and upper Thrust Roller Bearing (pc# 33).
4. Install the lower Thrust Roller Bearing (pc# 33) onto the Stem Nut (pc# 5).
5. Separately, install the O-ring (pc# 35) in the Thrust Base (pc# 31).
6. Place the Gasket (pc# 32) onto the Thrust Housing (pc# 37).
7. Place the Thrust Base (pc# 31) with O-ring (pc# 35) onto the Thrust Housing (pc# 37) and Stem Nut (pc# 5).
8. Secure the Thrust Base (pc# 31) to the Thrust Housing (pc# 37) using Cap Screws (pc# 34).
9. Place the Thrust Base & Thrust Housing Subassembly in the upright position.
10. Place the Gasket (pc# 36) onto the Thrust Housing (pc# 37).
11. Place the Base (pc# 2) onto the Thrust Housing (pc# 37) and secure using Cap Screws (pc# 38).
12. Install the upper O-ring (pc# 35) in the Thrust Housing (pc# 37).

NOTE: Lubricate all O-rings before installation

13. Install the lower Thrust Ball Bearing (pc# 13) in the Thrust Housing (pc# 37).
14. Install the Drive Sleeve (pc# 6) into the Thrust Housing (pc# 37) and lower Thrust Ball Bearing (pc# 13).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc#36) located in the Thrust Housing (pc# 37) is not damaged during installation.

15. Install the Output Helical Gear (pc# 3) onto the Drive Sleeve (pc# 6), ensuring the gear is properly seated with splines fully engaged.
16. Install the upper Thrust Ball Bearing (pc# 14) onto the Drive Sleeve (pc# 6).
17. Install the lower Radial Ball Bearing (pc# 11) and Intermediate Helical Pinion (pc# 17) in the Base (pc# 2).
18. Install the Intermediate Helical Gear (pc# 16) and Retaining Ring (pc# 29) onto the Intermediate Helical Pinion (pc# 17).
19. Install the upper Radial Ball Bearing (pc# 11) on the Intermediate Helical Pinion (pc# 17).

20. Install the lower Radial Ball Bearing (pc# 11) and Input Shaft & Pinion (pc# 4) in the Base (pc# 2).
21. Install the two upper Radial Ball Bearings (pc# 12) on the Input Shaft & Pinion (pc# 4).
22. Place the Gasket (pc# 22) in position on the Base (pc# 2).
23. Separately, install the upper O-ring (pc# 15) and lower Oil Seal (pc# 25) in the Housing (pc# 1).

NOTE: Lubricate all O-rings before installation.

24. Lower the Housing (pc# 1) into position onto the Base (pc# 2) using the Eye Bolts (pc# 23) and secure with the Cap Screws (pc# 9).

⚠ **CAUTION:** Care must be taken to ensure that the O-ring (pc# 15) and Oil Seal (pc# 25) located in the Housing (pc# 1) are not damaged during reassembly.

25. Separately, install the upper Oil Seal (pc# 25) in the Input Flange (pc# 8).
26. Install the Input Flange (pc# 8) with upper Oil Seal (pc# 25) over the Input Shaft & Pinion (pc# 4) onto the Housing (pc# 1) and secure using the Cap Screws (pc# 10).

⚠ **CAUTION:** Care must be taken to ensure that the Oil Seal (pc# 25) located in the Input Flange (pc# 8) is not damaged during reassembly.

NOTE: Lubricate sealing surfaces of the Input Shaft (pc# 8) and Oil Seal (pc# 25) before reassembly.

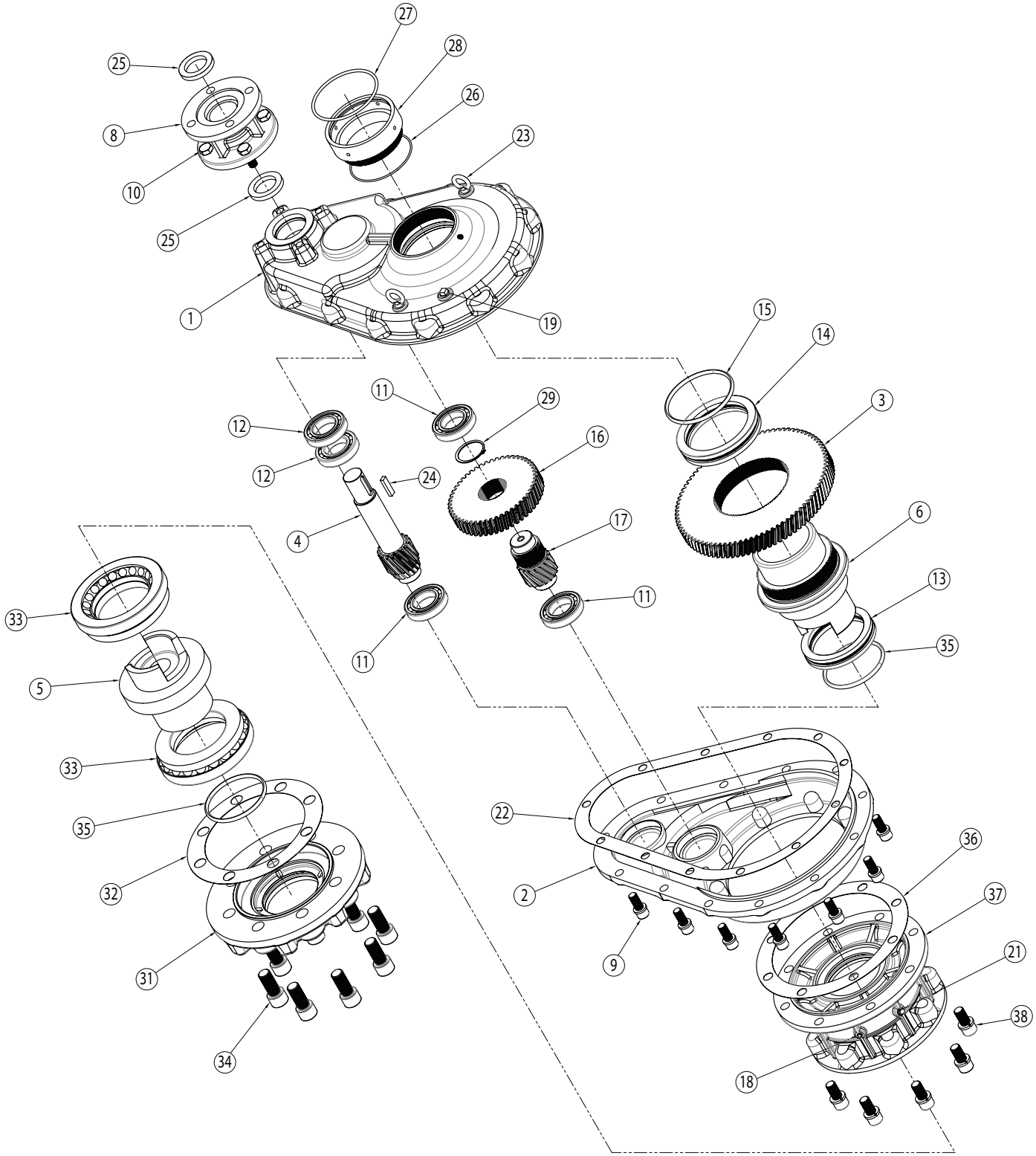
27. Install the Key (pc# 24) onto the Input Shaft & Pinion (pc# 4).
28. Separately, install the O-rings (pc# 26 and pc# 27) onto the Stem Cover Adapter (pc# 28).

NOTE: Lubricate all O-rings before installation.

29. Install the Stem Cover Adapter (pc# 28) with O-rings (pc# 26 and pc# 27) into the Housing (pc# 1). Tighten the Set Screw (pc# 20).

NOTE: Upon reassembly, ensure the Input Shaft can be rotated freely without binding.

Figure 5.2 - SR200H – SR600H Assembly View



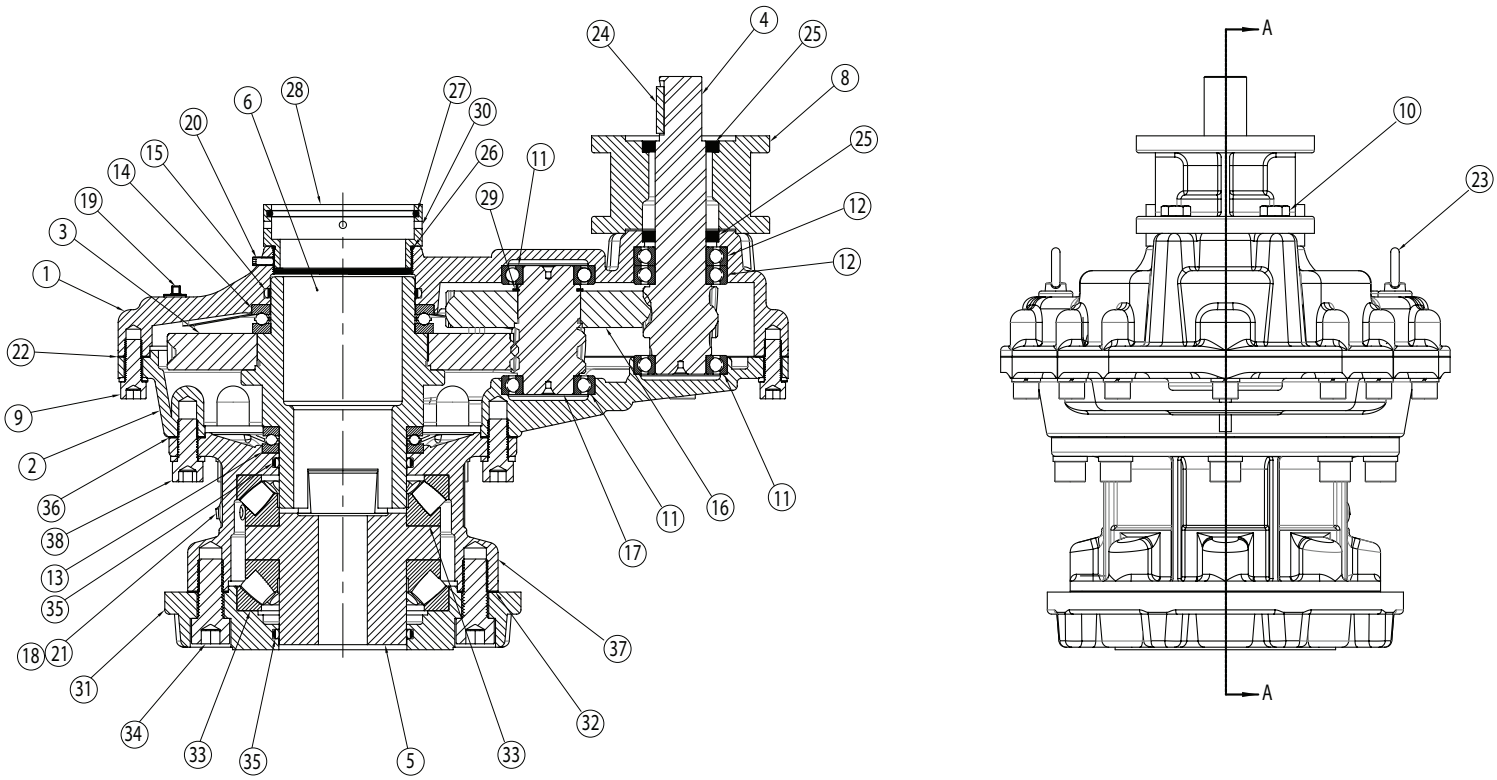


Table 5.2 – SR200H through SR600H Parts List

SRH		
Item No.	Description	QTY
1	HOUSING	1
2	BASE	1
3	OUTPUT HELICAL GEAR	1
4	INPUT SHAFT & PINION	1
5	STEM NUT	1
6	DRIVE SLEEVE	1
7	N/A	N/A
8	INPUT FLANGE	1
9	CAP SCREW	12
10	CAP SCREW	4
11	RADIAL BALL BEARING	3
12	RADIAL BALL BEARING	2
13	THRUST BALL BEARING	1
14	THRUST BALL BEARING	1
15	O-RING	1
16	INTERMEDIATE HELICAL GEAR	1
17	INTERMEDIATE HELICAL PINION	1
18	PIPE PLUG	1
19	PIPE PLUG	1

Item No.	Description	QTY
20	SET SCREW	1
21	PIPE PLUG	1
22	GASKET	1
23	EYE BOLT	2
24	KEY	1
25	OIL SEAL	2
26	O-RING	1
27	O-RING	1
28	STEM COVER ADAPTER	1
29	RETAINING RING	1
30	SET SCREW	4
31	THRUST BASE	1
32	GASKET	1
33	THRUST ROLLER BEARING	2
34	CAP SCREW	8
35	O-RING	2
36	GASKET	1
37	THRUST HOUSING	1
38	CAP SCREW	8

6 How to Order Parts

To order parts or obtain further information for your Limitorque SR Series, contact your local Limitorque distributor sales office, or:

Flowserve Limitorque

5114 Woodall Road
P.O. Box 11318
Lynchburg, VA 24506-1318

Telephone 434 528 4400
Fax 434 845 9736
www.limitorque.com

All inquiries or orders must be accompanied by the following information:

1. Gearbox Size

2. Limitorque Order Number

3. Limitorque Serial Number

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