



MOTORS

Repair Instruction

HP 30 Orbital Motor



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Chapter 1

Bearingless Motor

Topics:

- *Exploded view*
- *Part List*
- *Disassembly*

Exploded view

Single Speed - Bearingless Motor

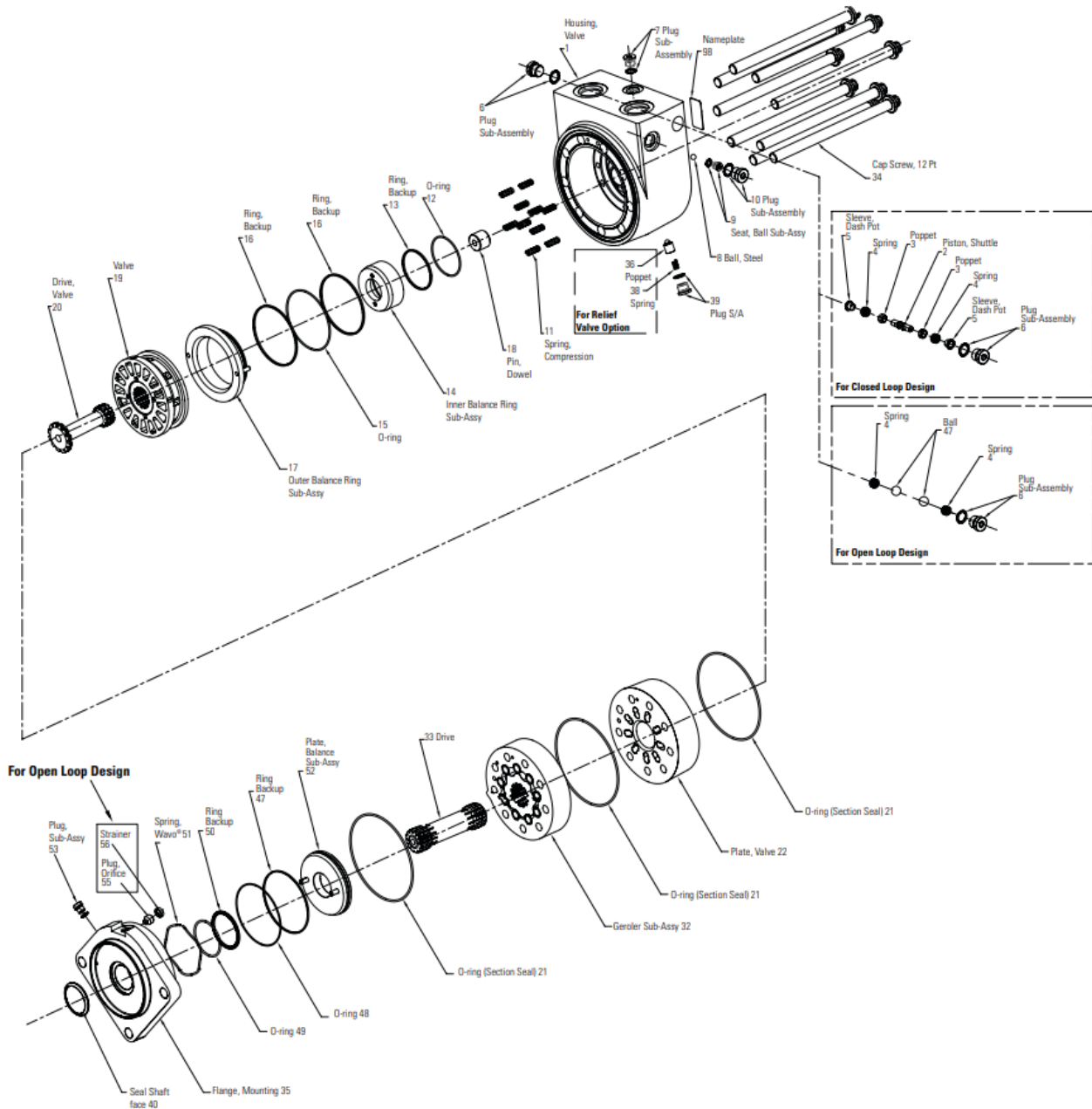


Figure 1 Exploded view -Single Speed - Bearingless Motor

Two Speed - Bearingless Motor

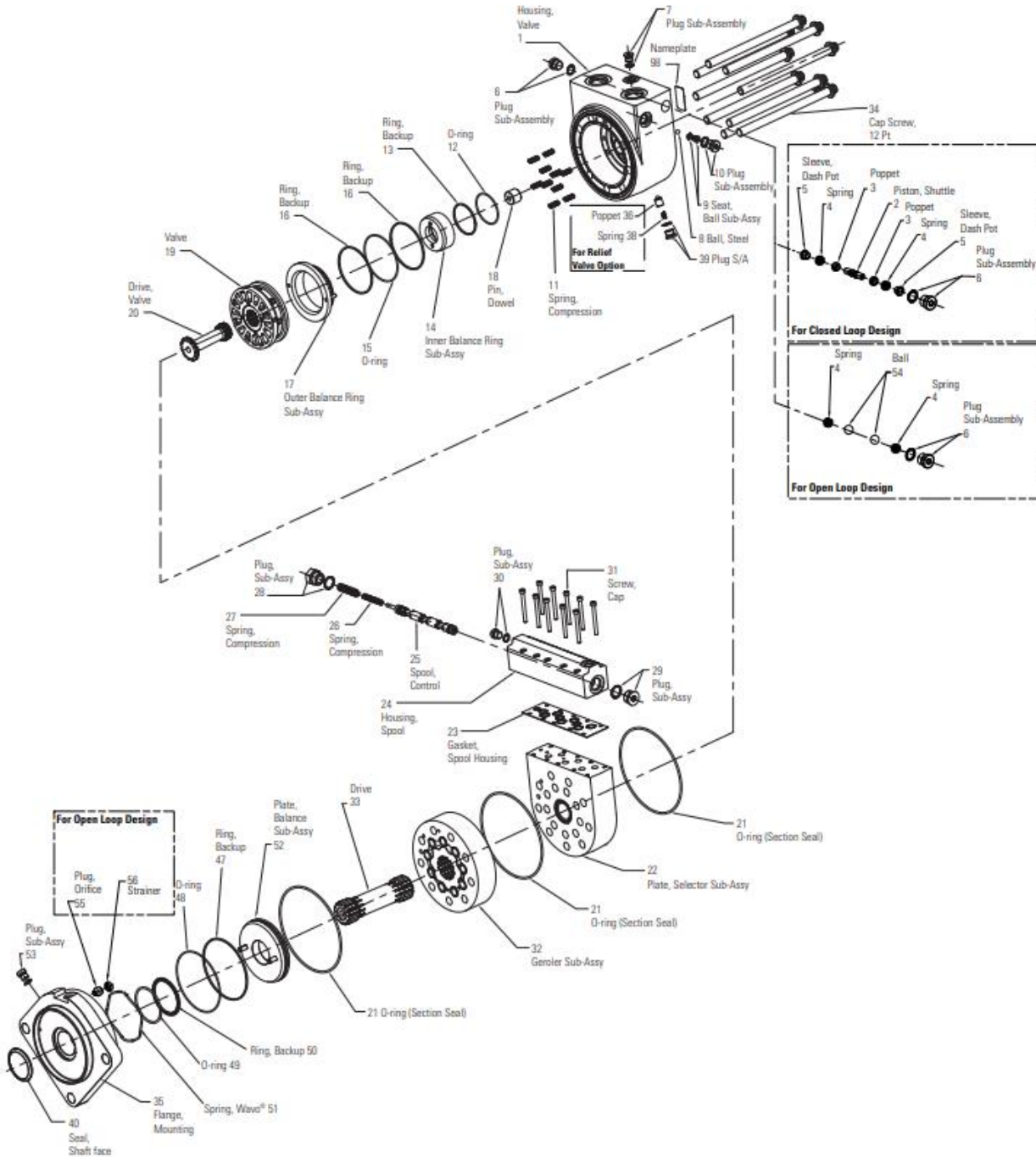


Figure 2 Two Speed - Bearingless Motor

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Part List

Single Speed - Bearingless Motor

Ref No.	Part No.	Description	Quantity
1	6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-002	Housing, Valve 1.3125-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-003	Housing, Valve G 1 BSP Straight Thread Ports	1
2	6048880-002	Piston, Shuttle	1
3	6048879-000	Poppet	2
4	230079-000	Spring	2
5	112126-001	Sleeve, Dash Pot	2
6	9266-006	Plug Sub-Assembly	2
	X 250003-906	O-ring	2
7	9266-006	Plug Sub-Assembly	1
	X 250003-906	O-ring	1
8	18026-000	Ball, Steel	1
9	5992342-001	Seat, Ball Sub-Assy	1
	X 250003-902	O-ring	1
10	9266-006	Plug Sub-Assembly	1
	X 250003-906	O-ring	1
11	6203-000	Spring, Compression	10
X 12	14502-032	O-ring	1
X 13	5989483-001	Ring, Backup	1
14	5991782-001	Inner Balance Ring Sub-Assy	1
	268009-005	Pin, Roll	2
X 15	14502-040	O-ring	1
X 16	5989483-002	Ring, Backup	2
17	5991783-001	Outer Balance Ring Sub-Assy	1
	268009-005	Pin, Roll	2
18	5987800-001	Pin, Dowel	1
19	6030354-001	Valve	1
20	6030970-001	Drive, Valve	1
X 21	250002-161	O-ring (Section Seal)	3
22	5989335-001	Plate, Valve	1
32	*	Geroler Sub-Assy	1
33	*	Drive, Main	1
34	*	Cap Screw, 12 PT	9
35	6033986-001	Flange, Mounting Shuttle Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port In Mounting Flange	1
	6033986-002	Flange, Mounting Check Valve with Orifice Plug, 5625-18 UNF-2B SAE O-Ring Case drain Port In Valve Housing	1
36	113538-001	Poppet (for relief valve unit only)	1
38	6048877-001	Spring (for relief valve unit only)	1
39	9072-004	Plug Sub-Assembly	1
	250003-905	O-ring	1
X 40	9080-001	Seal, Shaft Face	1
X 47	5989483-004	Ring, backup	1
X 48	112530-044	O-ring	1
X 49	112530-139	O-ring	1
X 50	14649-004	Ring, backup	1

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	51	6023120-001	Spring, Wavo®	1
	52	6035183-001	Plate, balance sub-assy	1
		5993989-005	Balance plate	1
		16026-609	Pin, roll	2
	53	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
X	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	1
X	56	31500-452	Strainer (For Open Loop Design Only)	1
		9901191-000	Seal Kit - Contains Parts Indicated by X	
	59	6039391-001	Extreme duty seal (For Seal Option - Extreme Duty Seal Guard Only)	1

Table 1 Single Speed - Bearingless Motor Part List

* = See Chart A/R = As Required

Displacement cm ³ /r [in ³ /r]	Ref. No. 14 GEROLER®	Width mm [in]	Ref. No. 22 DRIVE	Length mm [in]	Ref. No. 23 Screw 12 pt	Length mm [in]
343.8 [20.98]	6033989-001	32,1 [1.26]	5992182-001	130,4 [5.13]	114154-016	177,0 [6.97]
400.0 [24.40]		6033989-002		37,3 [1.47]		5992182-002
434.2 [26.50]	6033989-006	40,6 [1.60]	5992182-006	138,9 [5.47]	114154-025	185,2 [7.29]
479.5 [29.26]		6033989-003		44,7 [1.76]		5992182-003
677.3 [41.33]	6033989-007	63,2 [2.49]	5992182-008	161,2 [6.35]	114154-032	208,5 [8.21]

Table 2 Single-Speed Bearingless Motors Parts dimensions

Two- Speed Bearingless Motor

Ref No.	Part No.	Description	Quantity
1	6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-002	Housing, Valve 1.3125-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-003	Housing, Valve G 1 BSP Straight Thread Ports	1
2	6048880-002	Piston, Shuttle	1
3	6048879-000	Poppet	2
4	230079-000	Spring	2
5	112126-001	Sleeve, Dash Pot	2
X 6	9266-006	Plug Sub-Assembly	2
	250003-906	O-ring	2
X 7	9266-006	Plug Sub-Assembly	1
	250003-906	O-ring	1
8	18026-000	Ball, Steel	1
X 9	5992342-001	Seat, Ball Sub-Assy	1
	250003-902	O-ring	1
X 10	9266-006	Plug Sub-Assembly	1
	250003-906	O-ring	1
11	6203-000	Spring, Compression	10
X 12	14502-032	O-ring	1
X 13	5989483-001	Ring, Backup	1
14	5991782-001	Inner Balance Ring Sub-Assy	1
	268009-005	Pin, Roll	2

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X	15	14502-040	O-ring	1
X	16	5989483-002	Ring, Backup	2
	17	5991783-001	Outer Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
	18	5987800-001	Pin, Dowel	1
	19	6030354-001	Valve	1
	20	6030970-001	Drive, Valve	1
X	21	250002-161	O-ring (Section Seal)	3
	22	5991781-001	Plate, Selector Sub-Assy	1
		5989384-001	Insert, Sleeve	1
X	23	6028001-002	Gasket, Spool Housing	1
	24	5989326-002	Housing, Spool	1
	25	112850-002	Spool, Control	1
	26	112211-001	Spring, Compression	1
	27	114587-001	Spring, Compression	1
	28	9151-002	Plug Sub-Assembly	1
X		250003-908	O-ring	1
	29	9072-006	Plug Sub-Assembly	1
X		250003-908	O-ring	1
	30	9266-003	Plug Sub-Assembly	1
X		250003-904	O-ring	1
	31	16148-320	Screw, Cap	10
	32	*	Geroler Sub-Assy	1
	33	*	Drive, Main	1
	34	*	Cap Screw, 12 PT	9
	35	6033986-001	Flange, Mounting Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port In Mounting Flange	1
		6033986-002	Flange, Mounting Check Valve with Orifice Plug, .5625-18 UNF-2B SAE O-Ring Case drain Port In Valve Housing	1
	36	113538-001	Poppet (for relief valve unit only)	1
	38	6048877-001	Spring (for relief valve unit only)	1
	39	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
X	40	9080-001	Seal, Shaft Face	1
X	47	5989483-004	Ring, Backup	1
X	48	112530-044	O-ring	1
X	49	112530-139	O-ring	1
X	50	14649-004	Ring, Backup	1
	51	6023120-001	Spring, Wavo®	1
	52	6035183-001	Plate, balance sub-assy	1
		5993989-005	Balance plate	1
		16026-609	Pin, roll	2
	53	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
X	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	
X	56	31500-452	Strainer (for open loop design only)	1
		9901148-000	Seal Kit Contains Parts Indicated by X	
	59	6039391-001	Extreme duty seal (For Seal Option - Extreme Duty Seal Guard Only)	1

Table 3 Two-speed Bearingless Motor Part List

* = See Chart A/R = As Required

Displacement cm ³ /r [in ³ /r]	Ref. No. 14 GEROLER	Width mm [in]	Ref. No. 22 DRIVE	Length mm [in]	Ref. No. 23 Screw 12 pt	Length mm [in]
343.8 [20.98]	6033989-001	32,1 [1.26]	5992182-001	130,4 [5.13]	114154-016	177,0 [6.97]
400.0 [24.40]		37,3 [1.47]		135,7 [5.34]		182,6 [7.19]
434.2 [26.50]	6033989-006	40,6 [1.60]	5992182-006	138,9 [5.47]	114154-025	185,2 [7.29]
479.5 [29.26]		44,7 [1.76]		143,1 [5.63]		190,5 [7.50]
677.3 [41.33]	6033989-007	63,2 [2.49]	5992182-008	161,2 [6.35]	114154-032	208,5 [8.21]

Table 4 Two-Speed Bearingless Motors Parts dimensions

Disassembly

Tools required

- 7/32 inch Hex Key (Relief Valve Plug)
- 1/4 inch Hex Key (Shuttle Valve Plug)
- 5/16 inch Hex Key (Spool Housing Plug)
- 5/32 inch Hex Key (Spool Housing Screw, Cap)
- 7/8 Socket
- 9/16 Socket (12 Point Drive)
- Torque wrench - 142 Nm [1260 lb-in] capacity

Disassembly

1. Cleanliness is extremely important when repairing hydraulic motors. Work in a clean area. Before disconnecting the hydraulic motor thoroughly clean the exterior. Remove motor from application and drain the oil from the motor before disassembly.
2. Remove the 9 cap screws and disassemble the motor in the vertical position as shown.
3. Remove shuttle valve (and relief valve if applicable) from Valve Housing.
4. Check all mating surfaces. To reduce the chance of leakage, replace any parts that have scratches or burrs. Wash all metal parts in clean solvent. Blow them dry with pressurized air. Do not wipe parts dry with paper towels or cloth as lint in a hydraulic system will cause damage.

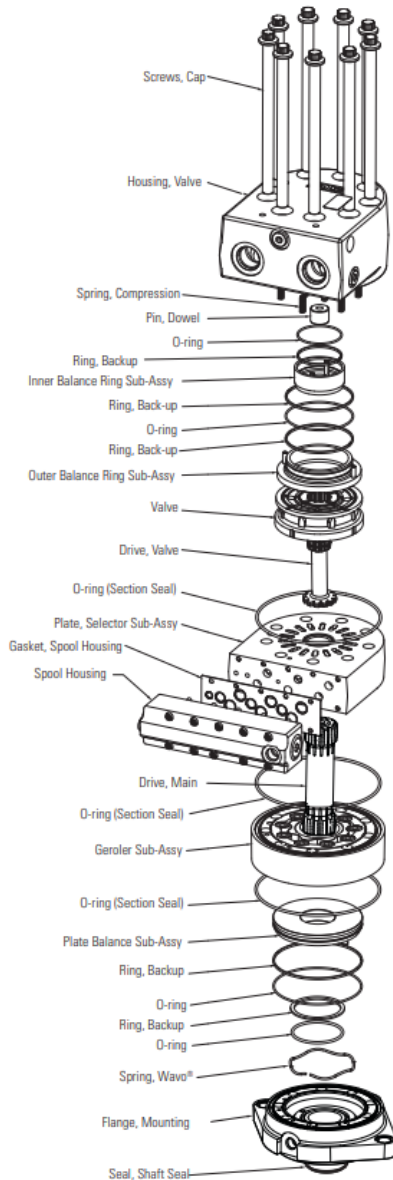


Figure 3 Two-Speed Bearingless Motor

***Note:** Always use new seals when reassembling hydraulic motors. Refer to parts list for seal kit number and replacement parts.

Important: During reassembly, lubricate the new seals with a petroleum jelly such as Vaseline®. Also lubricate machined surfaces with clean hydraulic fluid.

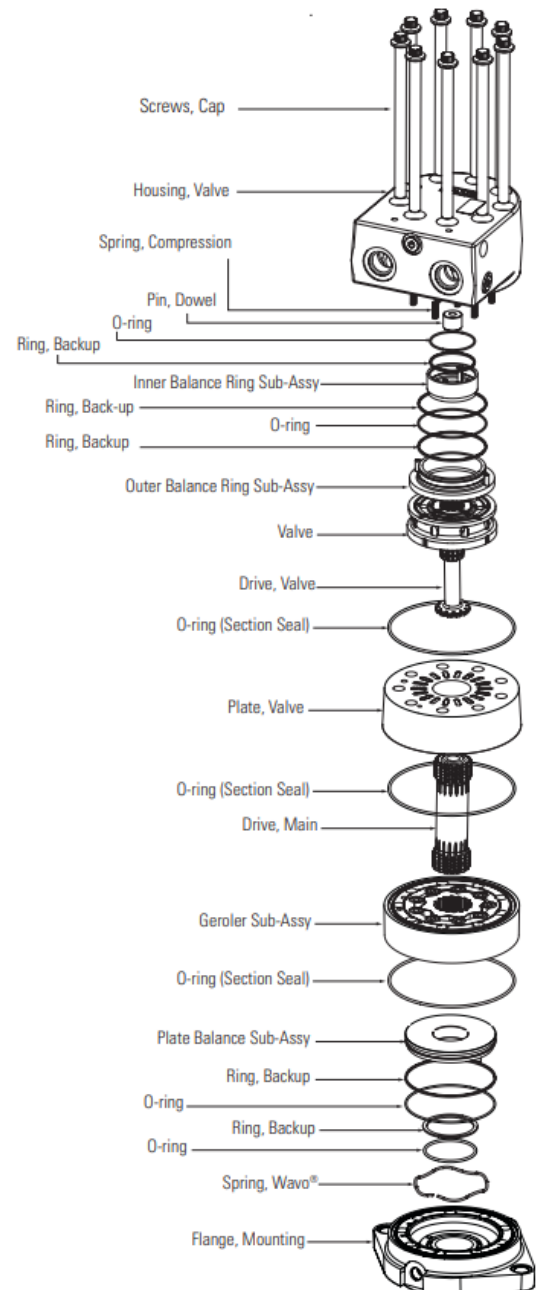


Figure 4 Single Speed Bearingless motor disassembly

Valve housing assembly

1. Install one poppet, spring, dash pot and threaded internal hex plug with O-ring into shuttle valve bore from one end of Valve Housing.
2. Install shuttle piston from opposite end of shuttle valve cavity.
3. Install one shuttle valve poppet, spring, dash pot onto piston and threaded internal hex plug with O-ring from opposite end of shuttle valve cavity.
4. Shuttle plug threads may have light coat of oil or preservative. Torque both plugs to 360 +/- 36 lbf-in.
5. For a motor with open loop design, Install Ball, Spring and threaded internal hex plug with O-ring form one end of cavity. And then install another Ball, Spring and threaded internal hex plug with O-ring from opposite end of cavity. Torque both plugs to 360 +/- 36 lbf-in. Plugs may have light coat of oil or preservative.
6. For a motor with low pressure relief valve, install poppet, spring and plug. Plug threads may have light coat of oil or preservative. Torque plug to 180 +/- 18 lbf-in.
7. For a motor without low-pressure relief valve, Install and torque plug to 180 ± 18 lbf-in. Plug may have light coat of oil or preservative.
8. Install ball and seat ball sub-assembly. Torque seat to 60 +/- 6 lbf-in. Install plug sub-assembly and torque to 360 +/- 36 lbf-in.

Shuttle Valve

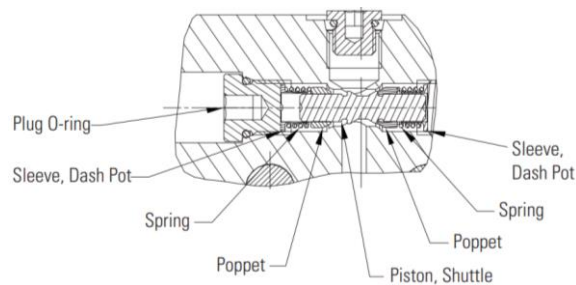


Figure 5 Shuttle valve

Shuttle Valve Parts

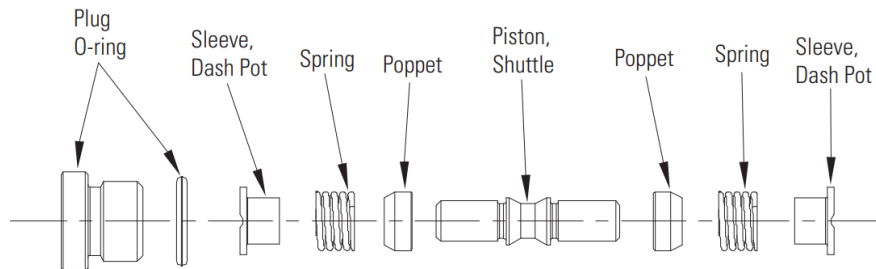


Figure 6 Shuttle Valve Parts

Relief Valve

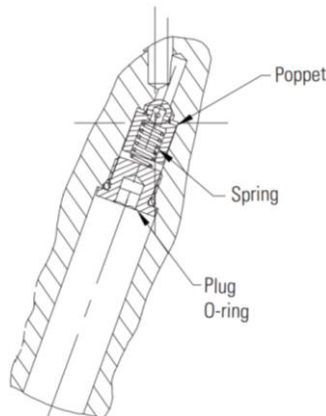


Figure 7 Relief Valve

Relief Valve Parts

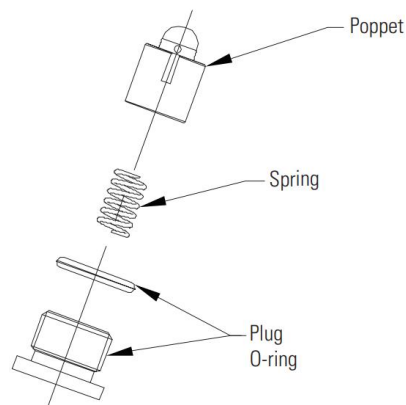


Figure 8 Relief Valve Parts

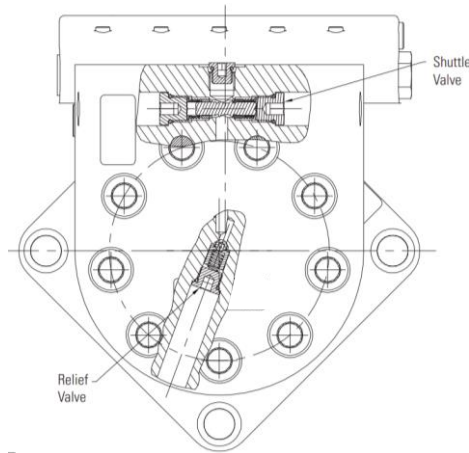


Figure 9 Relief valve

Outer balance ring assembly

1. Install one backup ring (75,1 mm [2.96 in] OD), then one O-ring (72,7 mm[2.86 in] ID) followed by one backup ring (75,1 mm[2.96 in] OD) into the O-ring groove in the outer balance ring. Seals and backups are to be greased. Ensure splits in backup rings are mated correctly. Location of splits in backup rings should not be aligned, a minimum of 90 degrees of separation is recommended.
2. Install one O-ring (47,3 mm [1.86 in] ID) then one backup ring (48,6mm [1.91 in] OD) into the inner balance ring groove, located in the valve housing. Seal and backup are to be greased. Ensure split in backup ring is mated correctly.
3. Grease dowel pin and install in valve housing.
4. Install 10 balance ring springs in valve housing.
5. Install inner and outer balance ring sub-assemblies into valve housing. Ensure O-rings seals are seated.
6. Install greased O-ring section seal (139,4 mm [5.49 in] ID) in valve housing O-ring groove.

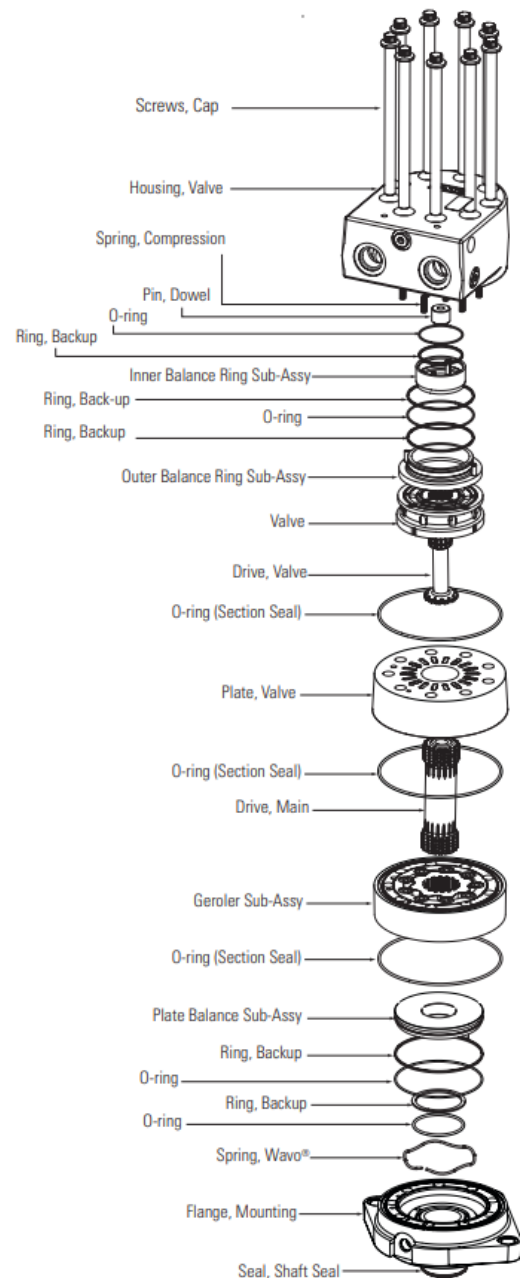


Figure 10 Single Speed

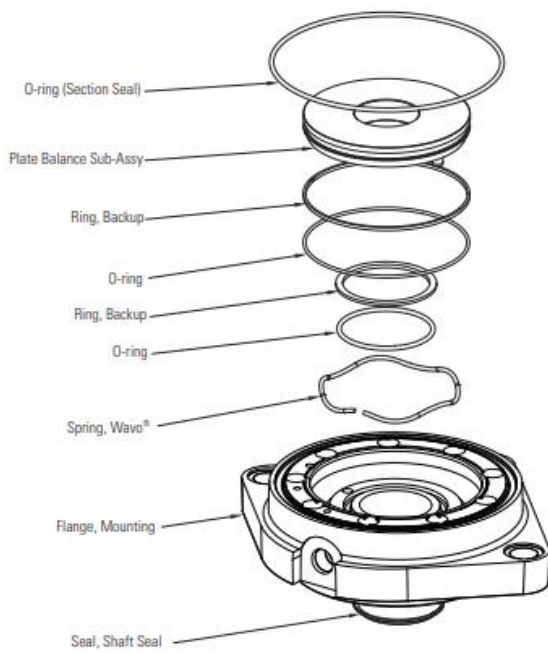


Figure 11 Bearingless Motor Flange Assembly

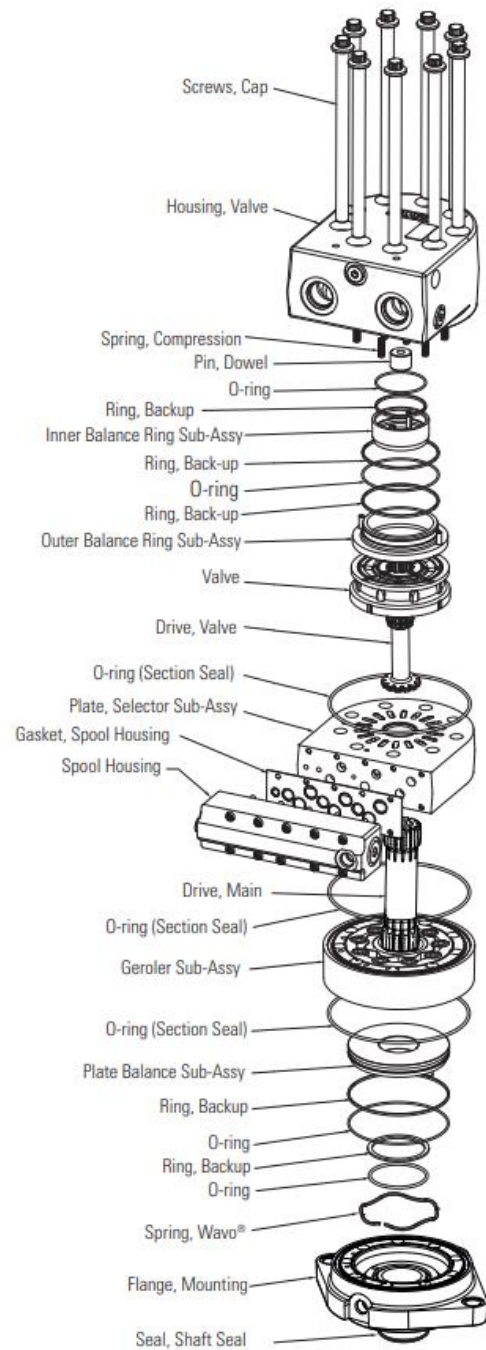


Figure 12 Bearingless Two-speed Motor

Flange assembly (For single speed bearingless motor)

1. Position flange on workbench with the O-ring grooves face down and install face seal (54,1 [2.13] OD).
2. With mounting flange O-ring grooves up, install O-ring section seal (139,4 [5.49] ID) into flange. Install back-up ring (62,1 [2.45] OD) over O-ring (55,2 [2.18] ID) with flat side up. Back-up ring and O-rings may be greased to assist in retaining parts.
3. Install spring in groove in mounting flange.
4. Install back-up ring (99,7 [3.93] OD) in groves of balance plate sub assembly and then install O-ring (95,0 [3.74] ID) over back-up ring from tapered side.
5. Install balance plate sub assembly in mounting flange with tapered side down.
6. Install the Plug, Orifice and then strainer as shown for open loop configuration only.

Final assembly (For single speed bearingless motor)

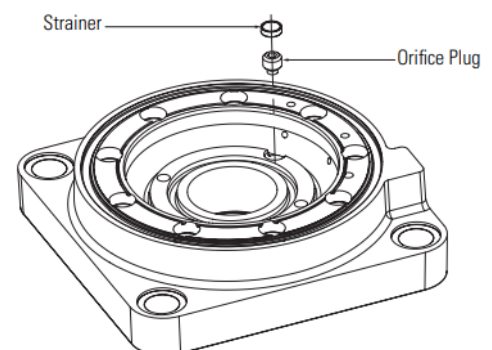
1. Place drive in build fixture. Place mounting flange (seal grooves up) over drive.
2. Place Geroler assembly (seal groove up) over mounting flange. Install greased O-ring section seal (139,4 mm [5.49 in] ID) in seal groove of Geroler assembly. Align shuttle flow hole of Geroler with shuttle flow hole of mounting flange.
3. Mark drive teeth that align with dykem pen. Install valve drive into internal star spline.
4. Install valve plate onto Geroler sub-assembly (valve plate valve slots up). Align shuttle flow hole of valve plate with shuttle flow hole of Geroler sub-assembly.
5. Install valve onto valve drive and selector plate assembly. Ensure long leakage groove is aligned with marked tooth on valve drive.
6. Carefully invert valve housing and place onto valve plate. Make sure that shuttle flow holes are aligned.
7. Install nine cap screws lubricated with DTE-26. Pre-torque each in a crisscross pattern to 80+/-10 lbf-ft. Finally, in a crisscross pattern, tighten screws to 105+/-5 lbf-ft.

Flange assembly (For two speed bearingless motor)

1. Position flange on workbench with the O-ring grooves face down and install face seal (54,1mm [2.13 in] OD).
2. With mounting flange O-ring grooves up (see Figure 4), install O-ring section seal (139,4 [5.49] ID) into flange. Install back-up ring (62,1 [2.45] OD) over O-ring (55,2 [2.18] ID) with flat side up. Back-up ring and O-rings may be greased to assist in retaining parts.
3. Install spring in groove in mounting flange.
4. Install back-up ring (99,7 [3.93] OD) in groves of balance plate sub assembly and then install O-ring (95,0 [3.74] ID) over back-up ring from tapered side.
5. Install balance plate sub assembly in mounting flange with tapered side down.
6. Install the Plug, Orifice and then Strainer as shown for Open Loop Configuration only.

Spool housing assembly (For two speed bearingless motor)

1. Install control spool into spool housing by first lubricating control spool with DTE26. Install control spool into spool bore, verifying that the control spool moves freely in bore.
2. Install nested springs and counter bored plug into end of spool housing spool bore. Plug may have light coat of oil or preservative. Torque plug to 46 +/-2 lbf-ft.
3. Install plug in opposite end of spool bore. Plug may have light coat of oil or preservative. Torque plug to 46 +/-2 lbf-ft. Install plug into spool housing port and torque to 192 +/- 19 lbf-in.



Selector plate assembly (For two speed bearingless motor)

1. Apply 1 drop of Loctite® 290 in all 10 screw holes in the selector plate while ensuring that no air is trapped underneath the droplet. Install the gasket onto the selector plate. Place the spool housing assembly onto the gasket. Install and torque each of the 10 screws starting in the middle working outwards using the sequence in Figure 13. Torque each screw to 70 +/- 8 lbf-in.

Final assembly (For two speed bearingless motor)

1. Place drive in build fixture. Place mounting flange (seal grooves up) over drive.
2. Place Geroler assembly (seal groove up) over mounting flange. Install greased O-ring section seal (139,4 [5.49] ID) in seal groove of Geroler assembly. Align shuttle flow hole of Geroler with shuttle flow hole of mounting flange.
3. Mark drive teeth that align with dykem pen. Install valve drive into internal star spline.
4. Install selector plate onto Geroler sub-assembly (selector plate valve slots up). Align shuttle flow hole of selector plate with shuttle flow hole of Geroler sub-assembly.
5. Install valve onto valve drive and selector plate assembly. Ensure long leakage groove is aligned with marked tooth on valve drive.
6. Carefully invert valve housing and place onto selector plate. Make sure that shuttle flow holes are aligned.
7. Install nine cap screws lubricated with DTE-26. Pre-torque each in a crisscross pattern to 80+/- 10 lb-ft. Finally, in a crisscross pattern, tighten screws to 105+/-5 lb-ft

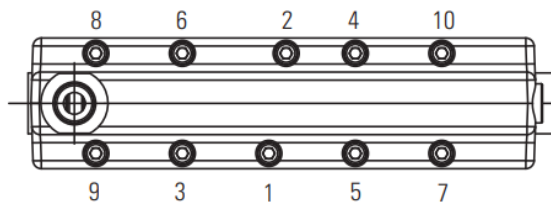


Figure 13

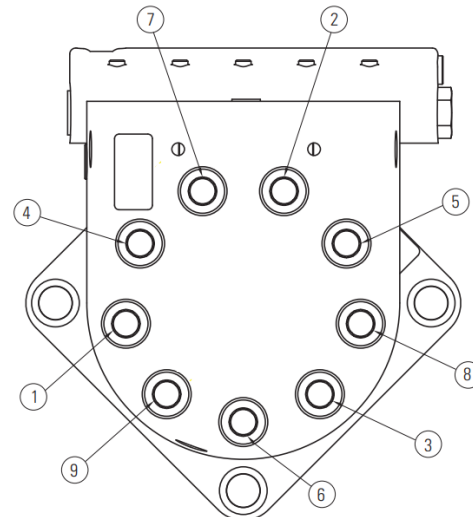
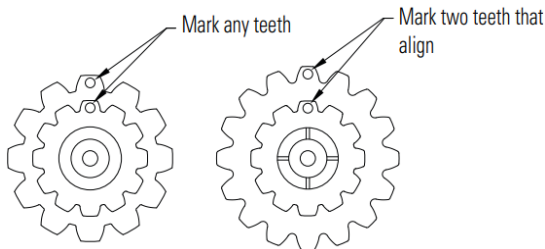
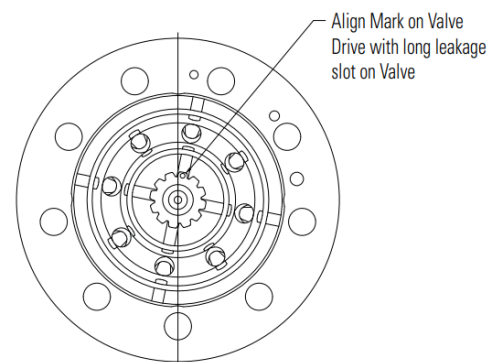
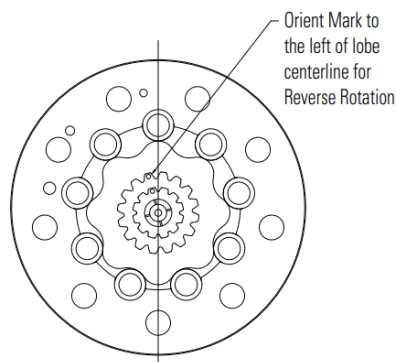
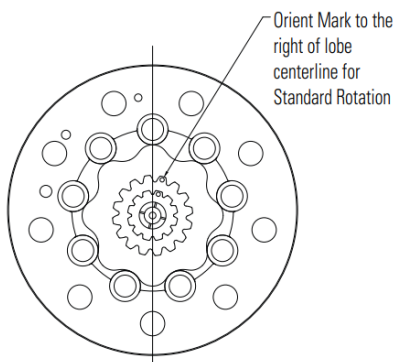


Figure 14



Chapter 2

Standard and Wheel Mount

Topics:

- *Exploded view*
- *Part List*
- *Disassembly*
- *Reassembly*

Exploded view

Single Speed Standard and Wheel Motor

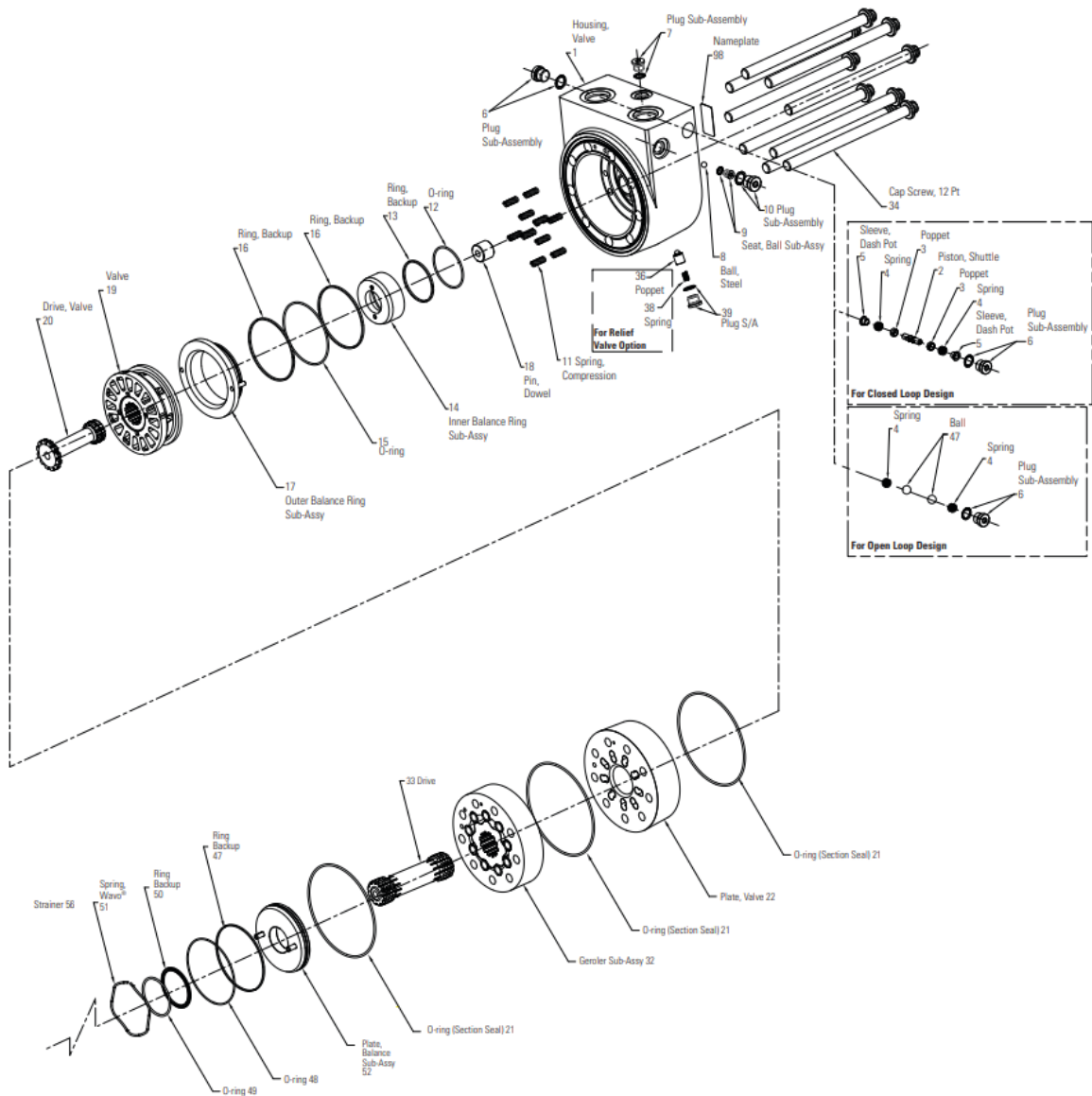


Figure 15 Single Speed Standard and Wheel Motor Exploded View

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Two-Speed Standard and Wheel Motor

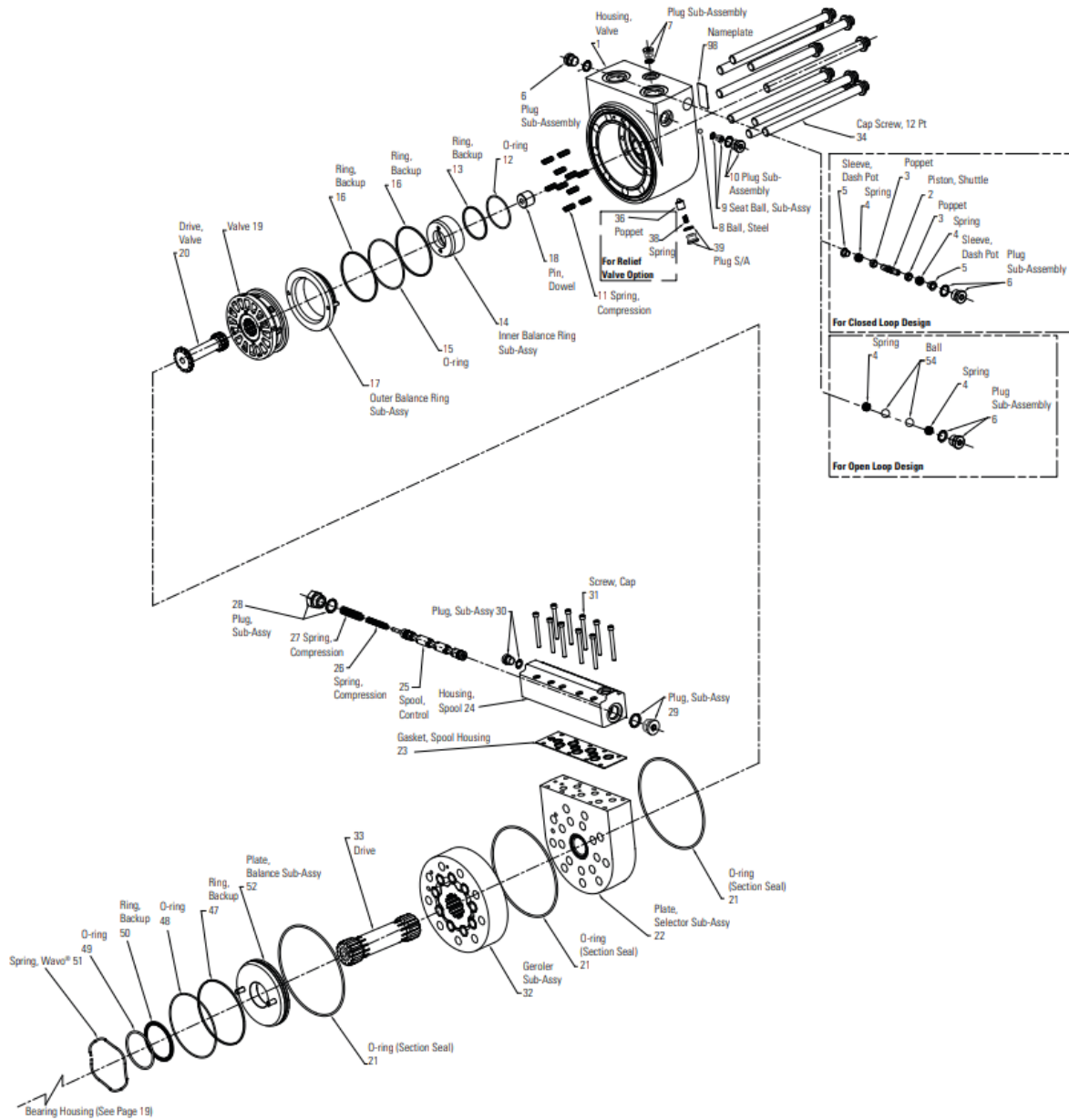
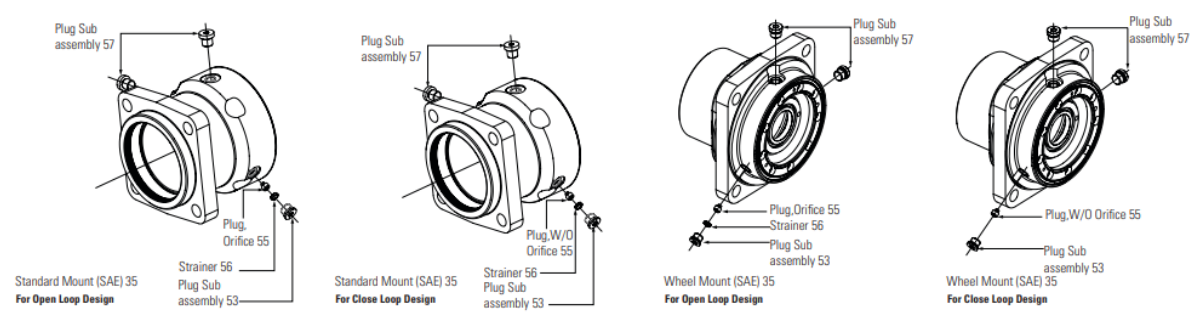
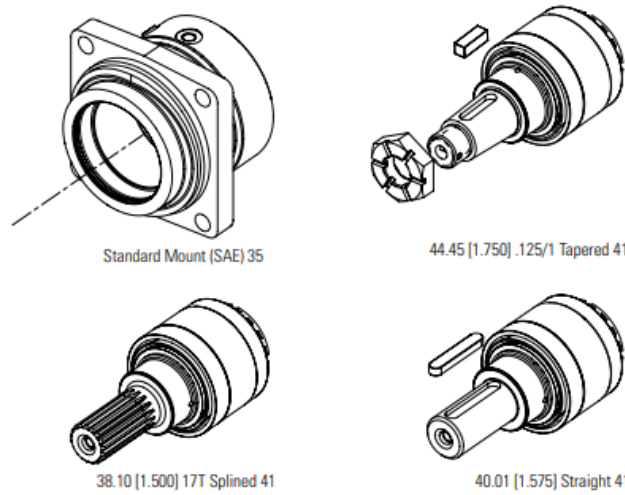
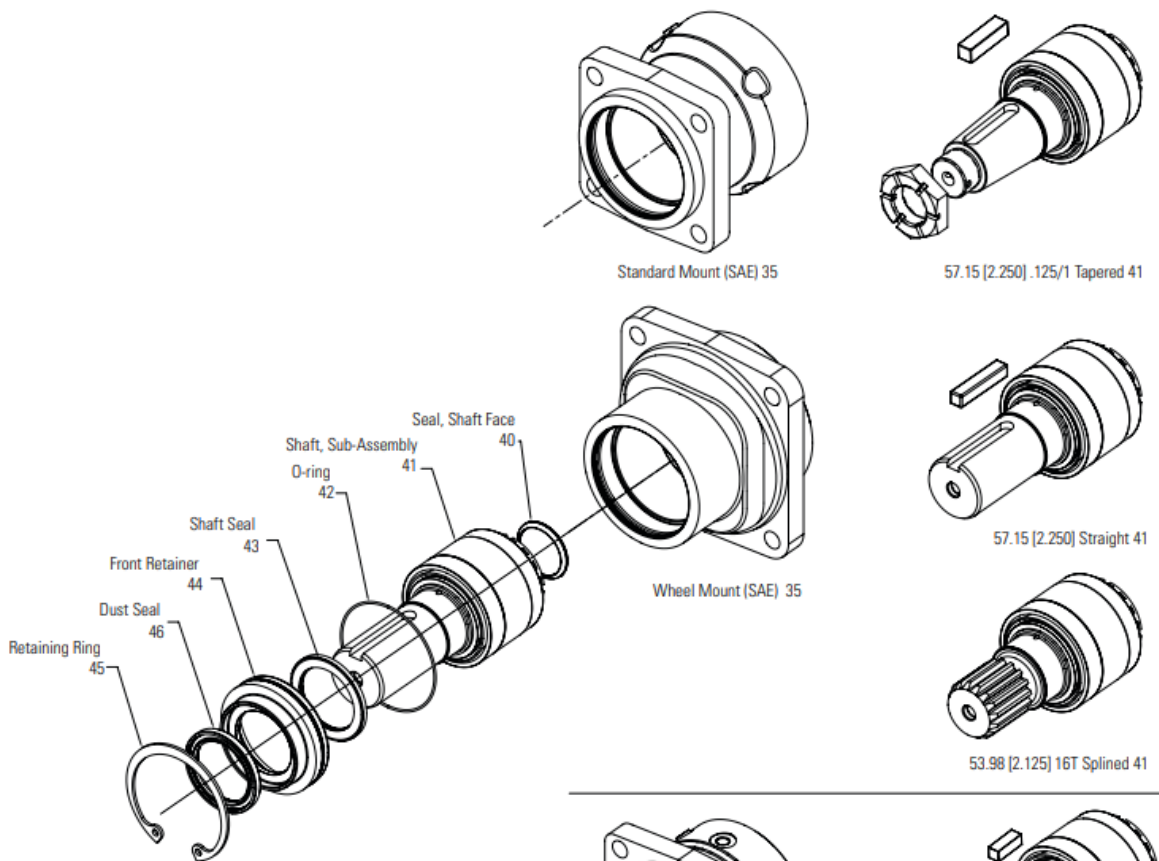


Figure 16 Two-Speed Standard and Wheel Motor Exploded view

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Part List

Ref No.	Part No.	Description	Quantity
1	6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-002	Housing, Valve 1.3125-12 UN-2B SAE O-Ring Ports (2)	1
	6033992-003	Housing, Valve G 1 BSP Straight Thread Ports	1
2	6048880-002	Piston, Shuttle	1
3	6048879-000	Poppet	2

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	4	230079-000	Spring	2
	5	112126-001	Sleeve, Dash Pot	2
	6	9266-006	Plug Sub-Assembly	2
X		250003-906	O-ring	2
	7	9266-006	Plug Sub-Assembly	1
X		250003-906	O-ring	1
	8	18026-000	Ball, Steel	1
	9	5992342-001	Seat, Ball Sub-Assy	1
X		250003-902	O-ring	1
	10	9266-006	Plug Sub-Assembly	1
X		250003-906	O-ring	1
	11	6203-000	Spring, Compression	10
X	12	14502-032	O-ring	1
X	13	5989483-001	Ring, Backup	1
	14	5991782-001	Inner Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
X	15	14502-040	O-ring	1
X	16	5989483-002	Ring, Backup	2
	17	5991783-001	Outer Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
	18	5987800-001	Pin, Dowel	1
	19	6030354-001	Valve	1
	20	6030970-001	Drive, Valve	1
X	21	250002-161	O-ring (Section Seal)	3
	22	5989335-001	Plate, Valve	1
	32	*	Geroler Sub-Assy	1
	33	*	Drive, Main	1
	34	*	Cap Screw, 12 PT	9
	35	6033984-001	Bearing Housing (Standard) Shuttle Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange	1
		6033984-002	Bearing Housing (Standard) Shuttle Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange	1
		6033985-001	Bearing Housing (Wheel) Shuttle Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange	1
		6033985-002	Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange	1
		6033984-001	Bearing Housing (Standard) Check Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing	1
		6033984-002	Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing	1
		6033985-001	Bearing Housing (Wheel) Check Valve With .5625-18 UNF-2B SAE O-Ring	1
	36	113538-001	Poppet (for relief valve unit only)	1
	38	6048877-001	Spring (for relief valve unit only)	1
	39	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	
X	40	9080-001	Seal, Shaft Face	1
	41	6041082-003	Shaft, Sub-Assy(57.15mm .125/1 Tapered)	1
		6041082-003	Shaft, Sub-Assy(57.15mm Straight)	1
		6041082-001	Shaft, Sub-Assy(53.98mm 16 Tooth Splined)	1
		6041082-007	Shaft, Sub-Assy(40.01mm Straight)	1
		6041082-008	Shaft, Sub-Assy(38.10mm 17 Tooth Splined)	1
X	42	112530-045	O-ring	1
X	43	14878-001	Shaft Seal	1
	44	5991645-002	Front Retainer	1
X	45	16077-066	Retaining Ring	1
X	46	14850-001	Dust Seal	1
X	47	5989483-004	Ring, backup	1

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X	48	112530-044	O-ring	1
X	49	112530-139	O-ring	1
X	50	14649-004	Ring, backup	1
	51	6023120-001	Spring, Wavo®	1
	52	6035183-001	Plate, balance sub-assy	1
		5993989-005	Balance plate	1
		16026-609	Pin, roll	2
	53	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
X	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	1
X	56	31500-452	Strainer (For Open Loop Design Only)	1
	57	9266-006	Plug Sub-Assembly	2
X		250003-906	O-ring	2
		9901186-000	Seal Kit - Contains Parts Indicated by X	
	59	6039391-001	Extreme duty seal (For Seal Option - Extreme Duty Seal Guard Only)	1

Figure 17 Single speed Standard and Wheel Motor Part List

* = See Chart A/R = As Required

Displacement cm ³ /r [in ³ /r]	Ref. No. 14 GEROLER	Width mm [in]	Ref. No. 22 DRIVE	Length mm [in]	Ref. No. 23 Screw 12 pt	Length mm [in]
343.8 [20.98]	6033989-001	32,1 [1.26]	5992182-001	130,4 [5.13]	114154-016	177,0 [6.97]
400.0 [24.40]		37,3 [1.47]		5992182-002		135,7 [5.34]
434.2 [26.50]	6033989-006	40,6 [1.60]	5992182-006	138,9 [5.47]	114154-025	185,2 [7.29]
479.5 [29.26]		44,7 [1.76]		5992182-003		143,1 [5.63]
677.3 [41.33]	6033989-007	63,2 [2.49]	5992182-008	161,2 [6.35]	114154-032	208,5 [8.21]

Table 5 Single-Speed Standard and Wheel Motors Parts dimensions

Two-Speed Standard and Wheel Motors

Ref No.	Part No.	Description	Quantity	
	1	6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	1
		6033992-002	Housing, Valve 1.3125-12 UN-2B SAE O-Ring Ports (2)	1
		6033992-003	Housing, Valve G 1 BSP Straight Thread Ports	1
	2	6048880-002	Piston, Shuttle	1
	3	6048879-000	Poppet	2
	4	230079-000	Spring	2
	5	112126-001	Sleeve, Dash Pot	2
X	6	9266-006	Plug Sub-Assembly	2
		250003-906	O-ring	2
X	7	9266-006	Plug Sub-Assembly	1
		250003-906	O-ring	1
	8	18026-000	Ball, Steel	1
X	9	5992342-001	Seat, Ball Sub-Assy	1
		250003-902	O-ring	1
X	10	9266-006	Plug Sub-Assembly	1
		250003-906	O-ring	1
	11	6203-000	Spring, Compression	10
X	12	14502-032	O-ring	1

X	13	5989483-001	Ring, Backup	1
	14	5991782-001	Inner Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
X	15	14502-040	O-ring	1
X	16	5989483-002	Ring, Backup	2
	17	5991783-001	Outer Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
	18	5987800-001	Pin, Dowel	1
	19	6030354-001	Valve	1
	20	6030970-001	Drive, Valve	1
X	21	250002-161	O-ring (Section Seal)	3
	22	5991781-001	Plate, Selector Sub-Assy	1
		5989384-001	Insert, Sleeve	1
X	23	6028001-002	Gasket, Spool Housing	1
	24	5989326-002	Housing, Spool	1
	25	112850-002	Spool, Control	1
	26	112211-001	Spring, Compression	1
	27	114587-001	Spring, Compression	1
	28	9151-002	Plug Sub-Assembly	1
X		250003-908	O-ring	1
	29	9072-006	Plug Sub-Assembly	1
X		250003-908	O-ring	1
	30	9266-003	Plug Sub-Assembly	1
X		250003-904	O-ring	1
	31	16148-320	Screw, Cap	10
	32	*	Geroler Sub-Assy	1
	33	*	Drive, Main	1
	34	*	Cap Screw, 12 PT	9
	35	6033984-001	Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange	1
		6033984-002	Bearing Housing (Standard) Shuttle Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange	1
		6033985-001	Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange	1
		6033985-002	Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange	1
		6033984-001	Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing	1
		6033984-002	Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing	1
		6033985-001	Bearing Housing (Wheel) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing	1
		6033985-002	Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing	1
	36	113538-001	Poppet (for relief valve unit only)	1
	38	6048877-001	Spring (for relief valve unit only)	1
	39	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
X	40	9080-001	Seal, Shaft Face	1
	41	6041082-003	Shaft, Sub-Assy(57.15mm .125/1 Tapered)	1
		6041082-002	Shaft, Sub-Assy(57.15mm Straight)	1
		6041082-001	Shaft, Sub-Assy(53.98mm 16 Tooth Splined)	1
		6041082-015	Shaft, Sub-Assy(44.45mm .125/1 Tapered)	1

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		6041082-007	Shaft, Sub-Assy(40.01mm Straight)	1
		6041082-008	Shaft, Sub-Assy(38.10mm 17 Tooth Splined)	1
	42	112530-045	O-ring	1
	43	14878-001	Shaft Seal	1
	44	5991645-002	Front Retainer	1
	45	16077-066	Retaining Ring	1
	46	14850-001	Dust Seal	1
X	47	5989483-004	Ring, Backup	1
X	48	112530-044	O-ring	1
X	49	112530-139	O-ring	1
X	50	14649-004	Ring, Backup	1
	51	6023120-001	Spring, Wavo®	1
	52	6035183-001	Plate, Balance Sub-Assy	1
		5993989-005	Balance plate	1
		16026-609	Pin, roll	2
	53	9072-004	Plug Sub-Assembly	1
X		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
X	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	1

Table 6 Two-Speed Standard and Wheel Motors

* = See Chart A/R = As Required

Displacement cm ³ /r [in ³ /r]	Ref. No. 14 GEROLER®	Width mm [in]	Ref. No. 22 DRIVE	Length mm [in]	Ref. No. 23 Screw 12 pt	Length mm [in]
343.8 [20.98]	6033989-001	32,1 [1.26]	5992182-001	130,4 [5.13]	114154-016	177,0 [6.97]
400.0 [24.40]		37,3 [1.47]		5992182-002		135,7 [5.34]
434.2 [26.50]	6033989-006	40,6 [1.60]	5992182-006	138,9 [5.47]	114154-025	185,2 [7.29]
479.5 [29.26]		44,7 [1.76]		5992182-003		143,1 [5.63]
677.3 [41.33]	6033989-007	63,2 [2.49]	5992182-008	161,2 [6.35]	114154-032	208,5 [8.21]

Table 7 Two-Speed Standard and Wheel Motors Parts dimensions

Disassembly

Tools required

- 7/32 inch Hex Key (Relief Valve Plug)
- 1/4 inch Hex Key (Shuttle Valve Plug)
- 5/16 inch Hex Key (Spool Housing Plug)
- 5/32 inch Hex Key (Spool Housing Screw, Cap)
- 7/8 Socket
- 9/16 Socket (12 Point Drive)
- Torque wrench - 142 Nm [1260 lb-in] capacity

Disassembly

1. Cleanliness is extremely important when repairing hydraulic motors. Work in a clean area. Before disconnecting the hydraulic motor thoroughly clean the exterior. Remove motor from application and drain the oil from the motor before disassembly.
2. Remove the 9 cap screws and disassemble the motor in the vertical position as shown.
3. Remove shuttle valve (and relief valve if applicable) from Valve Housing.
4. Check all mating surfaces. To reduce the chance of leakage, replace any parts that have scratches or burrs. Wash all metal parts in clean solvent. Blow them dry with pressurized air. Do not wipe parts dry with paper towels or cloth as lint in a hydraulic system will cause damage.

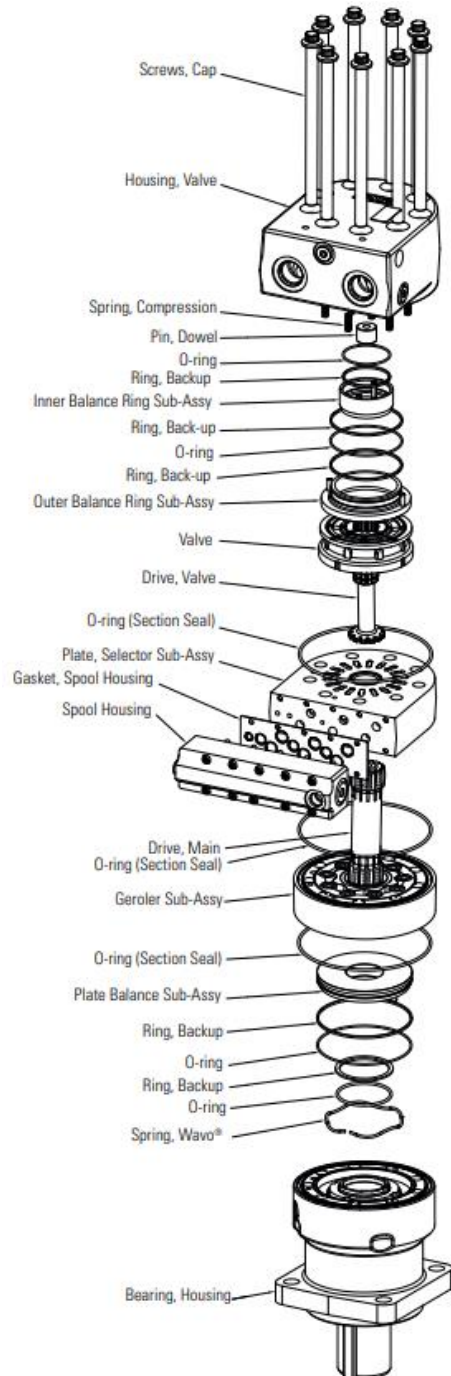


Figure 19 Two-speed Disassembly

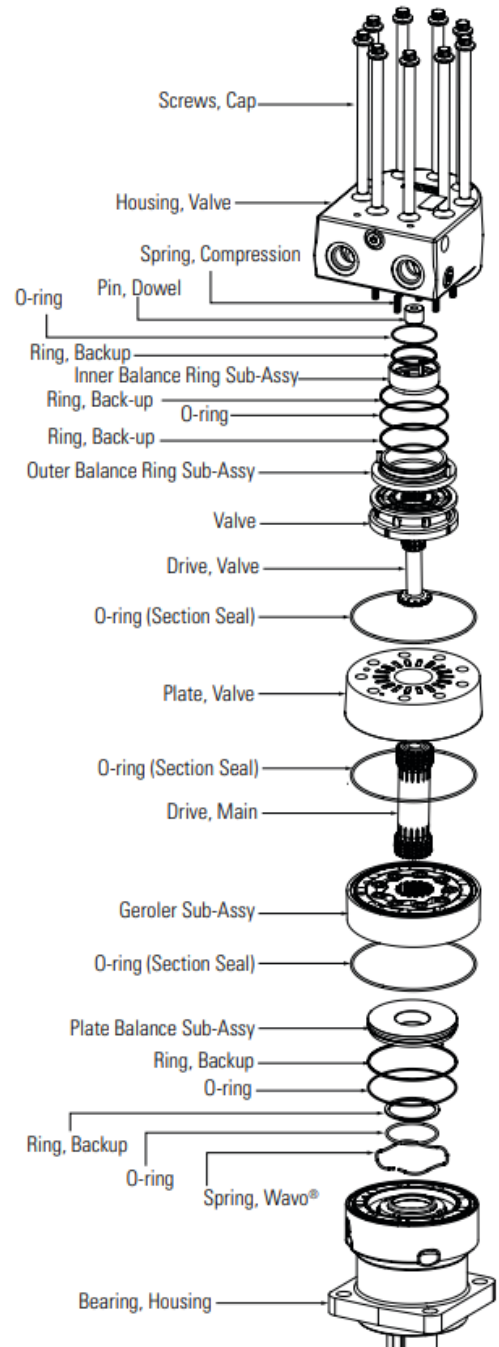
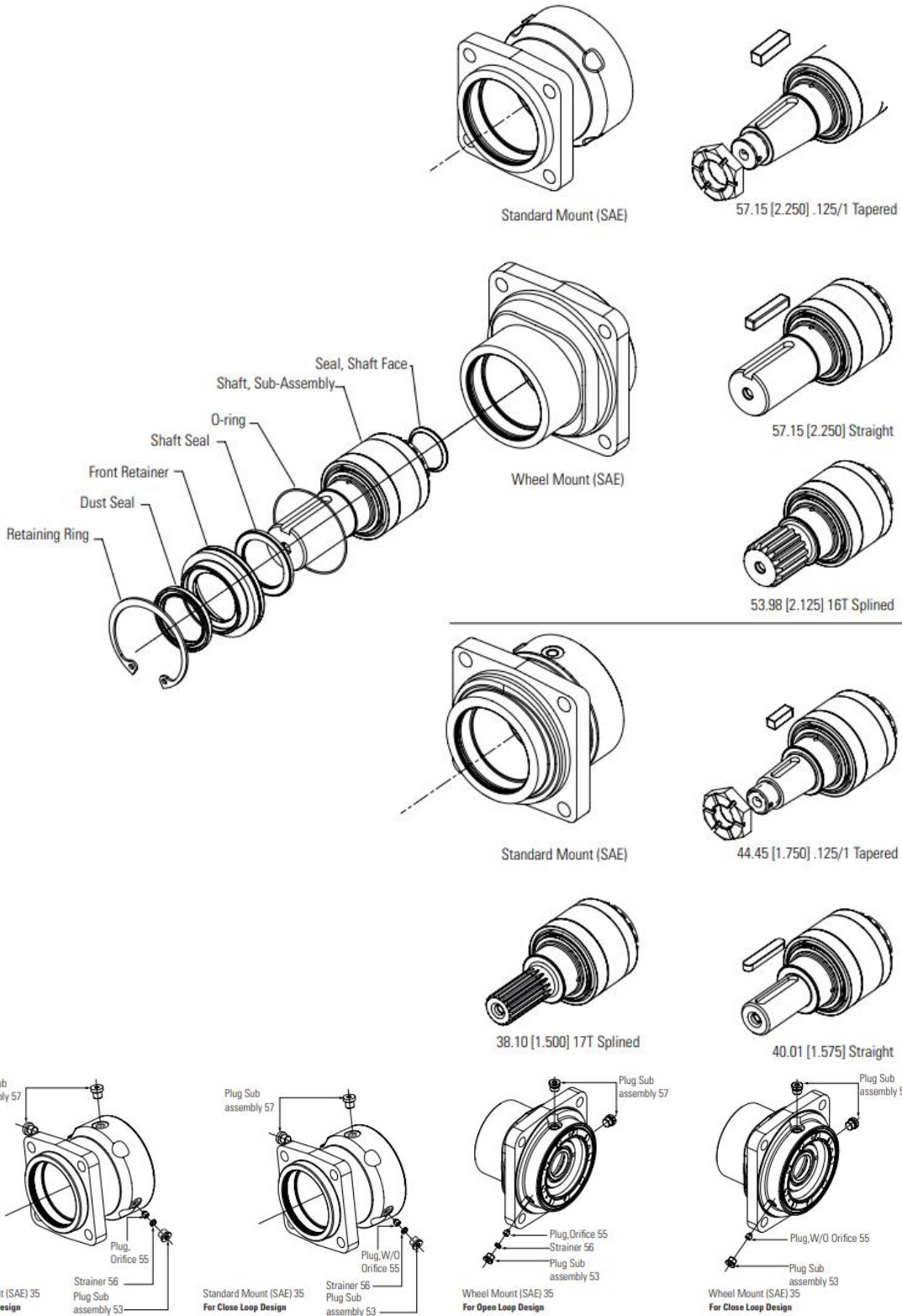


Figure 18 Single speed Disassembly

Disassembly Geroler Motors

1. Disassemble bearing housing (3 bearing housings, and 6 shaft sub-assembly options are shown).

Note: Do NOT disassemble shaft sub-assembly.



Note:

Always use new seals when reassembling hydraulic motors. Refer to parts list for seal kit number and replacement parts. Important: During reassembly, lubricate the new seals with a petroleum jelly such as Vaseline. Also lubricate machined surfaces with clean hydraulic fluid

Valve housing assembly

1. Install one poppet, spring, dash pot and threaded internal hex plug with O-ring into shuttle valve bore from one end of Valve Housing.
2. Install shuttle piston from opposite end of shuttle valve cavity.
3. Install one shuttle valve poppet, spring, dash pot onto piston and threaded internal hex plug with O-ring from opposite end of shuttle valve cavity.
4. Shuttle plug threads may have light coat of oil or preservative. Torque both plugs to 360 +/- 36 lbf-in.
5. For a motor with open loop design, Install Ball, Spring and threaded internal hex plug with O-ring from one end of cavity. And then install another Ball, Spring and threaded internal hex plug with O-ring from opposite end of cavity. Torque both plugs to 360 +/- 36 lbf-in. Plugs may have light coat of oil or preservative.
6. For a motor with low pressure relief valve, install poppet, spring and plug. Plug threads may have light coat of oil or preservative. Torque plug to 180 +/- 18 lbf-in.
7. For a motor without low-pressure relief valve, Install and torque plug to 180 ± 18 lbf-in. Plug may have light coat of oil or preservative.
8. Install ball and seat ball sub-assembly. Torque seat to 60 +/- 6 lbf-in. Install plug sub-assembly and torque to 360 +/- 36 lbf-in.

Shuttle Valve

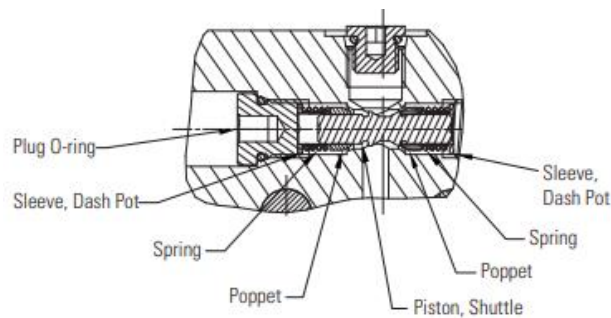


Figure 20 Shuttle valve

Shuttle Valve Parts

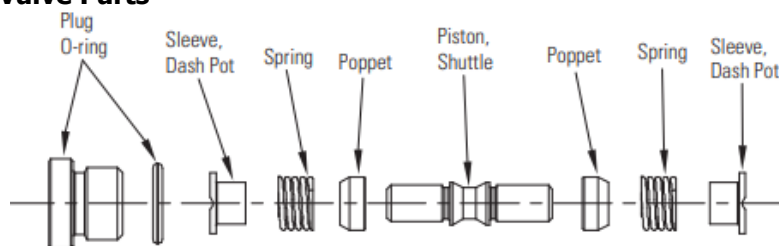


Figure 21 Shuttle Valve Parts

Relief Valve

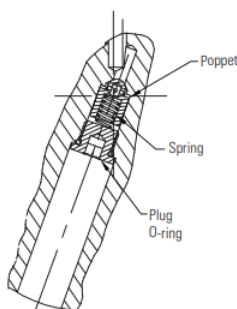


Figure 22 Relief Valve

Relief Valve Parts

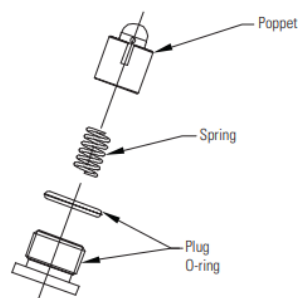


Figure 23 Relief Valve Parts

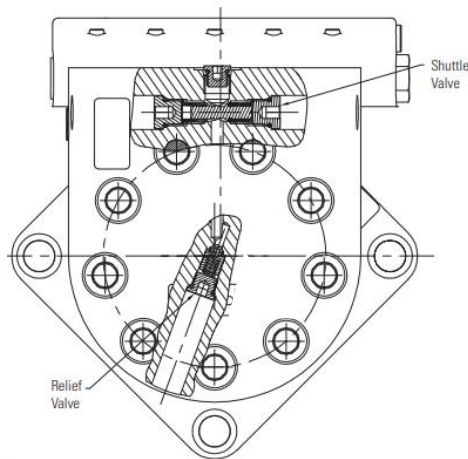


Figure 24 Relief valve

Reassembly

Outer balance ring assembly

1. Install one backup ring (75,1 mm [2.96 in] OD), then one O-ring (72,7 mm [2.86 in] ID) followed by one backup ring (75,1 mm [2.96 in] OD) into the O-ring groove in the outer balance ring. Seals and backups are to be greased. Ensure splits in backup rings are mated correctly. Location of splits in backup rings should not be aligned, a minimum of 90 degrees of separation is recommended.
2. Install one O-ring (47,3 mm [1.86 in] ID) then one backup ring (48,6 mm [1.91 in] OD) into the inner balance ring groove, located in the valve housing. Seal and backup are to be greased. Ensure split in backup ring is mated correctly.
3. Grease dowel pin and install in valve housing.
4. Install 10 balance ring springs in valve housing.
5. Install inner and outer balance ring sub-assemblies into valve housing. Ensure O-rings seals are seated.
6. Install greased O-ring section seal (139,4 mm 5.49 in] ID) in valve housing O-ring groove.

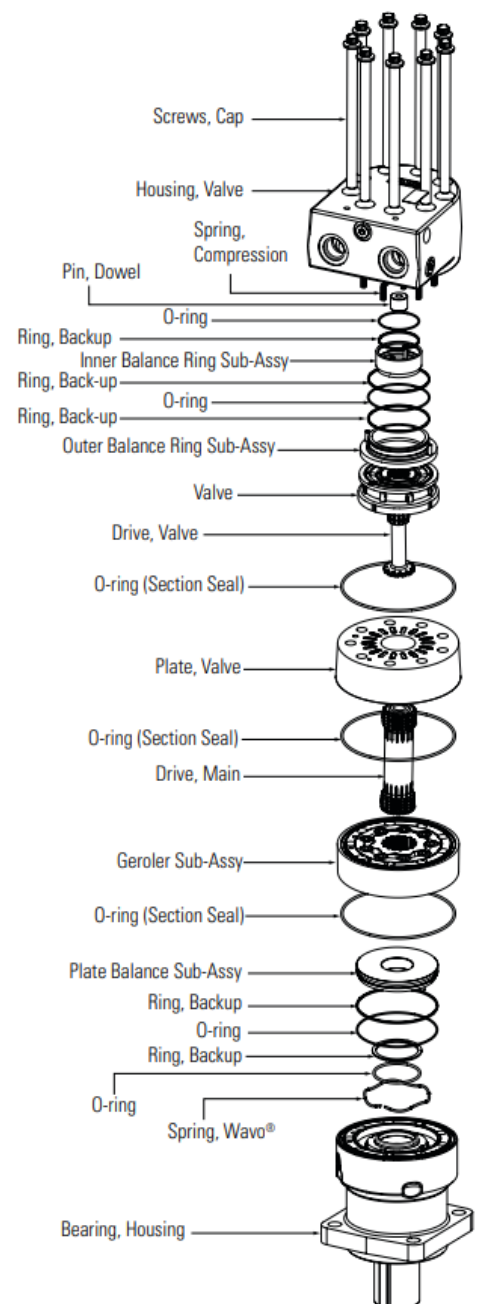


Figure 25 Single Speed

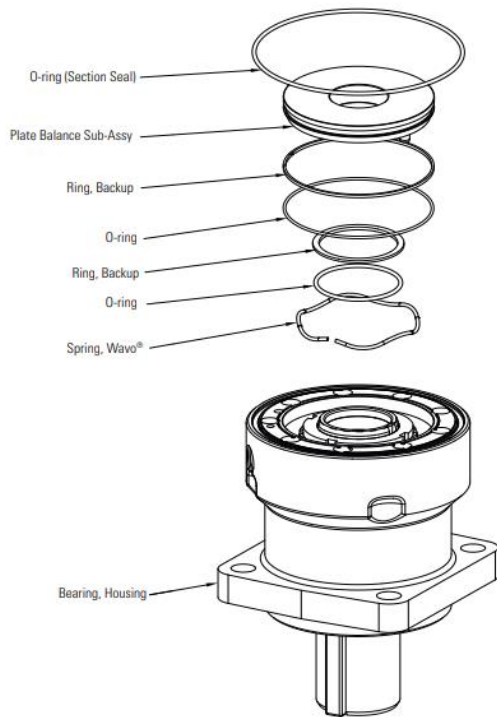


Figure 26 Standard and wheel Motor flange assembly

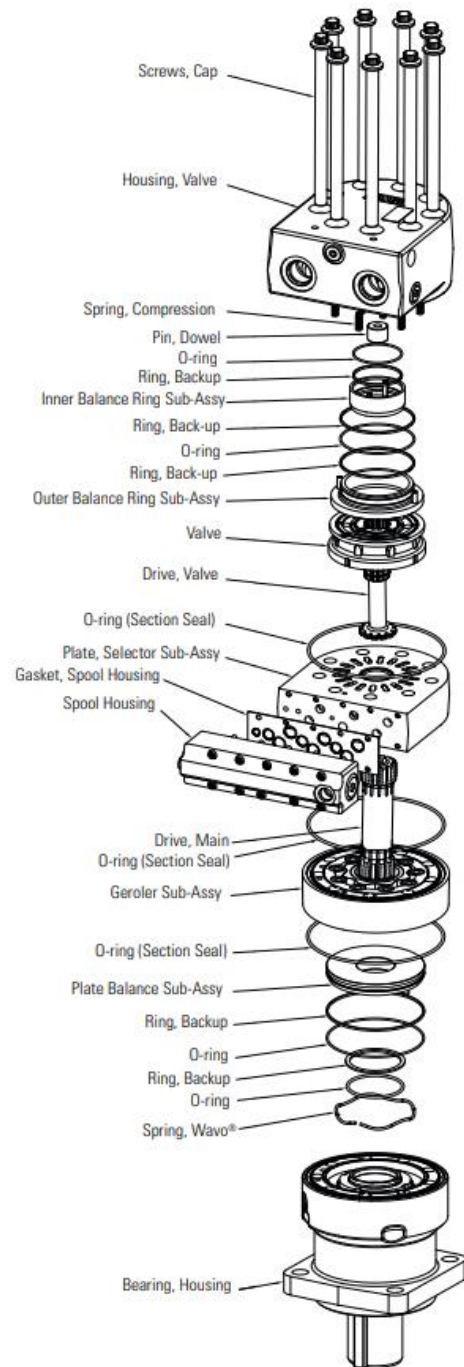
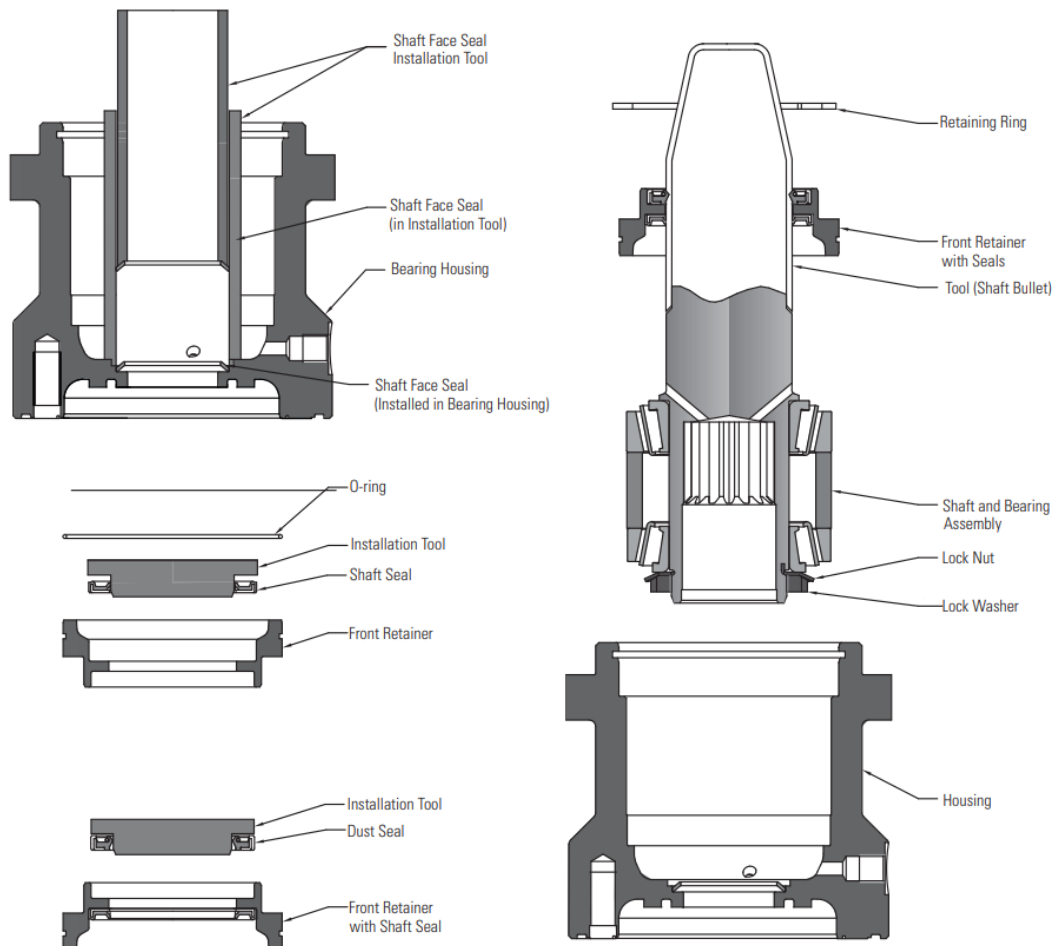


Figure 27 Two - speed

Note: Always use new seals when reassembling hydraulic motors. Refer to parts list for seal kit number, replacement parts, and ordering information.

Important: During reassembly, lubricate the new seals with a petroleum jelly such as Vaseline. Also lubricate machined surfaces with clean hydraulic fluid.



7. Install Teflon shaft face seal into bearing housing. Use an installation tool as shown, lubricate seal with Mobilith EP-111 grease or petroleum jelly (e.g. Vaseline) and compress seal into place.
8. Lightly lubricate seal with Mobilith EP-111 grease or petroleum jelly (e.g. Vaseline). Install in groove on front retainer.
9. Lightly Lubricate seal Shaft seal and dust seal lips with Mobilith EP-111 grease or petroleum jelly (e.g. Vaseline). Place seal on assembly tool and press into bore of front retainer. Press until seal makes positive stop with front retainer shoulder. Protect inside diameter shaft seal area from damage.
10. Invert the front retainer, place dust seal on assembly tool, and press into bore of front retainer. Press until seal makes positive stop with front retainer shoulder. Protect inside diameter dust seal area from damage.
11. Install shaft/bearing sub-assembly into housing with press force of 3300 +/- 200 lbf.
12. Before installing retainer, place a protective sleeve of bullet over shaft. Grease inside diameter of shaft seal. To prevent damage to seal, install front retainer over shaft with a twisting motion. Do not cut or distort shaft seal. Damage to shaft seal will cause external leakage. After installing front retainer into bearing housing secure it with snap ring.

Bearing housing assembly (For single speed standard and wheel motor)

1. With Bearing Housing O-ring grooves up, install O-ring section seal (139,4 [5.49] ID) Bearing Housing. Install back-up ring (62,1 [2.45] OD) over O-ring (55,2 [2.18] ID) with flat side up. Back-up ring and O-rings may be greased to assist in retaining parts.
2. Install Spring, Wavo in groove in bearing housing.
3. Install back-up ring (99,7 [3.93] OD) in groves of balance plate sub assembly and then install O-ring (95,0 [3.74] ID) over back-up ring from tapered side.

4. Install balance plate sub assembly in Bearing Housing with tapered side down.
5. Install the Plug W/O Orifice Plug as shown for Close Loop Configuration
6. Install the Strainer and then Plug, Orifice Plug as shown for Open Loop Configuration

Final assembly (For single speed standard an wheel motor)

1. Install main drive with longest spline length (if asymmetric) into output shaft spline.
2. Place Geroler assembly (seal groove up) over bearing housing. Install greased O-ring section seal (139,4 [5.49] ID) in seal groove of Geroler assembly. Align shuttle flow hole of Geroler with shuttle flow hole of Bearing Housing.
3. Mark drive teeth that align with dykem pen. Install valve drive into internal star spline.
4. Install valve plate onto Geroler sub-assembly (valve plate valve slots up). Align shuttle flow hole of valve plate with shuttle flow hole of Geroler sub-assembly.
5. Install valve onto valve drive and selector plate assembly. Ensure long leakage groove is aligned with marked tooth on valve drive.
6. Carefully invert valve housing and place onto valve plate. Make sure that shuttle flow holes are aligned.
7. Install nine cap screws lubricated with DTE-26. Pre-torque each in a crisscross pattern to 80+/- 10 lb-ft. Finally, in a crisscross pattern, tighten screws to 105+/-5 lb-ft.
8. Install two cap plugs in main ports (Optional).
9. Install key and hex nut into shaft if required.

Bearing housing assembly (For two speed standard and wheel motor)

1. With bearing housing O-ring grooves up, install O-ring section seal (139,4 mm[5.49 in] ID) Bearing Housing. Install back-up ring (62,1 mm [2.45 in] OD) over O-ring (55,2mm [2.18 in] ID) with flat side up. Back-up ring and O-rings may be greased to assist in retaining parts.
2. Install Spring, Wavo in groove in Bearing Housing.
3. Install back-up ring (99,7 mm [3.93 in] OD) in grooves of balance plate sub assembly and then install O-ring (95,0 mm [3.74] ID) over back-up ring from tapered side.
4. Install balance plate sub assembly in bearing housing with tapered side down.
5. Install the Plug w/o orifice plug as shown for close loop configuration then install a plug.
6. Install the strainer and then plug, orifice plug as shown for open loop configuration.

Spool housing assembly (For two speed bearingless motor)

1. Install control spool into spool housing by first lubricating control spool with DTE26. Install control spool into spool bore, verifying that the control spool moves freely in bore.
2. Install nested springs and counter bored plug into end of spool housing spool bore. Plug may have light coat of oil or preservative. Torque plug to 46 +/-2 lbf-ft.
3. Install plug in opposite end of spool bore. Plug may have light coat of oil or preservative. Torque plug to 46 +/-2 lbf-ft.
4. Install plug into spool housing port and torque to 192 +/- 19 lbf-in

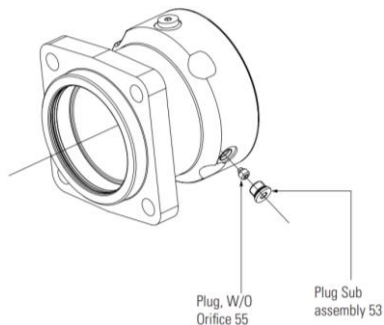


Figure 28 Close Loop Configuration

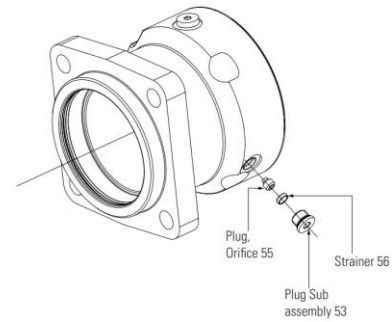


Figure 29 Open loop Configuration

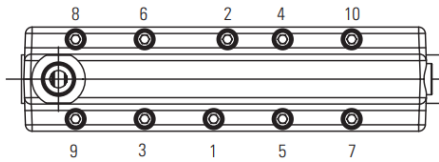


Figure 30

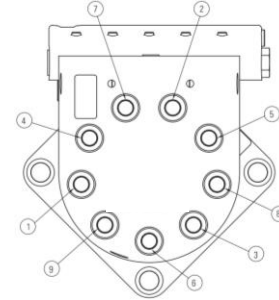


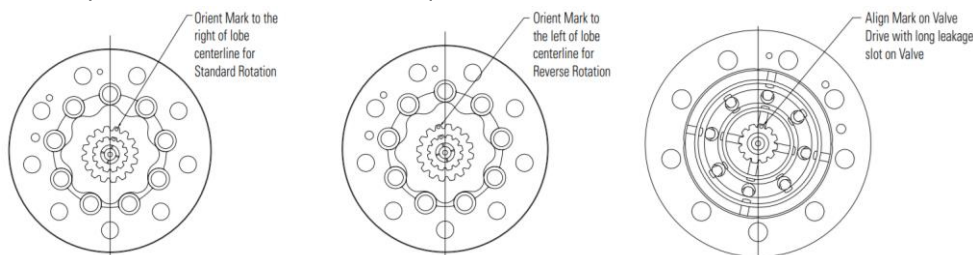
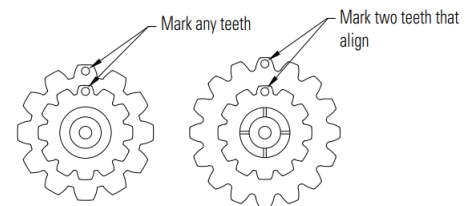
Figure 31

Selector plate assembly (For two speed bearing less motor)

1. Apply 1 drop of Loctite 290 in all 10 screw holes in the selector plate while ensuring that no air is trapped underneath the droplet. Install the gasket onto the selector plate. Place the spool housing assembly onto the gasket. Install and torque each of the 10 screws starting in the middle working outwards using the sequence in Figure 30. Torque each screw to 70 +/- 8 lbf-in.

Final assembly (For two speed standard and wheel motor)

1. Install main drive with longest spline length (if asymmetric) into output shaft spline.
2. Place Geroler assembly (seal groove up) over bearing housing. Install greased O-ring section seal (139,4 mm [5.49 in] ID) in seal groove of Geroler assembly. Align shuttle flow hole of Geroler with shuttle flow hole of bearing housing.
3. Mark drive teeth that align with dykem pen. Install valve drive into internal star spline.
4. Install selector plate onto Geroler sub-assembly (selector plate valve slots up). Align shuttle flow hole of selector plate with shuttle flow hole of Geroler sub-assembly.
5. Install valve onto valve drive and selector plate assembly. Ensure long leakage groove is aligned with marked tooth on valve drive.
6. Carefully invert valve housing and place onto selector plate. Make sure that shuttle flow holes are aligned.
7. Install nine cap screws lubricated with DTE-26. Pre-torque each in a crisscross pattern to 80 +/- 10 lb-ft. Finally, in a crisscross pattern, tighten screws to 105 +/- 5 lb-ft.
8. Install two cap plugs in main ports (Optional).
9. Install key and hex nut into shaft if required.



Speed Sensor

1. Rotate the motor shaft until a (gear/target) tooth is centered in the speed sensor port. If this is not done, the sensor may be damaged during the operation of the motor.
2. Make sure the locknut and its threads are clean and dry for the proper torque. Position the locknut against the alignment nut as shown in Figure 32.
3. Move the washer and the O-ring up against the speed sensor body threads.
4. By hand, lightly thread the speed sensor body into the housing until the sensor touches against the motor (gear/target) tooth. Do not force the sensor against the (gear/target) tooth, damage may occur. Make sure the O-ring or the washer do not touch housing – see Figure 32.
5. Turn the speed sensor body out one quarter turn (CCW) plus the additional amount (CCW) plus the additional amount (CCW) needed to make the alignment notches perpendicular to motor centerline ($90^\circ \pm 5$ degrees from the motor shaft centerline – Figure 32).
6. Maintain the speed sensor body alignment and tighten the locknut to 8.5–14 Nm [75-125 lbf-in.] (torque values are for clean and dry threads).
7. Check the speed sensor body for correct alignment, reinstall the sensor if it is not correct.

Speed Sensor Installation

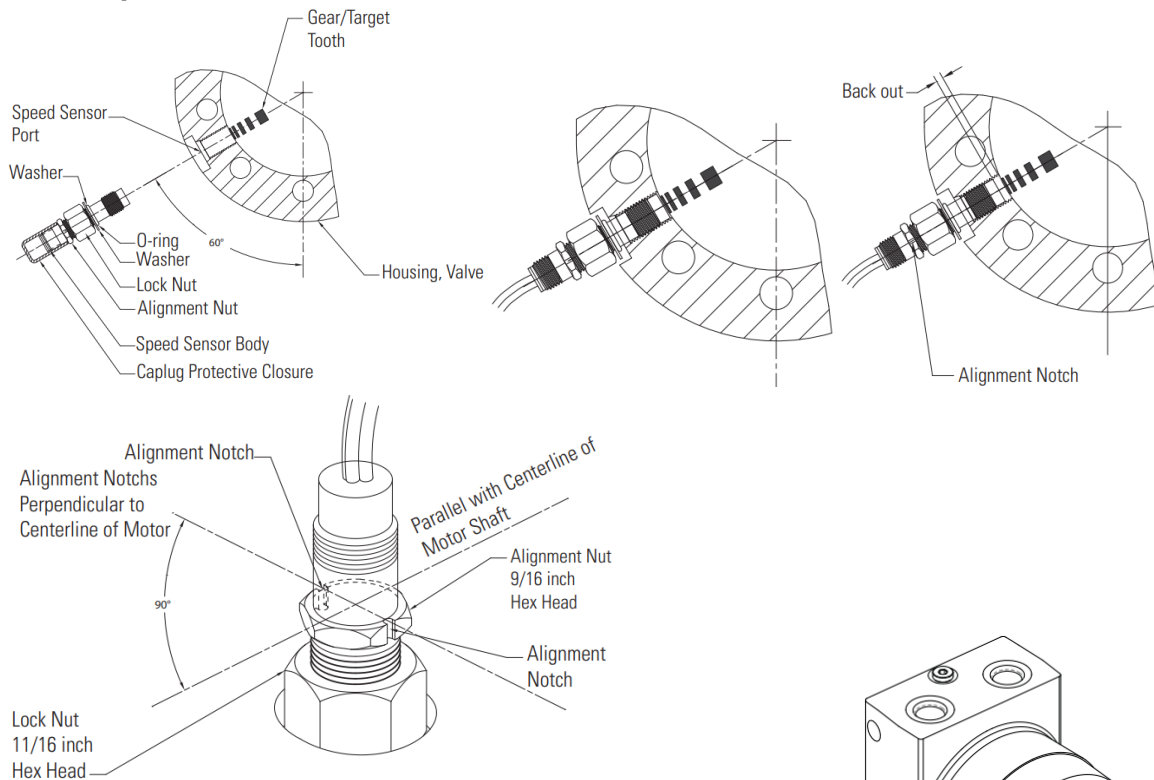
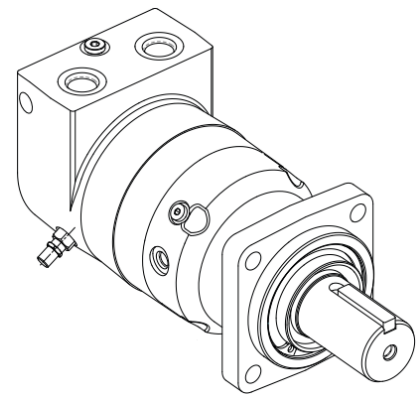


Figure 32 Speed sensor Installation



Chapter 3

Loop Conversion Kit

Topic:

- *HP 30 Open Loop Conversion Kit*
- *HP 30 Close Loop Conversion Kit*

HP 30 Open Loop Conversion Kit

Converting motor from close loop to open loop motor:

1. Remove sleeve dash pot (Qty 2), poppet (Qty 2) and piston shuttle (Qty1) as shown in Figure 33
2. Add ball (Qty 2) as shown Figure 34
3. Remove poppet and spring (pressure relief valve) as shown in Figure 35
4. Replace plug w/o orifice with plug orifice and add strainer as shown in Figure 36
5. The Parts required to convert motor from close loop to open loop is in conversion kit 9901135-000.

Parts required to convert Motor from close loop to open loop

Sr number	Quantity	Part Number	Description
1	2	285020-140	Ball
2	1	9289-001	Plug, orifice
3	1	31500-452	Strainer

Table 8 Parts required to convert Motor from close loop to open loop

For Close Loop Design

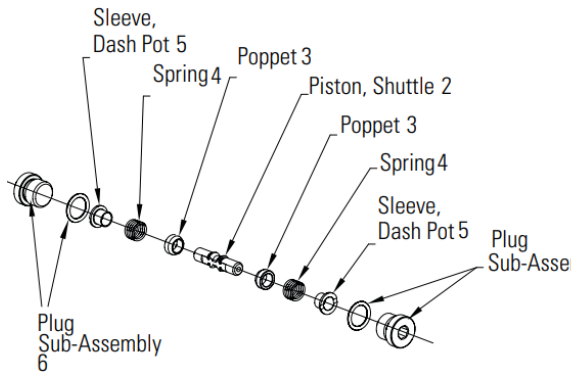


Figure 33 For Close Loop Design

For Open Loop Design

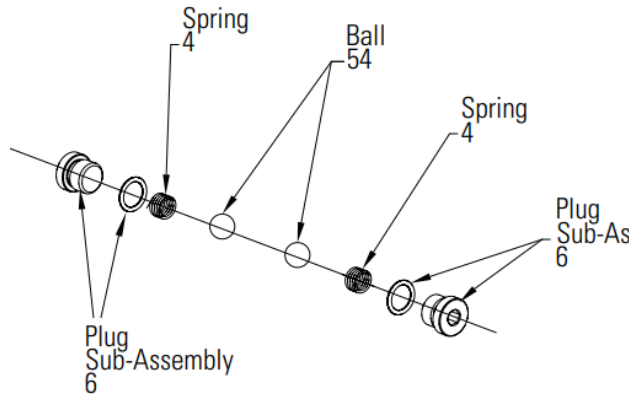


Figure 34 For Open Loop Design

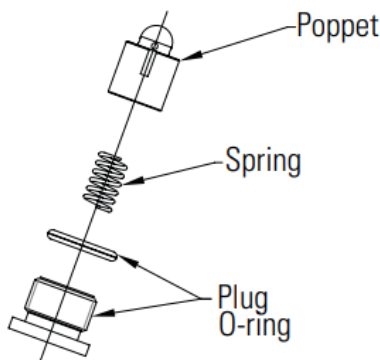


Figure 35 Low Pressure Relief Valve Parts

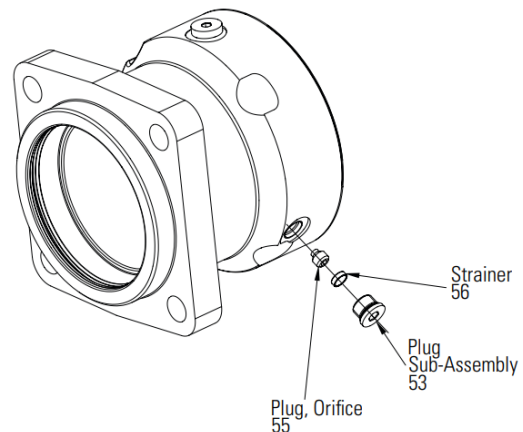


Figure 36

HP 30 Close Loop Conversion Kit

Converting motor from open loop to close loop motor:

1. Remove ball (Qty 2) as shown Figure 38
2. Add sleeve dash pot (Qty 2), poppet (Qty 2) and piston shuttle (Qty1) as shown in Figure 37
3. Add low pressure relief valve components poppet and spring (select pressure setting based on applications) as shown in Figure 39
4. Replace plug orifice with plug w/o orifice and remove strainer as shown in Figure 40
5. The parts required to convert Motor from open loop to close loop is in conversion kit 9901136-000.

Parts required to convert motor from close loop to open loop

Sr number	Qty	Part Number	Description
1	1	6048880-002	Piston, shuttle
2	2	6048879-000	Poppet
3	2	112126-001	Sleeve, dash pot
4	1	113538-001	Poppet (bprv) – back pressure relief valve
5	A	6048877-001	Spring (bprv) please see table 10 for details
	B	6048878-021	
	C	6048878-024	
	D	6048877-002	
6	1	6048871-004	Plug, without orifice

Table 9 Parts required to convert Motor from close loop to open loop

Parts for back pressure relief valve spring

Sr number	Spring number	Pressure setting	Color	Wire Diameter
1	6048877-001	65 lbf/in ²	Orange	Ø .0290
2	6048878-021	160 lbf/in ²	Orange	Ø .0317
3	6048878-024	220 lbf/in ²	N/A	Ø .0317
4	6048877-002	300 lbf/in ²	Light blue	Ø .0380

Table 10 Parts for back pressure relief valve spring

For Close Loop Design

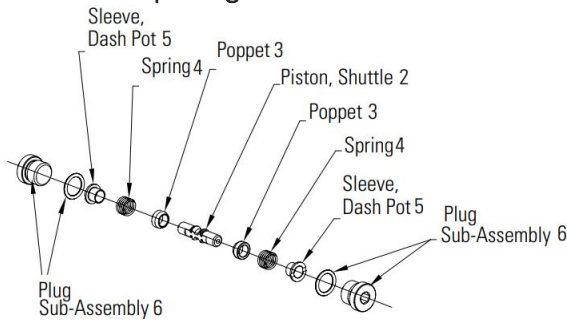


Figure 37 For Close Loop Design

For Open Loop Design

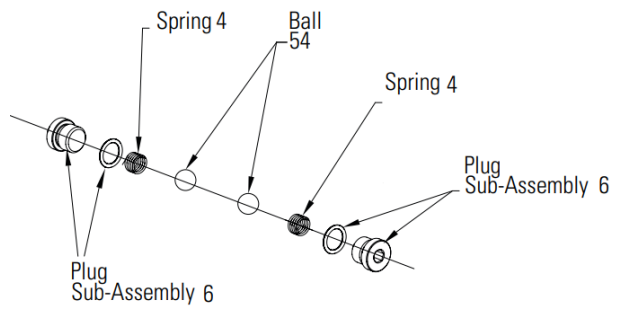


Figure 38 For Open Loop Design

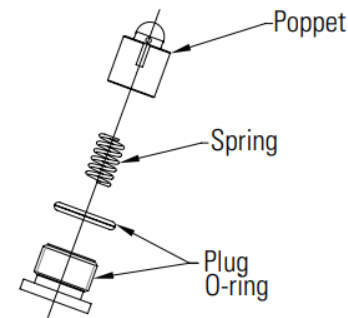


Figure 39 Low Pressure Relief Valve Parts

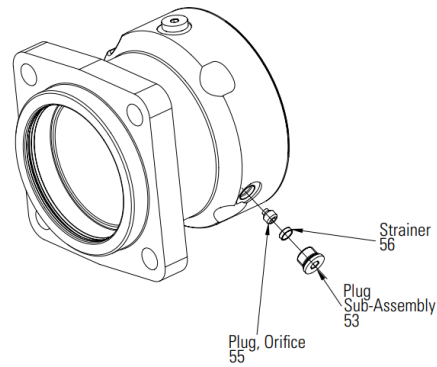


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