# MOTORS

## **Repair Instruction**

HP 30 Orbital Motor



together in motion /

White is a leading global provider of motor and steering solutions that power the evolution of mobile and industrial applications around the world.

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## **Chapter 1 Bearingless Motor**

## Topics:

- Exploded view
- Part List
- Disassembly

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## **Exploded view**



Figure 1 Exploded view -Single Speed - Bearingless Motor

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#### **Two Speed - Bearingless Motor**



Figure 2 Two Speed - Bearingless Motor

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## Part List

R	ef 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 U-Ring Ports (2)	1
	2	6048880 002	Dicton Shuttle	1
	2	6048870 000	Papat	2
	5	220070 000	Popper	2
	4	230079-000	Spring	2
	5	112126-001	Sleeve, Dash Pot	2
	6	9266-006	Plug Sub-Assembly	2
Х	7	250003-906	U-ring	2
v	/	9266-006	Plug Sub-Assembly	1
X	0	250003-906	U-ring	1
	8	18026-000	Ball, Steel	1
	9	5992342-001	Seat, Ball Sub-Assy	1
Х	10	250003-902	U-ring	1
v	10	9266-006	Plug Sub-Assembly	1
^	11	230003-900	0-illig	10
	11	6203-000	spring, compression	10
Х	12	14502-032	U-ring	1
Х	13	5989483-001	Ring, Backup	1
	14	5991782-001	Inner Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
Х	15	14502-040	O-ring	1
х	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
х	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
х	40	9080-001	Seal, Shaft Face	1
Х	47	5989483-004	Ring, backup	1
Х	48	112530-044	O-ring	1
х	49	112530-139	O-ring	1
Х	50	14649-004	Ring, backup	1

Single Speed - Bearingless Motor

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	51	6023120-001	Spring, Wavo <sup>®</sup>	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
Х		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
Х	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	1
Х	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 <sup>3</sup> /r [in <sup>3</sup> /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	6022080 001	32,1	E002182 001	130,4	114154-016	177,0
[20.98]	6033989-001	[1.26]	5992182-001	[5.13]		[6.97]
400.0	6022080 002	37,3	E002182 002	135,7	114154-021	182,6
[24.40]	0055969-002	[1.47]	5992182-002	[5.34]		[7.19]
434.2	6022080 006	40,6	E002182 006	138,9	114154-025	185,2
[26.50]	0022969-000	[1.60]	5992182-000	[5.47]		[7.29]
479.5	6022080 002	44,7	E002182 002	143,1	114154-026	190,5
[29.26]	6033989-003	[1.76]	5992182-005	[5.63]		[7.50]
677.3	6022080 007	63,2	5002182 008	161,2	11/15/ 022	208,5
[41.33]	0022969-007	[2.49]	5992182-008	[6.35]	114154-052	[8.21]

Table 2 Single-Speed Bearingless Motors Parts dimensions

#### **Two- Speed Bearingless Motor**

R	ef No.	Part No.	Description	Quantity
		6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	1
	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
	c	9266-006	Plug Sub-Assembly	2
Х	0	250003-906	O-ring	2
	7	9266-006	Plug Sub-Assembly	1
Х	/	250003-906	O-ring	1
	8	18026-000	Ball, Steel	1
	٩	5992342-001	Seat, Ball Sub-Assy	1
Х	3	250003-902	O-ring	1
	10	9266-006	Plug Sub-Assembly	1
Х	10	250003-906	O-ring	1
	11	6203-000	Spring, Compression	10
Х	12	14502-032	O-ring	1
Х	13	5989483-001	Ring, Backup	1
	1/	5991782-001	Inner Balance Ring Sub-Assy	1
	14	268009-005	Pin, Roll	2

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х	15	14502-040	O-ring	1
X	16	5989483-002	Ring, Backup	2
~		5991783-001	Outer Balance Ring Sub-Assy	1
	17	268009-005	Pin. Roll	2
	18	5987800-001	Pin, Dowel	1
	19	6030354-001	Valve	1
	20	6030970-001	Drive, Valve	1
х	21	250002-161	O-ring (Section Seal)	3
		5991781-001	Plate, Selector Sub-Assy	1
	22	5989384-001	Insert, Sleeve	1
Х	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
		9151-002	Plug Sub-Assembly	1
Х	28	250003-908	O-ring	1
	20	9072-006	Plug Sub-Assembly	1
Х	29	250003-908	O-ring	1
	30	9266-003	Plug Sub-Assembly	1
Х	30	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	1
			Mounting Flange	
		6033986-002	Flange, Mounting Check Valve with Orifice Plug, .5625-18 UNF-2B SAE O-Ring Case drain	1
	26		Port In Valve Housing	
	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
Х		250003-905	O-ring	1
Х	40	9080-001	Seal, Shaft Face	1
Х	47	5989483-004	Ring, Backup	1
Х	48	112530-044	O-ring	1
Х	49	112530-139	O-ring	1
Х	50	14649-004	Ring, Backup	1
	51	6023120-001	Spring, Wavo®	1
	52			
	52	6035183-001	Plate, balance sub-assy	1
	52	6035183-001 5993989-005	Plate, balance sub-assy Balance plate	1
	52	6035183-001 5993989-005 16026-609	Plate, balance sub-assy Balance plate Pin, roll	1 1 2
	53	6035183-001 5993989-005 16026-609 9072-004	Plate, balance sub-assy Balance plate Pin, roll Plug Sub-Assembly	1 1 2 1
x	53	6035183-001 5993989-005 16026-609 9072-004 250003-905	Plate, balance sub-assy Balance plate Pin, roll Plug Sub-Assembly O-ring	1 1 2 1 1
X	53	6035183-001 5993989-005 16026-609 9072-004 250003-905 285020-140	Plate, balance sub-assy Balance plate Pin, roll Plug Sub-Assembly O-ring Ball (for open loop design only)	1 2 1 1 2 2
x	53 54 55	6035183-001 5993989-005 16026-609 9072-004 250003-905 285020-140 9289-001	Plate, balance sub-assy     Balance plate     Pin, roll     Plug Sub-Assembly     O-ring     Ball (for open loop design only)     Plug, Orifice (For Open Loop Design Only)	1 1 2 1 1 2 2 1
x x	53 53 54 55	6035183-001 5993989-005 16026-609 9072-004 250003-905 285020-140 9289-001 6048871-004	Plate, balance sub-assy     Balance plate     Pin, roll     Plug Sub-Assembly     O-ring     Ball (for open loop design only)     Plug, Orifice (For Open Loop Design Only)     Plug, W/O Orifice (For Close Loop Design Only)	1 2 1 1 2 1 2 1
x x x	53 54 55 56	6035183-001 5993989-005 16026-609 9072-004 250003-905 285020-140 9289-001 6048871-004 31500-452	Plate, balance sub-assy     Balance plate     Pin, roll     Plug Sub-Assembly     O-ring     Ball (for open loop design only)     Plug, Orifice (For Open Loop Design Only)     Plug, W/O Orifice (For Close Loop Design Only)     Strainer (for open loop design only)	1 2 1 1 2 1 2 1 1 1
x x x	53 53 54 55 56	6035183-001 5993989-005 16026-609 9072-004 250003-905 285020-140 9289-001 6048871-004 31500-452 9901148-000	Plate, balance sub-assy     Balance plate     Pin, roll     Plug Sub-Assembly     O-ring     Ball (for open loop design only)     Plug, Orifice (For Open Loop Design Only)     Plug, W/O Orifice (For Close Loop Design Only)     Strainer (for open loop design only)     Strainer (for open loop design only)     Seal Kit Contains Parts Indicated by X	1 1 2 1 1 2 1 1 1 1

Table 3 Two- speed Bearingless Motor Part List

\* = See Chart A/R = As Required

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[26.50]	0033989-000	[1.60]		[5.47]		[7.29]
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677.3	6022080 007	63,2	5002192 009	161,2	11/15/ 022	208,5
[41.33]	0033989-007	[2.49]	5992182-008	[6.35]	114154-052	[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

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#### 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.



\*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<sup>®</sup>. Also lubricate machined surfaces with clean hydraulic fluid.



Figure 4 Single Speed Bearingless motor disassembly

Figure 3 Two-Speed Bearingless Motor

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#### 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 Oring 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**



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Figure 9 Relief valve

#### Outer balance ring assembly

- 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.
- 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.



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Figure 12 Bearingless Two-speed Motor

O-ring (Section Seal)

Plate Balance Sub-Assy

Ring, Backup

O-ring Ring, Backup

O-ring

Spring, Wavo<sup>®</sup>

Flange, Mounting

Seal, Shaft Seal

Figure 11 Bearingless Motor Flange Assembly



#### 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)

- 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.



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#### Selector plate assembly (For two speed bearingless motor)

 Apply 1 drop of Loctite<sup>®</sup> 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 lbfin.

#### 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.
- 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



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## Chapter 2 Standard and Wheel Mount

## **Topics:**

- Exploded view
- Part List
- Disassembly
- Reassembly

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## **Exploded view**

## 12 Pt Inner Bata Sub-Assy nce Ring lve 22 Seal) 21 er Sub-Assy 32 n Seal) 21 Balance Sub-Ass 52

Single Speed Standard and Wheel Motor

Figure 15 Single Speed Standard and Wheel Motor Exploded View

WHITE can accept no responsibility for possible errors in catalogues, brochures, and other printed material. WHITE reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequent changes being necessary in specifications already agreed.





Figure 16 Two-Speed Standard and Wheel Motor Exploded view

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#### Part List

R	ef No.	Part No.	Description	Quantity
	1	6033992-001	Housing, Valve 1.0625-12 UN-2B SAE O-Ring Ports (2)	
		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
Х		250003-906	O-ring	2
	7	9266-006	Plug Sub-Assembly	1
Х		250003-906	O-ring	1
	8	18026-000	Ball, Steel	1
	9	5992342-001	Seat, Ball Sub-Assy	1
Х		250003-902	O-ring	1
	10	9266-006	Plug Sub-Assembly	1
Х		250003-906	O-ring	1
	11	6203-000	Spring, Compression	10
Х	12	14502-032	O-ring	1
Х	13	5989483-001	Ring, Backup	1
	14	5991782-001	Inner Balance Ring Sub-Assy	1
		268009-005	Pin, Roll	2
Х	15	14502-040	O-ring	1
х	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		1
x	20	250002-161	Orring (Section Seal)	
~	21	20002-101 F08022F 001		1
	22	*	Pidle, 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
			Bearing Housing (Standard) Shuttle Valve with G 1/4 BSP Straight Thread	
		6033984-002	Case Drain Port in Mounting Flange	1
			Bearing Housing (Wheel) Shuttle Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port	_
		6033985-001	in Mounting Flange	1
		C022005 002	Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread	4
		6033985-002	Case Drain Port in Mounting Flange	1
		6022084 001	Bearing Housing (Standard) Check Valve With .5625-18 UNF-2B SAE O-Ring Case Drain Port	1
		0033304-001	in Valve Housing	
		6033984-002	Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread	1
			Case Drain Port in Valve Housing	
		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	40	250003-905	U-ring	1
X	40 41	5080-001 6041092 002	Seal, Shaft Face	1
	41	60/1022-003	Shaft Sub Assy(57.15(1)(1).125/1 (apered	1
		60/1002-003	Shaft Sub Assy(57.1311111 Stildigit)	1
		60/102-001	Shaft Sub-Assy(35.301111 10 100(11 Spilled)	1
		6041082-007	Shaft Sub-Assy(40.011111 Straight)	1
x	42	112530-045	O-ring	1
X	43	14878-001	Shaft Seal	1
	44	5991645-002	Front Retainer	1
х	45	16077-066	Retaining Ring	1
X	46	14850-001	Dust Seal	1
X	47	5989483-004	Ring, backup	1

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Х	48	112530-044	O-ring	1		
Х	49	112530-139	O-ring	1		
Х	50	14649-004	Ring, backup	1		
	51	6023120-001	Spring, Wavo®	1		
	52	6035183-001	35183-001 Plate, balance sub-assy			
		5993989-005	Balance plate	1		
		16026-609	Pin, roll	2		
	53	9072-004	Plug Sub-Assembly	1		
Х		250003-905	O-ring	1		
	54	285020-140	Ball (for open loop design only)	2		
Х	55	9289-001	Plug, Orifice (For Open Loop Design Only)	1		
		6048871-004	Plug, W/O Orifice (For Close Loop Design Only)	1		
Х	56	31500-452	Strainer (For Open Loop Design Only)	1		
	57	9266-006	Plug Sub-Assembly	2		
Х		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 <sup>3</sup> /r [in <sup>3</sup> /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	6022080 001	32,1	5002182 001	130,4	114154-016	177,0
[20.98]	0033989-001	[1.26]	5992182-001	[5.13]		[6.97]
400.0	6022080 002	37,3	5002182 002	135,7	114154-021	182,6
[24.40]	0033989-002	[1.47]	5992182-002	[5.34]		[7.19]
434.2	6033080 006	40,6	5992182-006	138,9	114154-025	185,2
[26.50]	0033989-000	[1.60]		[5.47]		[7.29]
479.5	6033080 003	44,7	5002182 002	143,1	114154-026	190,5
[29.26]	0033989-003	[1.76]	5992182-005	[5.63]		[7.50]
677.3	6022080 007	63,2	5002182 008	161,2	11/15/ 022	208,5
[41.33]	0033989-007	[2.49]	3332102-000	[6.35]	114134-052	[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
	6	9266-006	Plug Sub-Assembly	2
Х		250003-906	O-ring	2
	7	9266-006	Plug Sub-Assembly	1
Х		250003-906	O-ring	1
	8	18026-000	Ball, Steel	1
	9	5992342-001	Seat, Ball Sub-Assy	1
Х		250003-902	O-ring	1
	10	9266-006	Plug Sub-Assembly	1
Х		250003-906	O-ring	1
	11	6203-000	Spring, Compression	10
Х	12	14502-032	O-ring	1

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X     13     5989483-001     Ring, Backup     1       14     5991782-001     Inner Baince Ring, Sub-Asy     1       268009-005     Pin, Roll     2       X     15     14502-040     O-ring     1       268009-005     Pin, Roll     2       17     5991783-001     Outer Balance Ring, Sub-Asy     1       268009-005     Pin, Roll     2       18     5987800-001     Pin, Dowel     1       19     6030354-001     Userview     1       20     6030970-001     Drive, Valve     1       21     250002-161     O-ring (Section Seal)     3       22     5991781-001     Plate, Spectron Seal)     1       23     6028001-002     Gasket, Spool Housing     1       24     5989328-002     Housing, Spool     1       25     112211-001     Spring, Compression     1       24     5989328-002     Plug Sub-Assembly     1       X     250003-908     O-ring     1       25     91					
14     5991782-001     Inner Balance Ring Sub-Asy     1       X     15     14502-040     O-ring     1       X     16     59994783-001     Outer Balance Ring Sub-Asy     1       X     16     59994783-001     Outer Balance Ring Sub-Asy     1       17     5991783-001     Outer Balance Ring Sub-Asy     1       28009-005     Pin, Roll     2       18     5997308-001     Pin, Dowel     1       20     6030354-001     Drive, Valve     1       20     6030354-001     Drive, Valve     1       21     599738-001     Insert, Steeve     1       25     599738-001     Insert, Steeve     1       24     598038-001     Spool, Control     1       25     112850-002     Spool, Control     1       27     114587-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       28     9072-006     Plug Sub-Assembly     1       30     9266-003     Plug Su	Х	13	5989483-001	Ring, Backup	1
Zeso09-005     Pin, Roll     Z       15     14507-240     O-ring     1       X     16     5989483-002     Ring, Backup     2       17     5991783-001     Outer Balance Ring Sub-Assy     1       28009-005     Pin, Roll     2       18     5987800-001     Pin, Roll     2       20     603037-001     Drive, Valve     1       21     20002161     O-ring (Section Seal)     3       22     5991781-001     Plate, Selector Sub-Assy     1       X     21     590201-002     Gasket, Spool Housing     1       24     5989326-002     Housing, Spool     1       25     112850-002     Spool, Control     1       26     112211-001     Spring, Compression     1       27     14587-001     Spring, Compression     1       28     9151-002     Plug Sub-Assembly     1       30     9266-003     Plug Sub-Assembly     1       31     16148-320     Cereroler Sub-Assembly     1		14	5991782-001	Inner Balance Ring Sub-Assy	1
X     15     1450-240     O-ring     1       X     16     5599438-002     Ring, Backup     2       17     5991783-001     Outer Balance Ring Sub-Assy     1       18     598780-003     Pin, Rowl     1       19     6030354-001     Valve     1       20     6030370-001     Drive, Valve     1       X     21     250002-161     O-ring (Section Seal)     3       22     5991781-001     Plate, Selector Sub-Assy     1       X     23     6028001-002     Gasket, Spool Housing     1       24     5989384-001     Insert, Sleeve     1       25     112850-002     Spool, Control     1       24     598938-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       27     12458-002     Plug Sub-Assembly     1       30     9266-003     Plug Sub-Assembly     1       X     250003-904     O-ring     1       X     250003-904			268009-005	Pin, Roll	2
X     16     5989483-001     Ring, Backup     2       17     268009-005     Pin, Roll     2       18     5987780-001     Pin, Roll     2       19     6030354-001     Valve     1       20     6030370-001     Drive, Valve     1       X     21     250002-161     O-ring (Section Seal)     3       22     5991781-001     Pitate, Selector Sub-Assy     1       5989384-001     Insert, Sleeve     1       24     5989326-002     Housing, Spool     1       25     112211-001     Spring, Compression     1       26     112211-001     Spring, Compression     1       27     14587-001     Spool, Control     1       28     9151-002     Plug Sub-Assembly     1       29     9072-006     Plug Sub-Assembly     1       30     2266-003     Plug Sub-Assembly     1       31     16043-320     Screw, Cap     10       32     *     Gerolor Sub-Assembly     1	Х	15	14502-040	O-ring	1
17     5991783-001     Outer Balance Ring Sub-Assy     1       268009-005     Pin, Roll     2       18     598780-001     Pin, Roll     1       19     600307-001     Valve     1       20     600307-001     Drive, Valve     1       21     250002-151     O-ring (Section Seal)     3       22     5991781-001     Pitate, Selector Sub-Assy     1       24     5989324-002     Gasket, Spool Housing     1       24     5989326-002     Housing, Spool     1       25     112850-002     Spool, Control     1       27     114587-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       18     250003-908     O-ring     1       19     9072-006     Plug Sub-Assembly     1       14     20     Seconda - Plug Sub-Assembly     1       14     20     Seconda - Plug Sub-Assembly     1       14     10     Case Carolar Sub-Assembly     1	Х	16	5989483-002	Ring, Backup	2
268009-005     Pin, Roll     2       18     5987800-001     Pin, Dowel     1       19     6030354-001     Valve     1       20     6030970-001     Drive, Valve     1       21     25002-161     O-ring (Section Seal)     3       22     5991781-001     Insert, Sieve     1       23     602801-002     Gasket, Spool Housing     1       24     598326-002     Housing, Spool     1       25     112211-001     Spring, Compression     1       26     112211-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       28     9151-002     Plug Sub-Assembly     1       2     300     2666-003     Plug Sub-Assembly     1       30     9266-003     Plug Sub-Assembly     1       31     16148-320     Screw, Cap     10       32     •     Geroler Sub-Assy     1       33     *     Drive, Main     1       33     *		17	5991783-001	Outer Balance Ring Sub-Assy	1
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     Pilate, Selector Sub-Assy     1       X     23     6028001-002     Gasket, Spool Housing     1       24     5989384-001     Insert, Sleeve     1       25     112850-002     Spool, Control     1       26     112211-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       33     *     Orive, Main     1       34     *     Cap Screw, Cap     10       32     *     Geroler Sub-Assembly     1       33			268009-005	Pin, Roll	2
19     6030354-001     Valve     1       20     6030970-001     Drive, Valve     1       21     250002-161     0-ring (Section Seal)     3       22     5991781-001     Plate, Selector Sub-Assy     1       598384-001     Insert, Sleeve     1       X     23     6028001-002     Gasket, 5pool Housing     1       24     599326-002     Housing, Spool     1       25     112850-002     Spool, Control     1       26     112211-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       33     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       26     6033984-001     Bearin		18	5987800-001	Pin, Dowel	1
20     6030970-001     Drive, Valve     1       X     21     250002-161     O-ring (Section Seal)     3       22     \$5991781-001     Plate, Seletor Sub-Assy     1       X     23     6028001-002     Gasket, Spool Housing     1       X     23     6028001-002     Gasket, Spool Housing     1       24     5989326-002     Housing, Spool     1       25     112251-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       28     9151-002     Plug Sub-Assembly     1       X     250003-908     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       31     16148-320     Screw, Cap     10       32     *     Gerofer Sub-Assy     1       33     *     Drive, Main     1       34     *     Cap Screw, 12 PT     9 <td></td> <td>19</td> <td>6030354-001</td> <td>Valve</td> <td>1</td>		19	6030354-001	Valve	1
X     21     25002-161     O-ring (Section Seal)     3       2     5991781-001     Plate, Selector Sub-Assy     1       X     23     6028001-002     Gasket, Spool Housing     1       Z4     5989384-001     Insert, Sleeve     1       Z4     5989326-002     Housing, Spool     1       Z5     112850-002     Spool, Control     1       Z6     112211-001     Spring, Compression     1       Z7     114587-001     Spring, Compression     1       Z9     9072-006     Plug Sub-Assembly     1       X     250003-908     O-ring     1       X0     9266-003     Plug Sub-Assembly     1       X1     250003-904     O-ring     1       X1     16148-320     Screw, Cap     10       X2     *     Geroler Sub-Assy     1       X3     *     Drive, Main     1       X4     *     Cas Screw, 12 PT     9       X5     6033984-001     Bearing Housing (Standard) Shuttle Valve with 61/4 BSP St		20	6030970-001	Drive, Valve	1
22     S991781-001     Plate, Selector Sub-Asy     1       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       29     9072-006     Plug Sub-Assembly     1       X     250003-908     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       30     9266-003     Plug Sub-Assembly     1       X     250003-904     O-ring     1       31     16148-320     Screw, Cap     100       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Cap Screw, 12	Х	21	250002-161	O-ring (Section Seal)	3
S989384-001     Insert, Sleeve     1       X     23     6028001-002     Gasket, Spool Housing, Spool     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       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-Assey     1       33      Drive, Main     1       34     *     Case Drain Port in Mounting Flange       6033984-001     Bearing Housing (Standard) Shuttle Valve with 5(25-18 UNF-2B SAE O-Ring     1       6033985-001     Bearing Housing (Standard) Check Valve with 10 1/4 85P Straight Thread Case     1 <td></td> <td>22</td> <td>5991781-001</td> <td>Plate, Selector Sub-Assy</td> <td>1</td>		22	5991781-001	Plate, Selector Sub-Assy	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       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       6033984-002     Bearing Housing (Standard) Shuttle Valve with 6.1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 6.1/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve wi			5989384-001	Insert, Sleeve	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       30     9266-003     Plug Sub-Assembly     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assembly     1       33     *     Drive, Main     1       34     *     Cap Screw, 12 PT     9       35     6033984-001     Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring     1       34     *     Cap Screw, 12 PT     9       35     6033984-001     Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with .5625-18 UNF-28 SAE O-Ring Case	х	23	6028001-002	Gasket. Spool Housing	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     25003-908     O-ring     1       X     25003-908     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 5.625-18 UNF-28 SAE O-Ring     1       34     *     Case Drain Port in Mounting Flange     1       6033985-001     Bearing Housing (Standard) Shuttle Valve with 5.625-18 UNF-28 SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with 5.625-18 UNF-28 SAE O-Ring Case     1       6033984-001     <	<u> </u>	24	5989326-002	Housing Spool	1
12     112030-002     Deposition     1       26     112211-001     Spring, Compression     1       27     114587-001     Spring, Compression     1       28     9151-002     Plug Sub-Assembly     1       29     9072-006     Plug Sub-Assembly     1       X     250003-908     O-ring     1       X     250003-904     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       6033984-001     Bearing Housing (Standard) Shuttle Valve with 5625-18 UNF-28 SAE O-Ring     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 6 1/4 BSP Straight Thread Case     1       0rain Port in Mounting Flange     Drain Port in Mounting Flange     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 5625-18 UNF-28 SAE		25	112850-002	Spool Control	1
20     11111 001     Spring Compression     1       28     9151-002     Plug Sub-Assembly     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-908     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       X     250003-904     O-ring     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Case Drain Port in Mounting Flange     1       6033984-002     Bearing Housing (Standard) Shuttle Valve with. 5625-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 51/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Standard) Check Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with 1.5625-18		25	112050 002	Spring Compression	1
27     114307-001     Dyning, Cumpression     1       28     9151-002     Pilug Sub-Assembly     1       X     250003-908     0-ring     1       29     9072-006     Pilug Sub-Assembly     1       X     250003-908     0-ring     1       30     9266-003     Pilug Sub-Assembly     1       X     250003-904     0-ring     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Case Drain Port in Mounting Flange     1       6033984-001     Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033984-002     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-28 SAE O-Ring Case     1       6033984-002     Bearing Housing (Wheel) Check Valve with .5625-18 UNF-28 SAE O-Ring Case	-	20	11/587_001	Spring, Compression	1
28     9131-002     Pring 300-Assembly     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       6033984-001     Bearing Housing (Standard) Shuttle Valve with. 5625-18 UNF-2B SAE O-Ring     1       6033984-002     Bearing Housing (Wheel) Shuttle Valve with 5145 S12 Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 525-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve with 525-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing (Check Valve with 525-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing Check Valve with 525-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing Check Valve with 61/4 BSP Straight Th		27	0151 002	Blug Sub Assembly	1
X     250003-908     0-ring     1       X     250003-908     0-ring     1       X     250003-904     0-ring     1       X     250003-904     0-ring     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Cap Screw, 12 PT     9       5     6033984-001     Bearing Housing (Standard) Shuttle Valve with 5625-18 UNF-2B SAE O-Ring     1       6033984-002     Bearing Housing (Standard) Shuttle Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-001	v	28	9151-002		1
29     90/2-006     Pilig Sub-Assembly     1       X     250003-908     0-ring     1       30     9266-003     Plug Sub-Assembly     1       X     250003-904     0-ring     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Cap Screw, 12 PT     9       6033984-001     Bearing Housing (Standard) Shuttle Valve with.5625-18 UNF-28 SAE O-Ring Case Drain Port in Mounting Flange     1       6033985-001     Bearing Housing (Standard) Shuttle Valve with G 1/4 BSP Straight Thread 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       6033985-001     Bearing Housing (Standard) Check Valve with .5625-18 UNF-28 SAE O-Ring Case Drain Port in Mounting Flange     1       6033984-002     Bearing Housing (Standard) Check Valve with .5625-18 UNF-28 SAE O-Ring Case Drain Port in Mounting Flange     1       6033985-001     Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange     1 <t< td=""><td>X</td><td>20</td><td>250003-908</td><td>U-ring</td><td>1</td></t<>	X	20	250003-908	U-ring	1
X     250003-908     0-ring     1       30     9266-003     Plug Sub-Assembly     1       X     250003-904     0-ring     1       31     16148-320     Screw, Cap     10       32     *     Geroler Sub-Assy     1       33     *     Drive, Main     1       34     *     Cap Screw, 12 PT     9       6033984-001     Bearing Housing (Standard) Shuttle Valve with 5.625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange     1       6033984-002     Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Standard) Check Valve with 5.625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 5.625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 6.1/4 BSP Straight Thread Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 6.1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Check Valve with 6.1/4 BSP Straight Thread Ca		29	9072-006	Plug Sub-Assembly	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       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       6033984-001     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring 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 .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing     1       6033984-001     Bearing Housing (Wheel) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing     1       6033985-001     Be	Х		250003-908	U-ring	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       6033985-002     Bearing Housing (Standard) Shuttle Valve with 6 1/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve with 6 1/4 BSP Straight Thread Case     1       6033984-001     Bearing Housing (Standard) Check Valve with 5625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with 51/4 BSP Straight Thread Case     1       6033984-002     Bearing Housing (Wheel) Shuttle Valve with 6 1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Check Valve with 51/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Wheel) Check Valve with 6 1/4 BSP Straight Thread Case     1 <t< td=""><td></td><td>30</td><td>9266-003</td><td>Plug Sub-Assembly</td><td>1</td></t<>		30	9266-003	Plug Sub-Assembly	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 .5625-18 UNF-2B SAE O-Ring Case     1       6033985-001     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case     1       6033984-001     Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring     1       Case Drain Port in Mounting Flange     6033984-001     Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case     1       6033984-001     Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Mheel) Check Valve with G 1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case     1       0rain Port in Valve Housing     0	Х		250003-904	O-ring	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 G 1/4 BSP Straight Thread Case   1     0   Drain Port in Mounting Flange   1     6033985-002   Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case   1     0   Drain Port in Mounting Flange   1     6033984-001   Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring   1     0   Case Drain Port in Valve Housing   1     6033985-001   Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring   1     0   Drain Port in Valve Housing   1   1     6033985-002   Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case   1     0   Drain Port in Valve Housing   1   1     6033985-002   Bearing Housing (Whe		31	16148-320	Screw, Cap	10
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 6 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     1       6033985-002     Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case     1       6033985-002     Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring Case     1       6033984-001     Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring Case     1       6033984-002     Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case     1       6033985-001     Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case     1       6033985-002     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case     1       0     Drain Port in Valve Housing     1       6033985-002     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case     1       0     Drain Port in		32	*	Geroler Sub-Assy	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 .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing     1       6033985-001     Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring 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 6 1/4 BSP Straight Thread Case Drain Port in Valve Housing     1       6033985-001     Bearing Housing (Wheel) Check Valve with 6 1/4 BSP Straight Thread Case     1       11     Drain Port in Valve Hous		33	*	Drive, Main	1
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 .5625-18 UNF-2B SAE O-Ring Case Drain Port in Mounting Flange     1       6033985-001     Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing     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 .5625-18 UNF-2B SAE O-Ring 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       6033985-002     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing     1       36     113538-001     Port in Valve Housing     1		34	*	Cap Screw, 12 PT	9
Image: Case Drain Port in Mounting Flange     Case Drain Port in Mounting Flange       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 G 1/4 BSP Straight Thread 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 (Standard) Check Valve with G 1/4 BSP Straight Thread 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       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 <t< td=""><td></td><td>35</td><td>6033984-001</td><td>Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring</td><td>1</td></t<>		35	6033984-001	Bearing Housing (Standard) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring	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       6033984-002     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing     1       6033985-001     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread 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     40     9080-001     Seal, Shaft Face     1				Case Drain Port in Mounting Flange	
Image: Construct of the system of t			6033984-002	Bearing Housing (Standard) Shuttle Valve with G 1/4 BSP Straight Thread Case	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 6 1/4 BSP Straight Thread Case Drain Port in Valve Housing     1       6033985-001     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing     1       6033985-001     Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread 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       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     40     9080-001     Seal, Shaft Face     1				Drain Port in Mounting Flange	
Image: Provide the system of the sy			6033985-001	Bearing Housing (Wheel) Shuttle Valve with .5625-18 UNF-2B SAE O-Ring Case	1
6033985-002Bearing Housing (Wheel) Shuttle Valve with G 1/4 BSP Straight Thread Case Drain Port in Mounting Flange16033984-001Bearing Housing (Standard) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing16033984-002Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing16033985-001Bearing Housing (Wheel) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing16033985-002Bearing Housing (Wheel) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing16033985-002Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing16033985-002Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing136113538-001Poppet (for relief valve unit only)1386048877-001Spring (for relief valve unit only)1399072-004Plug Sub-Assembly1X250003-905O-ring1X409080-001Seal, Shaft Face1416041082-003Shaft, Sub-Assy(57.15mm 1.25/1 Tapered)16041082-001Shaft, Sub-Assy(53.98mm 16 Tooth Splined)16041082-015Shaft, Sub-Assy(44.45mm .125/1 Tapered)1				Drain Port in Mounting Flange	
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6033984-002Bearing Housing (Standard) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing16033985-001Bearing Housing (Wheel) Check Valve with .5625-18 UNF-2B SAE O-Ring Case Drain Port in Valve Housing16033985-002Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing136113538-001Poppet (for relief valve with G 1/4 BSP Straight Thread Case Drain Port in Valve Housing1386048877-001Spring (for relief valve unit only)1399072-004Plug Sub-Assembly1X250003-905O-ring1X409080-001Seal, Shaft, Sub-Assy(57.15mm .125/1 Tapered)16041082-002Shaft, Sub-Assy(53.98mm 16 Tooth Splined)16041082-015Shaft, Sub-Assy(44.45mm .125/1 Tapered)1				Case Drain Port in Valve Housing	
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Drain Port in Valve Housing       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       6041082-001     Shaft, Sub-Assy(53.98mm 16 Tooth Splined)     1       6041082-015     Shaft, Sub-Assy(44.45mm .125/1 Tapered)     1			6033985-002	Bearing Housing (Wheel) Check Valve with G 1/4 BSP Straight Thread Case	1
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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		38	6048877-001	Spring (for relief valve unit only)	1
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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	X X	39 40	250003-905 9080-001	O-ring Seal, Shaft Face	1
6041082-001     Shaft, Sub-Assy(53.98mm 16 Tooth Splined)     1       6041082-015     Shaft, Sub-Assy(44.45mm .125/1 Tapered)     1	X X	39 40 41	250003-905 9080-001 6041082-003	O-ring Seal, Shaft Face Shaft, Sub-Assy(57.15mm .125/1 Tapered)	1 1 1
6041082-015 Shaft, Sub-Assy(44.45mm .125/1 Tapered) 1	X X	39 40 41	250003-905 9080-001 6041082-003 6041082-002	O-ring Seal, Shaft Face Shaft, Sub-Assy(57.15mm .125/1 Tapered) Shaft, Sub-Assy(57.15mm Straight)	1 1 1 1
	x x	39 	250003-905 9080-001 6041082-003 6041082-002 6041082-001	O-ring Seal, Shaft Face Shaft, Sub-Assy(57.15mm .125/1 Tapered) Shaft, Sub-Assy(57.15mm Straight) Shaft, Sub-Assy(53.98mm 16 Tooth Splined)	1 1 1 1 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
Х	47	5989483-004	Ring, Backup	1
Х	48	112530-044	O-ring	1
Х	49	112530-139	O-ring	1
Х	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
Х		250003-905	O-ring	1
	54	285020-140	Ball (for open loop design only)	2
Х	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 <sup>3</sup> /r [in <sup>3</sup> /r]	Ref. No. 14 GEROLER®	Width mm [in]	Ref. No. 22 DRIVE	Length mm [in]	Ref. No. 23 Screw 12 pt	<b>Length</b> mm [in]
343.8	6022080 001	32,1	5992182-001	130,4	114154-016	177,0
[20.98]	6033989-001	[1.26]		[5.13]		[6.97]
400.0	6033989-002	37,3	5992182-002	135,7	114154-021	182,6
[24.40]		[1.47]		[5.34]		[7.19]
434.2	6033989-006	40,6	5992182-006	138,9	114154-025	185,2
[26.50]		[1.60]		[5.47]		[7.29]
479.5	6033989-003	44,7	5992182-003	143,1	114154-026	190,5
[29.26]		[1.76]		[5.63]		[7.50]
677.3	6033989-007	63,2	5992182-008	161,2	114154-032	208,5
[41.33]		[2.49]		[6.35]		[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

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#### 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.



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#### **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

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#### 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**







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#### Reassembly

#### Outer balance ring assembly

- Install one backup ring (75,1 mm [2.96 in] OD), then one Oring (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.
- 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.



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**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.



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- 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.

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- 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)

- 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 groves 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

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Mark two teeth that

align

Mark any teeth





#### Selector plate assembly (For two speed bearing less motor)

 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.
- 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.



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#### **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° +/- 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 lbfin.] (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.



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## **Chapter 3 Loop Conversion Kit**

## Topic:

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

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#### HP 30 Open Loop Conversion Kit

#### Converting motor from close loop to open loop motor:

- 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

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#### 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.

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 pres sure relief valve
5	A	6048877-001	Spring (bprv) please see
	В	6048878-021	table 10 for details
	С	6048878-024	
	D	6048877-002	
6	1	6048871-004	Plug, without orifice

#### Parts required to convert motor from close loop to open loop

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 <sup>2</sup>	Orange	Ø .0290
2	6048878-021	160 lbf/in <sup>2</sup>	Orange	Ø .0317
3	6048878-024	220 lbf/in <sup>2</sup>	N/A	Ø .0317
4	6048877-002	300 lbf/in <sup>2</sup>	Light blue	Ø .0380



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## Figures

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