

# Helical Hydraulic Rotary Actuators

L30 Series Service & Repair Manual

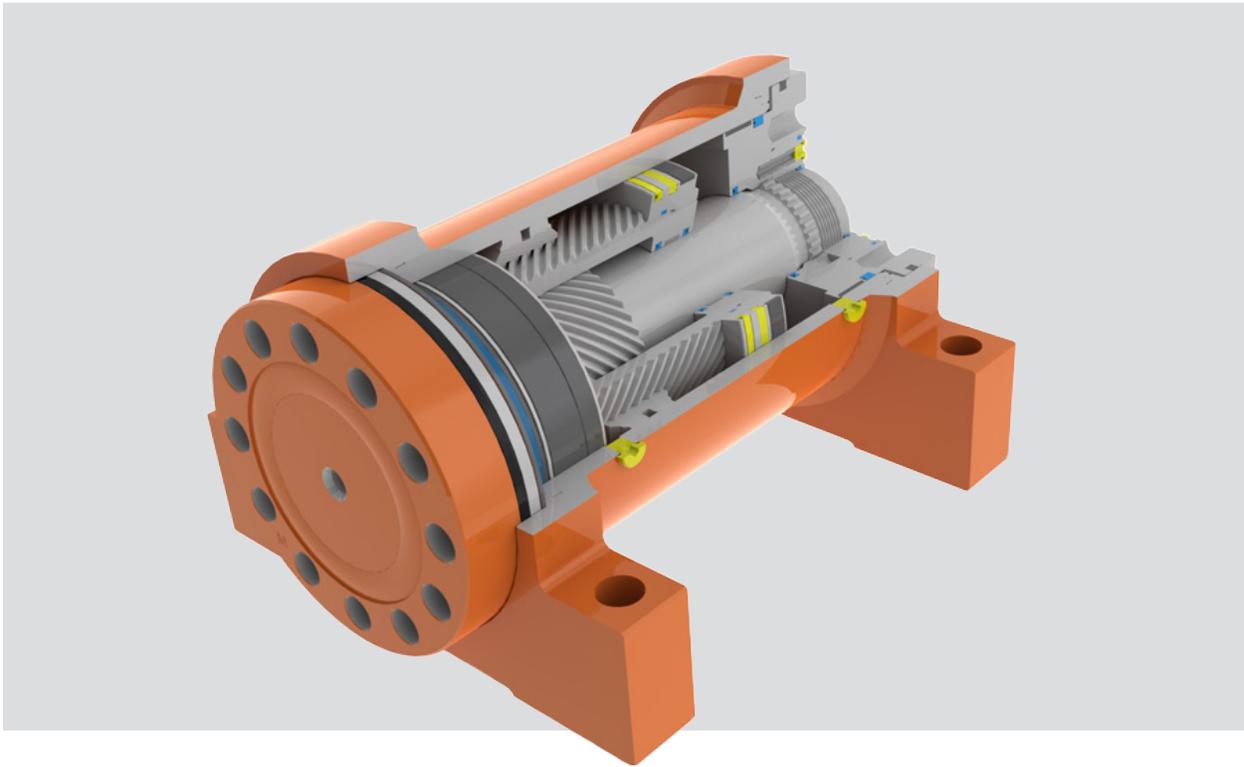


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## Product Introduction



For over 50 years, Parker Hannifin Corporation has been recognized for innovation in design of hydraulic rotary actuators and construction equipment attachments. Helac products are known for their tremendous torque output, compact configurations, exceptional load bearing capabilities, and rugged, reliable performance. Over 1,000 mobile, industrial, construction and mining machinery manufacturers around the world depend on Helac actuators to perform such functions as rotation, positioning, manipulation, vehicle steering and indexing.

The L30 Series is available in several different sizes. All L30 Series actuators incorporate the same internal design, though they vary in size depending on model.

# General Safety Guidelines



Many L30 actuator applications have several pinch points with the potential for severe injuries. Use extreme caution and remain clear of all rotating components when bleeding the hydraulic system and whenever the machine is in operation.

After rebuilding or repairing an actuator, it is necessary to bleed all air from the actuator as well as the hydraulic system of the machine.

## Product Identification

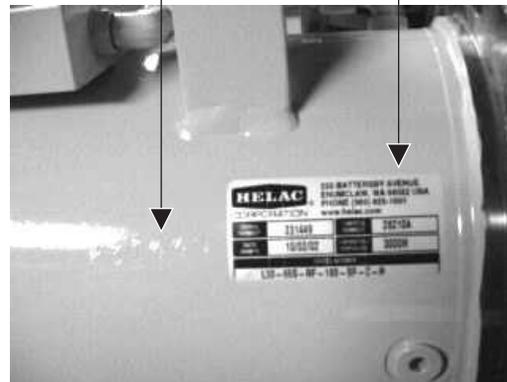
Each Helac actuator is individually serial numbered. The serial number is a six digit number and must be provided before parts and/or service issues can be addressed.

The serial number can be found on the Identification (ID) Tag that is affixed to all actuators. The tag is a thin, silver colored, plastic label with a self-adhesive backing. Information is imprinted in black. The tag is located on the housing tube of the actuator. In some cases, the ID tag may be painted over by the OEM (Original Equipment Manufacturer).

Additionally, the serial number of the actuator is stamped onto the housing tube. It may be necessary to remove paint to expose the serial number.

**Stamped Serial Number**

**Identification (ID) Tag**



## Theory of Operation

The L30 Series rotary actuator is a simple mechanism that uses Helac's sliding spline technology which converts linear piston motion into powerful shaft rotation. Each actuator is composed of a housing with an integral ring gear (1) and only two moving parts: the central shaft (2) with an integrated bearing and mounting flange, and the annular piston sleeve (3).

Helical spline teeth machined on the shaft engage matching splines on the inside diameter of the piston. The outside diameter of the piston carries a second set of splines, of opposite hand, which engage the matching splines of the housing's ring gear.

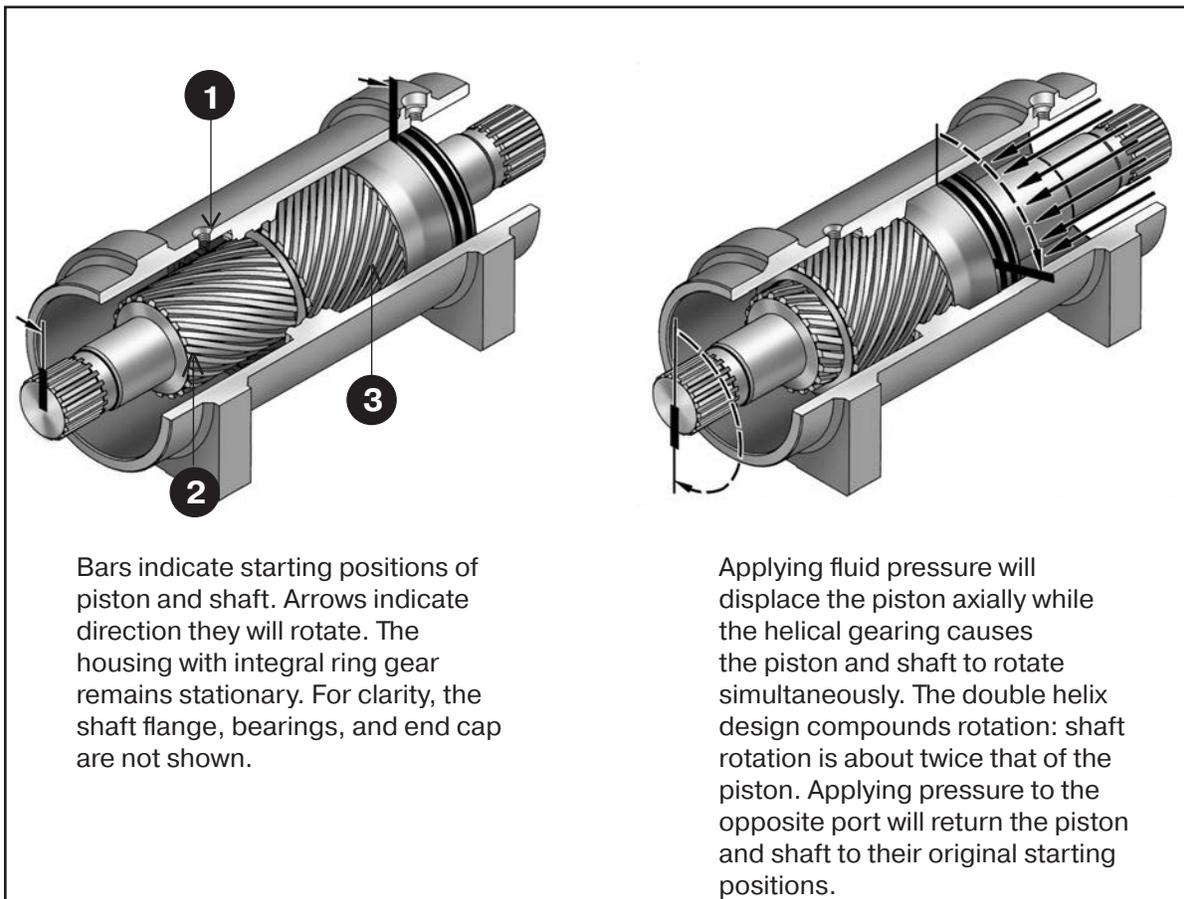
As hydraulic pressure is applied, the piston is displaced axially within the housing - similar to the operation of a hydraulic cylinder - while simultaneously, the splines cause the shaft to rotate. When the control valve is closed, oil is trapped inside the housing, preventing piston movement and locking the shaft firmly in position.

The shaft is supported radially by the large upper radial bearing and the lower radial bearing (see drawings on pages 8 and 9). Axially, the shaft is separated from the housing by the upper and lower thrust washers. The end cap is adjusted for axial clearance and locked in position by set screws, pins or locking collar.

The L30 Series is available in several different sizes. All L30 Series actuators incorporate the same internal design, though they vary in size depending on model.

Many actuators are equipped with a factory installed counterbalance valve, which performs four major functions.

- Protects the actuator in the event of overload
- Enables the actuator to hold position without drifting when external loads are applied
- Reduces hydraulic backlash by pressuring the hydraulic fluid
- Provides a constant controlled rate of rotation in over-center load conditions



# Tools Required



Several basic tools are required for the disassembly and reassembly of the actuator. The tools and their intended functions are outlined below:

- 1. PIPE VISE**
- 2. BOLTS**
- 3. PRY BAR**
- 4. SCREWS**
- 5. FLASHLIGHT**  
Helps in locating and examining timing marks, component failure and overall condition.
- 6. HEX WRENCH SET**  
Removal and replacement of port plugs and set screws
- 7. TORQUE TOOL**
- 8. TORQUE WRENCHES**
- 9. ASSORTED SCREWS**
- 10. PLASTIC MANDREL**  
Removal and installation of piston sleeve
- 11. FELT MARKER**  
Highlights timing marks and outlines troubled areas. Permanent ink is recommended.
- 12. SAFETY GLASSES**
- 13. SEAL TOOLS**

## 14. RUBBER Mallet

Removal and installation of shaft and piston sleeve assembly.

### MAKING A SEAL TOOL

The seal tool is merely a customized standard flat head screwdriver.

- 1. Heat the flat end with a torch until it glows.
- 2. Secure the heated end of the screwdriver in a vise and bend the heated end to a slight radius.
- 3. Round off all sharp edges of the heated to a polished finish. The tool may be modified slightly to your own personal preference.



**CAUTION**

To avoid injury:  
Be careful when  
handling the  
screwdriver when hot.

## Spare Parts

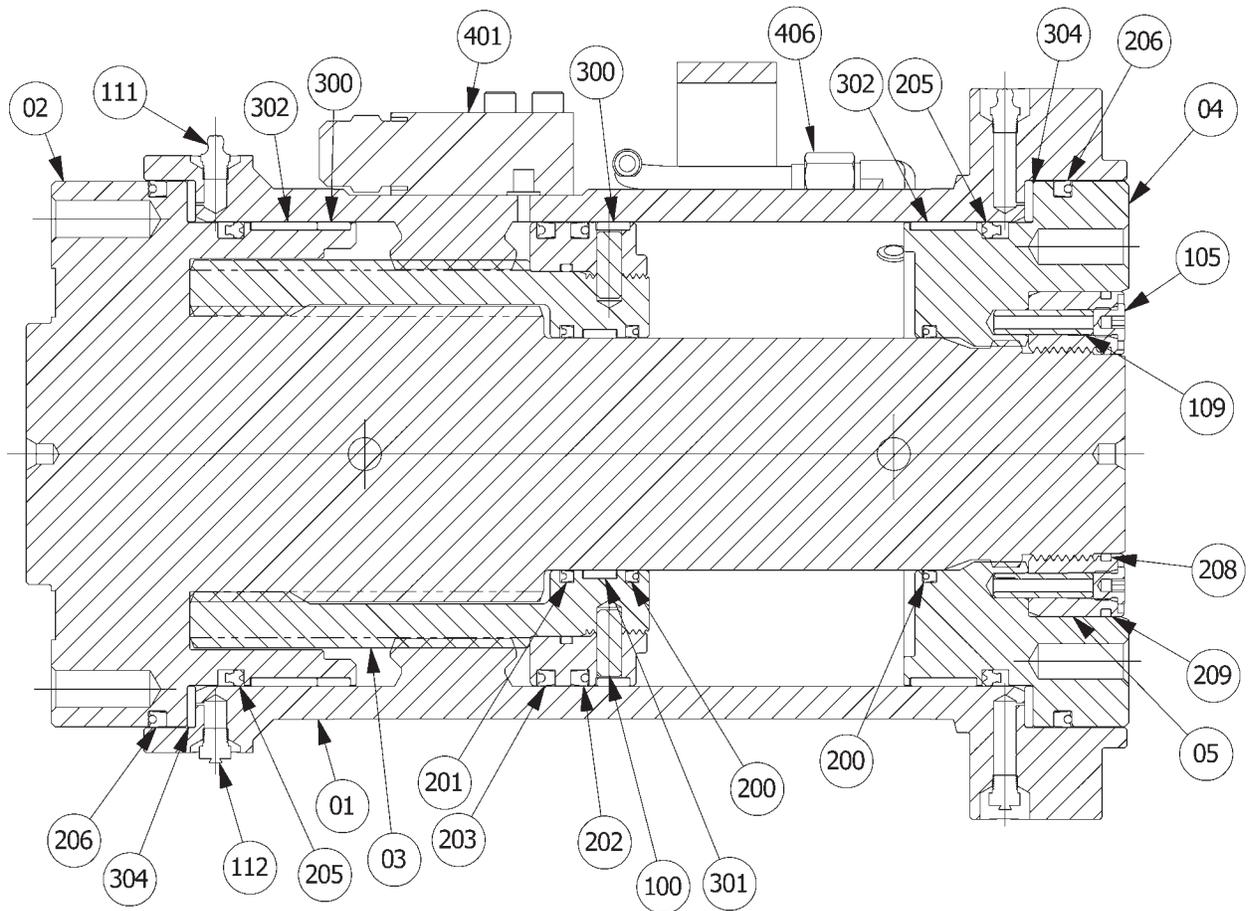
Spare parts must be ordered through the vehicle/machine OEM. Seals and bearings are available as complete kits only! In order to obtain the correct parts, it is essential to provide the serial number of the actuator

to be repaired, see Product Identification section on page 4. To identify spare parts required, refer to the Assembly Drawing on page 9 and Parts List on page 10.

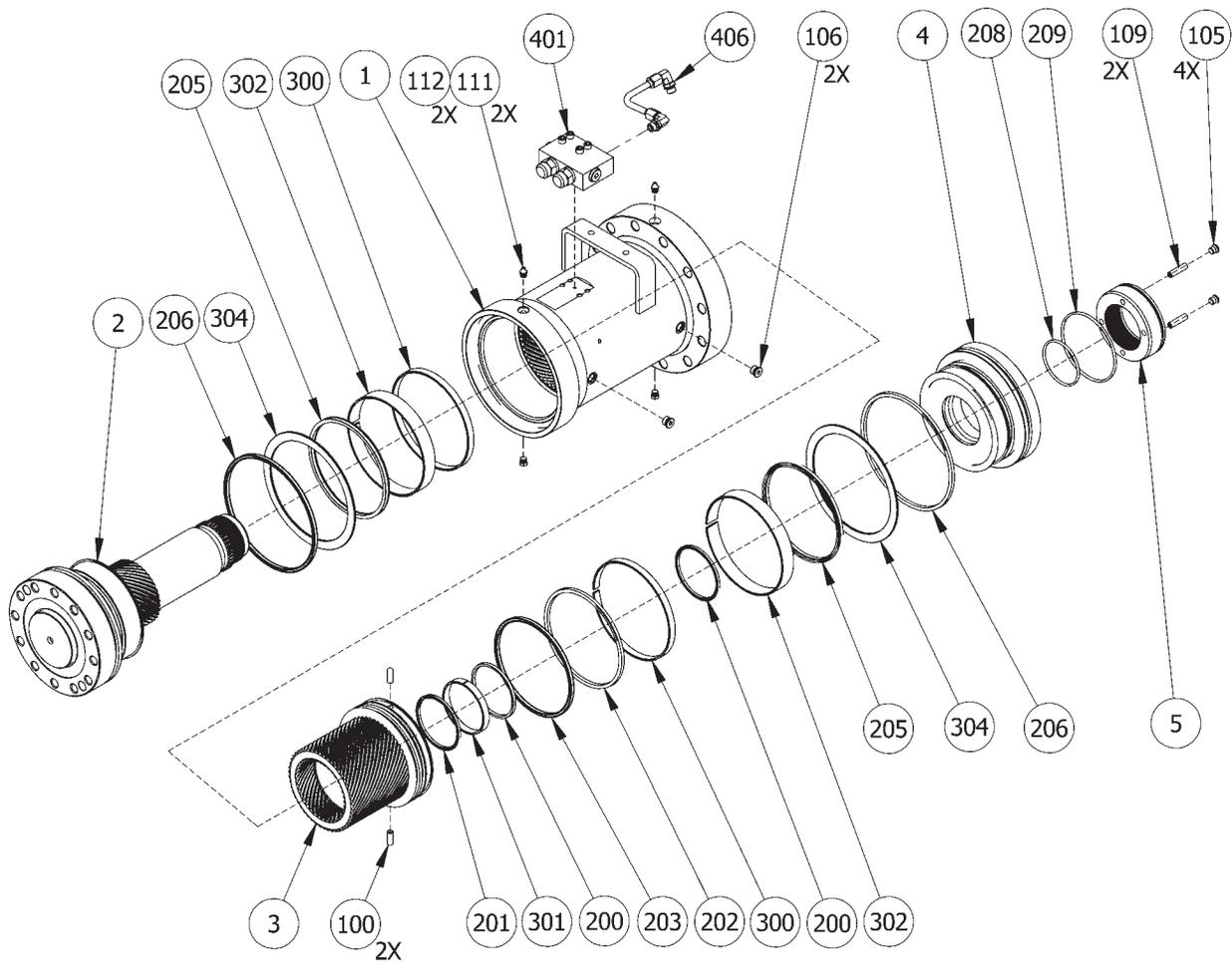
## Technical Support

Technical support is available from Parker Hannifin Corporation Monday through Friday 7 am to 4 pm Pacific Standard Time by calling 800-327-2589. If possible, please have the serial number of the actuator available. (The serial number is stamped into the housing of the actuator-see page 4).

# L30 Assembly Drawing



# L30 Exploded View



# Parts List - L30-17

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-17-S, L30-17-ES or L30-17-MS could use different parts.

## Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
29225	02	Shaft "E" 180° (SAE bolt circle)	1
29974	02	Shaft "M" 180° (Metric bolt circle)	1
29235	02	Shaft "E" 360° (SAE bolt circle)	1
29975	02	Shaft "M" 360° (Metric bolt circle)	1
27393	03	Piston Sleeve 180°	1
29241	03	Piston Sleeve 360°	1
29224	04	End Cap, S1 (no bolt circle)	1
29232	04	End Cap, S2 "E" (SAE bolt circle)	1
29978	04	End Cap, S2 "M" (Metric bolt circle)	1
29206	05	Lock Ring	1
29220		<b>Hardware Kit: SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	113	Set Screw (Socket head; 3/8"-16 x .375", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-2)	4
	106	Port Plug, Socket Hex Head (SAE-4)	6
	109	Pull-out dowel pin .25" x .75" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve ( 50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
29220-4		<b>Hardware Kit: BSPP Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	113	Set Screw (Socket head; 3/8"-16 x .375", Cup, Grade 8)	2
	105	Port plug SAE-2	4
	106	Port Plug, Hex Head (BSPP G 1/4)	4
	109	Pull-out dowel pin .25" x .75" long, tapped #8-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	Grease Relief Valve ( 50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
29920	401	<b>Counterbalance Valve Kit: 2 x SAE-4 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 29919</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	3
		Port plug: SAE-4 Hollow hex, o-ring	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

Part Number	Item #	Description	Qty
S28411-3		<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: SAE-6 Hollow hex, o-ring	2
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
29218-H		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	1
	201	Cup - Seal (energizer removed)	1
	202	T-Seal	1
	204	O-Ring	1
	205	Cup Seal	2
	206	Cup Seal	2
	207	Back-up Ring	1
	208	O-Ring	1
	209	O-Ring	1
S29219		<b>Bearing Kit 180° (Includes item below)</b>	
	301	Wear Guide	1
	302	Wear Guide	1
	303	Wear Guide	1
	304	Thrust Washer	2
S29247		<b>Bearing Kit 360° (Includes item below)</b>	
	301	Wear Guide	1
	302	Wear Guide	2
	303	Wear Guide	1
	304	Wear Guide	2

Parts in kits not sold individually



**Parts List**

# Parts List - L30-25

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-25-S, L30-25-ES or L30-25-MS could use different parts.

**Parts**

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28990	02	Shaft "E" 180° (SAE bolt circle)	1
31549	02	Shaft "M" 180° (Metric bolt circle)	1
29028	02	Shaft "E" 360° (SAE bolt circle)	1
31548	02	Shaft "M" 360° (Metric bolt circle)	1
29007	03	Piston Sleeve 180°	1
29027	03	Piston Sleeve 360°	1
29008	04	End Cap, S1 (no bolt circle)	1
29023	04	End Cap, S2 "E" (SAE bolt circle)	1
31550	04	End Cap, S2 "M" (Metric bolt circle)	1
29005	05	Lock Ring	1
29017		<b>Hardware Kit; SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	113	Set Screw (Socket head; 1/2"-13 x .50", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-2)	4
	106	Port Plug, Socket Hex Head (SAE-4)	4
	109	Pull-out dowel pin .25" x 1.0" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
29017-5		<b>Hardware Kit: BSPP Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	105	Port plug SAE-2	4
	106	Port Plug, Hex Head (BSPP G 1/4)	4
	109	Pull-out dowel pin .25" x 1.0" long, tapped #8-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
29017-6		<b>Hardware Kit: BSPP G1/8 Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	105	Port plug SAE-2	4
	106	Port Plug, Hex Head (BSPP G 1/8)	4
	109	Pull-out dowel pin .25" x 1.0" long, tapped #8-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve ( 50500, 1/8-27 NPT, Alemite 400-650 PSI)	2

Parts in kits not sold individually

Part Number	Item #	Description	Qty
29920	401	<b>Counterbalance Valve Kit: 2 x SAE-4 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 29919</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	3
		Port plug: SAE-4 Hollow hex, o-ring	2
S27357	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	3
		Port plug: SAE-4 Hollow hex, o-ring	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
29015-H		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	T-Seal	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
29016-H		<b>Bearing Kit 180° (Includes item below)</b>	
	301	Wear Guide	1
	302	Wear Guide	1
	304	Thrust Washer	2
29088		<b>Bearing Kit 360° (Includes item below)</b>	
	301	Wear Guide	1
	302	Wear Guide	5
	304	Wear Guide	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>



# Parts List - L30-42

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-42-S, L30-42-ES or L30-42-MS could use different parts.

## Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
29036	02	Shaft "E" 180° (SAE bolt circle)	1
29602	02	Shaft "M" 180° (Metric bolt circle)	1
29042	02	Shaft "E" 360° (SAE bolt circle)	1
29723	02	Shaft "M" 360° (Metric bolt circle)	1
29068	03	Piston Sleeve 180°	1
29069	03	Piston Sleeve 360°	1
29047	04	End Cap, S1 (no bolt circle)	1
29048	04	End Cap, S2 "E" (SAE bolt circle)	1
29603	04	End Cap, S2 "M" (Metric bolt circle)	1
29049	05	Lock Ring	1
29072		<b>Hardware Kit: SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Socket Hex Head (SAE-6)	4
	109	Pull-out dowel pin .375" x 1.25" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
29072-3		<b>Hardware Kit: BSPP Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)</b>	
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug SAE-4	4
	106	Port Plug, Hex Head (BSPP G 1/4)	2
	109	Pull-out dowel pin .375" x 1.25" long, tapped #10-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: SAE-6 Hollow hex, o-ring	2

Parts in kits not sold individually

Part Number	Item #	Description	Qty
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
29070-H		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	1
	201	Cup - Seal (energizer removed)	1
	202	T-Seal	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
	29071		<b>Bearing Kit 180° (Includes item below)</b>
301		Wear Guide	1
302		Wear Guide	2
29073		<b>Bearing Kit 360° (Includes item below)</b>	
	301	Wear Guide	1
	302	Wear Guide	5
	304	Wear Guide	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

Parts List

# Parts List - L30-65

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-65-S, L30-65-ES or L30-65-MS could use different parts.

Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28194	02	Shaft "E" 180° (SAE bolt circle)	1
29708	02	Shaft "M" 180° (Metric bolt circle)	1
28542	02	Shaft "E" 360° (SAE bolt circle)	1
29709	02	Shaft "M" 360° (Metric bolt circle)	1
S28227 or 36905	03	Piston Sleeve 180°	1
S28305 or 36896	03	Piston Sleeve 360°	1
28229	04	End Cap, S1 (no bolt circle)	1
28538	04	End Cap, S2 "E" (SAE bolt circle)	1
29707	04	End Cap, S2 "M" (Metric bolt circle)	1
28231	05	Lock Ring	1
28232-3		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.0" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Socket Hex Head (SAE-6)	4
	109	Pull-out dowel pin .375" x 1.5" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
28232-5		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.0" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Hex Head (BSPP G 1/4)	4
	109	Pull-out dowel pin .375" x 1.5" long, tapped #10-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2	

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

Part Number	Item #	Description	Qty
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
S28233		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	T-Seal (used on one piece piston sleeve instead of item 202 & 203 cup seals)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
S28234		<b>Bearing Kit 180° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	2
	304	Thrust Washer	2
S28234-2		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	1
	301	Wear Guide	1
	302	Wear Guide	5
	304	Thrust Washer	2

Parts in kits not sold individually



# Parts List - L30-95

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-95-S, L30-95-ES or L30-95-MS could use different parts.

## Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28594	02	Shaft "E" 180° (SAE bolt circle)	1
29733	02	Shaft "M" 180° (Metric bolt circle)	1
28493	02	Shaft "E" 360° (SAE bolt circle)	1
29734	02	Shaft "M" 360° (Metric bolt circle)	1
S28599	03	Piston Sleeve 180°	1
S28500	03	Piston Sleeve 360°	1
28498	04	End Cap, S1 (no bolt circle)	1
28667	04	End Cap, S2 "E" (SAE bolt circle)	1
29732	04	End Cap, S2 "M" (Metric bolt circle)	1
28506	05	Lock Ring	1
28505		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston pull-out dowel pin, .375" x 1.0" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Socket Hex Head (SAE-6)	4
	109	Pull-out dowel pin .375" x 1.75" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
28505-4		<b>Hardware Kit: BSPP G1/4 Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.0" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug SAE-4	4
	106	Port Plug, Hex Head (BSPP G 1/4)	4
	109	Pull-out dowel pin .375" x 1.5" long, tapped #10-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: SAE-6 Hollow hex, o-ring	2

Parts in kits not sold individually

Part Number	Item #	Description	Qty
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
S28503		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	T-Seal (used on one piece piston sleeve instead of item 202 & 203 cup seals)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
	210	O-ring (for two piece piston sleeve)	1
	29071		<b>Bearing Kit 180° (Includes item below)</b>
300		Wear Guide	2
301		Wear Guide	1
302		Wear Guide	3
304		Thrust Washer	2
29073		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	5
	304	Thrust Washer	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

**Parts List**

# Parts List - L30-125

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-125-S, L30-125-ES or L30-125-MS could use different parts.

**Parts**

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28692	02	Shaft "E" 180° (SAE bolt circle)	1
29446	02	Shaft "M" 180° (Metric bolt circle)	1
28518	02	Shaft "E" 360° (SAE bolt circle)	1
29712	02	Shaft "M" 360° (Metric bolt circle)	1
S28697	03	Piston Sleeve 180°	1
S28385	03	Piston Sleeve 360°	1
28388	04	End Cap, S1 (no bolt circle)	1
28699	04	End Cap, S2 "E" (SAE bolt circle)	1
29445	04	End Cap, S2 "M" (Metric bolt circle)	1
28390	05	Lock Ring	1
S28522		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.25" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Socket Hex Head (SAE-8)	4
	109	Pull-out dowel pin .375" x 1.75" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
29447-2		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.25" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Hex Head (BSPP G 1/2)	4
	109	Pull-out dowel pin .375" x 1.75" long, tapped #10-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2	

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

Part Number	Item #	Description	Qty
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
S28392		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	T-Seal (used on one piece piston sleeve instead of item 202 & 203 cup seals)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
28701		<b>Bearing Kit 180° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	3
S28393		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	5
		Thrust Washer	2

Parts in kits not sold individually



# Parts List - L30-165

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-165-S, L30-165-ES or L30-165-MS could use different parts.

## Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28740	02	Shaft "E" 180° (SAE bolt circle)	1
31937	02	Shaft "M" 180° (Metric bolt circle)	1
28761	02	Shaft "E" 360° (SAE bolt circle)	1
32164	02	Shaft "M" 360° (Metric bolt circle)	1
S28745	03	Piston Sleeve 180°	1
S28766	03	Piston Sleeve 360°	1
28748	04	End Cap, S1 (no bolt circle)	1
28755	04	End Cap, S2 "E" (SAE bolt circle)	1
31939	04	End Cap, S2 "M" (Metric bolt circle)	1
28750	05	Lock Ring	1
S28751		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.25" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug, Socket Hex Head (SAE-4)	4
	106	Port Plug, Socket Hex Head (SAE-8)	4
	109	Pull-out dowel pin .375" x 1.75" long	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	**Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
28751-5		<b>Hardware Kit: BSPP G1/4 Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
	100	Piston dowel pin, .375" x 1.25" long, hardened	1
	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
	105	Port plug SAE-4	4
	106	Port Plug, Hex Head (BSPP G 3/8)	4
	109	Pull-out dowel pin .375" x 1.5" long, tapped #10-32	1
	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: SAE-6 Hollow hex, o-ring	2

Parts in kits not sold individually

Part Number	Item #	Description	Qty
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
28752		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
	210	O-ring (for two piece piston sleeve)	1
28753		<b>Bearing Kit 180° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	3
28768		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	5
	304	Thrust Washer	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>



Parts List

# Parts List - L30-215

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-215-S, L30-215-ES or L30-215-MS could use different parts.

Parts

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
32465	02	Shaft "E" 180° (SAE bolt circle)	1
31547	02	Shaft "M" 180° (Metric bolt circle)	1
28783	02	Shaft "E" 360° (SAE bolt circle)	1
31503	02	Shaft "M" 360° (Metric bolt circle)	1
S28655	03	Piston Sleeve 180°	1
S28793	03	Piston Sleeve 360°	1
28776	04	End Cap, S1 (no bolt circle)	1
28660	04	End Cap, S2 "E" (SAE bolt circle)	1
31534	04	End Cap, S2 "M" (Metric bolt circle)	1
28662	05	Lock Ring	1
<b>28665-1</b>		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
964015	100	Piston dowel pin, .437" x 1.50" long, hardened	1
960155	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
977008	105	Port plug, Socket Hex Head (SAE-4)	4
977018	106	Port Plug, Socket Hex Head (SAE-8)	4
964050	109	Pull-out dowel pin .375" x 1.75" long	1
936002	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
938001	112	**Grease Relief Valve ( 50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
<b>32761-1</b>		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
964015	100	Piston dowel pin, .437" x 1.50" long, hardened	1
960155	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
977008	105	Port plug, Socket Hex Head (SAE-4)	4
977023	106	Port Plug, Hex Head (BSPP G 3/8)	4
964050	109	Pull-out dowel pin .375" x 1.75" long, tapped #10-32	1
936002	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
938001	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

Part Number	Item #	Description	Qty
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
		Port plug: SAE-6 Hollow hex, o-ring	2
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
28663		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
	210	O-ring (for two piece piston sleeve)	1
28664		<b>Bearing Kit 180° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	3
	304	Thrust Washer	2
28782		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	5
	304	Thrust Washer	2

Parts in kits not sold individually



**Parts List**

# Parts List - L30-380

Parts listed are standard components per the catalog. Parker-Helac has and does make special designs for OEM's that may differ. Model codes beginning with L30-380-S, L30-380-ES or L30-380-MS could use different parts.

**Parts**

Part Number	Item #	Description	Qty
Not Available as Spare Part	01	Housing	1
28806	02	Shaft "E" 210° (SAE bolt circle)	1
29750	02	Shaft "M" 210° (Metric bolt circle)	1
S28810	03	Piston Sleeve 210°	1
28776	04	End Cap, S1 (no bolt circle)	1
28660	04	End Cap, S2 "E" (SAE bolt circle)	1
31534	04	End Cap, S2 "M" (Metric bolt circle)	1
28662	05	Lock Ring	1
<b>28665-1</b>		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
964015	100	Piston dowel pin, .437" x 1.50" long, hardened	1
960155	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
977008	105	Port plug, Socket Hex Head (SAE-4)	4
977018	106	Port Plug, Socket Hex Head (SAE-8)	4
964050	109	Pull-out dowel pin .375" x 1.75" long	1
936002	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
938001	112	**Grease Relief Valve ( 50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
<b>32761-1</b>		<b>Hardware Kit: SAE Port Plugs (includes item 100, 105, 106, 106.1, 109, 111, 112)</b>	
964015	100	Piston dowel pin, .437" x 1.50" long, hardened	1
960155	113	Set Screw (Socket head; 5/8"-11 x .625", Cup, Grade 8)	2
977008	105	Port plug, Socket Hex Head (SAE-4)	4
977023	106	Port Plug, Hex Head (BSPP G 3/8)	4
964050	109	Pull-out dowel pin .375" x 1.75" long, tapped #10-32	1
936002	111	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
938001	112	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2

Parts in kits not sold individually

Part Number	Item #	Description	Qty
28411-3	401	<b>Counterbalance Valve Kit: 2 x SAE-6 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28411-03</b>	
		CB Valve	1
		Socket head cap screw; 5/16"-18 x 1.50" ASTM A574	4
28215-3	401	<b>Standard Counterbalance Valve Kit: 2 x BSPP G3/8 Ports (includes valve, mounting screws and o-rings) Top of valve stamped 28215-03</b>	
		CB Valve	1
		Socket head cap screw; 1/4"-20 x 1.50" ASTM A574	4
		Port plug: BSPP G3/8	2
	406	Hydraulic tube assembly (made locally)	1

**Note:** Parker Hannifin supplies many different counterbalance and motion control valves specific to an OEM application. If the valve you have is not one of the part numbers listed, contact the OEM of the equipment installed on to purchase the correct valve.

Part Number	Item #	Description	Qty
28663		<b>Seal Kit - Standard (Includes items below)</b>	
	200	Cup - Seal	2
	201	Cup - Seal (energizer removed)	1
	202	Cup - Seal	1
	203	Cup - Seal (energizer removed)	1
	205	Cup Seal	2
	206	Cup Seal	2
	208	O-Ring	1
	209	O-Ring	1
	210	O-ring (for two piece piston sleeve)	1
28782		<b>Bearing Kit 360° (Includes item below)</b>	
	300	Wear Guide	2
	301	Wear Guide	1
	302	Wear Guide	5
	304	Thrust Washer	2

Parts in kits not sold individually

Seal and bearing kits can be ordered online at <http://www.parker.com/helac>

**Disassembly**

# Disassembly



## Before Disassembly

**NOTICE**

All numbers that appear in parenthesis ( ) are referring to items on page 8 or 9.

Inspect the actuator for corrosion prior to disassembly. Severe corrosion can make it difficult to unthread and remove the lock nut (5) and end cap (4). If corrosion is evident, soak the effected areas with penetrating oil for several hours before disassembly. It is required prior to disassembly, that the shaft is rotated completely clockwise and that the valve block is removed, (See valve block drawing and parts list on page 10) and that the actuator is placed in a pipe vise.

## Disassembly

Be sure actuator has been fully rotated, valve block removed, and actuator is firmly secured to the pipe vise.

1. Remove port plugs (106) and both grease relief and grease fittings (111 and 112) for ease of disassembly and assembly



There could be hydraulic pressure built up behind the port plugs, use caution when removing. Wear safety glasses at all times.

2. Drain the actuator of all oil into a suitable container.

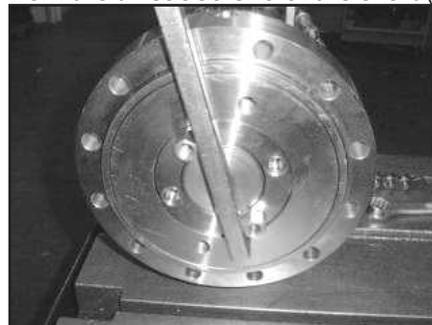
3. Using a hex wrench, remove the 4 port plugs (105) from the locknut (5).



4. Thread a bolt into each pull-out dowel pin (109) located behind 2 of the port plugs (105) in the lock nut (5), pull straight out to remove.



5. Insert two adaptor fittings opposite each other into the lock nut (5). Place a pry bar between the adaptor fittings and turn counterclockwise to remove the lock nut (5) from the threaded end of the shaft (2).

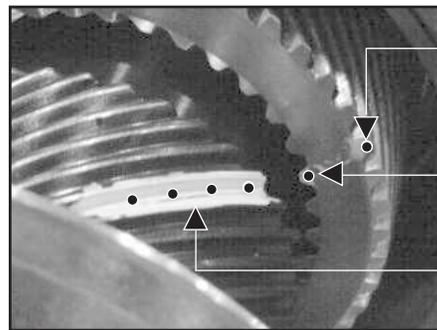
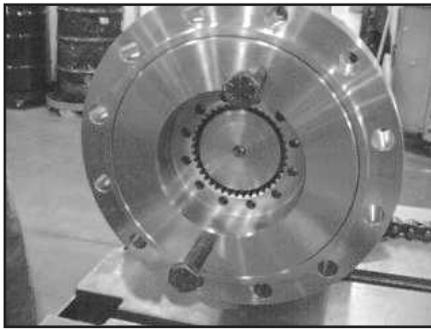
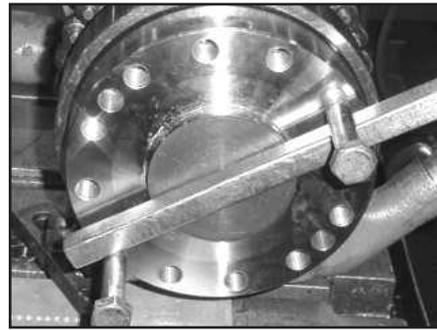


# Disassembly

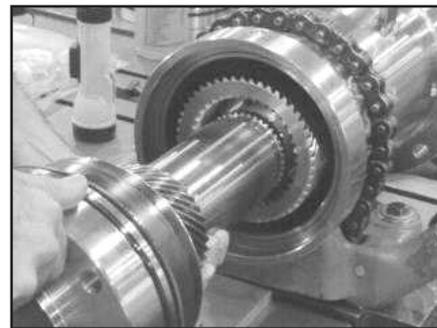
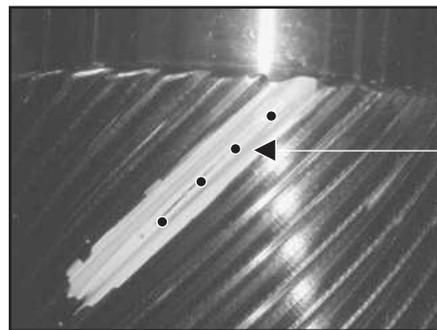
- Insert two threaded bolts opposite each other into the end cap (4). Pull straight out to remove end cap (4). See Photo Below

**NOTICE**

If needed, to break the seal friction, the end cap can be removed by first removing the shaft (see step 7) then tapping the inside of the end cap through the actuator housing and piston sleeve with a rubber mallet and plastic mandrel. Do not let end cap fall.



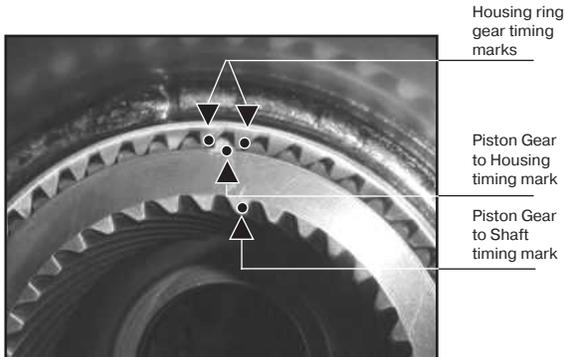
- Thread two bolts into the shaft (2) flange. Using a long pry bar turn the shaft (2) counterclockwise. It will start to rotate out of the housing. If it does not rotate out of the housing, use a plastic mandrel to tap the threaded end to break the hydraulic lock and start the shaft out of the housing. **(Do not rotate shaft out of gear engagement with the piston)**. Look on the gear end of the piston sleeve (3) and locate the existing timing marks (center punches), make new timing marks if needed. Take a felt pen and clearly mark the gear engagement at the timing marks on both the piston and shaft. Upon reassembly the same gear engagement (timing) has to be achieved. Rotate the shaft out of the actuator. Support the weight of the shaft to prevent damage to the rod surface. See Photos to Right.



# Disassembly

- Using a plastic mandrel and rubber mallet, drive the piston sleeve assembly towards the end cap end of the actuator. Stop when the gear end of the piston sleeve is flush with the Housing (1) ring gear.

**NOTICE**  
To avoid damage to machined parts: Carefully remove seals using removal tools with rounded edges.



- Locate the timing marks on the piston sleeve assembly (3) and the housing (1) ring gear, clearly mark them with a felt pen (make new timing marks if none are found). Continue to drive the piston sleeve assembly out of the housing ring gear. Stop immediately after the gear teeth come out of engagement. Take a felt pen and put a mark on top of the piston and a corresponding mark on the thrust surface of the housing (see photo below). This mark will simplify assembly later. Remove the piston sleeve assembly from the housing. Do not allow the piston to

bind or jam in the housing bore. Support the weight of the piston to prevent damage to the housing bore.

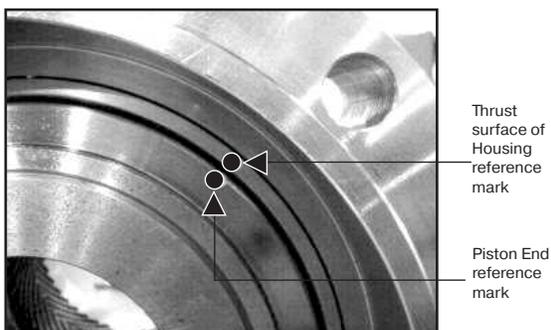
- Remove the OD O-ring (209) from the locknut (5) using a pick or seal tool.



- Remove the ID O-ring (208) from the locknut (5) using a pick or seal tool.



- Remove the ID cup seal (200) from the end cap (4) using a pick or seal tool.



# Disassembly

- 13.** Remove the wear guide (302) from the end cap (4).



- 16.** Remove the exclusion seal (206) from the end cap (4) using a seal tool.



- 14.** Remove the main pressure seal (205) from the end cap (4) using a seal tool.



- 17.** Remove the ID cup seal (200) from the piston sleeve assembly (3) using a seal tool.



- 15.** Remove the thrust washer (304) from the end cap (4).



- 18.** Remove the ID wear guide (301) from the piston sleeve assembly (3) using a pick tool.



## Disassembly

- 19.** Remove the ID cup seal (201) from the piston sleeve assembly (3) using a small pick or seal tool.



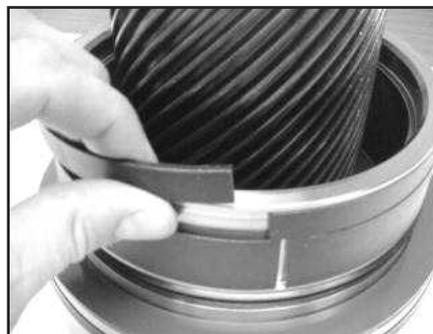
- 22.** Remove the OD cup seal (203) from the piston sleeve assembly (3) using a small pick or seal tool.



- 20.** Remove the wear guide (300) from the piston sleeve assembly (3).



- 23.** Remove the wear guides (300 & 302) from the shaft (2).



- 21.** Remove the OD cup seal (202) from the piston sleeve assembly (3) using a small pick or seal tool.



- 25.** Remove the main pressure seal (205) from the shaft (2) using a seal tool.



## Disassembly

- 26.** Remove the thrust washer (304) from the shaft (2).



- 27.** Remove the exclusion seal (206) from the shaft (2) using a seal tool.



# Seal and Wear Guide Installation

	<b>⚠ WARNING</b>
	<b>Avoid personal injury and machinery damage:</b> Read the Service and Repair Manual for proper installation, maintenance and repair procedures.

<b>⚠ CAUTION</b>
<b>To avoid injury or damage to product:</b> Secure product to slotted table or vise.

	<b>⚠ CAUTION</b>
	<b>Spraying fluids.</b> Contents under pressure. Wear approved eye protection. Use caution when removing port plugs and fittings.

<b>NOTICE</b>
<b>To avoid contamination to machined parts:</b> Make sure work area is clean.

## Pre-Assembly

All actuators are timed according to OEM specifications at Helac's production facility. The timing ensures that the actuator will stop at the required position at the end of the rotation in either direction. Wrong timing can cause the actuator to over rotate resulting in interference and damage of equipment components. Rotation being too short can limit the operating range of the equipment. The proper gear engagement of shaft, piston and housing ensures the correct timing.

For repair personnel not familiar with the L30 actuator, it is recommended that a "dry run" without the seals installed but with the wear guides and thrust washer installed, be performed prior to final assembly. Proceed to assembly procedures starting on page 29, insure proper fit and timing of actuator, then disassemble and apply all seals and wear guides. For seal and wear guide orientation use the cut-away drawing on page 8 as a reference.

<b>NOTICE</b>
<b>To avoid damage to machined parts:</b> Carefully remove seals using removal tools with rounded edges.

### NOTICE

Lubricate all seals and contact surfaces with hydraulic oil. Apply a thin layer of lubricating grease to the thrust washers.

## Inspection

1. Clean all parts in a wash tank and dry with compressed air prior to inspecting.
2. Carefully inspect all critical areas: Seal grooves, wear guide grooves, thrust surfaces, shaft surfaces, housing bore and gear teeth for any surface finish abnormalities.

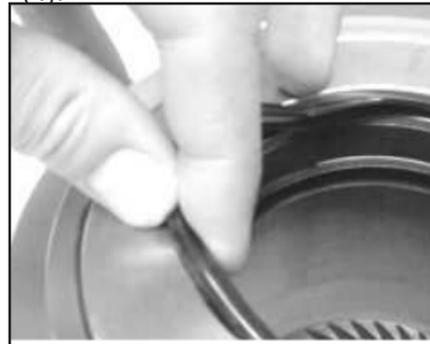
1. Using a seal tool install the OD O-ring (209) onto the locknut (5).



2. Install the ID O-ring (208) into the lock nut (5).



3. Install the ID cup seal (200) into the end cap (4).



## Seal and Wear Guide Installation

4. Install the exclusion seal (206) onto the end cap (4) using a seal tool.



5. Lightly grease both sides of the thrust washer with Lithium grease (304) and install onto the end cap (4).



6. Install the main pressure seal (205) onto the end cap (4) using a seal tool.



7. Install the wear guide (302) onto the end cap (4).



8. Install the OD cup seal (203) with the energizer ring removed, onto the piston sleeve assembly (3) using a seal tool.



9. Install the OD cup seal (202) onto the piston sleeve assembly (3) using a seal tool.



**\* NOTE: Several models use O.D. T-seal that comes without an energizer ring. Install the O.D. seal and two backup rings.**

## Seal and Wear Guide Installation

- 10.** Install the wear guide (300) onto the piston sleeve assembly (3).



- 13.** Install the ID cup seal (200) into the piston sleeve assembly (3).



- 11.** Install the ID cup seal (201) with the energizer ring removed, into the piston sleeve assembly (3).



- 14.** Install the exclusion seal (206) onto the shaft (2).



- 12.** Install the ID wear guide (301) into the piston sleeve assembly (3).



- 15.** Lightly grease both sides of the thrust washer with Lithium grease (304) and install onto the shaft (2).

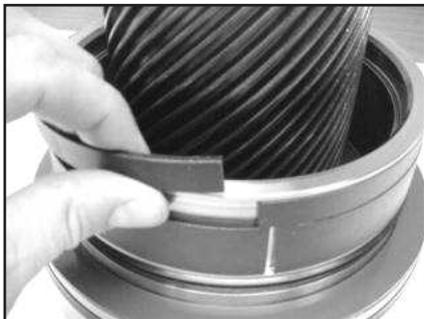


## Seal and Wear Guide Installation

16. Install the main pressure seal (205) onto the shaft (2).



17. Install wear guides (300&302) onto the shaft (2).



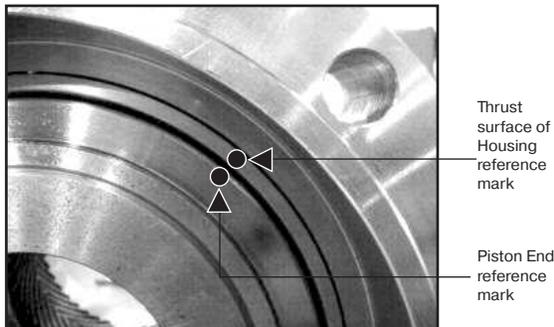
**Assembly**

# Assembly

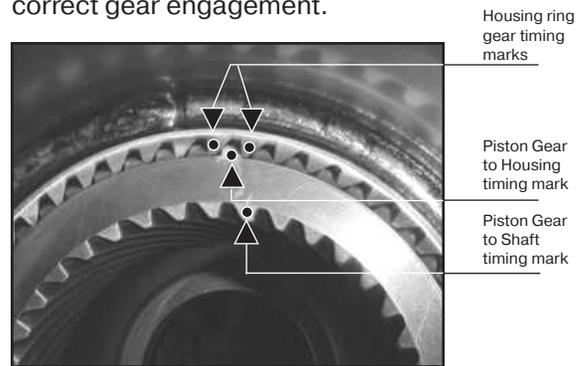


## Assembly

1. Secure the actuator to a pipe vise, then carefully slide the piston sleeve assembly (3), gear teeth first, into the end cap end of the actuator. **(Be careful not to bind or jam the piston sleeve assembly in the housing)**. Stop when the end of the piston is flush with the thrust surface of the housing (1) and the two reference marks, made during disassembly line up. (The gear teeth of the piston sleeve assembly should be almost ready to engage the housing (1) ring gear teeth).



2. Confirm proper gear alignment from the shaft flange end, then use a rubber mallet and plastic mandrel to engage the piston sleeve assembly gear teeth and housing ring gear teeth. Drive piston in until the front of the piston sleeve is lined up with the housing ring gear (see photo below). Locate the timing marks on the piston sleeve gear teeth and the housing ring gear teeth. Both timing marks should be lined up. If not, disengage the piston from the ring gear and line up with the correct gear engagement.

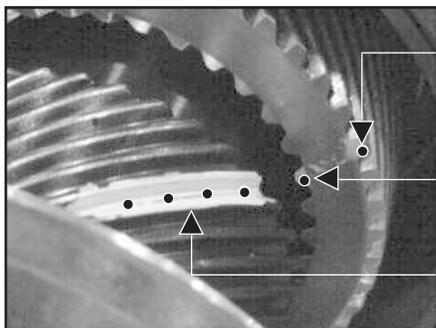
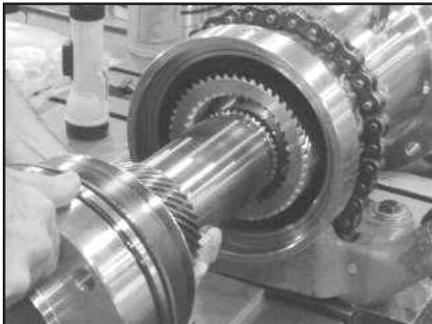


3. Using a rubber mallet and plastic mandrel, continue to drive piston sleeve assembly (3) towards the shaft flange end of actuator until the piston sleeve assembly is fully seated against the housing ring gear.



# Assembly

4. Install the shaft (2) threaded end first into the piston sleeve assembly (3). The shaft (2) gear teeth timing mark and the piston sleeve assembly (3) gear teeth timing mark must be lined up.



Piston Gear to Housing timing mark

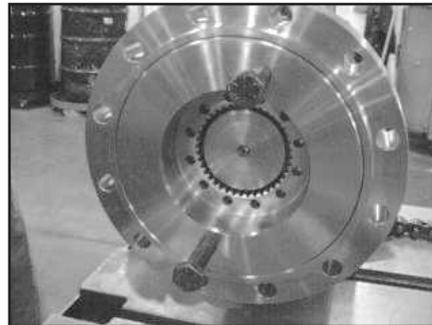
Piston Gear to Shaft timing mark

Shaft gear to Piston timing marks

5. Install two bolts into the shaft (2) flange. Using a long pry bar turn the shaft (2) clockwise. Be sure both timing marks on the gear teeth are lined up. Rotate shaft (2) in until approximately 2 inches are still between the shaft flange and the housing.



6. Grease the end cap (4) splines with Lithium grease. Install two bolts in the end cap and slide end cap into the housing. Carefully tap the end cap (4) with a rubber mallet until the seals enter the housing and the end cap becomes flush with the housing.

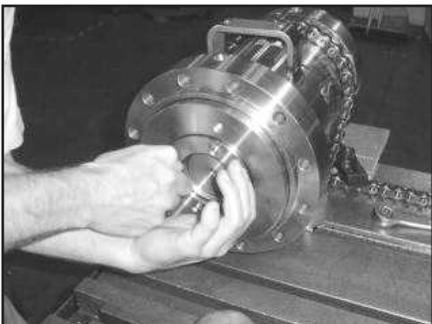


7. Using the pry bar turn the shaft (2) clockwise slowly to engage the shaft (2) splines and the end cap (4) splines. If needed, use the two bolts on the end cap to turn end cap for proper alignment of the splines. After engagement of splines, fully seat the shaft (2) clockwise into the housing.

**NOTICE**  
To avoid damage to machined parts:  
Carefully remove seals using removal tools with rounded edges.

# Assembly

8. Grease the threads and contact surfaces of the end cap (4), shaft (2) and locknut (5). Thread the locknut (5) onto the threaded end of the shaft (2). Install two adaptor fittings opposite each other into the locknut (5). Using the pry bar, turn lock nut clockwise and tighten, per chart on page 24.



9. Rotate the locknut (5) counterclockwise just far enough to insert the 2 pull-out dowel pins (109) opposite each other.



10. Install and tighten the port plugs (105) into the locknut (5) using a hex wrench.



11. Install the valve block (if equipped), hydraulic lines, all port plugs and grease fittings onto the actuator.

## L30 End Cap / Lock Nut Torque Chart

Model	Ft-Lbs	Nm
L30 – 25	200	271
L30 – 65	200	271
L30 – 95	250	339
L30 – 125	250	339

# Greasing Thrust Washers

After the actuator is assembled but before it is put back into service, the thrust washers and exclusion seals must be packed with Lithium grease.

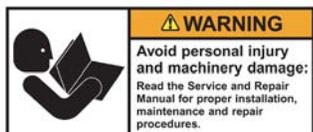
1. There are two male grease fittings (111) and two grease relief ports (112), one of each (111, 112) is located at both ends of the outer diameter of the housing (1). (See exploded view on page 8 for reference).

**NOTICE** If a hydraulic test bench is not available, the actuator can be rotated by hand, open the pressure ports and use a pry bar with cap screws inserted into the shaft flange to turn the shaft in the desired direction.

2. Insert the tip of the female grease nozzle onto the male grease fitting (111) and apply grease. Continue applying until grease flows from the relief port (112). Cycle the actuator five times and apply grease again. Repeat this process at the other end of the housing (1).

**NOTICE** Helac Corporation recommends a greasing schedule of every three months. Annually inspect and replace seals and bearings, if needed.

# Testing the Actuator



## Testing the Actuator

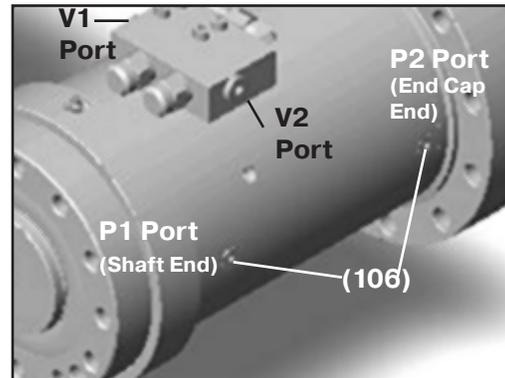
If the equipment is available, the actuator should be tested on a hydraulic test bench. The breakaway pressure—the pressure at which the shaft begins to rotate—should be to 650 psi (45 bar) maximum. Cycle the actuator at least 25 times at 3000 psi (210 bar) pressure. After the 25 rotations, increase the pressure to 4500 psi (315 bar) to check for leaks and cracks. Perform the test again at the end of the rotation in the opposite direction.

## Testing the Actuator for Internal Leakage

Plug the valve ports and connect the hydraulic lines to the housing ports. Bleed all air from the actuator (see *Installation and Bleeding Procedure* on page 26) Rotate the shaft to the end of rotation at 3000 psi (210 bar) and maintain pressure. Remove the hydraulic line from the non-pressurized side.

Continuous oil flow from the open housing port indicates internal leakage across the piston. Replace the line and rotate the shaft to the end of rotation in the opposite direction. Repeat the test procedure outlined above for the other port. If there is an internal leak, disassemble, inspect and repair.

# Installation and Bleeding



## Installation and Bleeding

After installation of the actuator onto the equipment, it is important that all safety devices such as tie rods or safety cables be properly reattached. The actuator body is equipped with a pair of port plugs (106) which can be removed for bleeding.

### For actuators with an optional valve block installed.

1. Connect the pressure lines to ports V1 and V2.
2. Connect a hydraulic line to port P1 routed either back to tank or to a 5 gallon container to collect the purged oil.
3. Apply pressure to port V2 until actuator has fully rotated to one side.
4. With port P1 still open, apply pressure to the primary port V1 allowing oil/air to be purged from the open port.
5. Install port P1 plug and attach purge line to port P2.
6. Apply pressure to port V1 until actuator has fully rotated in the opposite direction.
7. With port P2 still open, apply pressure to port V2 allowing oil/air to be purged from the open port.
8. Install port P2 plug.
9. All air should be purged from the actuator.

### For actuator without optional valve block installed.

Air should be purged through the upper ports P1 and P2. With that in mind, apply pressure hoses to the lower ports P1 and P2.

1. Connect a hydraulic line to upper port P1 routed either back to tank or to a 5 gallon container to collect the purged oil.
2. Apply pressure to lower port P2 until actuator has fully rotated to one side.
3. With upper port P1 still open, apply pressure to the lower port P1 allowing oil/air to be purged from the open port.
4. Install upper port P1 plug and attach purge line to upper port P2.
5. Apply pressure to lower port P1 until actuator has fully rotated to the opposite side.
6. With upper port P2 still open, apply pressure to the lower port P2 allowing oil/air to be purged from the open port.
7. Install upper port P2 plug.
8. All air should be purged from the actuator.

## Troubleshooting Guide

<b>PROBLEM</b>	<b>SEE CAUSES AND SOLUTIONS BELOW</b>
Shaft rotates slowly or not at all	1 - 6
Operation is erratic or not responsive	7
Shaft will not fully rotate	8, 9
Selected position cannot be maintained	3, 4, 7

<b>CAUSE</b>	<b>SOLUTION</b>
1. Insufficient torque output	Verify correct operating pressure. Do not exceed OEM's pressure specifications. Load may be above maximum capacity of the actuator.
2. Low rate of fluid flow	Inspect ports for obstructions and hydraulic lines for restrictions and leaks.
3. Control or counterbalance valve has internal leak	Disconnect hydraulic lines and bypass valve. Leave valve ports open and operate the actuator through housing ports (do not exceed OEM's operating pressure). The valve must be replaced if a steady flow of fluid is seen coming from the valve ports.
4. Piston and/or shaft seal leak	Remove the plug and the housing's valve ports. Operate the actuator through the housing ports. Conduct the internal leakage test as described in the Testing section on page 32 of this manual.
5. Corrosion build-up on the thrust surfaces	Re-build the actuator. Remove all rust then polish.*
6. Swollen seals and composite bearings caused by incompatible hydraulic fluid (Standard actuators only)	Re-build the actuator. Use fluid that is compatible with seals and bearings. Contact Helac Corporation for more information.
7. Air in actuator	Purge air from actuator. See bleeding procedures outlined on page 33.
8. Twisted or chipped gear teeth overload condition.	Check for gear binding. Actuator may not be able to be re-built and may need to be replaced.
9. Port fittings are obstructing the piston during stroke	Check thread length of port fittings. Fittings should not reach inside the housing bore.

\* Replacement parts may be needed.

**Offer of Sale****Helical, Hydraulic Rotary Actuators  
L30 Series Service & Repair Manual**

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**6. LIMITATION OF LIABILITY.** IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCT, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.

**7. Confidential Information.** Buyer acknowledges and agrees that any technical, commercial, or other confidential information of Seller, including, without limitation, pricing, technical drawings or prints and/or part lists, which has been or will be disclosed, delivered or made available, whether directly or indirectly, to Buyer ("Confidential Information"), has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller.

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**12. Use of Products; Indemnity by Buyer.** Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. Unauthorized Uses. If Buyer uses or resells the Products in

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**13. Cancellations and Changes.** Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

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**16. Waiver and Severability.** Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

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**18. Ownership of Software.** Seller retains ownership of all Software supplied to Buyer hereunder. In no event shall Buyer obtain any greater right in and to the Software than a right in the nature of a license limited to the use thereof and subject to compliance with any other terms provided with the Software.

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**21. Entire Agreement.** These Terms, along with the terms set forth in the main body of any Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the main body of a Quote and these Terms, the terms set forth in the main body of the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter shall have no effect. These Terms may not be modified unless in writing and signed by an authorized representative of Seller.

**22. Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer acknowledges that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Laws. 8/20





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