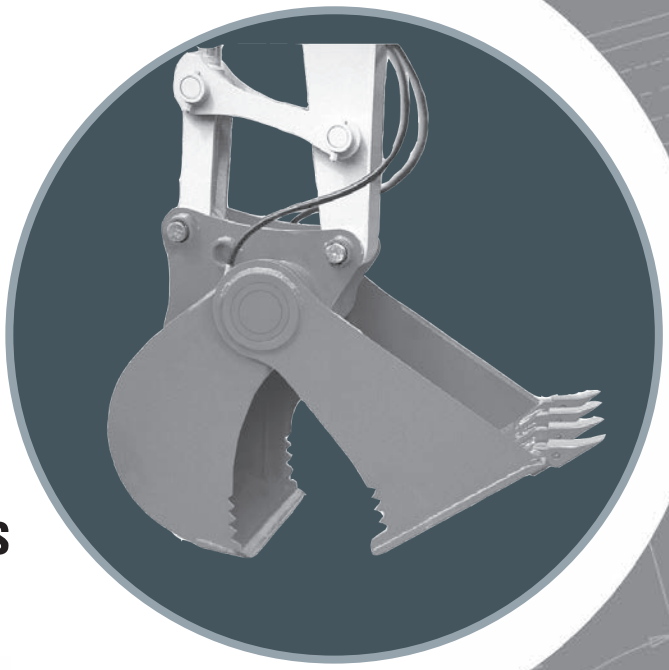
CONSTRUCTION EQUIPMENT ATTACHMENTS

Parker

POWERGRIP®

Instruction,Service and Repair Manual



PG and PGA Series

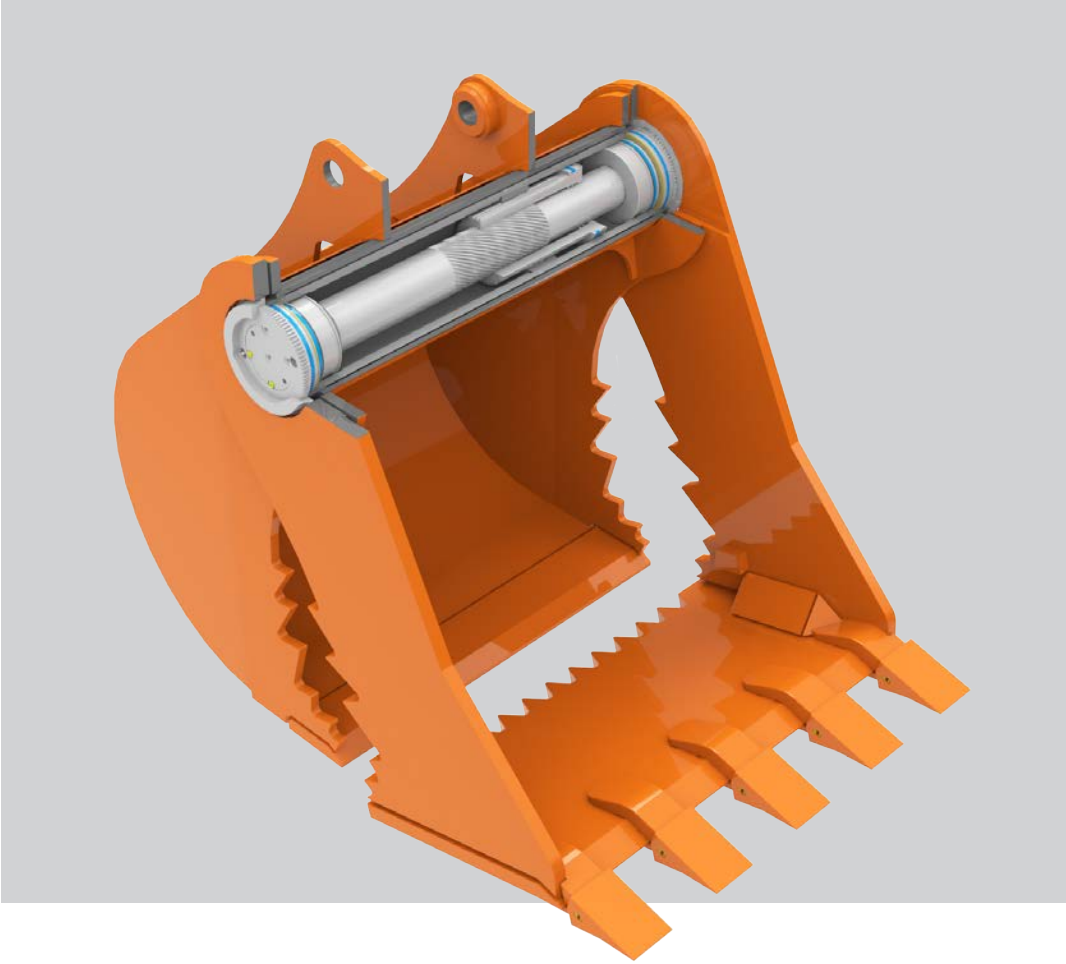
OIL SOLUTIONS

PO Box 38
Strathfieldsaye, VIC, 3551
1800 OIL SOL
1800 645 765
sales@oilsolutions.com.au
www.oilsolutions.com.au
"For All Your Hydraulic Needs"

HA PGIM/07.22

Table of Contents

Product Overview



Product Introduction

Helac PowerGrip®, a multi-purpose bucket from Parker Hannifin, is a versatile, durable tool used as a trenching, grading or clamshell bucket and for gripping and loading. PowerGrip increases the tasks a single machine can perform, reducing the number of dedicated-task machines needed on a job site. PowerGrip also performs as a general purpose excavating bucket for everyday tasks.

Ideal for a broad range of applications, PowerGrip can be used during every step of the construction process. Since 2001, contractors have come to rely on PowerGrip for demolition, land clearing, tree/brush/stump removal, underground utilities, material handling and finish grading.

Each PowerGrip is built with the quality and durability Helac is known for – so we offer a one year warranty to ensure your complete satisfaction.

When used in combination with Helac PowerTilt®, a swing attachment, you can achieve unmatched, hand-like manipulation and dexterity, dramatically maximizing productivity.

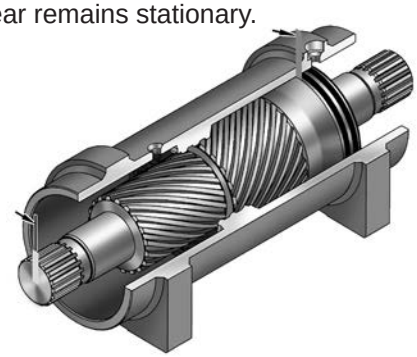
Operation Technology

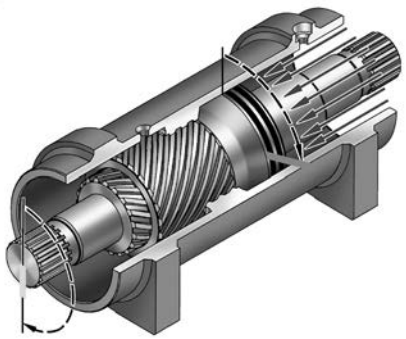
PowerGrip uses Parker Hannifin's innovative, sliding-spline operating technology to convert linear piston motion into powerful shaft rotation. Each actuator is composed of a housing and two moving parts — the central shaft and piston.

Helical spline teeth on the shaft engage matching teeth on the piston's inside diameter. A second set of splines on the piston's outside diameter mesh with the gear in the housing.

Starting position

The piston is completely bottomed out. Bars indicate starting positions of piston and shaft. Arrows indicate directions they will rotate. The housing with integral ring gear remains stationary.





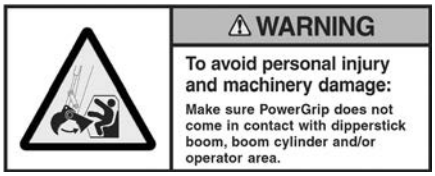
Ending position

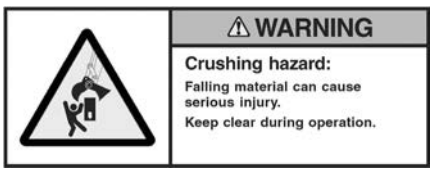
When hydraulic pressure is applied to the piston, it moves axially, while the helical gearing causes the piston and shaft to rotate simultaneously. Applying pressure to the opposite port will return the piston and shaft to their original starting positions.

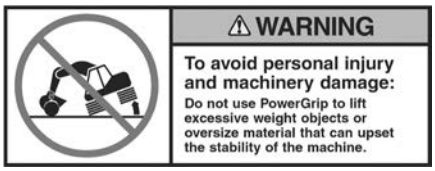
General Safety Guidelines

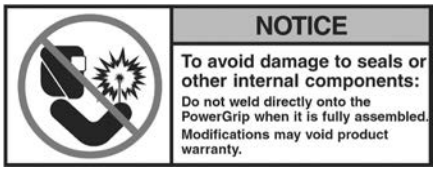
Cautionary Notices

Before beginning installation of the PowerGrip®, there are several cautionary notices that should be considered. If you are not comfortable with installation or maintenance of this product, contact your local dealer or Parker Hannifin's Customer Service Department for assistance.









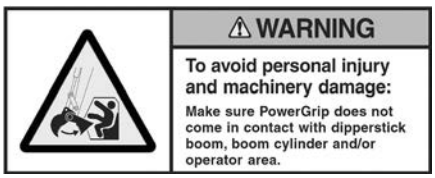
Other Safety Guidelines and Precautions

1. PowerGrip should only be used to perform tasks for which it was designed. Abusing the product and/or using it for purposes for which it was not intended can expose the operator and others to hazards as well as result in damage to the PowerGrip, carrier and/or other attachments.
2. The operation of the PowerGrip Bucket is similar to the operation of OEM buckets in trenching and material handling applications. However, the PowerGrip Bucket has the added ability to grip, hold and lift materials in a pick and place capability. This attachment is not designed for long term holding of materials.

   Refer to the carrier manufacturer's instructions regarding safe material handling practices.

   The bucket jaw should only be opened when needed for specific tasks. Failure to close the jaw can result in damage to the dipper arm.
3. Modification to the PowerGrip is done at the owner's risk and may void the Parker Hannifin Offer of Sale.
4. It is the owner's responsibility to be sure all safety equipment is in place and operating properly at all times. If safety decals fade, are damaged or become unreadable from a distance of 10 feet, they should be replaced immediately.

   Be sure to post the warning decal provided by Parker Hannifin to the cab of the carrier machine.



5. PowerGrip should be used in conjuction with attachments that do not adversely affect the stability of the machine.

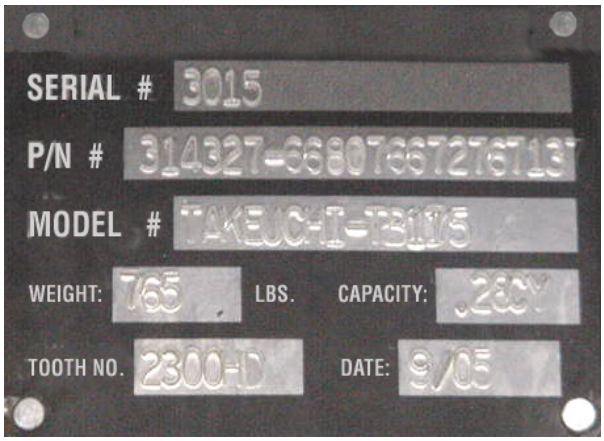
General Safety Guidelines

Important Notice

Parker Hannifin does not assume any reponsibility beyond the design and performance of its construction equipment attachment products. The customer is solely responsble for engineering of mating structures, fasteners and other associated components related to the installation of the product and its ultimate application.

Product Identification

A unique serial number is located on each PowerGrip. This serial number is stamped on one end of the actuator and is also located on an Identification (ID) Tag. It may be necessary to remove paint to expose the serial number.



Installation and Mounting

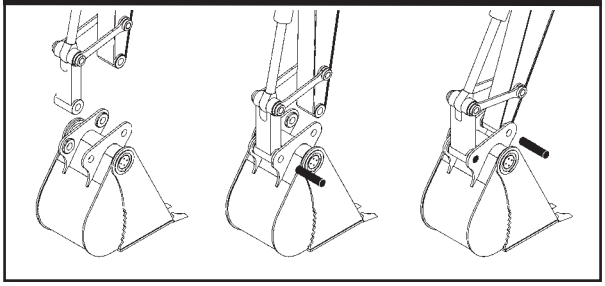
Each PowerGrip is engineered for a specific backhoe or excavator and is designed to be pin mounted directly to the machine. When using Universal or Hydraulic Quick Couplers, contact the respective coupler manufacturer for instructions and maintenance requirements.

Installing the PowerGrip Bucket onto the Carrier

All PowerGrip models should be mounted to the carrier according to the instructions outlined below.

1. Position the PowerGrip close to the carrier boom to ensure easy use of the lifting reach and range of the carrier boom.
2. Lower the dipper to approximately 2-3 inches (50-75 mm) above the PowerGrip. Roll out the bucket cylinder to lower the link bars to the PowerGrip.
3. Align the PowerGrip and link bar holes and install the link pin.
4. Slowly lift the PowerGrip to a safe height with the bucket and boom cylinders.
5. Curl the bucket cylinder until the PowerGrip and dipper holes align and install the bucket pivot pin. Rotate the pins as necessary and install the required retainers.

PowerGrip Installation



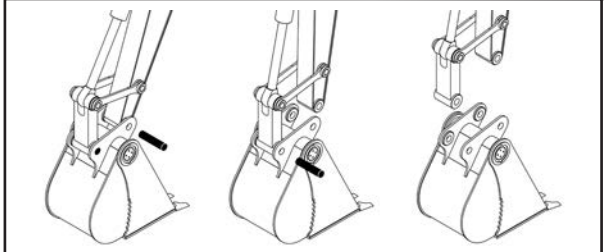
6. Safety check. Check that the Helac Attachment is fitting correctly by maneuvering it with the machine and at the same time watching for any interference or resistance to movement that may exist. If there is any sign of problems with the smooth functioning of the PowerGrip, DO NOT attempt to carry out any modifications to it, or the host machine. Contact Helac's Customer Service Department instead, and they will advise as necessary.

Removing the PowerGrip Bucket from the Carrier

To remove the PowerGrip bucket follow the instructions outlined below.

1. Position the bucket so it is lightly supported by the ground and in a position so it will not move or fall when a pin is removed.
2. Remove the bucket pivot and link pins.

PowerGrip Removal



Hydraulic Requirements and Plumbing

Hydraulic Requirements

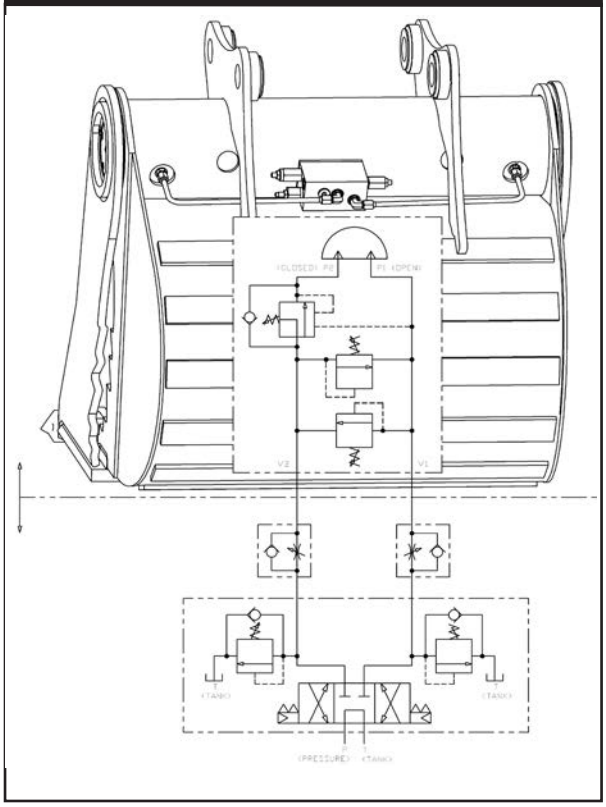
The Typical PowerGrip Circuit Chart and the Tool Circuit Requirements Table (shown on this page) illustrate the control circuit requirements for the PowerGrip. The hydraulic pressures and flow requirements must be observed or damage to the actuator can occur.

The installer of the PowerGrip is responsible for selecting control circuits that are compatible with the excavator and meet the tool circuit requirements. Helac can be contacted for additional control circuits and methods for controlling the PowerGrip.

NOTICE PowerGrips are equipped with a standard pressure control/ load lock manifold welded to the bucket shell.

Refer to the Suggested Hose Routings Diagram on Page 11 for the recommended routings.

Typical PowerGrip Circuit



Tool Circuit Requirements

Model Sizes		PG06	PG07	PG08
Displacement	in^3 *(cm^3)*	84.8 *(1,390)*	118.5 *(1,942)*	211 *(3,458)*
Required Oil Flow	gpm *(liters/minute)*	2-7 *(8-28)*	3-10 *(12-39)*	5-18 *(21-70)*
Port Connections*	SAE	6	6	8
Hydraulic Circuit Min. Hose Tube Size	in *(mm)*	1/2 *(12)*	5/8 *(16)*	5/8 *(16)*
Whip Hose Size	in (mm)	3/8 *(10)*	3/8 *(10)*	3/8 *(10)*
Hydraulic Pressures				
Cross Port Relief Valve Pressure (opening)		1,000-1,500 psi		(70-103 bar)
Cross Port Relief Valve Pressure (closing)		3,200-3,300 psi		(220-230 bar)
Circuit Pressure		3,650-3,750 psi		(250-260 bar)
Maximum Circuit Back Pressure		580 psi		(40 bar)

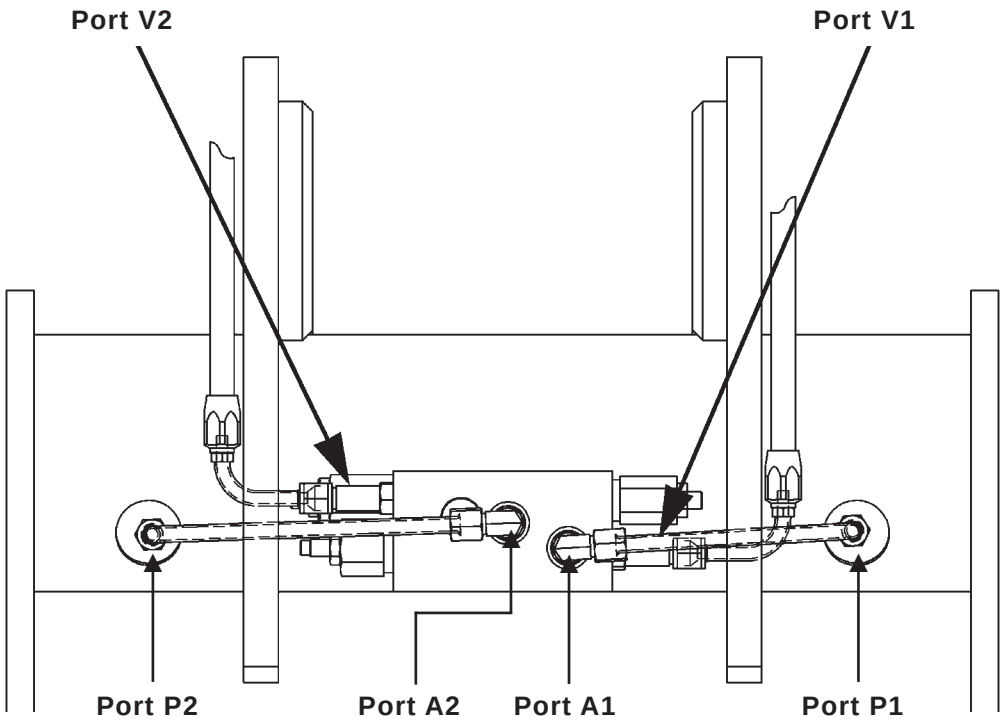
* 3-10 second open/close time

Hydraulic Requirements and Plumbing

Installing and Removing Hyrdualic LInes

The manifold incorporates two ports for hydraulic hose connections, Port V1 and Port V2. When pressure is applied to Port V1 the jaw opens; when pressure is applied to Port V2 the jaw closes.

After installing the PowerGrip onto the equipment and attaching the hydraulic lines, it is important that all safety devices are properly reattached.



Plumbing

Hose and tube size recommendations can be found in the Tool Circuit Requirements Chart shown on Page 4.

The position of the hoses is important for reliable operation. Refer to the Suggested Hose Routings Chart on Page 10 for suggested hose routings.

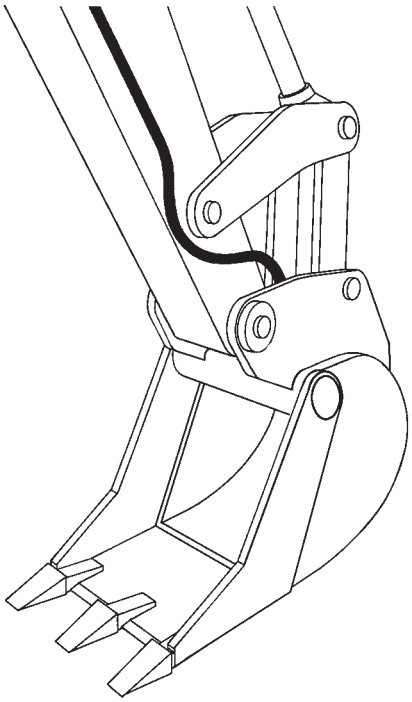
Connect hydraulic hoses to the appropriate ports. Be sure the hoses do not cross, foul, crush or chafe when operating the PowerGrip or machine. Verify proper hose routing for all possible positions of the PowerGrip and all attachments, which are to be used with the PowerGrip. Repair any oil leaks immediately.

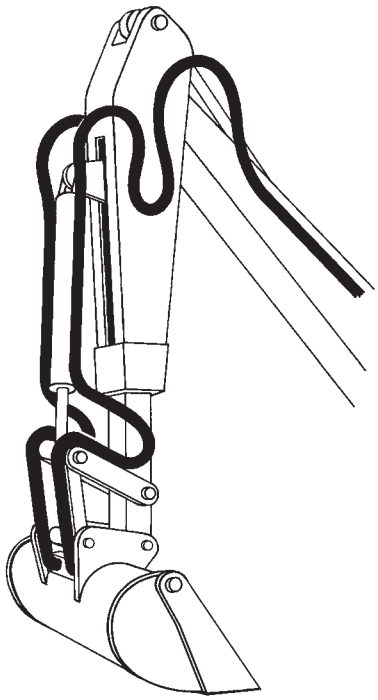
NOTICE

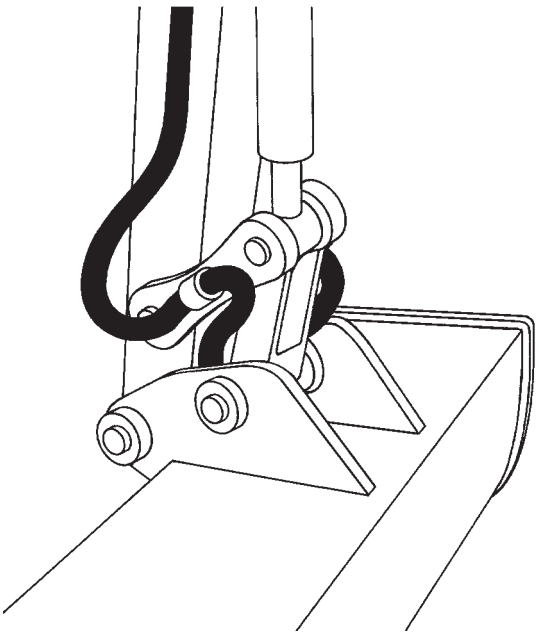
When installing a new tool circuit or hydraulic lines, flush all the tool circuit lines with hydraulic oil prior to connecting the PowerGrip. This will help remove any contaminants from the circuit components which may have accumulated during manufacturing and/or installation.

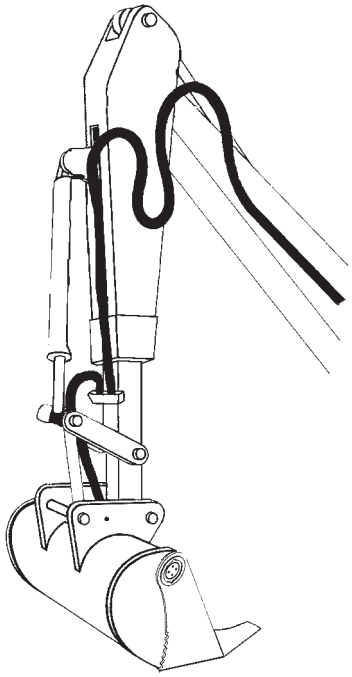
Hydraulic Requirements and Plumbing

Suggested Hose Routings









Maintenance

Daily

1. Grease the PowerGrip at the two grease fittings with a high quality Lithium-based grease. Apply grease until clean grease flows from the grease reliefs. Severe operating conditions such as abrasive dust or prolonged submersion in water may require more frequent grease applications.
2. Make sure the grease reliefs are functioning properly. Open or replace non-functioning grease reliefs immediately.

NOTICE Never replace the grease relief valves with grease fittings or plugs.

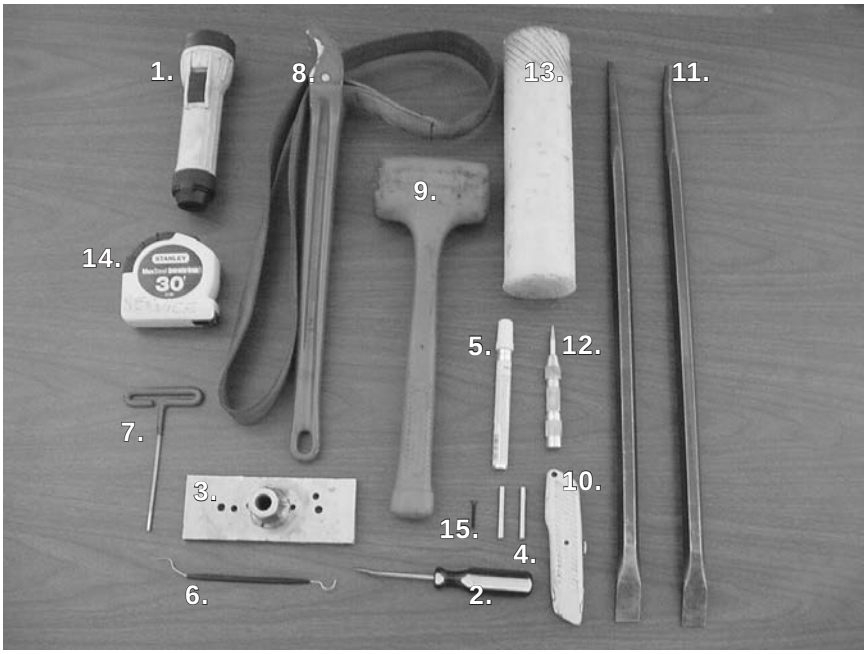
NOTICE Do not operate the PowerGrip if the grease reliefs are not functioning.

3. Inspect the PowerGrip for loose, worn or damaged components and replace or repair immediately.
4. Mounting pins should be greased upon installation and thereafter according to the equipment manufacturer's instructions.

Troubleshooting Guide

Problem	Possible Cause	Solution
PowerGrip jaw does not hold position	Excessive force being applied to jaw is causing relief valve to open.	This is normal. The relief valve limits the force applied to the bucket jaw to prevent damage to the unit.
	A bi-directional hydraulic motor control valve is being used without the bucket load control valve.	Install bucket load control valve.
	Load control valve is leaking.	Test, repair or replace as needed.
	Seals are leaking oil.	Test and replace seals as necessary.
Jaw moves only in one direction	Single directional control valve is being used.	Replace with bi-directional control valve.
	Load control valve manifold is obstructed.	Clean manifold passageways(s).
	Hydraulic hose is internally damaged.	Test and replace damaged hose.
PowerGrip Bucket has spongy feel	Air in PowerGrip actuator or hydraulic circuit.	Bleed air from circuit and check for cause.
Side to side (axial play) movement of jaw	Worn or missing thrust washers.	Replace or install thrust washers.
PowerGrip will not accept grease at grease fittings.	Grease relief valve is not functioning, or it has been replaced with a grease fitting or plug.	Clean or replace grease relief valves.

Tools Required



Several basic tools are required for the disassembly and reassembly of the PowerGrip. The suggested tools are outlined below:

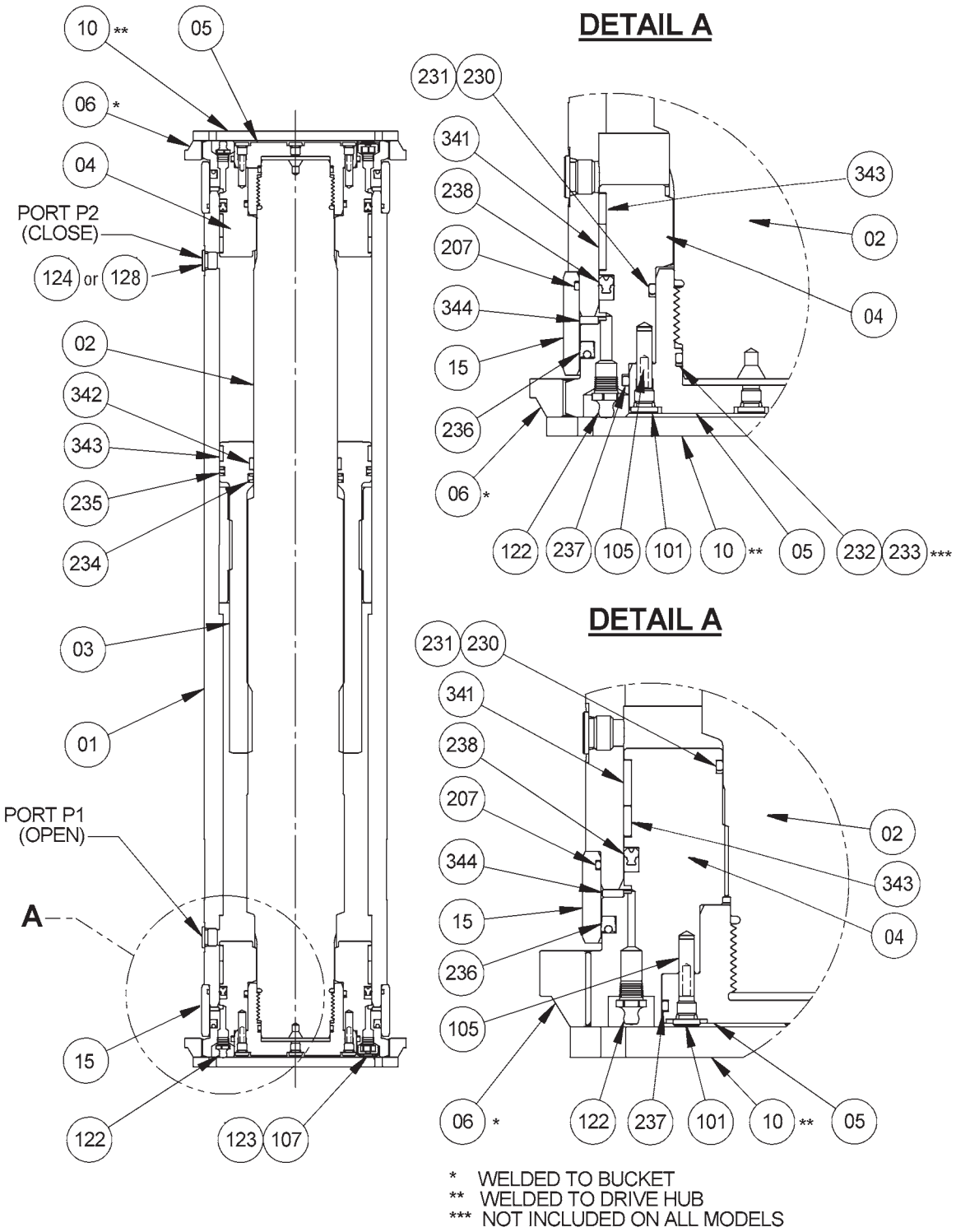
1. Flashlight
2. Seal tool
3. Pin spanner wrench
4. Two metal dowels
5. Felt or paint marker
6. Pick
7. 1/8 T-handle allen wrench
8. Strap wrench
9. Plastic or rubber mallet
10. Utility knife
11. Two pry bars
12. Metal punch
13. Plastic drift
14. Tape measure
15. One #8-32 x 1.00 or longer machine screw

Making a Seal Tool

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

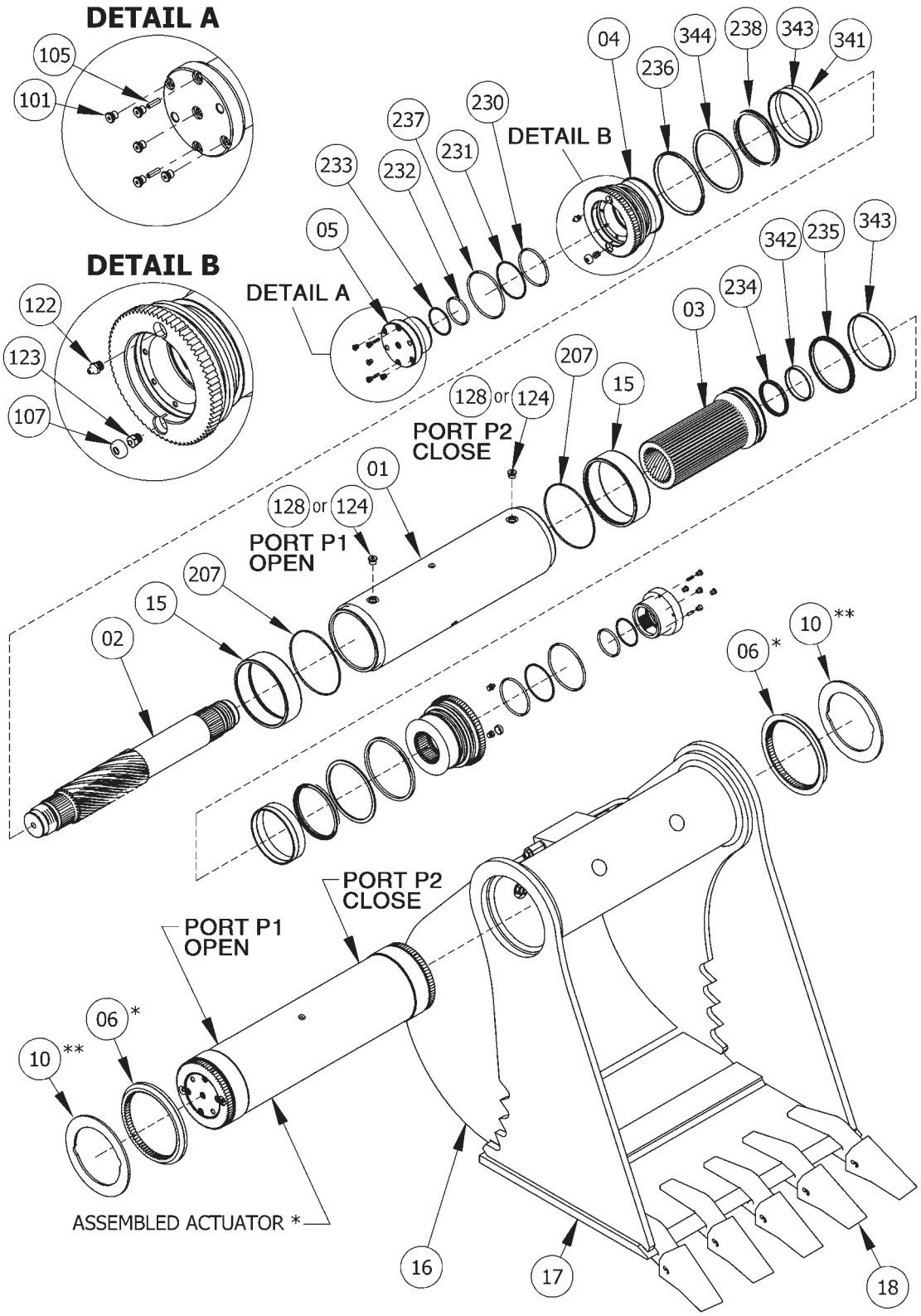
1. Heat the flat end with a torch until it glows.
2. Secure the heated end of the screwdriver in a vise and bend the heated end to a slight radius.
3. Round off all sharp edges of the heated tip to a polished finish. The tool may be modified slightly to your own personal preference.

Assembly Drawing

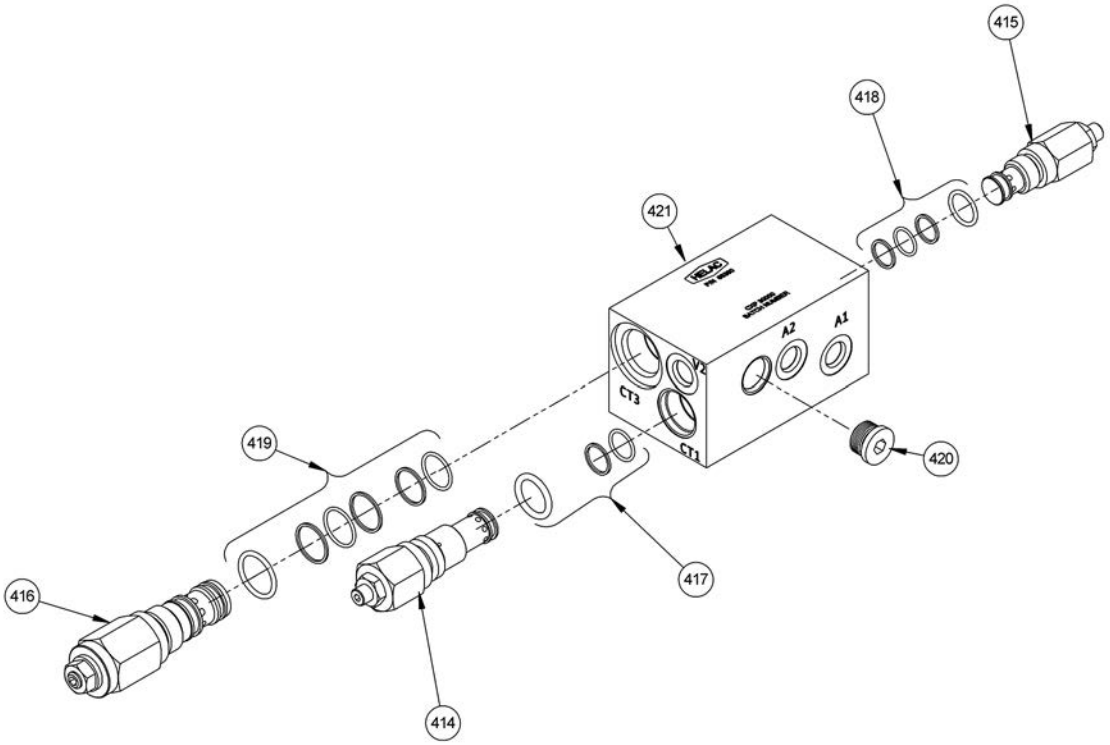


* WELDED TO BUCKET
** WELDED TO DRIVE HUB
*** NOT INCLUDED ON ALL MODELS

Exploded View — Bucket and Actuator



Exploded View — Valve Manifold Assembly



Parts List - PG-06

Parts

Part Number	Item #	Description	Qty
68140-24PS	01	Housing - 24" (Includes item #15 housing collars)	1
68140-30PS	01	Housing - 30" (Includes item #15 housing collars)	1
68140-36PS	01	Housing - 36" (Includes item #15 housing collars)	1
68140-42PS	01	Housing - 42" (Includes item #15 housing collars)	1
68140-48PS	01	Housing - 48" (Includes item #15 housing collars)	1
65743-24	02	Shaft 24"	1
65743-30	02	Shaft 30"	1
65743-36	02	Shaft 36"	1
65743-42	02	Shaft 42"	1
65743-48	02	Shaft 48"	1
68139	03	Piston Sleeve	1
65805	04	Drive Hub	2
65806	05	Lock Nut (diameter is approx. 4.00")	2
65045	06	Spine Adapter	2
65792	10	Cover Plate	2
65039	15	Housing Collar	2
Not Available From Parker	16	Bucket	1
Not Available From Parker	17	Bucket Jaw	1
Not Available From Parker	18	Bucket Tooth Assembly	Vari-able
65807		**Hardware Kit: SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)**	
	101	Port plug, Socket Hex Head (SAE-2)	10
	**105	Pull-out dowel pin .25" x 1.0" long	4
	**107	Grease relief valve cover	2
	122	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	**123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	128	Port Plug, Socket Hex Head (SAE-6)	2

**Items included in seal kit

Part Number	Item #	Description	Qty
65350		**Relief Valve Assembly (includes items 414, 415, 416, 420, 421)**	
949046	414	Low pressure cartridge (includes seals 417)	1
949047	415	High pressure cartridge (includes seals 418)	1
949048	416	Load holding cartridge (includes seals 419)	1
N/A	420	Plug	1
N/A	421	Relief Manifold - Block only (not available as spare part, buy assembly)	1

The cartridges listed are available to order individually.
Note that some attachment manufacturers supply their own relief valves.

Seal Kits

Part Number	Item #	Description	Qty
S68152		**Seal Kit - Standard (Includes items below)**	
	207	Collar O-ring (2-162, 90 Durometer)	2
	230	O-ring	2
	231	Back-up ring	2
	232	O-Ring	
	233	Back-up Ring	
	234	T-Seal	1
	235	T-Seal	1
	236	Cup Seal	2
	237	O-Ring	2
	238	Cup Seal	2
	105	Pull-out dowel pin .25" x 1.0" long	4
	107	Grease relief valve cover	2
	123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	417, 418 419	Helac Relief valve seal kit	1

Bearing Kits

Part Number	Item #	Description	Qty
65064		**Bearing Kit 180° (Includes item below)**	
	341	Drive Hub Wear guide	2
	342	Piston ID Wear guide	1
	343	Piston OD and Drive Hub Wear guide	3
	344	Thrust washer	2

Parts in kits not sold individually except as noted

Parts List - PG-07

Parts

Part Number	Item #	Description	Qty
66699-24PS		Housing - 24" (Includes item #15 housing collars)	
66699-30PS	01	Housing - 30" (Includes item #15 housing collars)	1
66699-36PS	01	Housing - 36" (Includes item #15 housing collars)	1
66699-42PS	01	Housing - 42" (Includes item #15 housing collars)	1
66699-48PS	01	Housing - 48" (Includes item #15 housing collars)	1
66699-60PS	01	Housing - 60" (Includes item #15 housing collars)	
66704-24	02	Shaft 24"	
66704-30	02	Shaft 30"	1
66704-36	02	Shaft 36"	1
66704-42	02	Shaft 42"	1
66704-48	02	Shaft 48"	1
66704-60	02	Shaft 60"	
66703	03	Piston Sleeve	1
65811	04	Drive Hub	2
65812	05	Lock Nut (diameter is approx. 4.625")	2
65057	06	Spine Adapter	2
65817	10	Cover Plate	2
65050	15	Housing Collar	2
Not Available From Parker	16	Bucket	1
Not Available From Parker	17	Bucket Jaw	1
Not Available From Parker	18	Bucket Tooth Assembly	Vari-able
65233		**Hardware Kit: SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)**	
	101	Port plug, Socket Hex Head (SAE-2)	10
	**105	Pull-out dowel pin .25" x 1.0" long	4
	**107	Grease relief valve cover	2
	122	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	**123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	128	Port Plug, Socket Hex Head (SAE-6)	2

**Items included in seal kit

Part Number	Item #	Description	Qty
65350		**Relief Valve Assembly (includes items 414, 415, 416, 420, 421)**	
949046	414	Low pressure cartridge (includes seals 417)	1
949047	415	High pressure cartridge (includes seals 418)	1
949048	416	Load holding cartridge (includes seals 419)	1
N/A	420	Plug	1
N/A	421	Relief Manifold - Block only (not available as spare part, buy assembly)	1

The cartridges listed are available to order individually.
Note that some attachment manufacturers supply their own relief valves.

Seal Kits

Part Number	Item #	Description	Qty
S68513		**Seal Kit - Standard (Includes items below)**	
	207	Collar O-ring (2-166, 70 Durometer)	2
	230	O-ring	2
	231	Back-up ring	2
	232	O-Ring	2
	233	Back-up Ring	2
	234	T-Seal	1
	235	T-Seal	1
	236	Cup Seal	2
	237	O-Ring	2
	238	Cup Seal	2
	105	Pull-out dowel pin .25" x 1.0" long	4
	107	Grease relief valve cover	2
	123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	417, 418 419	Helac Relief valve seal kit	1

Bearing Kits

Part Number	Item #	Description	Qty
65084		**Bearing Kit 180° (Includes item below)**	
	341	Drive Hub Wear guide	2
	342	Piston ID Wear guide	1
	343	Piston OD and Drive Hub Wear guide	3
	344	Thrust washer	2

Parts in kits not sold individually except as noted

Parts List - PG-08

Parts

Part Number	Item #	Description	Qty
69226-30PS	01	Housing - 30" (Includes item #15 housing collars)	1
69226-36PS	01	Housing - 36" (Includes item #15 housing collars)	1
69226-42PS	01	Housing - 42" (Includes item #15 housing collars)	1
69226-48PS	01	Housing - 48" (Includes item #15 housing collars)	1
66836-30	02	Shaft 30"	1
66836-36	02	Shaft 36"	1
66836-42	02	Shaft 42"	1
66836-48	02	Shaft 48"	1
66837	03	Piston Sleeve	1
66838	04	Drive Hub	2
66839	05	Lock Nut (diameter is approx. 5.750")	2
66840	06	Spine Adapter	2
66841	10	Cover Plate	2
66834	15	Housing Collar	2
Not Available From Parker	16	Bucket	1
Not Available From Parker	17	Bucket Jaw	1
Not Available From Parker	18	Bucket Tooth Assembly	Vari-able
69227		**Hardware Kit: SAE Port Plugs (includes item 105, 106, 106.1, 109, 111, 112)**	
	101	Port plug, Socket Hex Head (SAE-2)	10
	**105	Pull-out dowel pin .25" x 1.0" long	4
	**107	Grease relief valve cover	2
	122	Grease Fitting (Balcrank, 5000 Lincoln, 1/8-27 NPT)	2
	**123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	128	Port Plug, Socket Hex Head (SAE-6)	2

**Items included in seal kit

Part Number	Item #	Description	Qty
69198-01		**Relief Valve Assembly (includes items 414, 415, 416, 420, 421)**	
949063	414	Low pressure cartridge (includes seals 417)	1
949064	415	High pressure cartridge (includes seals 418)	1
949065	416	Load holding cartridge (includes seals 419)	1
N/A	420	Plug	1
N/A	421	Relief Manifold - Block only (not available as spare part, buy assembly)	1

The cartridges listed are available to order individually.
Note that some attachment manufacturers supply their own relief valves.

Seal Kits

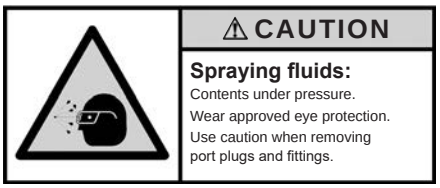
Part Number	Item #	Description	Qty
S66843		**Seal Kit - Standard (Includes items below)**	
	207	Collar O-ring (2-170, 70 Durometer)	2
	230	O-ring	2
	231	Back-up ring	2
	232	O-Ring	2
	233	Back-up Ring	2
	234	T-Seal	1
	235	T-Seal	1
	236	Cup Seal	2
	237	O-Ring	2
	238	Cup Seal	2
	105	Pull-out dowel pin .25" x 1.0" long	4
	107	Grease relief valve cover	2
	123	Grease Relief Valve (50500, 1/8-27 NPT, Alemite 400-650 PSI)	2
	417, 418 419	Helac Relief valve seal kit	1

Bearing Kits

Part Number	Item #	Description	Qty
66844		**Bearing Kit 180° (Includes item below)**	
	341	Drive Hub Wear guide	2
	342	Piston ID Wear guide	1
	343	Piston OD and Drive Hub Wear guide	3
	344	Thrust washer	2

Parts in kits not sold individually except as noted

Product Inspection



Make sure the PowerGrip is thoroughly cleaned prior to disassembly. Inspect the PowerGrip for corrosion prior to disassembly.

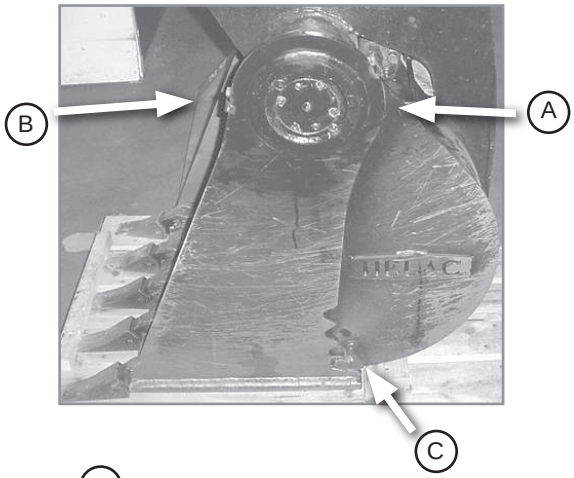
Severe corrosion can make it difficult to remove the fitting plugs (101) and lock nuts. If corrosion is evident, soak with penetrating oil for several hours before disassembly.

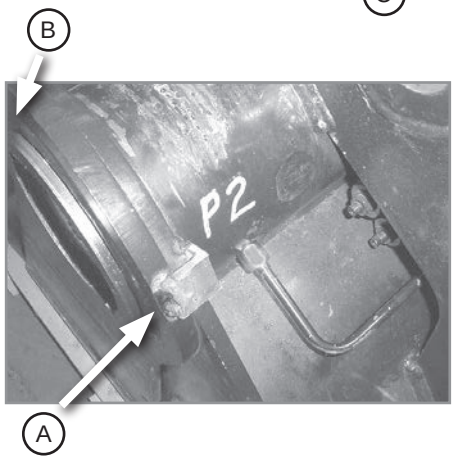
NOTICE

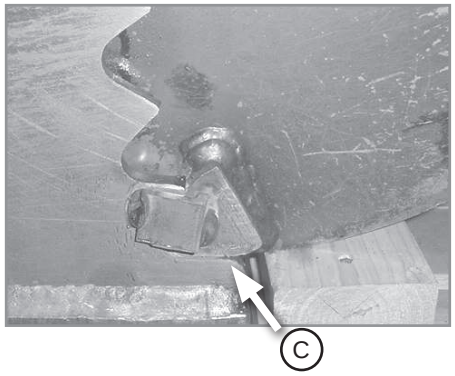
All numbers that appear in parenthesis () in the following sections are referring to items on page 17.

Before Disassembly

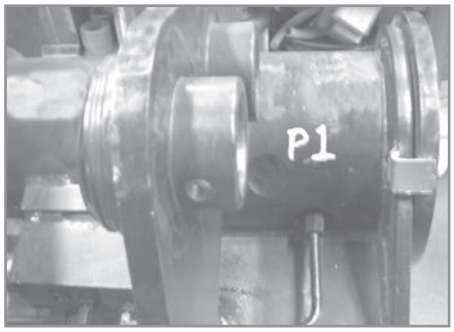
1. Close jaw fully and release hydraulic pressure. Secure jaw to bucket shell by tack welding tabs at three locations as shown on both sides of the jaw.

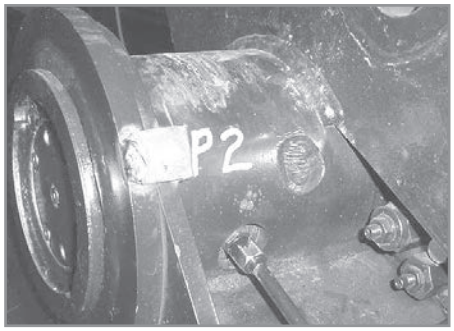






2. Mark the port access holes with P1 and P2 for future reference during disassembly and assembly.

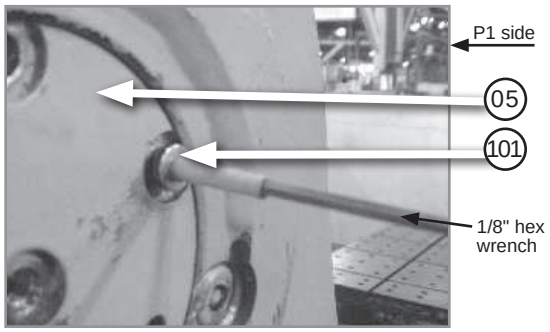




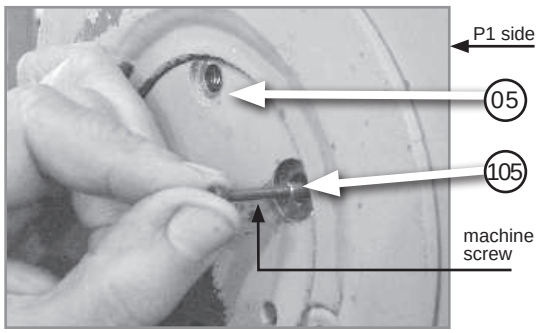
Disassembly

Disassembly

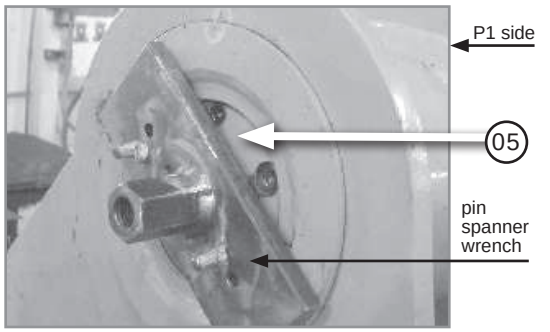
1. Remove the hydraulic tubes from P1 and P2. Using a 1/8 T-handle allen wrench, remove the 5 SAE #2 fitting plugs (101) from each lock nut (05).



2. Remove the two retainer pins (105) located on each lock nut (05) using a #8-32 x 1.00 machine screw. Thread the machine screw into the end of each retainer pin (105) and pull on the machine screw to remove the retainer pin (105).

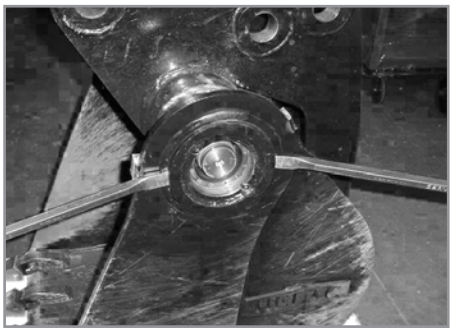


3. Using pin spanner wrench or two metal dowels and a pry bar, unthread and remove both lock nuts (05).

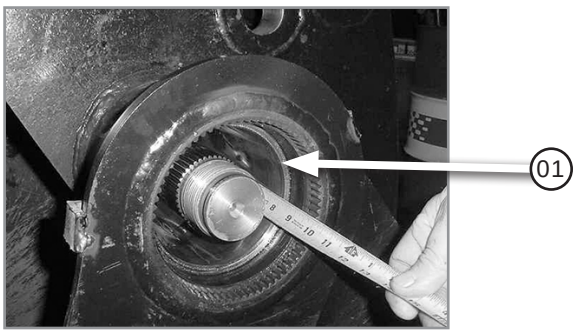


4. Using pry bars, remove P1 drive hub (04) first, then P2 drive hub (04).

NOTICE Hydraulic oil will discharge when hub is removed.



5. Measure distance from piston sleeve (03) to edge of housing (01) bore at P2 Side. Record measurement.



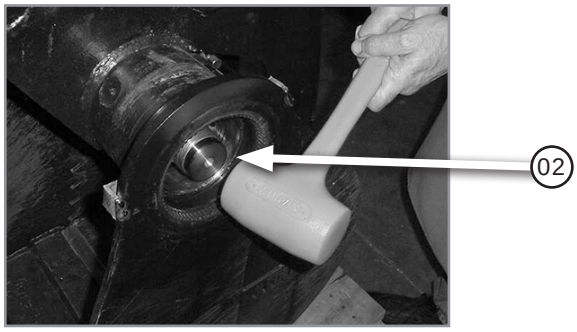
NOTICE It is very important to record the measurement of the piston sleeve position before further disassembly. Proper piston sleeve position ensures that the bucket will close before the piston sleeve reaches its internal stop. If improperly positioned, the piston sleeve will bottom out against the ring gear causing damage to the gear teeth.

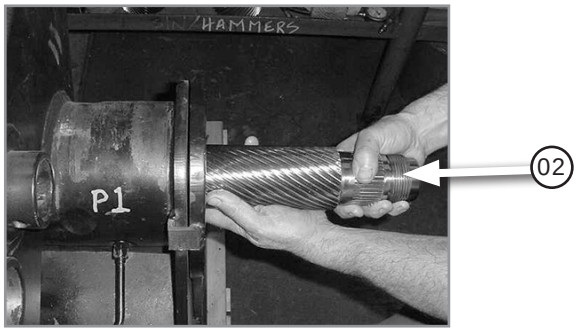
Disassembly

6. Using a plastic mallet, drive the shaft (02) toward the P1 end until the shaft protrudes far enough to grasp. Carefully pull the shaft (02) out from the P1 side of the actuator.

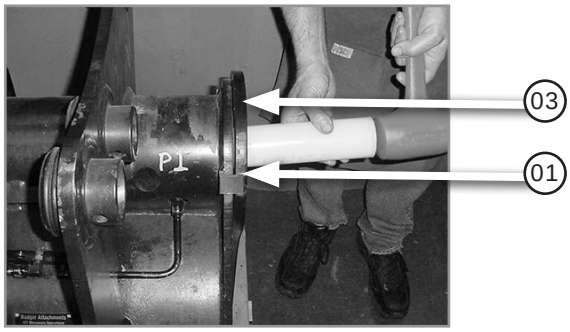
NOTICE

To avoid damage to the gear teeth and housing bore:
Carefully support the weight of the shaft as it clears the piston sleeve.





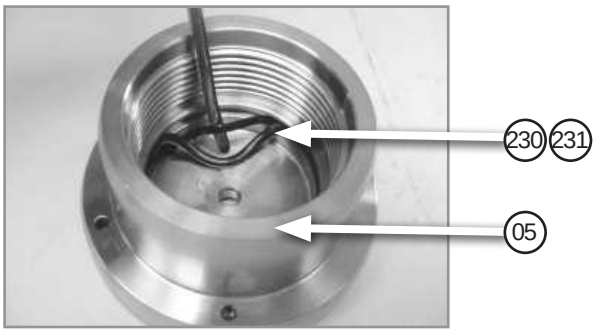
7. Using a plastic drift and plastic mallet, carefully drive the piston sleeve (03) out the P2 port side of the actuator housing (01).



NOTICE Be sure the piston sleeve (03) and housing (01) are not damaged during disassembly.

8. Some models have seals on the ID and / or OD of the lock nuts (05). If they exist, remove the seals and back-up rings from both lock nuts using a seal tool.

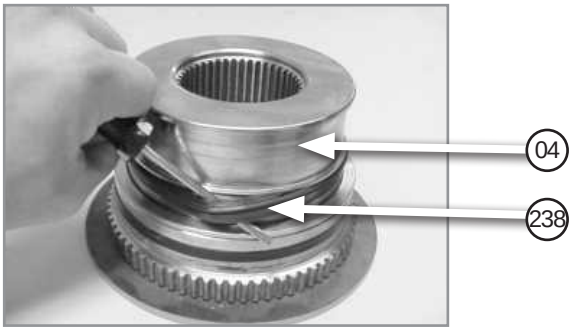
NOTICE As seals are removed, note their orientation. Many seals work in one direction only.



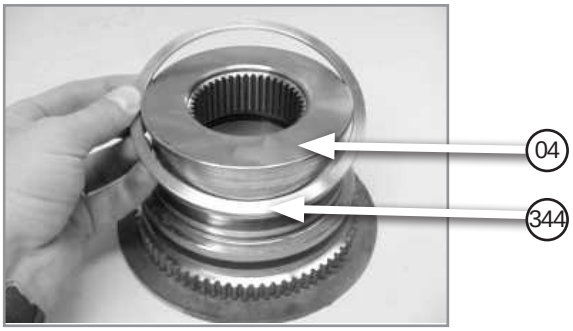
9. Remove the bearings (341, 343) from both drive hubs (04).

Disassembly

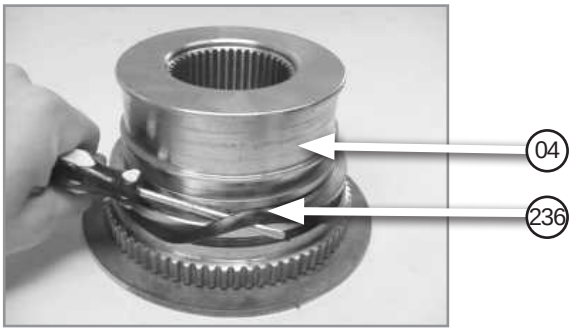
10. Remove the drive hub seal (238) from the drive hubs (04) using a seal tool or a utility knife.



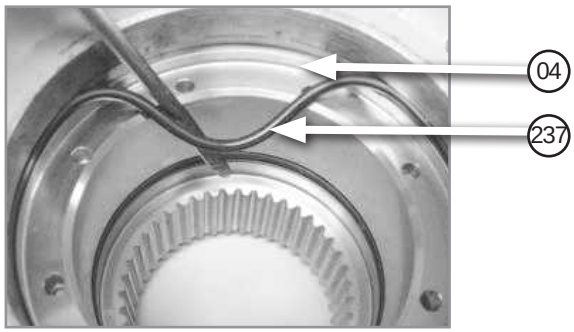
11. Remove the thrust washer (344) from the drive hubs (04).



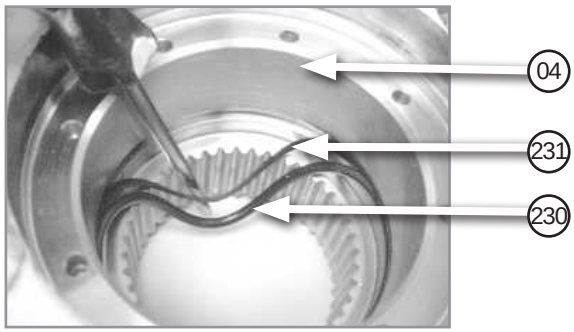
12. Remove the exclusion seal (236) from the drive hubs (04) using a seal tool or a utility knife.



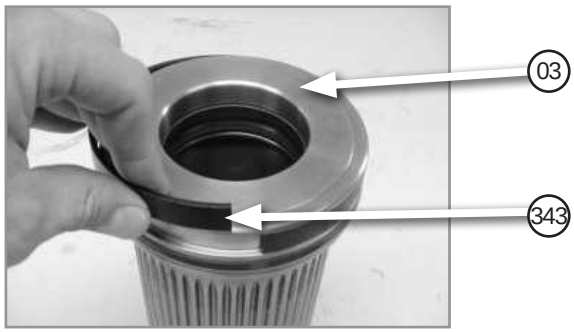
13. Remove the exclusion seal (236) from the drive hubs (04) using a seal tool or a utility knife.



14. Remove the drive hub ID O-Ring (230) and drive hub back-up ring (231) from each drive hub (04).

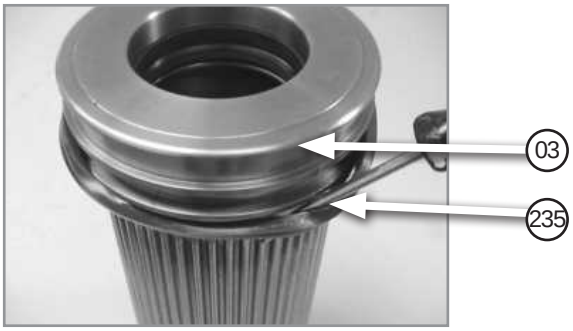


15. Place the piston sleeve (03) flange side up to access the seals and bearings. Remove the piston OD bearing (343) from the piston sleeve (03).

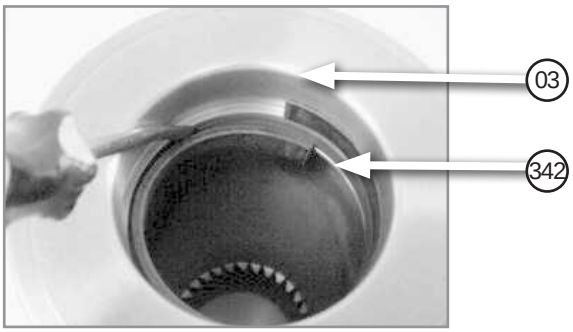


Disassembly

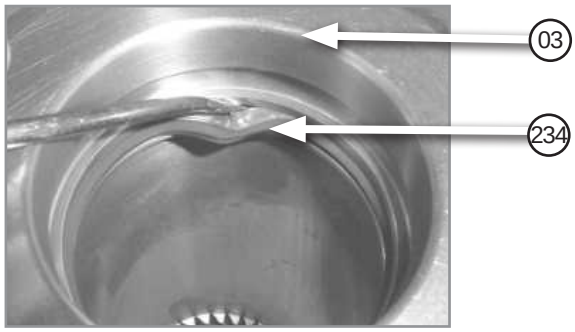
16. Remove the piston OD seal (235) from the piston sleeve (03) using a seal tool or a utility knife.



17. Remove the piston ID bearing (342) from the piston sleeve (03) using a seal tool.



18. Remove the piston ID seal (234) from the piston sleeve (03) using a seal tool.



Parts Inspection

1. Prior to inspection, clean all parts in a wash tank and dry with compressed air.

2. **Housing** — Inspect the cylinder bore for wear and scratches. Local polishing can repair minor scratches and damage. Inspect all bearing and seal surfaces for signs of wear or damage. Check the condition of the gear teeth for any signs of extreme wear or chipping. Inspect the housing for signs of damage or cracking.

3. **Shaft** — Check the shaft surface for scratches from the piston seal or other damages. Small or minor scratches can be carefully polished. Examine the condition of the gear teeth.

4. **Drive Hubs** — Inspect the ID and OD splines for signs of chipping or serious wear. Evaluate the surface finish of the seal grooves.

5. **Lock Nuts** — Inspect the threads for galling or cross threading. Make sure that the end cap spins freely on the threads of the shaft. Evaluate the surface finish of the seal grooves.

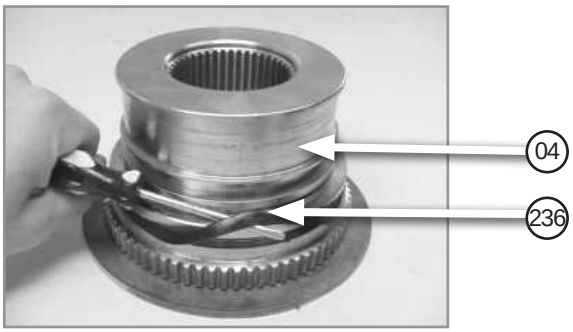
6. **Piston Sleeve** — Inspect the condition of the gear teeth. Evaluate the surface finish of the seal grooves.

7. **Seals** — Helac recommends replacement of all seals and bearings.

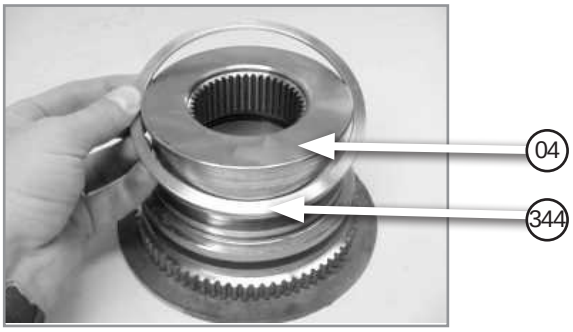
Seal and Bearing Assembly

NOTICE Lightly oil all seals, seal grooves and bearings prior to installing.

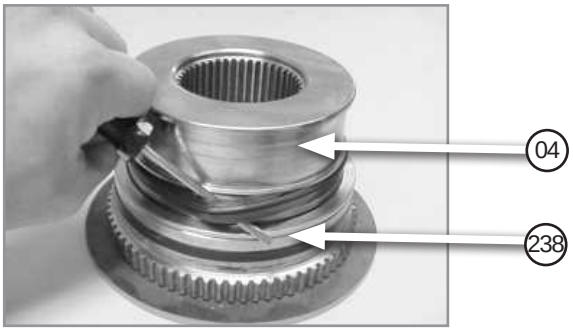
1. Install the exclusion seal (236) onto each drive hub (04) using a seal tool.



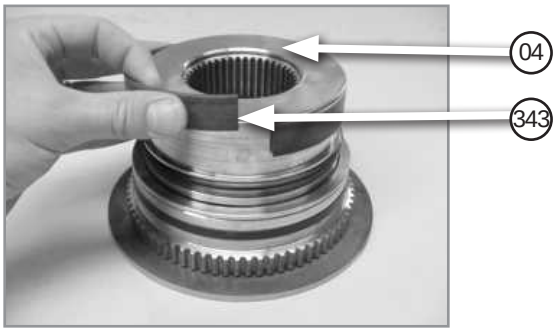
2. Lightly grease the thrust washer (344) and install onto each drive hub (04).

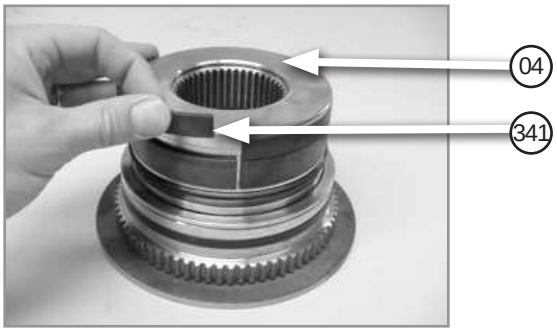


3. Install drive hub seal (238) onto each drive hub (04).

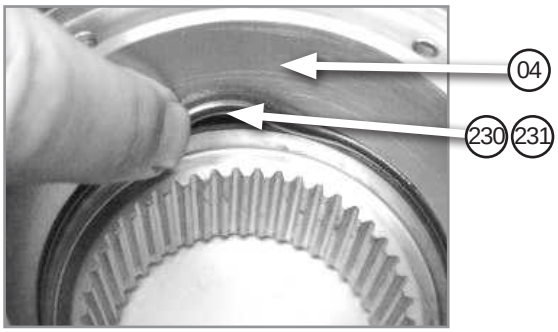


4. Install the bearings (341, 343) onto each drive hub (04).





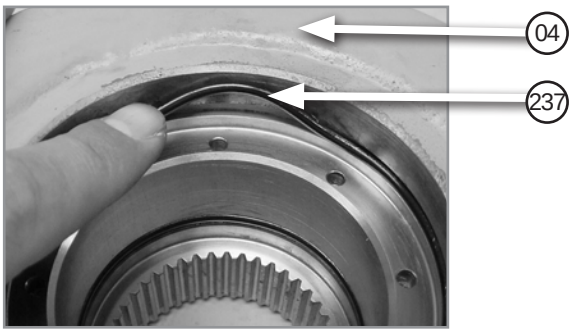
5. Install the drive hub ID o-ring (230) and drive hub ID back-up ring (231) into each drive hub (04).



NOTICE The orientations of seals are vital to PowerGrip functioning safely and correctly. Refer to the assembly drawing and details on page 15 for the correct orientation of each seal.

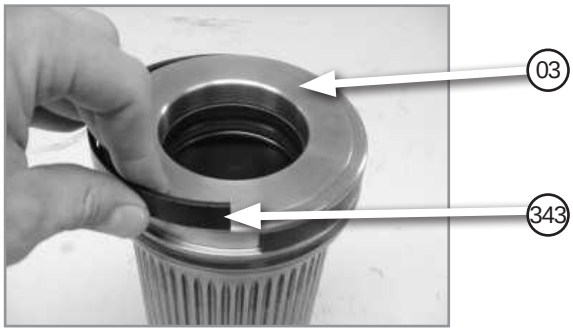
Seal and Bearing Assembly

6. Depending on model, install the exclusion o-ring seal (237) into the ID of the drive hub (04) or the OD of the locknut (05).

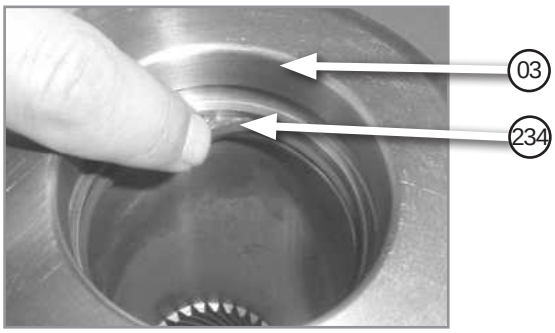


7. Install the piston OD seal (235) (with back- up rings if applicable) onto the piston sleeve (03) using a seal tool.

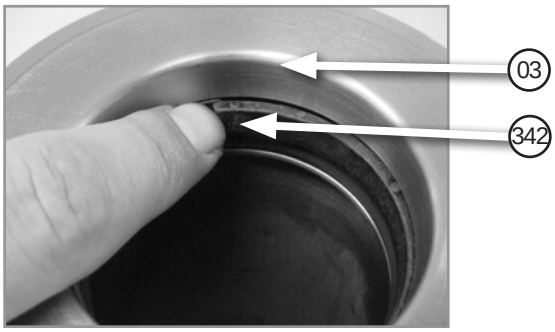
8. Install the piston OD bearing (343) onto the piston sleeve (03).



9. Install the piston ID seal (234) (with back-up rings if applicable) into the piston sleeve (03).

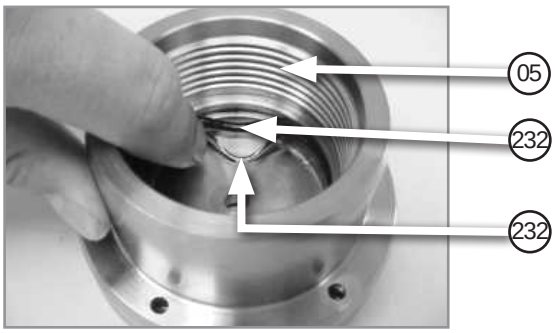


10. Install the piston ID bearing (342) into the piston sleeve (03).



11. Some models have seals on the ID and / or OD of the lock nuts (05). If they exist, install the seals and backup rings onto lock nuts.

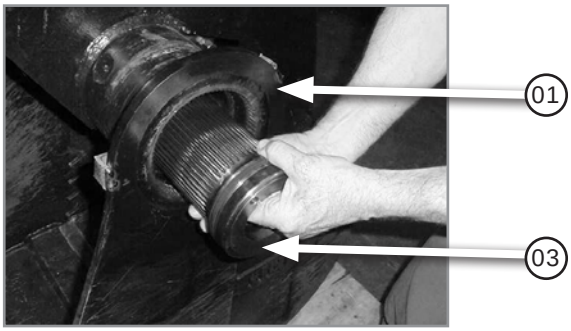
NOTICE Be sure the lock nut ID back-up ring (233) is farthest from the threads.

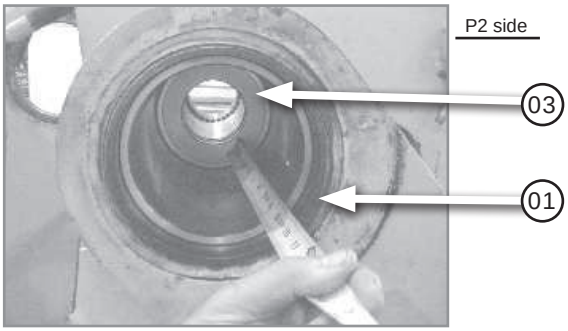


Assembly

NOTICE Lightly oil inside the housing and each component as installed.

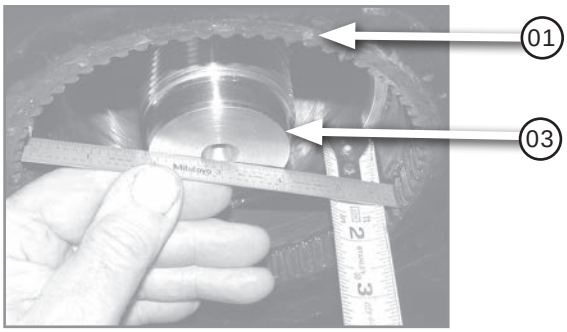
1. Install the piston sleeve (03) into the housing (1) from the P2 side, engage the teeth and push in until the measured distance from the back of the piston sleeve (03) to outer edge of the housing bore at the P2 side is as recorded during step five of disassembly on page 21.

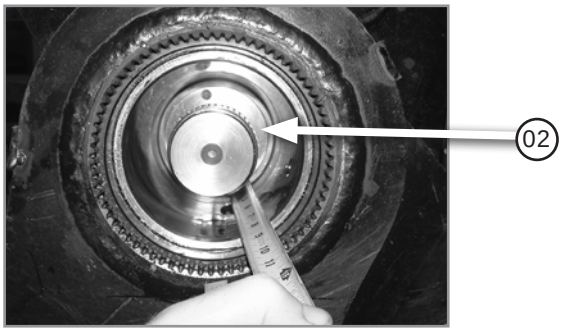




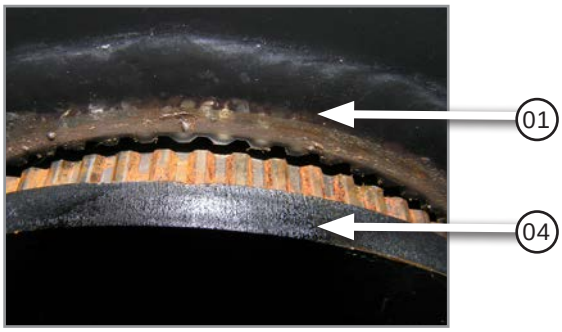
NOTICE Proper piston sleeve position ensures that the bucket will close before the piston sleeve reaches it's internal stop. If improperly positioned, the piston sleeve will bottom out against the ring gear causing damage to the gear teeth.

2. Install the shaft (02) in the P1 side and position it inside the housing (01) until it is even on both P1 and P2 sides, while keeping the piston (03) to housing bore distance unchanged. Confirm piston (03) to housing distance and adjust as needed while maintaining shaft (02) position.





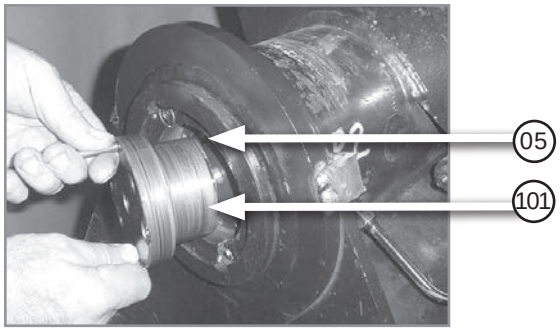
3. Coat the drive hub ID splines with nickel anti-seize (Loctite 77169 or equivalent). Install drive hubs (04). If OD splines do not align with jaw splines, remove hub and index the hub until both ID and OD splines align.



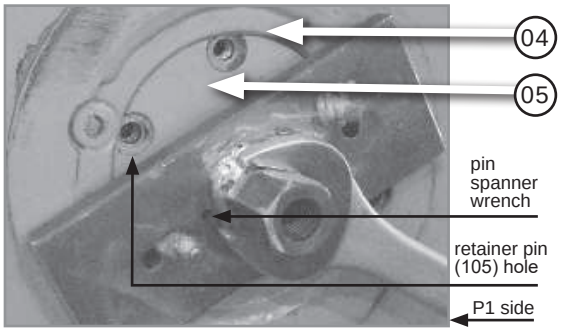
4. Coat the lock nut (05) threads, OD, and flange mating surface with nickel anti-seize (Loctite 77169 or equivalent).

Assembly

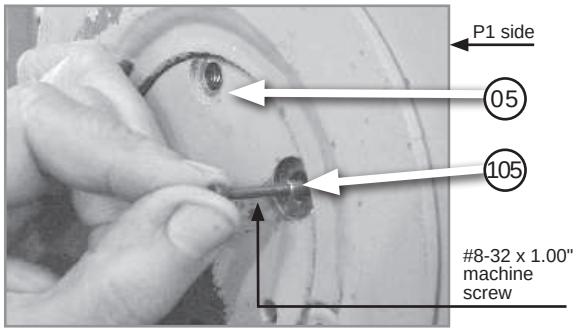
5. Install P1 and P2 lock nuts (05) onto shaft (02) and tighten snug.

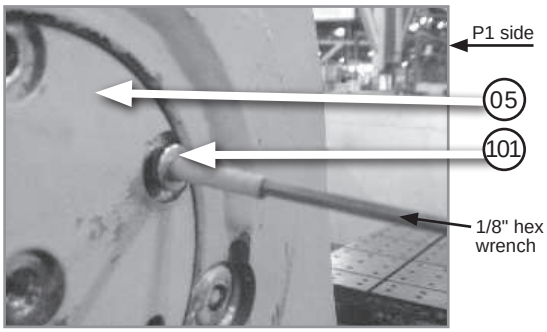


6. Using a pin spanner wrench or two metal dowels and a pry bar, tighten the P1 lock nut (5) to 120 ft-lbs (162 Nm). Then loosen the lock nut just far enough until the two retainer pin (105) holes line up.



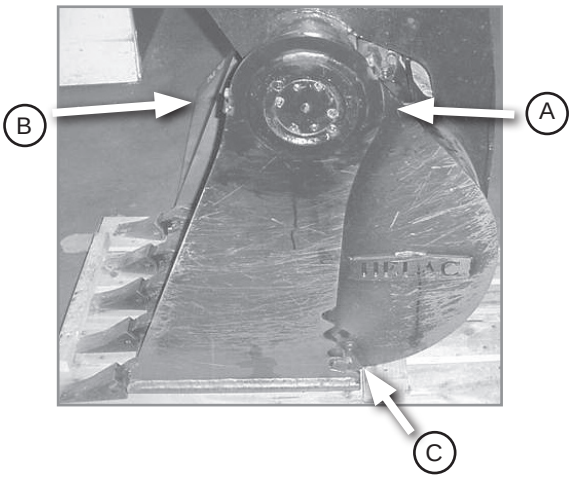
7. Install the two retainer pins (105) and the five fitting plugs (101) into the lock nut (05) on the P1 side.



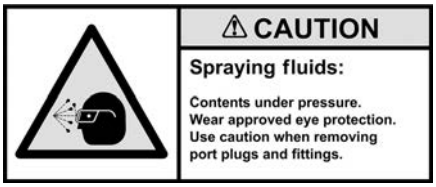


8. Using a pin spanner wrench or two metal dowels and a pry bar, tighten the P2 lock nut (5) to 120 ft-lbs (162 Nm). Without over tightening, adjust the lock nut as needed to insert the two remaining retainer pins (105). Install and tighten the five fitting plugs (101) into the lock nut (05).

9. Remove the three tabs installed to secure the jaw to the bucket shell prior to disassembly.



Testing



Testing the Carrier's Hydraulic System

If symptoms of poor performance develop, refer to the Troubleshooting Guide on Page 15 for general instructions. If you need help with more specific application issues, contact Helac Corporation's Service Department.

It is the responsibility of your service technician to verify that the carrier and hydraulic circuit are operating correctly. Because the PowerTilt receives its power from the carrier, a thorough check of the carrier hydraulic system is mandatory before performing any PowerTilt service or adjustments.

Testing for Internal Leakage

1. Connect a 5,000 psi (350 bar) test gauge into the hydraulic line to Port P2. Pressurize P2 until the jaw closes fully.

NOTICE If the jaw is not completely closed, hydraulic fluid will exhaust from Port P1 at a high velocity when Port P1 is uncapped.

2. Remove and cap the hydraulic line attached to Port P1. Pressurize port P2 to 2,500 psi (175 bar). Check for leakage at port P1 and from around the main shaft and end cap seals. Leaks indicate worn or improperly installed parts.

Testing Load Control Valve

See valve manifold drawing on page 18 for locations of ports and valve.

Valve Design

This valve has three separate cartridges that work together to provide:

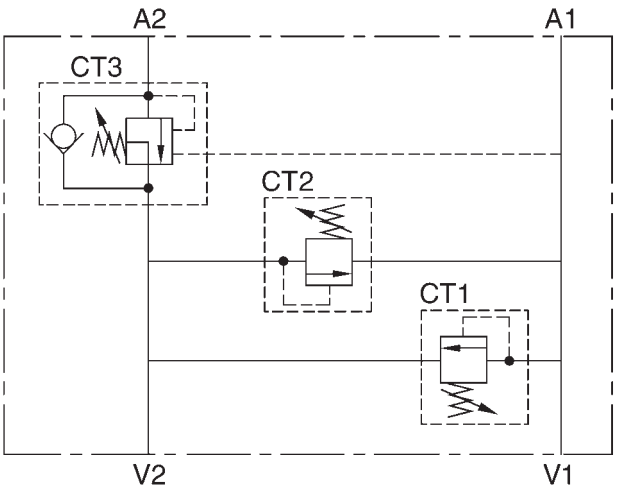
1. Load holding with very low leakage to the tool circuit.
2. High pressure relief protection (when clamping).
3. Low pressure relief protection (when open and being pushed closed).

Testing

Hydraulic Logic of Load Control Manifold

This valve has three separate cartridges that work together to provide:

1. Hydraulic oil should require 3,000 psi (206 bar) to flow from port A2 to port V2.
2. Ports A1 and V1 are always common to each other.
3. With Port A1 blocked, hydraulic oil should require 1,000 to 1,500 psi (69 to 103 bar) to flow from port V1 to port A2/V2.
4. With Port A1 blocked and pressure applied to port V1, Port A2 should be common to port V2.
5. With Port A2 blocked and pressure applied to port V2, it should require 3,200 psi (220 bar) to pass oil to port V1/A1.



1800-OILSOL https://oilsolutions.com.au/ sales@oilsolutions.com.au
1800-645765

POST ASSEMBLY

Offer of Sale

The items described in this document and other documents and descriptions provided by Parker Hannifin Corporation, its subsidiaries and its authorized distributors ("Seller") are hereby offered for sale at prices to be established by Seller. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer. All goods, services or work described will be referred to as "Products".

1. Terms. All sales of Products by Seller are expressly conditioned upon, and will be governed by the acceptance of, these Terms. These Terms are incorporated into any Quote provided by Seller to Buyer. Buyer's order for any Products whether communicated to Seller verbally, in writing, by electronic data interface or other electronic commerce, shall constitute acceptance of these Terms. Seller objects to any contrary or additional terms or conditions of Buyer. Reference in Seller's order acknowledgement to Buyer's purchase order or purchase order number shall in no way constitute an acceptance of any of Buyer's terms or conditions of purchase. No modification to these Terms will be binding on Seller unless agreed to in writing and signed by an authorized representative of Seller.

2. Price; Payment. The Products set forth in the Quote are offered for sale at the prices indicated in the Quote. Unless otherwise specifically stated in the Quote, prices are valid for thirty (30) days and do not include any sales, use, or other taxes or duties. Seller reserves the right to modify prices at any time to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2020). All sales are contingent upon credit approval and full payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified in the Quote). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate, and Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repackage any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

4. Warranty. The warranty for the Products is as follows: (i) Goods are warranted against defects in material or workmanship for a period of eighteen (18) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED. UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS".**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

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.

8. Loss to Buyer's Property. Any tools, patterns, materials, equipment or information furnished by Buyer or which are or become Buyer's property ("Buyer's Property"), will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property. Furthermore, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

9. Special Tooling. "Special Tooling" includes but is not limited to tools, jigs, fixtures and associated manufacturing equipment acquired or necessary to manufacture Goods. Seller may impose a tooling charge for any Special Tooling. Such Special Tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole discretion at any time.

10. Security Interest. To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

11. User Responsibility. Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

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 any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, tools, equipment, plans, drawings, designs, specifications or other information or things furnished by Buyer; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

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.

14. Limitation on Assignment. Buyer may not assign its rights or obligations without the prior written consent of Seller.

15. Force Majeure. Seller is not liable for delay or failure to perform any of its obligations by reason of events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, delays or failures in delivery from carriers or suppliers, shortages of materials, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by force majeure shall be tolled for the duration of such force majeure and rescheduled for mutually agreed dates as soon as practicable after the force majeure condition ceases to exist. Force majeure shall not include financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or sub-contractors.

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.

17. Termination. Seller may terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

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.

19. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights ("Intellectual Property Rights") except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third party claim that one or more of the Products sold hereunder infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products sold hereunder is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products so as to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer; or (ii) directed to any Products provided hereunder for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products provided hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

20. Governing Law. These Terms and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

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. 08/2020

Service Offering

Parker Hannifin's Service Department can effectively tackle your service and repair needs and provide responsive customer support. Our 30 years of extensive rotary actuator expertise coupled with an in-depth understanding of our customers' expectations, enables us to quickly and efficiently service your needs with the following three offerings:

Technical Support

Our service representatives have been trained to answer the majority of your technical questions during the initial call. If your question can't be answered immediately, our representative will return your call quickly.

Call our Technical Support Department at
+1 800 797 8458 (U.S. and Canada) or
+1 360 802 1039 (Worldwide) from 7 a.m. to 4 p.m. PST on weekdays (excluding holidays), or e-mail us at cylsaleshelac@support.parker.com

Repair Service

Our fully equipped repair department ensures factory specifications and customer expectations are met quickly and efficiently. Helac PowerTilt and

PowerGrip can also be serviced through your local equipment dealer.

Call or e-mail our Repairs Department at
+1 800 797 8458 (U.S. and Canada),
+1 360 802 1039 (Worldwide) or
cylsaleshelac@support.parker.com

Parts Service

Our parts service team offers same day or 24 hour turnaround, depending on when the call is received, on all common items.
When ordering Spare and Replacement Parts, including Seal and Bearing Kits, please have the serial and/or model number available.
Spare parts can be ordered online at www.helac.com/service/parts.asp, or by calling or e-mailing our Parts Department at
+1 800 797 8458 (U.S. and Canada),
+1 360 802 1039 (Worldwide) or
cylsaleshelac@support.parker.com

PowerGrip - U.S. patent #6370801

PARKER HANNIFIN CORPORATION
225 BATTERSBY AVENUE • ENUMCLAW, WA 98022 USA
PHONE 360.825.1601 • FAX 360.825.1603 • www.parker.com/helac