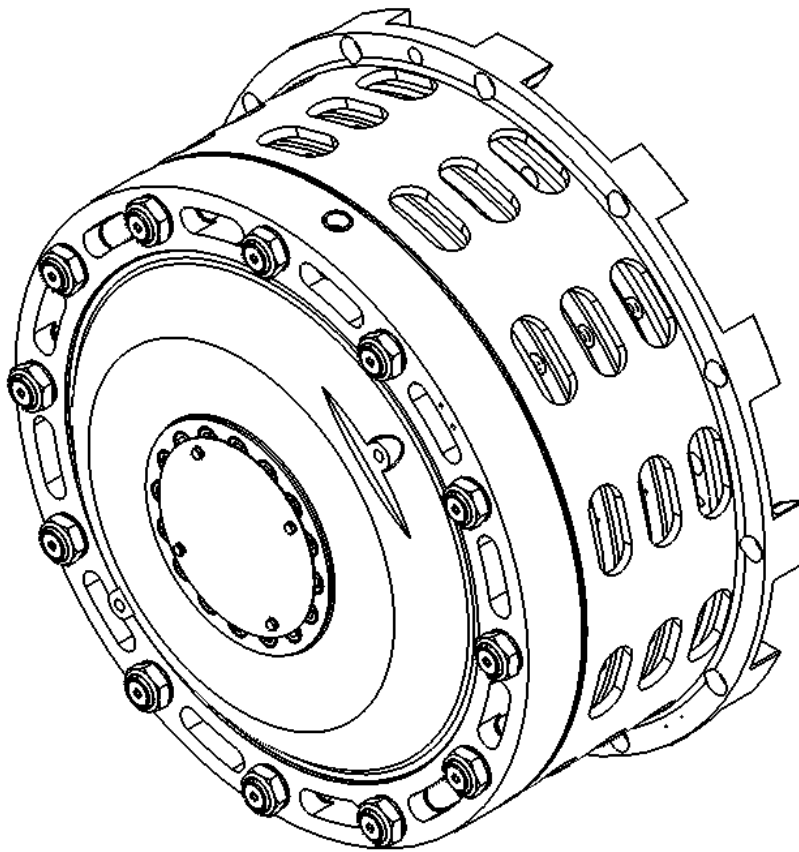


POWER SET BRAKE

Installation & Maintenance Manual

PE 13" THRU 30"




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1. Cautions and Warnings

This manual contains several **HAZARD WARNINGS** that must be read and adhered to in order to prevent possible loss of equipment and/or personal injury and /or loss of life. The three warning words are “Danger”, “Warning”, and “Caution”. They are used to indicate severity of the hazard and may be preceded by a safety alert symbol. 

 **”DANGER”** Denotes the most serious injury hazard and is used when serious injury or death **WILL** result from misuse or failure to follow specific instructions set forth in this manual.

 **”WARNING”** Denotes when serious injury or death **MAY** result from misuse or failure to follow specific instructions set forth in this manual.

 **”CAUTION”** Denotes when injury or equipment damage may result from misuse or failure to follow specific instructions set forth in this manual.

It is the responsibility of personnel involved in the installation, operation, and maintenance of this equipment to fully understand hazards and correct procedures to safely install, operate, and maintain this equipment.

2. Introduction

.....DANGER

Forward this manual to person or persons responsible for installation and/or operation and/or maintenance of the product described herein. Faulty installation, operation and/or maintenance may occur without access to this information. Equipment damage, personal injury, and even death may result.

.....DANGER

Read these instructions thoroughly and review until you fully understand all warnings and hazards before proceeding with the work described in this manual. Failure to follow instructions in this manual can result in unreasonable exposure to hazardous conditions and/or personal injury and/or death.

.....DANGER

Use of improper tools and/or methods when installing or servicing this unit can result in accidents causing injury and/or death. Adequate lifting points are provided to safely handle individual unit components only. Lifting and handling of assembly will require use of alternate methods.

.....CAUTION

Minimum personal protective equipment required for this procedure are: Safety glasses, steel toe shoes. Always observe company policies above and beyond minimum required for this procedure.

2.1. Using this Manual

Read these instructions before proceeding.

Diagrams and instructions in this manual are provided as a general guide for the field repairman servicing the WPT brake. Diagrams are not intended to cover all models of brakes but to provide general information.

NOTE: The drawing and bill of materials supplied with brake override information in this manual.

When ordering replacement parts, use part numbers from bill of materials and drawing supplied with brake. If these documents are lost, free replacements may be obtained by

contacting WPT or their distributor. Provide assembly number and serial number for unit found on tag affixed to brake.

This manual utilizes English units with metric units shown in [brackets].

2.2. Conditions of Use

.....DANGER

Equipment must be provided with pressure sensitive valve which will prevent application of air to brake until “MINIMUM SUPPLY PRESSURE” is available. “MINIMUM SUPPLY PRESSURE” can be found on associated assembly drawing. Failure to do so may result in risk of ignition due to excessively hot parts.

.....DANGER

Equipment must be provided with clean instrument air or sufficient filter device with proper maintenance to ensure air introduced to system is dry and free of contaminants.

.....DANGER

Protective means must be used to prevent oil, grease, and/or dirt from contacting surfaces of frictions or wear surfaces. Oil and/or grease will significantly reduce torque capacity of the unit. Dirt may produce erratic torque. Suggested IP 54 protection level.

2.3. Product Descriptions

The WPT Power-Set Brake is a spring set, pneumatic release disc brake. Spring force acts on the pressure plate to press wear plates to the drive discs. Air is applied to the piston/cylinder air chamber to raise piston and pressure plate against spring force to release brake discs.

WPT units are available in various sizes, quantities of brake discs, and configuration. Consider for example, a “325 POWER SET” indicates there are three 25” diameter brake discs. Vertical mounted units are designed for applications with a vertical shaft. Horizontal mount units are designed for applications with a horizontal shaft.

Unit must have hub attached to shaft of the equipment being managed. Also, housing of the brake must be attached to either the equipment being managed or by a rigid support member.

Unit is in an engaged state when actuator is not pressurized. Applying pressure to piston works against engagement spring to release brake discs allowing hub to turn. Release springs in some units ensure release of all brake discs from the wear surfaces.

Path of torque passes through the unit from the equipment's shaft, through the hub, through the brake discs, to the wear plates into studs and drive ring.

When ordering replacement parts, use part numbers from bill of materials and drawing supplied with unit. Current documents may be obtained by contacting WPT or an authorized distributor. Provide assembly number and serial number for unit found on brass tag affixed to front of the unit. See Example in **Figure 1**.

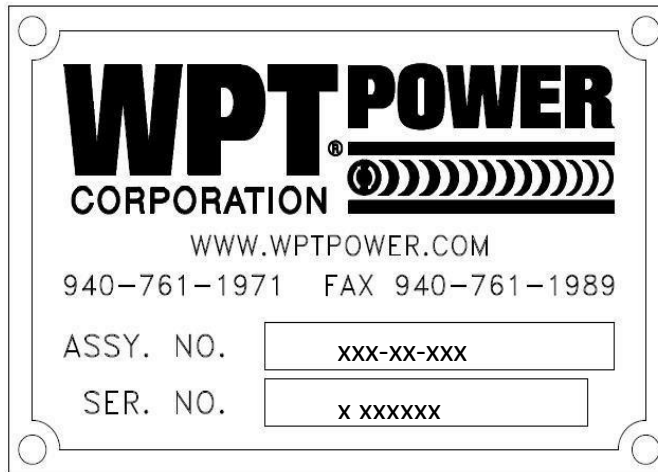


Figure 1 Example Brass Tag

Recommended spare parts should be held by customer. This will greatly reduce possibility of costly downtime.

2.4. Power Set Part Descriptions

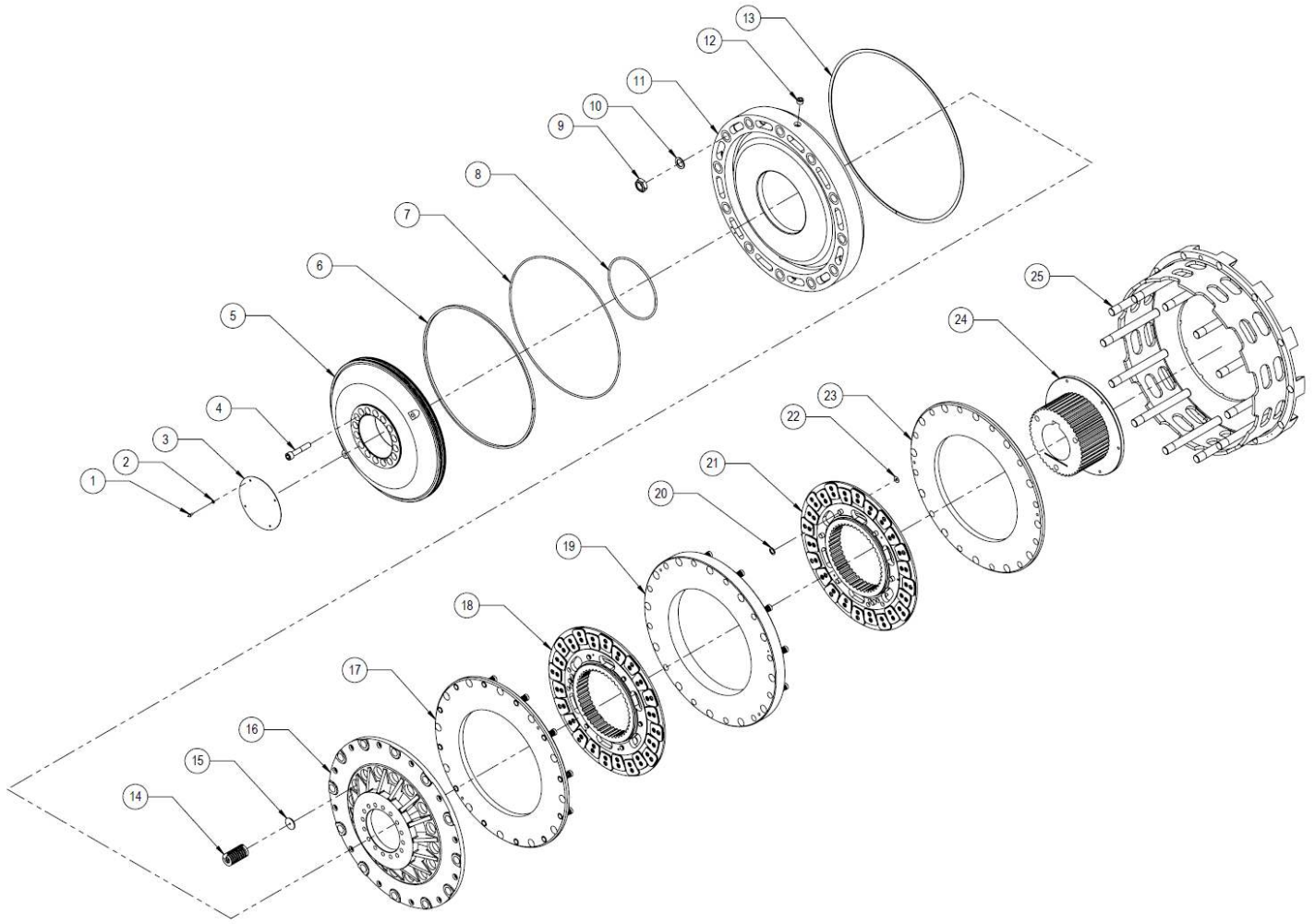


Figure 2 Exploded View

1	Hex head Cap Screw	10	Washer	19	Center Wear Plate Ass'y
2	Lock washer	11	Cylinder	20	Release Spring Shim
3	Cover Plate	12	Plug	21	Inner Brake Disc Ass'y
4	Socket Head Cap Screw	13	Shim	22	Release Spring Shim
5	Piston	14	Engagement Spring	23	Inner Wear Plate
6	Dust Seal	15	Insulating Washer	24	Hub
7	O-ring	16	Pressure Plate	25	Drive Ring Ass'y
8	O-ring	17	Outer Wear Plate Ass'y		
9	Nut	18	Outer Brake Disc Ass'y		

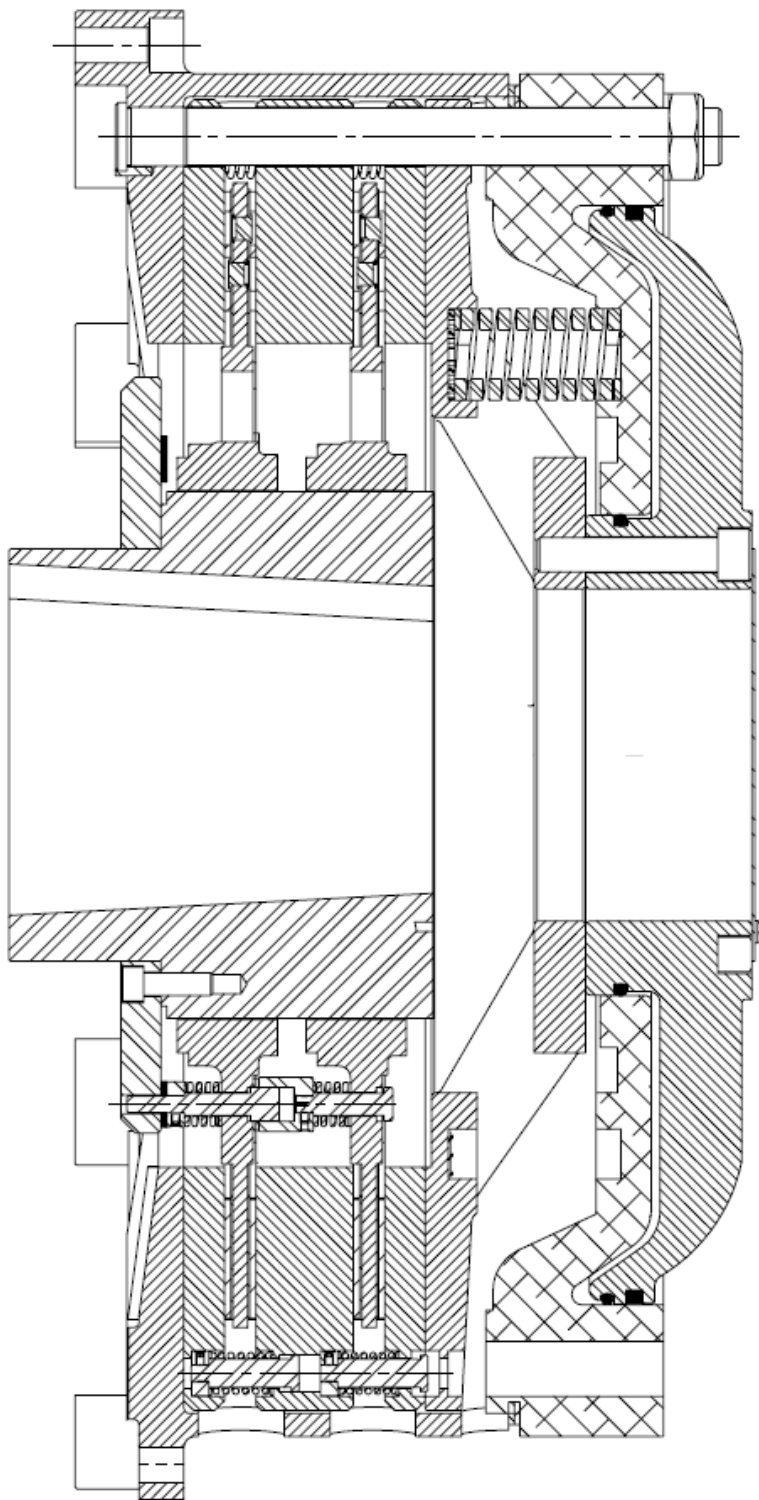


Figure 3 Section view of W25-PE-206

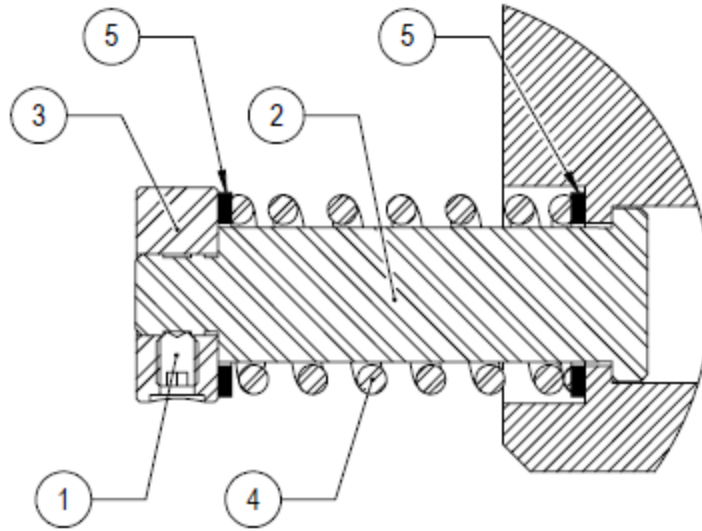


Figure 4 Example Release Spring Assembly

Table 2 Part Nomenclature-Release Spring	
1	Set Screw
2	Release Spring Pin
3	Release Spring Collar
4	Release Spring
5	Insulating Washer

3. Installation

.....DANGER

Use only proper quantity and grade of fasteners shown in drawings. Failure to do so may result in fastener failure and/or a reduction in unit torque.

.....CAUTION

Follow safety guidelines utilizing lockout tagout procedures before and during all installation and maintenance procedures.

.....CAUTION

Remove or block loads held by brake before performing any service. Failure to do so may result in grave bodily harm.

.....CAUTION

Even though units are properly set before shipment from factory, they should be checked for proper clearance before being put into operation. See Section 7.1 for detailed instruction on checking clearance.

3.1. Preparation and Alignment

.....CAUTION

Proper alignment is necessary to ensure drive discs track properly. Improper alignment will result in excessive wear to friction material and mating surfaces and generate heat and excessive drag. Improper alignment will also overstress gear and splined bore of drive discs. See Figure 5.

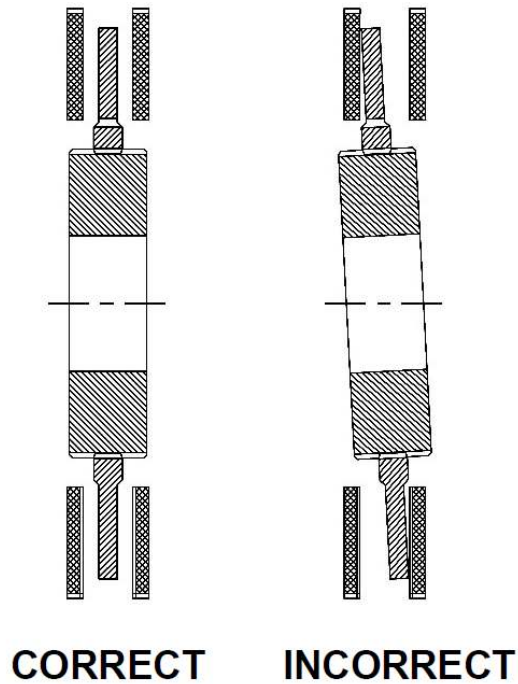


Figure 5 Drive Disc Alignment

Refer to appropriate assembly drawing (available upon request) for envelope dimensions, mounting register diameters, and mounting bolt circles and positions for each brake.

The brake reaction member (such as the machine frame) should have a machined register to allow for the mounting and alignment control of the brake. The mounting surface should be designed to provide full support of the face of the mounting flange in order to prevent any deflection during operation.

For proper operation and service life, the brake's drive ring must be concentric with and aligned to shaft within limits shows in Table 3.

Table 3 Alignment Requirements		
BRAKE SIZE	CONCENTRICITY	PERPENDICULARARITY
13"	0.0065" (0.165)	0.0065" (0.165)
17"	0.0085" (0.216)	0.0085" (0.216)
21"	0.0110" (0.279)	0.0110" (0.279)
25"	0.0125" (0.318)	0.0125" (0.318)
30"	0.0150" (0.381)	0.0150" (0.381)

IMPORTANT:

Refer to appropriate assembly drawing for setup dimensions between brake mounting surface and end of hub. The hub should be positioned to ensure disc splines will not overhang end of hub when brake is mounted. Brake hub should be checked for overhang with new and worn conditions.

Concentricity of the Shaft: With dial indicator mounted to a solid part of machine, place indicator tip on shaft and rotate shaft. Total Indicated Reading should have a maximum value shown in Table 3. See Figure 6 below.

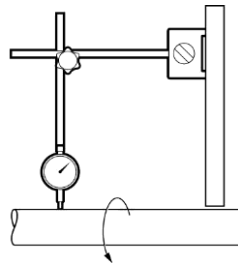


Figure 6 Measuring Concentricity of the Shaft

Concentricity of Pilot: With dial indicator mounted to the shaft, place indicator tip on pilot diameter and rotate shaft. Total Indicated Reading should have a maximum value shown in Table 3. See Figure 7 below.

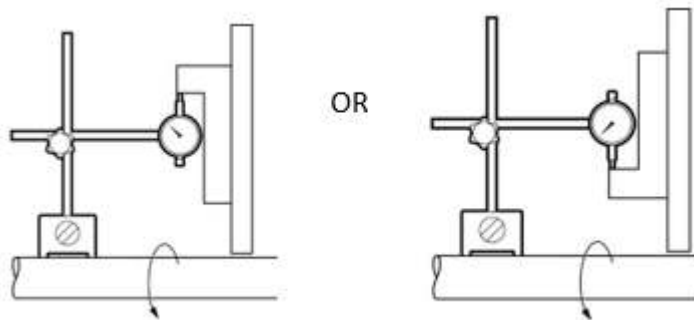


Figure 7 Measuring Concentricity of the Pilot

Perpendicularity of the Mounting Face: With dial indicator mounted to shaft, place indicator tip on face of mounting surface and rotate shaft. Total Indicated Reading should have a maximum value shown in Table 3. See Figure 8.

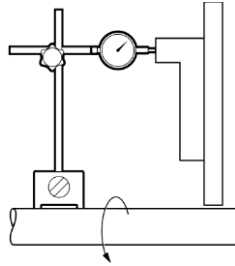


Figure 8 Measuring Perpendicularity of the Mounting Face

3.2. Installation of Hub

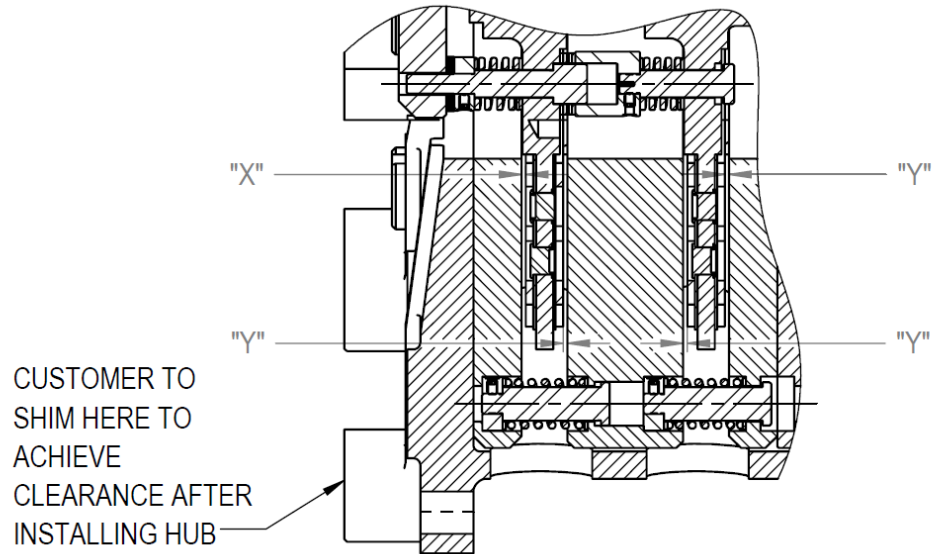
- 3.2.1. Check that equipment shaft equipment is free of nicks and burrs. Check concentricity of the shaft. Ensure key will fit properly in shaft and hub.
- 3.2.2. If brake is to be mounted while completely assembled, be sure disc splines are aligned with each other and hub splines. This is accomplished by installing hub in discs to align splines. Apply enough air pressure to unit to release discs. Center hub and discs in brake and release air pressure to engage drive plates.
- 3.2.3. For a straight or splined hub, heat hub uniformly to 250° F (121° C) to expand bore and ease assembly. Press hub onto shaft, making sure dimension between hub and unit mounting surface is maintained. Distance is found on unit assembly drawing. Allow hub to cool.
- 3.2.4. For a tapered bore hub, tighten nut per machine manufacturer's guidelines.
- 3.2.5. Ensure hub is properly positioned on shaft in relation to unit. Hub should be locked in this position to prevent axial movement during installation.
- 3.2.6. Perpendicularity of Hub: With a dial indicator mounted to a solid part of machine, place indicator tip on face of hub and rotate shaft. Verify hub face is perpendicular to shaft with maximum Total Indicated Reading shown in Table 3.

3.3. Installation of Brake

.....**CAUTION**

Maximum allowable air pressure is 130 lbf/in² [9 bar]. Application of air pressure exceeding maximum allowable may result in damage to brake.

- 3.3.1. Ensure equipment mounting surface is clean and free of nicks and burrs. Install adapter plate as required.
- 3.3.2. Clean hub spline of dirt and lightly coat with MoS₂ dry film lubricant or equivalent.
- 3.3.3. Use proper lifting equipment to lift brake and slide it over hub.
- 3.3.4. Position brake in corresponding pilot. Mounting should be a slip fit. If binding occurs, remove brake and check for burrs.
- 3.3.5. Use customer supplied bolts to fasten brake to frame. Tighten to recommended torque see Table 5.
- 3.3.6. Attach air equipment as specified in Section 3.4.
- 3.3.7. Even though brake is properly set before shipment from factory, it should be checked for proper clearance before being put into operation. Operating clearance is obtained by measuring axial distance (stroke) moved by piston relative to cylinder or other stationary location on brake. See Section 7.1 for procedure to check stroke.
- 3.3.8. Clearance should be as indicated on assembly drawing for the specific brake.
- 3.3.9. If installing a brake mounted on a vertical shaft, additional shimming may be required between drive ring and equipment mounting surface.
- 3.3.10. Apply at least minimum release pressure noted on assembly drawing up to 130 lbf/in² [9 bar].
- 3.3.11. If dimensions shown in Figure 9 are present on assembly drawing, measure “X” and “Y” distances on inner and outer side of friction pucks to adjacent wear surface.



- 3.3.12. Customer is to provide shims to install between drive ring mounting surface and adjacent equipment or adapter mounting surface to obtain clearance values listed on assembly drawings.

Figure 9 Vertical Mount Clearance Locations

3.4. Air System

- 3.4.1. Maximum allowable pressure is 130 lbf/in² [9 bar] for the brake.
- 3.4.2. Use only clean, filtered air (50 micron filter or better is recommended). Air should be free of excess moisture especially when temperatures could approach freezing.
- 3.4.3. Air inlets are located in the cylinder. The lowest port should be at or near the 6 o' clock position to facilitate purging of any moisture that may accumulate in air system. If only one inlet is being used, connection must be made at lowest position possible.
- 3.4.4. All pipes should be free of metal chips, cutting compound, and any other foreign matter. Pipe ends should be reamed after cutting to eliminate any possible restrictions or burrs. For optimum air system response, a minimum number of bend and elbows should be used.
- 3.4.5. Final connection to brake's inlet ports can be made using flexible or rigid hoses/tubing. If only one inlet is being used, connection must be made at lowest position possible.

3.5. Brake Release Test

- 3.5.1. Visually inspect all mounting bolts and fittings for tightness.
- 3.5.2. Apply at least minimum release pressure noted on the assembly drawing up to 130 lbf/in² [9 bar].
- 3.5.3. Manually cycle brake by applying and releasing air pressure. Piston should slide in and out of the cylinder quickly and smoothly.

3.6. Burnishing

.....Warning

Sparks may occur during this procedure. Ensure all flammable materials are removed from area.

.....CAUTION

Minimum personal protective equipment required for this procedure are: Safety glasses, fire retardant clothing, steel toe shoes, and hard hat. Always observe company policies above and beyond minimum required for this procedure

Burnishing is the process of controlled wear to the friction surfaces prior to operational use. Burnish-in procedure should be performed on all new and relined discs. The process works to create maximum surface area and establishes the designed coefficient of friction.

- 3.6.1. Install brake according to sections 3.1, 3.2, 3.3, and 3.4.
- 3.6.2. Check operating clearance conforms to requirements listed on appropriate assembly drawing.
- 3.6.3. Check and record initial temperature of pressure plate using a handheld infrared temperature sensor. If a temperature sensor is installed on brake, do not perform test until monitor reads that engagement is allowed.
- 3.6.4. During process if temperature exceeds 300°F (149°C), stop procedure and allow to cool down below 200°F (93°C). Some sparking may occur and disc particles may be ejected from brake. Excessive amounts of either could indicate a problem such as overheating or improper release. Stop and correct if this occurs.

- 3.6.5. Remove excess load on machine, perform (4) four stops at ($\frac{1}{4}$) one-quarter speed. Allow at least (1) one minute between stops and ensure brake temperature is below 200°F (93°C).
- 3.6.6. Remove excess load on machine, perform (8) eight stops at ($\frac{1}{2}$) one-half speed. Allow at least (2) Two minutes between stops and ensure brake temperature is below 200°F (93°C).
- 3.6.7. Check static holding torque of brake at maximum load with motor stopped. If unit does not hold load, repeat burnish in procedure and recheck static holding torque.
- 3.6.8. On hoist, drag, and propel brake units, perform (1) one additional full load/full speed stop to be certain unit is stopping within manufacturer's guidelines for stopping distances and times.
- 3.6.9. On swing brake units, perform (1) one additional full load/ $\frac{3}{4}$ speed stop to be certain stopping angles and times are within manufacturer's guidelines.

4. Operation

.....**DANGER**

This is a parking brake. It can be used in an emergency. It will overheat and could ignite explosive gas if used as a dynamic brake.

.....**DANGER**

Do not exceed maximum surface temperature 300°F (149°C). Exceeding maximum temperature could ignite explosive gas.

.....**Warning**

For ambient temperature below -4°F (-20°C), warm brake to -4°F (-20°C) before heavy use. Failure to warm brake may result in damage to components.

.....**Warning**

Maximum speed must not exceed speeds listed in Table 4. Exposure to speeds in excess of these values may cause friction discs to spark and result in extensive damage to brake and/or personal injury.

.....**Warning**

Protective means must be used to prevent oil, grease, and/or dirt from contacting surfaces of friction disc, or wear surfaces. Oil and /or grease on these parts will significantly reduce torque capacity of unit. Dirt will produce erratic torque. Do not risk personal injury or damage to equipment.

4.1. Pressure and Speed Limits

- 4.1.1. Do not exceed maximum free-wheeling disc speed in Table 4 below

BRAKE SIZE	r/min
13"	2650
17"	2000
21"	1650
25"	1400
30"	1150

4.2. Operational Sequence

- 4.2.1. Apply air pressure through ports in cylinder to raise piston and release brake. Release springs present in some brakes assist wear plates to fully clear friction buttons. If torque is applied to shaft, it should be free to rotate.
- 4.2.2. Exhausting all air from air cavity allows it to engage. Exhaust air should be unrestricted.
- 4.2.3. As brake wears, some brakes are equipped with shims allowing brake to be returned to operating clearances before replacing brake discs. See Section 7.1 and Section 7.2.

5. Disassembly

.....Warning

Only qualified personnel should install, adjust and/or repair WPT brake. Faulty workmanship could result in faulty installation, dangerous operation of brake, repeated costly maintenance and greatly shorten life of brake.

.....Warning

Ensure machinery is and will remain in a locked and safe position prior to loosening fasteners or removing brake.

.....Warning

Use caution when removing brake bolts. Springs within brake store energy and could cause the brake to fly apart.

5.1. Complete Brake Removal

- 5.1.1. Remove all hose connections.
- 5.1.2. Remove any auxiliary measurement devices from brake.
- 5.1.3. Use appropriate lifting equipment to support weight of brake.
- 5.1.4. Evenly remove bolts securing drive ring to equipment mounting surface.
- 5.1.5. Slide brake from hub.If binding occurs, air pressure can be applied to release brake discs.

5.2. Disassembly for Brake Disc Replacement Only

.....DANGER

Do not remove socket head sap screws connecting piston to pressure plate. Bolts are not long enough to remove all spring pressure when drive stud nuts are removed. See Section 5.5 for disassembly of actuator assembly.

- 5.2.1. Inspect exposed threads of drive studs. Galling may occur during removal if threads are damaged. Correct before moving to next step.
- 5.2.2. Apply air pressure to actuator to release brake. This compresses springs so stud nuts do not have pressure on them. Studs are not long enough to remove spring pressure without releasing brake.
- 5.2.3. Once nuts are removed, release air pressure slowly and use proper lifting equipment to remove entire piston/cylinder/pressure plate assembly and set aside.
- 5.2.4. Remove extra wear plates, if present, to access drive discs for replacement.
- 5.2.5. With new or relined drive discs installed on hub, reassemble plates checking assembly drawing for appropriate alignment.
- 5.2.6. Reposition piston/cylinder/pressure plate assembly on studs.
- 5.2.7. Install shims as required by assembly drawing for new friction discs.
- 5.2.8. Apply air pressure to piston/cylinder and install nuts slowly and evenly in a star pattern. Torque to value listed on assembly drawing or Table 5.

5.3. Disassembly for O-ring Replacement

 **DANGER**

Do not remove drive stud nuts connecting cylinder to drive ring. Drive studs are not long enough to remove all spring pressure. To remove nuts, ensure piston and socket head cap screws are installed and see Section 5.5 for disassembly of actuator assembly.

- 5.3.1. Remove all hose connections.
- 5.3.2. Ensure brake is engaged and no air pressure is applied.
- 5.3.3. Slowly and evenly remove socket head cap screws connecting piston to pressure plate. DO NOT remove stud nuts with piston screws removed.
- 5.3.4. Remove piston from cylinder.
- 5.3.5. Replace O-rings in piston, applying Chevron Moly grease NLGI 2, or equal, to new O-rings.

- 5.3.6. Reinsert piston in cylinder. Appropriately sized all-thread can be used to align bolt holes.
- 5.3.7. Evenly install socket head cap screws. Torque to value listed in assembly drawing or Table 5.
- 5.3.8. Burnish all new and relined discs according to Section 3.6.

5.4. Shim Removal

.....**DANGER**

Do not remove socket head cap screws connecting piston to pressure plate. Bolts are not long enough to remove all spring pressure when drive stud nuts are removed. See Section 5.5 for disassembly of actuator assembly.

- 5.4.1. See Section 7.2 for appropriate instruction to determine if shim(s) should be removed.
- 5.4.2. Inspect exposed threads of drive studs. Galling may occur during removal if threads are damaged. Correct before moving to next step.
- 5.4.3. DO NOT remove socket head cap screws connecting piston to pressure plate.
- 5.4.4. Apply air pressure to actuator to release brake. This compresses springs so stud nuts do not have pressure on them.
- 5.4.5. If air pressure is not applied, slowly and evenly loosen nuts only until shims are free.
- 5.4.6. Shims are designed with a split, so nuts do not need to be completely removed.
- 5.4.7. After shim is removed, tighten nuts to torque value listed on assembly drawing or Table 5.
- 5.4.8. Check all clearances conform to values listed on assembly drawing. See Section 7.1 for instruction to check clearance.

5.5. Disassembly of Actuator Assembly

.....Warning

Use caution when removing brake bolts. Springs within brake store energy and could cause brake to fly apart.

Disassembly of actuator may be done using a combination of all-thread, washers, and nuts. All-thread should match thread of socket head cap screws to screw into pressure plate. Hardware should be grade 8 or better. All-thread length should be at least 6.0" [152] above piston.

- 5.5.1. Remove half of the socket head cap screws.
- 5.5.2. Thread all-thread in spring plate and add washer to top of piston.
- 5.5.3. Thread nuts on all-thread and hand tighten to piston.
- 5.5.4. Slowly and evenly remove remaining socket head cap screws. Spring force is held by temporary nuts on all-thread.
- 5.5.5. Slowly and evenly loosen nuts to release spring force. If all-thread begins to unthread in pressure plate, measures should be taken to secure all-thread while nuts are loosened.
- 5.5.6. Once all spring force is removed, remove all-thread and lift piston out of cylinder.

6. Assembly

.....DANGER

Springs will be compressed during assembly. Take precautions to secure spring force during assembly.

.....WARNING

Only qualified personnel should install, adjust and/or repair WPT brake. Faulty workmanship could result in faulty installation, dangerous operation of brake, repeated costly maintenance and greatly shorten life of brake.

The brake will be shipped from factory fully assembled with disc plates centered and aligned using a hub not included in assembly. If installing a fully assembled brake, see Section 3. Use the following instructions to assemble brake part-by-part on equipment mounting surface. Not every brake will require components to follow every step.

6.1. Assembly Instructions

- 6.1.1. Check equipment mounting surface is free of nicks and burrs. Install adapter plate on as required and check concentricity of pilot. See Section 3.1.
- 6.1.2. Follow procedure for preparation and alignment in Section 3.1.
- 6.1.3. Follow procedure to install hub in Section 3.2.
- 6.1.4. Use assembly drawing and bill of materials provided by WPT to ensure all parts are correct. Contact WPT for current revision.
- 6.1.5. Position drive ring in corresponding pilot on equipment surface. Mounting should be a slip fit. If binding occurs, remove brake and check for burrs. Teflon grease may be applied to pilot and O.D. of drive ring.
- 6.1.6. Internal parts will vary from brake to brake. Use assembly drawing and bill of materials to ensure proper parts are used in correct locations.
- 6.1.7. Wear plates and pressure plates may utilize release springs or screws to aid in ensuring proper clearance is achieved. Release springs should be installed in wear plates and/or pressure plates prior to installing plate in brake.

- 6.1.8. Clean hub spline of dirt, lightly coat with MoS2 dry film lubricant or equivalent.
- 6.1.9. If present, install inner wear plate. Ensure holes and spring pockets are oriented correctly.
- 6.1.10. If applicable, use proper shoulder bolt or socket head cap screw in bill of materials to secure inner wear plate to drive ring. Use lubrication as required by assembly drawing and torque to value listed on assembly drawing. Torques listed on assembly drawing take precedence if noted.
- 6.1.11. Slide drive discs on hub to contact inner wear surface. Ensure proper orientation if required. For discs with release springs, ensure pins align in corresponding locations.
- 6.1.12. For multiple disc units, install center plate with release springs previously installed. Check spring pin collars are properly seated in corresponding pocket in adjacent wear plate. Subsequent levels of release spring pins should align with previous row.
- 6.1.13. Repeat step 6.1.12 as required.
- 6.1.14. For horizontal mount assembly see Section 6.2.
- 6.1.15. For vertical mount assembly see Section 6.3.

6.2. Horizontal Mount Assembly

Brakes mounted horizontally should be assembled part-by-part separate from mounting surface. If this installation method is acceptable follow procedure in Section 6.4 and install complete brake according to procedure in Section 3.3. If brake must be installed part-by-part on mounting surface see the following procedure.

- 6.2.1. Follow procedure for beginning stages of installation in Section 6.1.
- 6.2.2. The actuator of a unit for use with a horizontal shaft must be assembled separately.
- 6.2.3. Set pressure plate on a flat surface and install release springs if required.
- 6.2.4. Place required number of engagement spring and insulating washers as required in the bill of materials.
- 6.2.5. Position cylinder and check all springs are seated correctly in spring pockets.
- 6.2.6. Stud holes in pressure plate and cylinder should align. Spare drive studs may be used to aid in aligning stud holes since misalignment may make installation of actuator assembly difficult.

- 6.2.7. Install dust seal in piston trimming to length so the two ends meet. Cover outside edge with Chevron Moly grease NLGI 2, or equivalent.
- 6.2.8. Cover O-rings with Chevron Moly grease NLGI 2, or equivalent, then install in piston, taking care not to roll O-ring in groove.
- 6.2.9. Lightly coat sealing surfaces and air cavity in cylinder and piston with Chevron Moly grease NLGI 2, or equivalent.
- 6.2.10. Screw all-thread into every other tapped hole in the spring plate. All-thread should be at least grade 8 and long enough to extend at least 6 inches above piston when it is lowered into place.
- 6.2.11. Lower piston in cylinder using all-thread to ensure bolt holes are aligned.
- 6.2.12. Add washers and nuts to all-thread. Tighten nuts to compress piston and spring plate together.
- 6.2.13. Apply Chevron Moly grease NLGI 2 or equivalent to socket head cap screws and install in remaining holes.
- 6.2.14. Remove all-thread (no tension should be on the all-thread)
- 6.2.15. Install socket head cap screws in remaining holes. Torque in a star pattern to value required by assembly drawing or Table 5.
- 6.2.16. Using appropriate lifting equipment, install actuator assembly on drive ring studs until cylinder pilot starts in drive ring.
- 6.2.17. Install shims if required over cylinder pilot to rest on the top of drive ring.
- 6.2.18. Apply air pressure to actuator.
- 6.2.19. Visually inspect threads on drive studs and correct if nicks are found. Apply Chevron Moly grease NLGI 2 or equivalent to threads.
- 6.2.20. Install nuts evenly and torque in a star pattern. See assembly drawing for nut torque or Table 5.
- 6.2.21. After brake is assembled refer to Section 3 for remaining installation instructions.

6.3. Vertical Mount Assembly

The following procedure is for assembling brake part-for-part on mounting surface for a vertically mounted brake.

- 6.3.1. Follow procedure for beginning stages of installation in Section 6.1.
- 6.3.2. Actuator assembly portion of unit should be installed part-by-part on drive ring. If necessary, actuator assembly may be assembled separate and then installed on drive studs. See Section 6.2 for instruction on how to assemble actuator assembly separate from brake.
- 6.3.3. Install pressure plate in drive ring with release springs installed if required.
- 6.3.4. Place engagement spring and insulating washers as required in bill of materials.
- 6.3.5. Position cylinder in drive ring and check all springs are seated correctly in spring pockets.
- 6.3.6. Install shims if required over cylinder pilot on top surface of drive ring.
- 6.3.7. Install dust seal in piston, trimming to length so the two ends meet. Cover outside edge with Chevron Moly grease NLGI 2 or equivalent.
- 6.3.8. Cover O-rings with Chevron Moly grease NLGI 2 or equivalent and install in piston taking care not to roll O-ring in groove.
- 6.3.9. Lightly coat sealing surfaces and air cavity in cylinder and piston.
- 6.3.10. Screw all-thread into every other tapped hole in the spring plate. All-thread should be at least grade 8 and long enough to extend at least 6 inches above piston when it is lowered into place.
- 6.3.11. Lower piston in cylinder using all-thread to ensure bolt holes are aligned.
- 6.3.12. Add washers and nuts to all-thread. Tighten nuts to compress piston and spring plate together.
- 6.3.13. Apply Chevron Moly grease NLGI 2 or equivalent to socket head cap screws and install in remaining holes.
- 6.3.14. Remove all-thread (no tension should be on the all-thread)
- 6.3.15. Install socket head cap screws in remaining holes. Torque in a star pattern to value required by assembly drawing or Table 5.
- 6.3.16. Apply air pressure to actuator.

- 6.3.17. Visually inspect threads on drive studs and correct if damage is found. Apply Chevron Moly grease NLGI 2 or equivalent to threads.
- 6.3.18. Install nuts evenly and torque in a star pattern. See assembly drawing for nut torque or Table 5.
- 6.3.19. After brake is assembled refer to Section Installation3 for remaining installation instructions

6.4. Basic Assembly

Basic assembly instructions should be used to assemble entire brake separate from mounting surface.

- 6.4.1. Follow instructions for vertical mount assembly in Section 6.3, assembling unit on a flat surface.
- 6.4.2. Use a loose hub to center and align disc splines.
- 6.4.3. If brake is to be installed, refer to Section 3.
- 6.4.4. If brake is to be stored, refer to Section 9.

7. Maintenance

.....WARNING

Only qualified personnel should install, adjust, and/or repair the WPT brake. Faulty workmanship could result in faulty installation, dangerous operation of brake, repeated costly maintenance, and greatly shorten life of brake.

.....WARNING

Ensure machinery is and will remain in a locked and safe position prior to loosening fasteners or removing brake.

.....WARNING

Failure to remove shims as required may deteriorate the brake torque to a point where equipment will not be stopped.

.....CAUTION

Periodically examine brake for wear of friction material and wear plates. Failure to perform this examination periodically may result in excessive wear to components, improper operation, or a significant reduction in torque and may result in personal injury and/or damage to machinery.

7.1. Checking Operating Stroke

- 7.1.1. On all units, friction material must be replaced when maximum clearance has been reached with all ring shims removed. See assembly drawing for maximum and minimum clearance specifications.
- 7.1.2. Some unit designs allow for brake to return to its original operating clearances by removing ring shims from brake. See Section 5.4 for shim removal.
- 7.1.3. Ensure brake is engaged with no air pressure applied.
- 7.1.4. Secure dial indicator to outside of drive ring with tip on a flat machined section of piston.

Or secure dial indicator to flat section of piston with tip on a machined section of the cylinder.

- 7.1.5. Record initial reading or zero indicator, ensuring enough travel remains on dial indicator to measure entire movement.
- 7.1.6. Apply air pressure above release pressure noted on assembly drawing but below 130 lbf/in² [9 bar].
- 7.1.7. Record final dial indicator reading.
- 7.1.8. The difference between the two measurements is total assembly clearance or stroke of the piston.

7.2. Adjusting Operating Stroke

Many brakes include shims between top of drive ring and mating surface on cylinder. These are to be removed when stroke of brake increases the amount of one shim. Removal of a shims as frictions wear allows spring compression and in turn torque capacity to remain consistent.

- 7.2.1. Follow Section 7.1 to measure brake stroke.
- 7.2.2. Compare worn stroke to new assembly stroke listed on assembly drawing or original measured stroke if available.
- 7.2.3. Brake is worn if stroke is at or above maximum stroke listed on assembly drawing.
- 7.2.4. If brake is worn and shims are present between drive ring and cylinder, one shim may be removed to reduce stroke by thickness of the shim. See Section 5.4 for shim removal procedure.

7.3. Checking O-Ring Seals

O-rings are pressure tested at factory for every new brake.

O-ring seals contain air within the chamber between piston and cylinder. O-ring performance is influenced by several different factors. Inadequate pressure or loss in pressure may indicate a failed O-ring. Apply at least minimum release pressure and hold for 10 minutes. Pressure loss should be no more than 10 lbf/in² [0.68 bar].

See Section 5.3 for instruction on disassembly for O-ring replacement.

8. Troubleshooting Guide

Problem	Possible Cause	Possible Remedy
Brake will not release	Tooth wear	Replace hub and drive plates
	Low operating pressure	Verify operating pressure exceeds minimum operating pressure and does not exceed 130 lbf/in ² [9 bar] Check for possible damage to hoses and/or actuator
	Leaking seals	Replace O-rings, look for and correct nicks or burrs which may cut the O-ring
	Jammed wear plates	Disassemble and inspect, replace parts as necessary
Torque below specification	Worn friction surfaces	Check clearance and remove shims if necessary, according to section 7.1 and 7.2. If all shims are removed and clearance is above maximum worn condition, replace or rebuild all drive discs.
	Friction material contamination	Thoroughly clean friction material-replace discs if necessary
	Damaged springs	In new brake, check number of springs matches bill of material Inspect springs for signs of wear-replace all springs if necessary
Brake is getting too hot	Brake is not releasing	See Troubleshooting “Brake will not release”

9. General Storage Guidelines

Upon receipt of parts or assemblies, they should be inspected for corrosion or other related damage. If any problem is detected, contact WPT's warranty department.

It is the owner's primary responsibility to store and protect the WPT product.

Products should be stored in a manner protected from environment and outside sources, which may include but are not limited to the following:

- **Environmental storage requirements should be maintained as follows:**
 - o No exposure to rainwater
 - o Temperatures 32F° (0C°) to 110F° (43C°)
 - o Below 50% average humidity
 - o Average sunlight
- **Hazards requiring addition protection:**
 - o Dust and debris
 - o Oil, water, saltwater, acids, or other chemicals
 - o Any other foreign items which may damage product
 - o Other measures include covering product to prevent ingress of foreign matter
- **Additional Protection Measures for Long-Term Storage (Storage Exceeding 1 Month):**
 - o Coating studs, hub, springs, and exposed metal with Cosmoline RP-342 "HEAVY" Military-Grade Rust Preventive Aerosol Spray, or equal
 - o Coating of painted surfaces is not required or recommended
 - o Visually inspect product for degradation once every three-months

10. Appendix

Table 5 Stud Nut and Piston Bolt Torque		
Size	Stud Nut Torque with Chevron Moly grease NLGI 2, or equivalent lbf·ft (N·m)	Piston Bolt Torque with Chevron Moly grease NLGI 2, or equivalent lbf·ft (N·m)
13"	45-50 (61-67)	85-90 (115-122)
17"	70-80 (95-108)	50-55 (68-74)
21"	90-100 (122-135)	200-220 (272-298)
25"	110-120(150-162)	200-220(272-298)
30"	190-200 (257-271)	275-300 (373-406)

NOTE: Values for nut and bolt torque given on assembly drawing take precedence



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