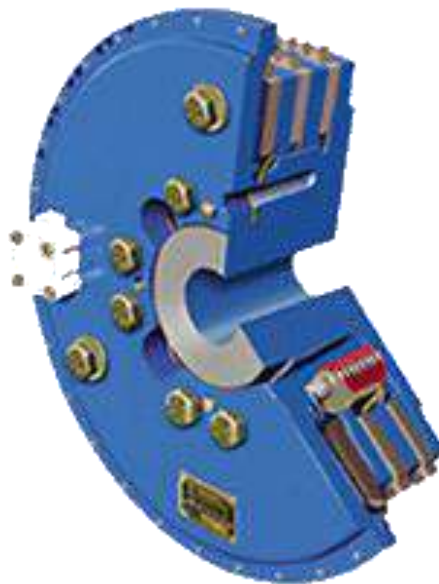




**PO STYLE AIR CLUTCH**

**INSTALLATION AND  
MAINTENANCE MANUAL**



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# **SECTION 1**

## **INTRODUCTION**

### **GENERAL INFORMATION**

An assembly drawing and bill of material sheet is provided with each unit shipped from our factory. If these are not available, they may be obtained from WPT Power Corporation or one of its authorized stocking distributors found worldwide.

Order parts from your nearest WPT Power Corporation distributor. In most cases, they will have the commonly needed parts ready for shipment.

The illustrations found in this manual refer to this manual only and not specifically to your clutch. Consult the assembly drawing for your model clutch when ordering parts.

When ordering replacement parts, proceed as follows:

1. Provide the assembly number of the clutch as found on the stamped nameplate. Provide the item number of the part from the bill of material, the description of the part, and the quantity required.
2. Furnish the complete shipping destination and physical address. All parts sales are made through the distributor network. State specifically how the parts are to be shipped. If not advised, the equipment will be shipped the best way, considering time and expense.

### **SCOPE**

This publication provides the information necessary for the operation and maintenance of the WPT Power Corporation equipment specified on the cover of this manual. Specific engineering details and performance characteristics can be obtained from WPT Power Corporation or one of its authorized distributors.

Operation and maintenance personnel responsible for this equipment should have this manual at their disposal and be familiar with its contents. Following the instructions in this manual will insure performance from the unit and will speed maintenance. Some repairs to this equipment may require special tools.

### **SPECIAL TOOLS**

Drawings are included for the fabrication of special tools that may be required during disassembly and assembly of a unit. These tools are not available from WPT Power Corporation.

WPT Power Corporation absolves itself of any responsibility resulting from modifications made without the express written approval of WPT Power Corporation. All returned parts, new or old, resulting from any of the above stated changes will not be accepted for credit. Any equipment which has been subjected to such changes will not be covered by a WPT Power Corporation Warranty.

### **PREVENTIVE MAINTENANCE-TROUBLE SHOOTING**

#### **NOTE**

Frequent reference to the information provided in this manual regarding daily operation or adjustment of this equipment will insure trouble free operation. Schedules are provided for the recommended maintenance of the equipment, and if observed, minimum repairs, aside from normal wear, will result.

In the event a malfunction does occur, trouble shooting suggestions are provided per Section 3 to help identify the problem area, and help determine the extent of the repairs necessary to get a unit back into operation.

### **IMPORTANT SAFETY NOTICE**

Because of the possible danger to person(s) or property from accidents which may result from the use of manufactured products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified. Proper installation, maintenance, and operation procedures must be observed. Inspection should be made as necessary to assure safe operations under prevailing conditions. Proper guards and other suitable safety devices or procedures that may be desirable or specified in safety codes should be provided. These devices are neither provided by WPT Power Corporation, Incorporated nor are they the responsibility of WPT Power Corporation.

### **LIFTING BOLT HOLES**

Most WPT Power Corporation products have provisions for attaching lifting bolts. The holes provided are always of adequate size and number to safely lift the WPT Power Corporation product.

### **CAUTION**

These lifting points must not be used to lift the complete power unit. Lifting excessive loads at these points could cause failure at the lift point (or points) and result in damage or personal injury.

### **CAUTION**

Select lifting eyebolts to obtain maximum thread engagement with bolt shoulder tight against housing. Bolts should not contact bottom of bolt hole.

### **SAFETY**

#### General

Safe operating practices should be employed by all personnel servicing this unit. WPT Power Corporation will not be responsible for personal injury resulting from careless use of hand tools, lifting equipment, power tools, or unaccepted maintenance/work practices.

### **SOURCE OF SERVICE INFORMATION**

Each series of maintenance manuals issued by WPT Power Corporation is current at the time of printing. When required, changes are made to reflect advancing technology and product improvements.

Individual product service bulletins are issued to provide customers new service information. These service bulletins are distributed to all WPT Power Transmission distributorships.

For the latest service information on WPT Power Corporation products, contact a WPT Power Corporation Distributor, or write to WPT Power Corporation, PO Box 8148, Wichita Falls, Texas, U.S.A. 76307

### **WARRANTY**

Equipment for which this manual was written has a limited warranty. For details of the warranty, contact any WPT Power Corporation distributor, or WPT Power Corporation, PO Box 8148, Wichita Falls, Texas, U.S.A. 76307

### **DESCRIPTION**

The WPT PO style clutch is an air-actuated, spring-released, disc type axial clutch (Refer to the diagrams at the back of this manual). Power input is transmitted through the driving ring (1) or drive

spider to which the friction discs are meshed. During clutch engagement, pressurized air is fed into the diaphragm (13). Friction discs (2) and center plates (3) are clamped to the hub & backplate (4). The hub & backplate (4), spline connected to the center plate (3), transmits the torque through its keyed hub to the output shaft. The drive-through is on a common center axis with the input.

Air cooling passages are provided through the clutch to carry away the heat generated during engagement.

## OPERATING SPECIFICATIONS

<b>PO Clutch Ratings</b>					
<b>Clutch Size</b>	<b>DYNAMIC TORQUE @ 100 psi (lb-in)/7 bar (Nm)</b>		<b>STATIC TORQUE @ 100 psi (lb-in)/7 bar (Nm)</b>		<b>Maximum Speed</b>
	<b>lb-in</b>	<b>Nm</b>	<b>Lb-in</b>	<b>Nm</b>	
114	28,800	3,305	38,400	4,410	2,450
214	57,600	6,610	76,800	8,820	2,450
314	86,400	9,915	115,200	13,230	2,450
118	58,875	6,760	78,500	9,015	2,000
218	117,750	13,520	157,000	18,030	2,000
318	176,625	20,280	235,500	27,045	2,000
124	141,225	16,220	188,300	21,630	1,500
224	282,450	32,440	376,600	43,260	1,500
324	423,675	48,660	564,900	64,890	1,500
230	548,250	62,980	731,000	83,970	1,300
330	822,375	94,470	1,096,500	125,955	1,300

# CHART 1 Bolt Torque Specifications

TORQUE VALUES FOR SOCKET HEAD AND HEX HEAD CAPSCREWS						
SOCKET HEAD CAP SCREWS						
BOLT SIZE INCHES	As Received			Lubricated**		
	lbf-ft	lbf-in	N-m	lbf-ft	lbf-in	N-m
1/4	13	150	17	10	120	13
5/16	23	305	34	18	244	27
3/8	45	545	62	36	436	49
7/16	70	840	95	56	672	76
1/2	108	1300	147	86	1040	117
9/16	155	1860	210	124	1488	168
5/8	211	2530	286	168	2024	228
3/4	367	4400	497	293	3520	397
7/8	583	7000	791	466	5600	632
1	867	10400	1175	693	8320	940
1 1/8	1242	14900	1684	993	11920	1347
1 1/4	1750	21000	2374	1400	16800	1899
1 3/8	2317	27800	3142	1853	22240	2513
1 1/2	3042	36500	4125	2433	29200	3300
1 3/4	4950	59400	6714	3960	47520	5371
2	7492	89900	10161	5993	71920	8128
HEX HEAD CAP SCREWS - Grade 8						
BOLT SIZE INCHES	As Received			Lubricated**		
	lbf-ft	lbf-in	N-m	lbf-ft	lbf-in	N-m
1/4	8	100	11	6	80	9
5/16	17	200	23	13	160	18
3/8	30	360	41	24	288	32
7/16	48	570	64	38	456	51
1/2	83	990	112	66	792	89
9/16	107	1285	145	85	1028	116
5/8	143	1714	194	114	1371	155
3/4	256	3070	347	204	2456	277
7/8	417	5000	565	333	4000	452
1	625	7500	848	500	6000	678
HEX HEAD CAP SCREWS - Grade 5						
BOLT SIZE INCHES	As Received			Lubricated**		
	lbf-ft	lbf-in	N-m	lbf-ft	lbf-in	N-m
1/4	6	71	8	5	56	6
5/16	12	142	16	9	113	12
3/8	22	260	29	17	208	23
7/16	34	410	46	27	328	36
1/2	53	636	72	42	508	57
9/16	74	890	101	59	712	80
5/8	104	1250	141	83	1000	112
3/4	183	2200	249	146	1760	199
7/8	298	3570	403	238	2856	322
1	440	5280	597	352	4224	477
1 1/8	553	6640	750	442	5312	600
1 1/4	775	9300	1051	620	7440	840
1 3/8	1012	12140	1372	809	9712	1097
1 1/2	1350	16200	1831	1080	12960	1464

\*\* NOTE: For Loctite use lubricated values

# **CLUTCH OPERATION**

## **ENGAGEMENT**

When pressurized air is supplied to the quick release valve/s(QRV/s) of the clutch, the diaphragm of the QRV/s move to cover the exhaust port of the valve(s). This causes full supply pressure to be admitted to the space behind the diaphragm, moving the diaphragm, insulator plate and pressure plate toward the friction disc/center plate stack. This clamps friction discs, center plates and hub/backplate causing them to turn as a unit. The pressure plate also moves the plate separator compressing the release spring.

## **DIS-ENGAGEMENT**

Disengagement is accomplished by releasing the supply air pressure to the QRV/s. This release of supply air pressure, causes the QRV diaphragm to move away from the exhaust port, allowing the air behind the clutch diaphragm to be released to atmosphere. The release springs which were compressed, move the plate separators to open up the stack so that the center plates, driven by the hub/backplate, turn free of the friction discs.

## **EMERGENCY CLUTCH OPERATION**

In the event of clutch diaphragm failure, or loss of supply air pressure, it is possible to engage the clutch mechanically. Three short cap screws (20) are removed from the front plate and replaced by three main cap screws (23). Tighten these longer cap screws to engage the clutch.

This will force the pressure plate through the diaphragm (13) and insulator plate (11) to clamp the center plate (3) floating plate (10) and friction discs (2) to the hub/backplate (4), engaging the clutch (See diagram).

This will make a solid drive with NO RELEASE. Do not use air at this time.

## **NOTE**

After engaging the clutch mechanically, the clutch diaphragm must be replaced. The clutch must be disassembled, the insulator plate (11) inspected for damage which in turn could damage a new diaphragm, a new diaphragm (13) installed, and the clutch re-assembled.

## **SECTION 2 PREVENTIVE MAINTENANCE**

1. Routinely check the following:
  - a. Be sure no dirt or foreign matter has collected in the driving ring or spider which would prevent the driving plates from working freely.
  - b. Check pressure plate and insulator plate for plate release travel
2. In cold weather operation, air lines may contain moisture which can freeze and restrict air flow to the clutch. The addition of denatured alcohol or Ethylene Glycol in the air receiver will eliminate this problem.
3. Avoid the use of products that may affect diaphragm life.

## **SECTION 3 TROUBLE SHOOTING**

### **CLUTCH SLIPPAGE.**

#### **NOTE**

Maximum allowable travel of insulator plate (see chart) with the clutch engaged. Measurements less than the specified distance, indicate the clutch friction discs are worn and should be replaced.

1. Air pressure at the clutch must be 60 to 130 psi depending on the amount of torque being transmitted. Measure this pressure at a pipe tee placed at the inlet to the rotary coupling.
2. Inspect the entire air line installation for any restrictions or leaks which could decrease the air supply to the clutch.
3. Check the operating valve for full opening.
4. Carefully inspect the clutch for possible air leakage at the diaphragm.
5. If operating in cold weather, the air lines may be restricted due to the condensing and freezing of moisture in the air lines or system. The addition of denatured alcohol in the air system will eliminate moisture freezing. Avoid the use of products which may affect diaphragm life.

### **CLUTCH OVERHEATING**

1. Check all points listed previously under "Clutch Slippage."
2. Check alignment as described in Section 6. If misalignment exists, the clutch may not completely disengage.
3. Be sure no dirt or foreign matter has collected in the driving ring or spider which would prevent the driving plate from operating freely.
4. Check the pressure plate and insulator plate for complete release travel.
6. Check for grease on the clutch plates. Disassemble and clean or replace the clutch plates if they are greasy.

<b>POWER GRIP PO CLUTCH MINIMUM OPERATING CLEARANCE</b>		
<b>SIZE</b>	<b>MINIMUM CLEARANCE</b>	
<b>114</b>	<b>1/16"</b>	<b>[1.59]</b>
<b>214</b>	<b>3/32"</b>	<b>[2.38]</b>
<b>314</b>	<b>1/8"</b>	<b>[3.18]</b>
<b>118</b>	<b>1/16"</b>	<b>[1.59]</b>
<b>218</b>	<b>3/32"</b>	<b>[2.38]</b>
<b>318</b>	<b>1/8"</b>	<b>[3.18]</b>
<b>124</b>	<b>3/32"</b>	<b>[2.38]</b>
<b>224</b>	<b>1/8"</b>	<b>[3.18]</b>
<b>324</b>	<b>5/32"</b>	<b>[3.97]</b>
<b>130</b>	<b>3/32"</b>	<b>[2.38]</b>
<b>230</b>	<b>1/8"</b>	<b>[3.18]</b>
<b>330</b>	<b>3/16"</b>	<b>[4.76]</b>

## **SECTION 4 REMOVAL AND UNIT DISASSEMBLY**

### **GENERAL NOTE**

Wear on the clutch driving plates is determined by measuring the travel of the insulator plate as the clutch is engaged. This must be measured before disassembly.

Using suitable lifting equipment, place the clutch on a working surface, back plate down.

### **RELEASE VALVES**

1. Remove the air lines attached to the quick release valves, and remove the hex-head cap screws (15), and plain washers (14) attaching the quick release valves to the cover plate (16).
2. Remove the two quick release valves and gaskets (V6) from the front plate (16).
3. Remove the valve cover (V2), gasket (V6), spring (V3) from the valve body (V1).
4. Remove the spring seat (V5), and diaphragm (V4) from the valve body (V1).

### **CLUTCH**

1. Remove the hex-head cap screws (23) and washers (21) from the front cover plate (16). Use two 5/8-11 thread pusher screws in the holes provided in the front cover plate (16) to separate the front cover plate (16) from the hub/backplate (4).
3. Remove the pusher screws and install eyebolts in the pusher screw holes.
4. Use a chain hoist to lift the front cover plate (16) from the hub/backplate (4).
5. Remove the insulator plate (11) and pressure plate (10). The insulator plate (11) and pressure plate (10) are doweled together with roll pins (19).
6. Remove the release spring nuts (5) from the release spring studs (6).
7. Remove the center plate (3), and friction discs (2) and remove the plate separators (7) and release springs (8) from the hub/backplate (4).
8. Remove the four separator release spring studs (6) from the hub/backplate only if parts replacement is necessary.
9. Pry the insulator plate (11) from the pressure plate (10) only if replacement of parts is necessary.
10. Remove the roll pins (19) from the pressure plate (10) only if replacement of parts is necessary.



## **NOTE**

The diaphragm need not be removed from the clutch assembly if clutch driving plate replacement is all that is required. If the diaphragm must be replaced, proceed with steps 11, 12 and 13.

11. Remove the hex-head cap screws (18) which secure the inner clamp ring (17) to retain the inner bead of the diaphragm (13). Remove the inner clamp ring (17).
12. Remove the hex-head cap screws (18) which secure the outer clamp ring (12) to the front the front cover plate (16) retaining the outer bead of the diaphragm (13).
13. Remove the diaphragm (13) from the front cover plate (16).
14. Remove the two tapered dowel pins (22) from the front cover (16) only if replacement of parts is necessary.
15. Remove the three cap screws (20) only if replacement of parts is necessary.

## **SECTION 5 CLEANING AND INSPECTION**

### **CLEANING**

Thoroughly clean all parts with suitable cleaning agents. After cleaning, dry with compressed air. Lubricate all machined surfaces with clean oil. Foreign particles tend to collect in the root of the gear teeth. Clean thoroughly and repair minor nicks with a fine file. Replace parts with gear teeth that cannot be repaired.

### **INSPECTION**

1. Inspect castings for cracks. Replace cracked castings. Inspect tapped holes for damaged threads. Chase damaged threads with a standard tap of the correct size. Replace all castings that cannot be repaired properly.
2. Inspect the teeth of the driving ring if one is used. Replace a damaged driving ring.
3. Inspect all flexible hoses for cracks, sponginess, or other damage. Replace any damaged hoses.
4. Inspect the diaphragm for surface cracks and hardening. Replace a damaged or questionable diaphragm.
5. Inspect all gear teeth for cleanliness and damage. Examine each part after cleaning to make certain all foreign matter has been removed.
6. It is very important that all orifices be clean and clear.
7. Inspect the driving plates for cracks, nicks or chips. Replace damaged driving plates.
8. Inspect for cracked or warped pressure plate. Replace the plate if it is damaged.
9. Inspect quick release valves to insure proper operation. Replace faulty release valves.
10. Replace return springs as standard practice after any clutch failure.

## SECTION 6

### UNIT ASSEMBLY AND INSTALLATION

**Parts of these instructions will depend on whether a single disc or multi-disc clutch is being assembled. These instructions will have an “S” (for single) or “M” (for multiple).**

Lift holes are provided where appropriate to safely handle WPT clutch components. Always use approved lifting equipment and devices to avoid injury. Refer to the torque specification chart at the back of this manual for torque specifications.

1. Place front cover plate (16) on a working surface with the diaphragm side up.
2. Place the diaphragm (13) on the cover plate (16) so the beads are toward the cover plate. Work the inner and outer beads of the diaphragm (13) into their mounting grooves in the cover plate (16).
3. Position the outer clamp ring (12) over the outer bead of the diaphragm (13). Secure the outer clamp ring with hex-head cap screws (18).
4. Position the inner clamp ring (17) over the inner bead of the diaphragm (13) and secure with hex-head cap screws (18). Tighten these per CHART 1.

**If the tapered dowel pins (22) were removed, be sure tapered dowel pin holes in the inner clamp ring (17) are aligned with those in the front plate.**

5. Position the hub/backplate (4) on a working surface with the splined section upward.
- 6M. Install the release spring studs (6) in the hub/backplate (4) making sure the threads enter completely until bottomed.
- 6S. Install the springs (8) into the spring pockets in the hub/backplate.
- 7M. Install the release springs (8) onto the studs and into the pockets of the hub/backplate. Install the pins (9) in the plate separators (7) if they are not already installed.
- 7S. If installing a new pressure plate (10) or if the plate separators (7) are not on the pressure plate, install them now using roll pins (22).
8. Install one friction disc (2) onto the hub/backplate (4).
- 9M. Install center plate (3) onto hub/backplate working the plate separators (7) into the center plate so the center plate rests on the lips of the plate separators.
- 9S. Slide the pressure plate (10) with plate separators (7) attached onto the hub/backplate. Insure that the springs have entered the pockets of the plate separators.
- 10M. Install plate separators onto studs (6) and into release springs (8).
- 11M. Install hex locking nuts (5) onto release spring studs (6) and tighten to end of thread on studs (6) or to a point where the top of the plate separators (7) are approximately 1/8 inch below the top of the teeth on the hub. Insure that the center plate (3) rests evenly on the lips of the plate separators (7)

12M. Install the friction disc (2) against center plate.

13. If the insulator plate (11) is not assembled to the pressure plate (10), proceed as follows. Install the roll pins (19) into the pressure plate (10). Install the insulator plate (11) over the roll pins and use a rubber mallet to seat the insulator plate against the pressure plate.

14. Install the assembled pressure plate (10) and insulator plate (11) onto the hub/backplate (4) against the friction disc (2). Insure the plate separator pins (9) mesh between the teeth of the pressure plate (10).

15. Position the front cover plate assembly (16) onto the hub/backplate (4). Align the dowel pins (22) (if not removed) with the matching holes in the hub and back plate. If the tapered dowel pins were removed, align the dowel pin holes. Install the tapered dowel pins (22).

16. Secure the front cover plate (16) to the hub and back plate (4) with hex-head cap screws (23) and washers (21). Torque the cap screws evenly to the values from CHART 1.

<b>PO CLUTCH PARTS</b>			
<b>1</b>	<b>Drive Ring</b>	<b>11</b>	<b>Insulator Plate</b>
<b>2</b>	<b>Friction Disc</b>	<b>12</b>	<b>Outer Clamp Ring</b>
<b>3</b>	<b>Center Plate</b>	<b>13</b>	<b>Diaphragm</b>
<b>4</b>	<b>Hub/Backplate</b>	<b>14</b>	<b>Quick Release Valve Washer</b>
<b>5</b>	<b>Locking Nut</b>	<b>15</b>	<b>Quick Release Valve Bolt</b>
<b>6</b>	<b>Stud</b>	<b>16</b>	<b>Cover Plate</b>
<b>7</b>	<b>Plate Separator</b>	<b>17</b>	<b>Inner Clamp Ring</b>
<b>8</b>	<b>Separator Spring</b>	<b>18</b>	<b>Clamp Ring Bolt</b>
<b>9</b>	<b>Separator Roll Pin</b>	<b>19</b>	<b>Insulator Plate Roll Pin</b>
<b>10</b>	<b>Floating Plate</b>	<b>20</b>	<b>Hex Head Cap Screw</b>
		<b>21</b>	<b>Washer</b>
		<b>22</b>	<b>Tapered Dowel Pin</b>
		<b>23</b>	<b>Hex Head Cap Screw</b>
		<b>V1</b>	<b>Valve Body</b>
		<b>V2</b>	<b>Valve Cap</b>
		<b>V3</b>	<b>Spring</b>
		<b>V4</b>	<b>Diaphragm</b>
		<b>V5</b>	<b>Spring Seat</b>
		<b>V6</b>	<b>Gasket</b>

This chart refers to the parts in the diagram used in this manual. When ordering parts, use the part numbers from the Bill of Materials supplied with the unit. If this Bill of Materials has been lost, a copy can be obtained from WPT Power Corporation at no charge. Please supply the Part Number and Serial Number from the brass nameplate on the unit.

