POR SERIES
Pneumatic Overload Release Clutches

Installation and Operation

P-3030-BG

POR Series
Model H2000

Boston® Gear

An **Altra Industrial Motion** Company

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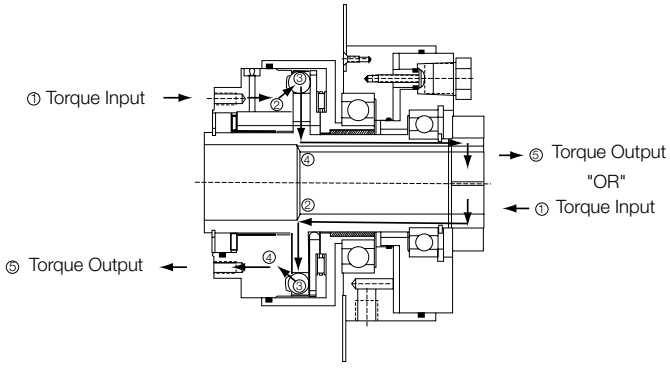
I. Operating Principle

The POR Series, Model H2000 is a pneumatic, ball detent style overload release clutch. It has been designed to provide accurate and dependable torque disconnect protection for mechanical power transmission equipment. Torque is transmitted through the clutch in one of two paths. Refer to Figure 1.



Torque Path
① Plate Sprocket, Coupling, Etc.
② Housing
③ Balls
④ Rotor
⑤ Drive Shaft

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Figure 1

Torque transmission between the balls and detent plate is the key to the disengagement of the clutch. The balls are forced into the pockets of the detent plate by an axial load generated by an air cylinder. This axial load determines the torque capacity of the clutch. Increasing or decreasing the air pressure provides a means for remotely controlled precision “in-flight” torque adjustment. When a torque overload condition occurs, the balls roll out of the pockets and freewheel much as a ball thrust bearing. This rolling action increases the efficiency in which the clutch operates and reduces any fluctuation of torque setting due to frictional changes. Refer to Figure 2. The clutch has been designed with an internal valving mechanism. During an overload condition, the air is purged instantaneously from the cylinder.

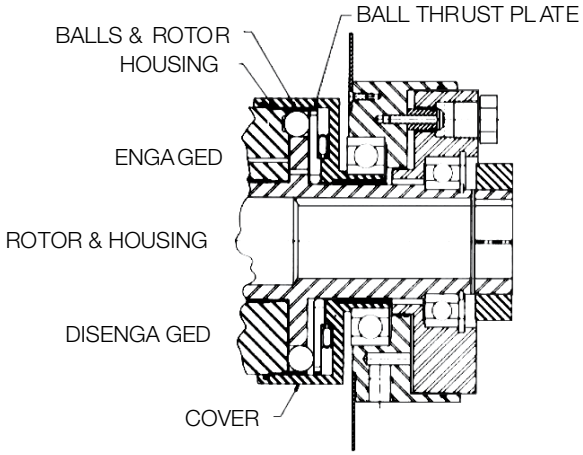


Figure 2

The movement of the air cylinder during disengagement can be used to trip a limit switch and signal a torque overload condition. The drive should be shut down immediately and the source of the overload determined and cleared. The drive can then be restarted.

To engage the clutch, lower the air pressure and jog the drive until the clutch engages. Adjust the release torque by increasing the air pressure supplied to the clutch to reach the desired torque value. The clutch is now ready for normal operation.

II. Mounting Adapters and Sprockets or Sheaves to Clutch

A. Mounting to housing of basic clutch

1. Inspect mating pilots on clutch and sprocket, sheave or adapter for nicks or burrs and remove as required.

2. Position sprocket, sheave or adapter on clutch housing and align holes.

3. Attach sprocket, sheave or adapter to housing with mounting bolts and a high collar lock washer. Refer to Table 1 for recommended seating torques.

Note: Large sprockets or sheaves should be supported on the rotor of the clutch with an auxiliary bearing, i.e. sleeve, needle roller, radial ball. Refer to Figure 4.

Table 1 - Mounting Screws

Type "B"			
Size	**Screw Size**	**Qty.**	**Seating Torque**
02	#8-32	6	49 in-lb
04	#10-24	6	64 in-lb
05	#5/16-18	6	305 in-lb
06	3/8-16	6	545 in-lb
09	7/16-14	6	70 ft-lb
11	5/8-11	6	210 ft-lb

Type "T"			
Size	**Screw Size**	**Qty.**	**Seating Torque**
02	#8-32	6	49 in-lb
04	#8-32	3	49 in-lb
05	1/4-20	3	150 in-lb
06	1/4-20	3	150 in-lb
09	3/8-16	3	545 in-lb
11	3/8-16	3	545 in-lb

B. Mounting to "T" adapter

1. Inspect mating pilots on adapter and sprocket or sheave for nicks or burrs and remove as required.

2. Position sprocket or sheave on adapter and align dowel pin holes.

3. Attach sprocket or sheave to adapter with mounting bolts and a high collar lock washer, refer to Table 1 for recommended seating torques.

4. Finish ream sprocket or sheave and adapter for dowel pins. These holes should be .0005 inches under the nominal pin diameter. Refer to Table 3 for pin sizes.

5. Install dowels to a point where they bottom in adapter.

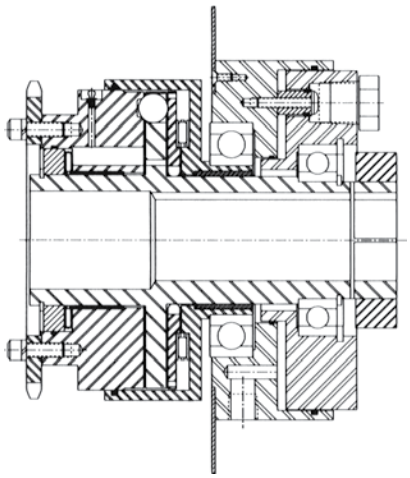


Figure 3
Type B - Style F, Standard Sprocket Mounting

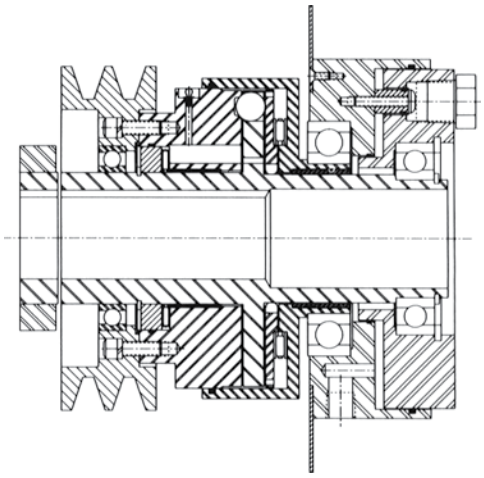


Figure 4
Type B - Style L, Standard Sheave Mounting

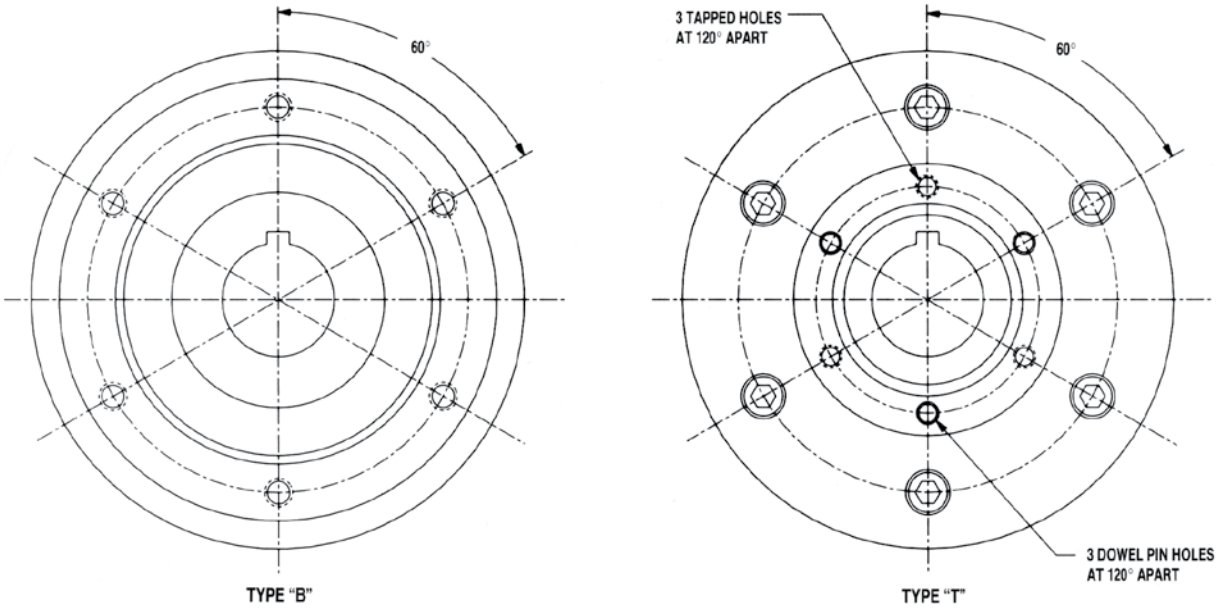


Figure 5 - Standard Mounting Hole Patterns

Table 2 - Minimum Acceptable Plate Sprocket Mounts

Size	Type	Number of Teeth Per Pitch Size							Type	Number of Teeth Per Pitch Size						
		#25 1/4 Pitch	#35 3/8 Pitch	#40 1/2 Pitch	#50 5/8 Pitch	#60 3/4 Pitch	#80 1 Pitch	#100 1-1/4 Pitch		#25 1/4 Pitch	#35 3/8 Pitch	#40 1/2 Pitch	#50 5/8 Pitch	#60 3/4 Pitch	#80 1 Pitch	#100 1-1/4 Pitch
02	B	39	27	22	-	-	-	-	T	27	19	15	-	-	-	-
04	B	51	35	28	23	-	-	-	T	37	26	20	17	-	-	-
05	B	69	47	36	30	26	-	-	T	50	35	27	23	19	-	-
06	B	76	52	40	33	28	-	-	T	54	37	29	24	20	16	14
09	B	101	68	52	43	36	28	24	T	79	54	41	34	29	23	-
11	B	119	80	61	50	43	33	27	T	90	61	47	38	32	-	-

Note: Consult the factory for sprocket mounting requirements which are below the minimum sprocket values shown above.

Table 3 - Standard Mounting Hole Patterns

Size	Type	Capscrews		Depth Thread	Bolt Circle	+.000 -.002 Pilot	Type	Capscrews		Dowel Pins		Depth Thrd./ Pin	Bolt Circle	+.000 -.002 Pilot
		Qty.	Thread					Qty.	Thread	Qty.	Dia.			
02	B	6	#8-32	0.38	2.125	1.781	T	6	#8-32	-	-	0.38	1.422	1.094
04	B	6	#10-24	0.50	3.062	2.688	T	3	#8-32	3	3/16	0.38	2.250	1.922
05	B	6	5/16-18	0.75	4.250	3.625	T	3	1/4-20	3	1/4	0.50	3.219	2.750
06	B	6	3/8-16	0.81	4.750	4.000	T	3	1/4-20	3	1/4	0.50	3.406	2.938
09	B	6	7/16-14	0.88	6.625	5.750	T	3	3/8-16	3	3/8	0.75	5.094	4.344
11	B	6	5/8-11	1.00	7.750	6.500	T	3	3/8-16	3	1/2	0.75	5.938	5.188

Note: 1. Mounting bolts must be minimum 160,000 PSI tensile, Rc 36-43.
2. Dowel pins must be minimum 150,000 PSI Shear, Rc 50-58 core hardness.
3. All Mounting holes are equally spaced.

III. Locating and Mounting Clutch and Couplings to Shaft

A. Location

The clutch should always be located as close as possible to the source of an overload condition. Figures 6 through 9 indicate both preferred and not preferred locations for mounting a POR Series, H2000 pneumatic overload release clutch.

Note: Clutch mounted sprockets, etc. and couplings should be positioned as close to a supporting bearing as possible to minimize overhung loads. A minimum shaft engagement of 1-1/2 times the shaft diameter is recommended for clutch and coupling flange installation.

1. Direct Drives

   a. Figure 6 shows the **preferred** location for mounting in a direct drive application. The clutch is mounted on the low speed side of the reducer, and transmits power from its housing, through its rotor to the driven shaft.

   b. Locating the clutch as shown in Figure 7 is **not preferred.** Here, the clutch is mounted on the high-speed side of the reducer. Generally, mounting in this manner requires the clutch to be hypersensitive to perform satisfactorily.

2. Indirect Drives

   a. Either location of the clutch shown in Figure 8 is **preferred** in indirect drive applications.

   b. The mounting location in Figure 9 is **not preferred** for the same reasons as those for Figure 7. Always consult the factory when a mounting of this type seems necessary.

B. Mounting Basic Clutch

1. Inspect shaft and key for any nicks or burrs and remove as required.

2. Loosen clamp collar on clutch.

3. Position shaft key and slide clutch onto shaft.

4. Align sprocket or sheave mounted to clutch with mating sprocket or sheave in drivetrain. Refer to installation and alignment instructions furnished with sprocket or sheave.

5. Secure clutch to drive shaft by tightening clamp collar. Refer to Table 4 for recommended seating torque for clamp collar screw.

6. Stabilize air cylinder to prevent it from rotating. Use one of three 1/4-20 x 3/8-deep holes in the O.D. of the cylinder. This connection must have flexibility to allow for axial movement of the cylinder during disengagement of the clutch.

7. Remove the protective cap from the air cylinder inlet. Connect a flexible air line from your control system to the air union. To compensate for any eccentricities occurring from installation, it is imperative that a flexible connection be used. DO NOT PIPE SOLID. Use a 45-degree elbow and pipe union on the riser, making certain there is a slight curve in the hose. Do not install hose taut. Adjust air pressure to the desired overload release point. Refer to Torque Curves on Page 10.

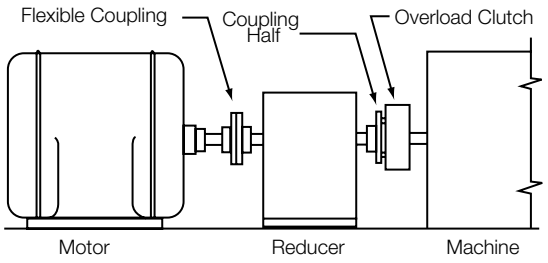


Figure 6

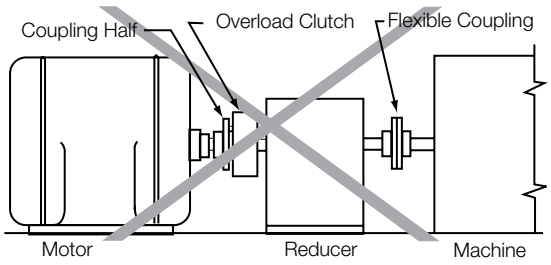


Figure 7

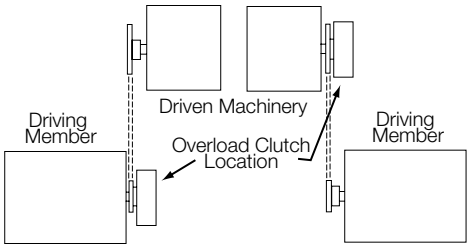


Figure 8

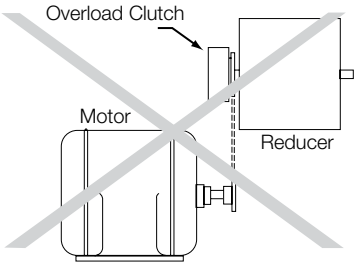


Figure 9

Table 4 - Clamp Collar Screws

Clutch Size	Screw Size	Seating Torque
02	1/4-28	190 in-lb
04	1/4-28	190 in-lb
05	5/16-24	435 in-lb
06	3/8-24	63 ft-lb
09	1/2-20	140 ft-lb
11	1/2-20	140 ft-lb

C. Mounting Clutch with Type "C" Flexible Coupling

1. Inspect shafts and keys for any nicks or burrs and remove as required.

2. Loosen clamp collar on clutch.

3. Position shaft keys and slide clutch and coupling flange onto appropriate shafts.

4. Slide coupling flange onto coupling studs. The coupling flange and adapter should be separated by a gap of 1/8".

5. Secure clutch to drive shaft by tightening clamp collar. Refer to Table 4 for recommended seating torque for clamp collar screw.

6. Secure coupling flange to drive shaft by tightening the two setscrews located in the hub of the flange. Refer to Table 5 for recommended setscrew seating torques.

Table 5 - Setscrews

Screw Size	Seating Torque	Screw Size	Seating Torque
#10-32	36 in-lb	1/2-13	52 ft-lb
1/4-28	87 in-lb	9/16-12	52 ft-lb
5/16-24	165 in-lb	5/8-11	110 ft-lb
3/8-24	290 in-lb	3/4-10	200 ft-lb
7/16-20	430 in-lb	7/8-9	300 ft-lb

Note: Retaining compound is furnished for screws 1/2" diameter and larger. Smaller screws are furnished with self-locking patch.

7. Check the parallel alignment.

   a. Place a straightedge across the coupling flange and adapter as shown in Figure 10.

   b. Measure the offset around the periphery of these two components without rotating the shafts.

   c. If the difference in offset from any two points 180 degrees apart exceeds the maximum value shown in Table 6, the shafts must be realigned.

Table 6 - "C" Coupling

Size	Maximum Allowable Misalignment	
	Parallel - In.	Angular - In.
02	0.012	0.055
04	0.016	0.074
05	0.027	0.101
06	0.045	0.117
09	0.045	0.174
11	0.045	0.226

8. Check angular alignment with a micrometer or caliper.

   a. Measure from the outside of the coupling flange to the outside of the adapter around the periphery of these two components **without rotating** the shafts. Refer to Figure 11.

   b. If the difference between any two points 180 degrees apart exceeds the maximum angular misalignment value shown in Table 6, the shafts must be realigned.

c. If a correction is required to satisfy angular alignment requirements, then recheck the parallel alignment.

9. Stabilize air cylinder to prevent it from rotating. Use one of three 1/4-20 X 3/8-deep holes in the O.D. of the cylinder. This connection must have flexibility to allow for axial movement of the cylinder during disengagement of the clutch.

10. Remove the protective cap from the air cylinder inlet. Connect a flexible air line from your control system to the air union. To compensate for any eccentricities occurring from installation, it is imperative that a flexible connection be used. DO NOT PIPE SOLID. Use a 45-degree elbow and pipe union on the riser, making certain there is a slight curve in the hose. Do not install hose taut. Adjust air pressure to the desired overload release point. Refer to Torque Curves on Page 10.

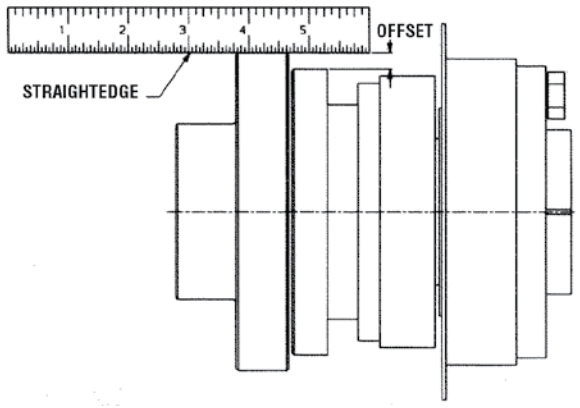


Figure 10 - Parallel "C" Coupling Alignment

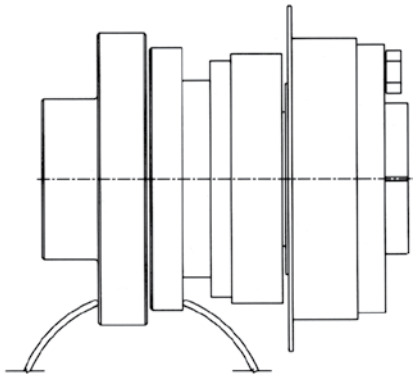


Figure 11 - Angular "C" Coupling Alignment

D. Mounting Clutch with Type "R" - Rigid Coupling

1. Inspect mating pilots of clutch and coupling flange for nicks or burrs and remove as required.

2. Inspect shafts and keys for any nicks or burrs and remove as required.

3. Loosen clamp collar on clutch.

4. Position shaft keys and slide clutch and coupling flange onto appropriate shafts.

5. Slide coupling flange and clutch together until they contact and align mounting holes.

6. Secure clutch to drive shaft by tightening clamp collar. Refer to Table 4 for recommended seating torque for clamp collar screw.

7. Secure coupling flange to drive shaft by tightening the two setscrews located in the hub of the flange. Refer to Table 5 for recommended setscrew seating torques.

8. Check the parallel alignment.

   a. Place a straightedge across the coupling flange and clutch as shown in Figure 12.

   b. Measure the offset around the periphery of these two components **without rotating** the shafts.

   c. The shafts must be aligned until no offset exists or is equal at all points around the periphery.

9. Check angular alignment.

   a. Measure the gap around the periphery between the coupling flange and clutch **without rotating** the shafts. Refer to Figure 13.

   b. The shafts must be aligned until no gap exists or is equal at all points around the periphery.

   c. If a correction is required to satisfy angular alignment requirements, then recheck the parallel alignment.

Note: The “R” coupling connection is rigid and does not allow for forgiveness of parallel or angular misalignment. To eliminate unnecessary bearing loads, both shafts must be in near perfect alignment.

10. Loosen clamp collar of clutch. Attach coupling flange to clutch with mounting bolts and a high collar lock washer. Refer to Table 1 for recommended seating torques. Tighten clamp collar to secure clutch to drive shaft.

11. Stabilize air cylinder to prevent it from rotating. Use one of three 1/4-20 x 3/8-deep holes in the O.D. of the cylinder. This connection must have flexibility to allow for axial movement of the cylinder during disengagement of the clutch.

12. Remove the protective cap from the air cylinder inlet. Connect a flexible air line from your control system to the air union. To compensate for any eccentricities occurring from installation, it is imperative that a flexible connection be used. DO NOT PIPE SOLID. Use a 45-degree elbow and pipe union on the riser, making certain there is a slight curve in the hose. Do not install hose taut. Adjust air pressure to the desired overload release point. Refer to Torque Curves on Page 10.

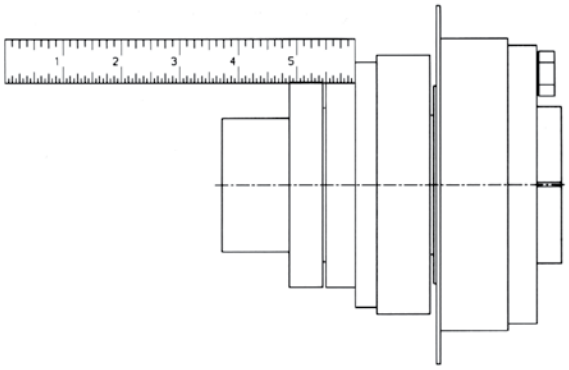


Figure 12 - Parallel “R” Coupling Alignment

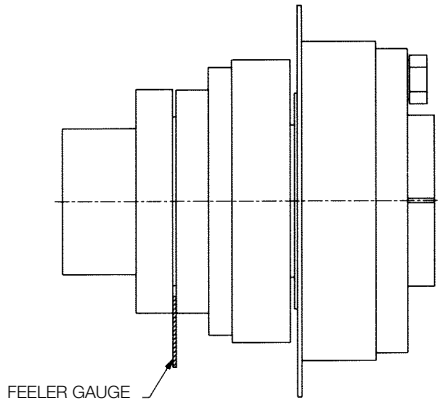


Figure 13 - Angular “C” Coupling Alignment

IV. Limit Switches

The POR Series clutch is an automatic reset device. Because of this feature it is important that the drive be shut down immediately upon a torque overload condition. The switch should be able to operate within the disengagement travel of the clutch. Upon an overload, the cylinder of the clutch will move to actuate the limit switch and shut down the drive. An oversized metallic plate provides a means for sensing movement from both ends of the clutch and the utilization of precision proximity switches.

The limit switch should be wired in its normally closed condition. The switch is used to open the circuit to the motor during a torque overload condition. The switch should be wired in parallel with the JOG button of the motor control. This will permit the drive to be started in the event the POR Series clutch has stopped with the limit switch circuit in an open state.

Figure 14 shows limit switch kits available for the POR Series clutch which are compatible with the POR PC. (Refer to Section VI.) Before using this switch in your circuit verify that the electrical ratings meet your requirements.

V. Torque Adjustment

The POR Series pneumatic overload release clutch provides precision “in-flight” torque control. By simply varying the air pressure supply, you can remotely adjust the release torque of the clutch while in operation.

The torque curves on page 10 can be used to approximate the air pressure required to yield a desired torque setting.

Example:
Clutch Size – 05
Torque Setting – 3,600 in.-lb.
Air Pressure by Curve – 60 psi
Air Pressure by Equation – 60.3 psi

For applications requiring a precise release torque, the release torque setting of the clutch should be tested as shown in Figure 15. Verification of the release torque several times in both clockwise and counterclockwise directions is recommended.

Size	A	B	C	D	E	Unit Switch Kit No.
02	3.88	5.81	.060	1.63	1.50	711700-001
04	4.75	7.25	.078	2.25	1.73	711700-001
05	6.63	8.88	.110	2.60	2.63	711701-001
06	7.75	10.12	.128	2.82	3.06	711701-001
09	10.00	12.50	.165	3.60	4.00	711702-001
11	12.25	14.62	.183	3.95	5.00	711702-001

Circuit	Electrical Rating		
	Silver Contacts		
1NO - 1NC	Volts	Make	Break
Red, Black, NC, NO, Green, Blue	125 AC	7.2A	1.2A
	250 AC	1.2A	0.2A
	5.1 Amps Continuous		
	3A (Res.) at 28 VDC		

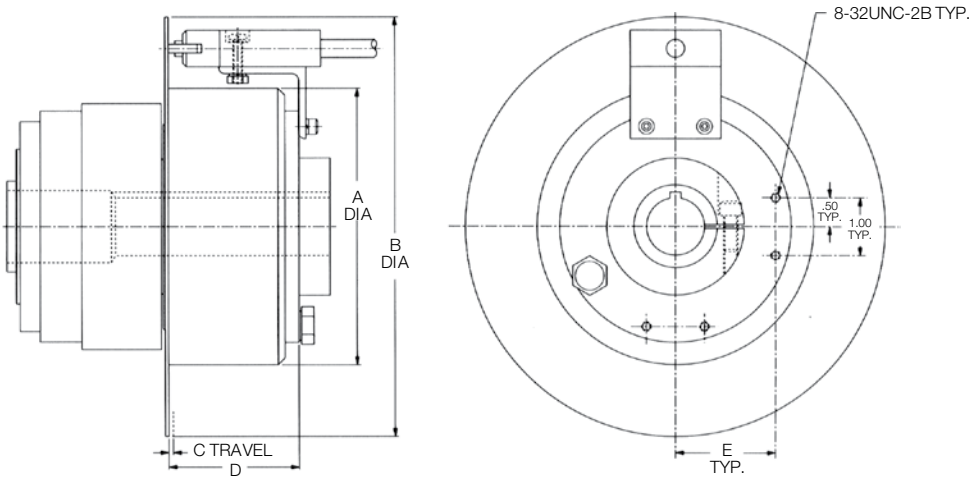


Figure 14 - Limit Switches

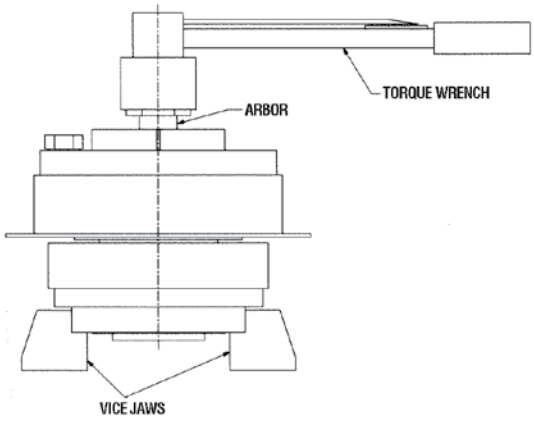


Figure 15 - Torque Verification

VI. General Maintenance

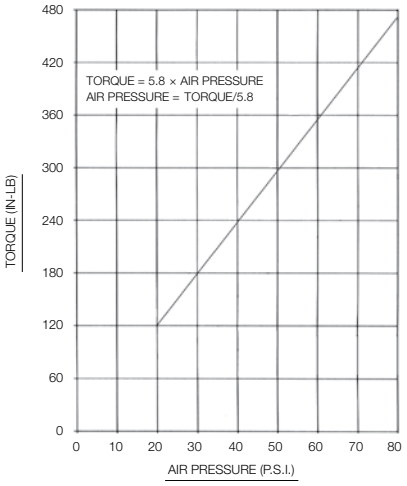
A. Lubrication

The POR Series clutch is pre-lubricated at the factory and is also equipped with lube fittings for scheduled lubrication. The size 02 is lubricated with a light oil and sizes 04 through 11 with a Bentone type, NLGI grade 0 grease. The lubrication schedule should be in accordance with good operating practices for the equipment on which the clutch is mounted.

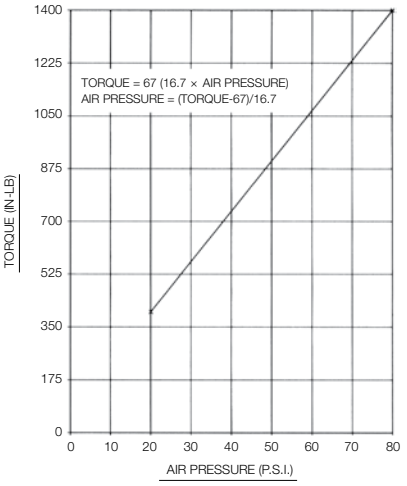
B. Annual Inspection

The POR Series overload release clutch is constructed of heavy-duty materials. Under reasonably clean conditions the unit will operate with a minimum of maintenance. A scheduled annual inspection of seals, bearings and other internal components is suggested. However, the actual frequency should be in accordance with good operating practices for the equipment on which the clutch is installed.

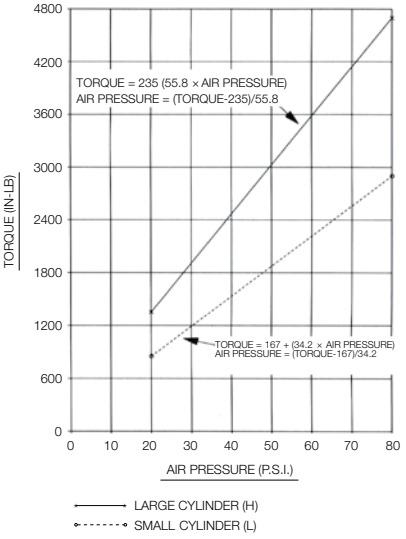
Size 02



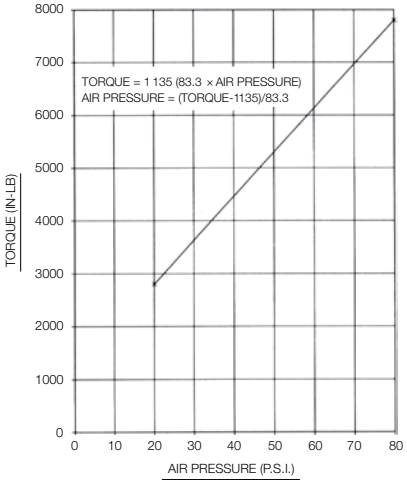
Size 04



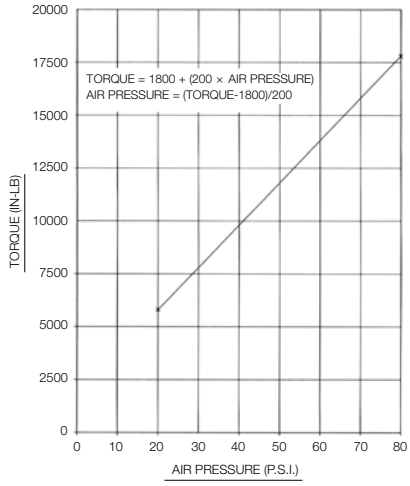
Size 05



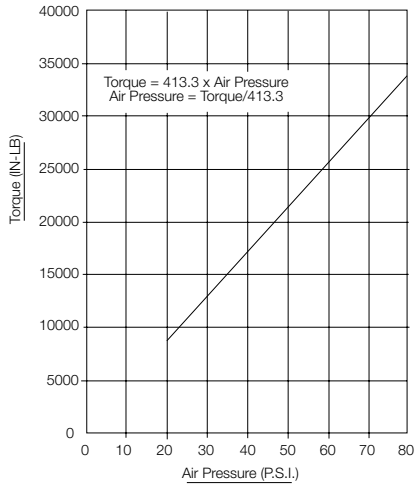
Size 06



Size 09



Size 11



Torque Curves

Note: In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.

⚠CAUTION Rotating equipment is potentially dangerous and could cause injury or damage if not properly protected. Follow all applicable codes and regulations.

VII. General Disassembly

A. Cover, cylinder and miscellaneous internal components

1. Loosen capscrew from clamp collar and remove collar.
2. Remove the air muffler from the face of the piston.
3. Remove the external snap ring, retaining the piston bearing to the rotor.
4. Press off the cylinder half from the rotor as shown in Figure 13.
5. Remove the piston from the inside of the cylinder.
6. Remove the valve from the cylinder by removing the valve screw.
7. Lift cover assembly off of the housing and rotor.
8. Lift thrust bearings, washers and thrust plate from rotor.
9. Use a magnet to remove steel balls from rotor flange.

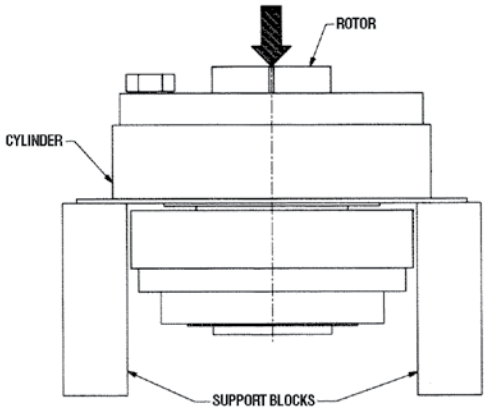


Figure 16

B. Housing and miscellaneous internal components

1. Remove any adapters, couplings, sprockets or sheaves from the housing.
2. Remove ring, retaining rear spacer to rotor. On clutch sizes 09 and 11 there are two capscrews which must be removed from rear spacer.
3. Insert capscrews in threaded holes of rotor flange. Use these screws to push rear spacer off rotor. Screws must be turned evenly and progressively to avoid binding.

   Because of the extended length of the rotor on a Style “L” clutch, it will be necessary to press the rotor through the housing with an arbor. Use the push off holes in the rotor flange to separate the detent plate from the rotor flange. See Table 7 for push off hole sizes. Support the clutch by the detent plate as shown in Figure 16 and push the rotor through the housing.
4. Remove thrust bearing and washers from housing.
5. Separate detent plate from housing.

Table 7 - Push Off Holes

Size	Qty.	Hole Size
02	3	#6-32
04	4	1/4-28
05	4	1/4-28
06	4	1/4-28
09	4	3/8-24
11	4	3/8-24

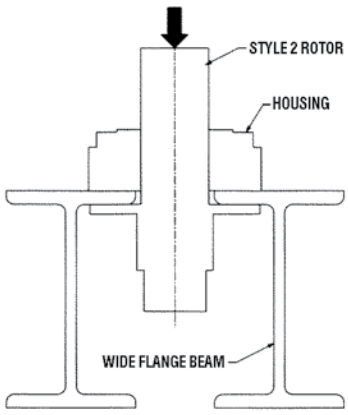


Figure 17

VIII. General Assembly

A. Housing and miscellaneous internal components

1. Grease pack O-ring groove in housing and insert O-ring seal.
2. Paint pocket side of detent surface with grease on all sizes except 02. The detent surface of the 02 housing should be brushed with a light oil.
3. Slip housing onto rotor.
4. Grease coat thrust bearing and washers. Sandwich bearing between washers and slip into cavity of housing.
5. Press rear spacer onto rotor until the snap ring groove in rotor is cleared and install snap ring into groove.
6. On clutch sizes 09 and 11, the tabs of the snap ring must be oriented between the two tapped holes in rear spacer. Install spacer as shown in Figure 18.

B. Cover and miscellaneous internal components

1. Grease pack groove in cover and insert quad seal.
2. Paint steel balls with grease on all clutch sizes except 02, these should be dipped in a light oil. Align ball holes of rotor flange with pockets in detent plate. Insert steel balls into holes of rotor flange.
3. Place the thrust plate on the rotor.
4. Grease coat both thrust washers.
5. Place one thrust washer on the pilot of the thrust plate and the other thrust washer on the pilot inside of the cover.
6. Grease coat thrust bearing and place it on top of the thrust washer on the thrust plate.
7. Slip the cover assembly onto rotor. The cover assembly is properly installed when the edge of the cover meets the outside edge of the counterbore of the grease fitting on the housing.

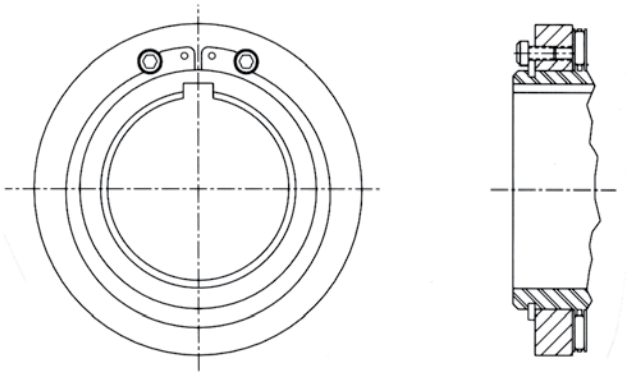


Figure 18

C. Cylinder, piston and miscellaneous internal components

1. Grease pack grooves of cylinder and install quad ring seals.
2 Install the springs into the spring pockets in the cylinder.
3. Press piston bearing into bearing pocket of the piston.
4. Install the internal snap ring into the groove of the piston.
5. Grease coat the outside diameter of the piston and outer surface of the hub of the piston.
6. Align the piston and cylinder using the dowel pin as a locator. Gently push the piston into cylinder until the piston bottoms out. If it is difficult, make sure that the inner seal is not binding. If the inner seal is binding, slowly back the piston out and adjust the seal so that the piston hub can slide through it.
7. Coat the outside diameter of the cover ball bearing with a layer of an anti-seize compound.
8. With the piston facing upward, place the piston and cylinder assembly over the rotor and press the piston and cylinder onto the rotor until the piston bearing has cleared the snap ring groove in the rotor.
9. Install the external snap ring into the groove of the rotor.

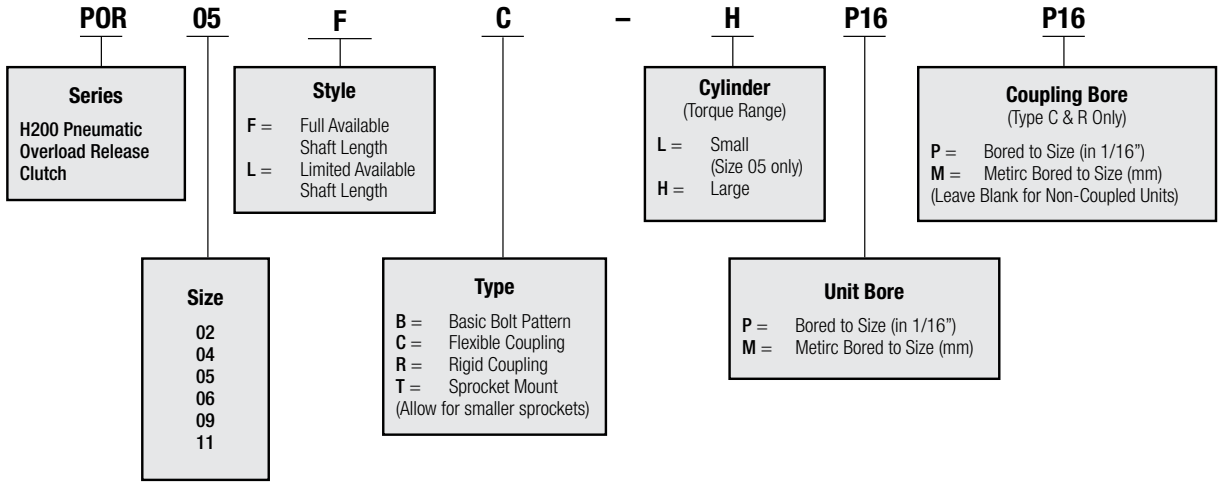
10. Apply a thin coat of grease to the O-ring of the valve body.

11. Insert the valve assembly into the counter-bored hole of the piston.

12. Apply a light grade of thread locking compound to the threads of the valve screw. Loctite Removable Threadlocker 242 or equivalent is recommended. For the size 02 apply right to the threads of the valve. Secure the valve by tightening the valve screw with a phillips head screwdriver. For a size 02 use a straight blade screwdriver. **Be sure not to over tighten the valves for it may damage the threads in the cylinder!** For the size 02 it may be necessary to adjust the valve for leakage. Make sure that the valve is bottomed out in the cylinder. Apply air to the clutch and disengage the clutch. If the valve does not bleed air upon disengagement, slowly turn the valve counterclockwise until the valve bleeds. Reset the clutch and make sure that the valve seals.

13. Install air muffler in valve hole of the piston and tighten.

POR Series Part Numbering System



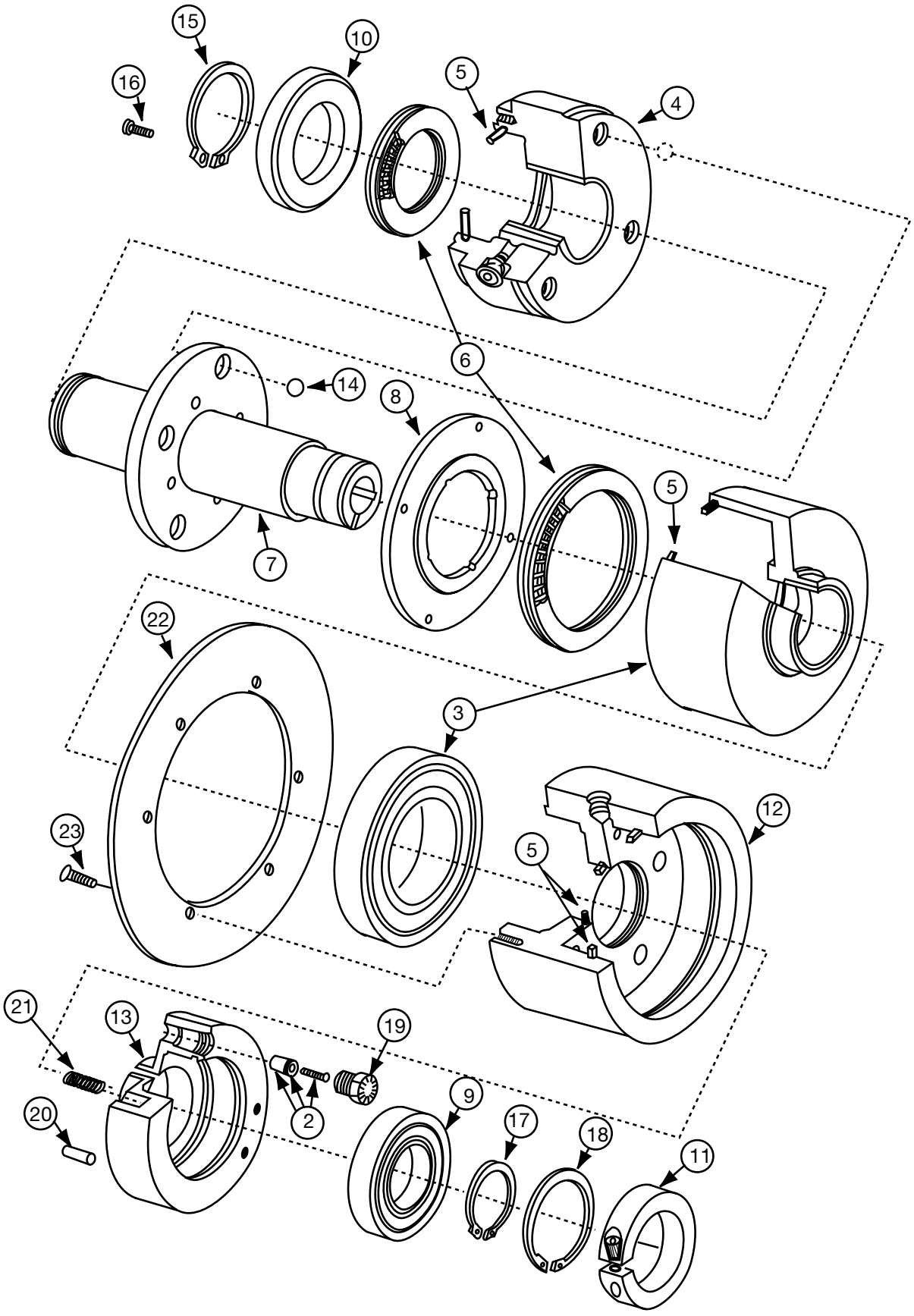
Part Identification For Type B, Style F & Style L Basic Unit

Item No.	Name		Qty.	02	04	05	06	09	11
1	Clutch Assembly	Style F	-	711600-002	711601-004	711602-005	711603-006	711604-009	711605-011
		Style L	-	711606-002	711607-004	711608-005	711609-006	711610-009	711611-011
2	Valve Sub-Assembly		1	711692-002	711377-001	711595-001	711595-001	711595-001	711595-001
3	Cover Sub-Assembly		1	711656-002	711657-004	711658-005	711659-006	711660-009	711661-011
4	Housing Sub-Assembly		1	711036-602	711040-604	711044-605	711048-606	711052-609	711056-611
5	Seal Kit		1	711650-002	711651-004	711652-005	711653-006	711654-009	711656-011
6	Thrust Bearing Kit		1	711647-002	711042-604	711046-605	711050-606	711054-609	711058-611
7	Rotor	Style F	1	731465-001	731439-001	731472-001	731450-001	731477-001	731482-001
		Style L	1	731461-001	731549-001	731565-001	731447-001	731473-001	731478-001
8	Thrust Plate		1	731304-001	731310-001	731324-001	731317-001	731331-001	731339-001
9	Ball Bearing		1	039273-074	039273-069	039273-070	039273-049	039273-071	039273-072
10	Rear Spacer		1	731306-001	731312-001	731327-001	731320-001	731335-001	731343-001
11	Clamp Collar	Style F	1	730094-028	730094-029	730094-021	730094-022	730094-025	730094-035
		Style L	1	730094-028	730094-029	730094-030	730094-022	730094-025	731244-001
12	Cylinder		1	731463-001	731437-001	731470-001	731448-001	731475-001	731480-001
13	Piston		1	731462-001	731438-001	731471-001	731449-001	731476-001	731481-001
14	Ball		*4	070071-007	070071-003	070071-008	070071-001	070071-009	070071-010
15	Snap Ring		1	040682-042	040682-043	040682-025	040682-045	040682-046	040682-047
16	Cap Screw		2	N/A	N/A	N/A	N/A	075519-001	075519-001
17	Snap Ring		1**	040682-042	040682-043	040682-050	040682-045	040682-046	040682-063
18	Snap Ring		1	040682-056	040682-057	040682-058	040682-059	040682-060	040682-061
19	Air Muffler		1	730338-002	730338-002	730338-004	730338-004	730338-004	730338-004
20	Dowel Pin		1	023921-020	023921-009	023921-020	023921-020	023921-020	023921-021
21	Piston Spring		3	034124-081	034124-081	034124-081	034124-081	034124-081	034124-081
22	Actuating Plate		1	731566-001	731566-002	731566-003	731566-004	731566-005	731566-006
23	Cap Screw		6	074103-001	074103-001	074103-001	074103-004	074103-010	074103-016

* Size 02 uses only 3 balls.
** Sizes 02 and 11 use 2 snap rings.
Clutch serial number required when ordering spare parts.

Part Identification Adapters

Name	02	04	05	06	09	11
"C" Adapter Sub-Assembly	712037-602	712038-604	712039-605	712040-606	712041-609	712042-611
"R" Adapter Sub-Assembly	712043-602	712044-604	712045-605	712046-606	712047-609	712048-611
"T" Adapter Sub-Assembly	712031-602	712032-604	712033-605	712034-606	712035-609	712036-611



Type B - Style F, Basic Unit

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