

# PC-500 Clutch, PCC-500 Clutch Coupling, PCBC-500 Clutch/Brake Coupling

Installation Instructions

P-203-WE  
819-0484



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**⚠ WARNING** Failure to follow these instructions may result in product damage, equipment damage, and serious or fatal injury to personnel.

Follow the installation instructions in this manual carefully to ensure safe, reliable operation. All stated or implied manufacturer warranties are voided if this product is not installed in accordance with these instructions.



**PC-500  
Pin Drive**



**PCC-500  
Spline Drive**



**PCBC-500  
Pin Drive**

## PC-500 Clutch Pin Drive Armature

The illustration drawings, parts lists, and exploded views for these units can be found on pages 24 and 25.

Either the magnet half of the clutch unit or the armature half of the unit may be mounted on the shaft first, depending on the characteristics of each application.

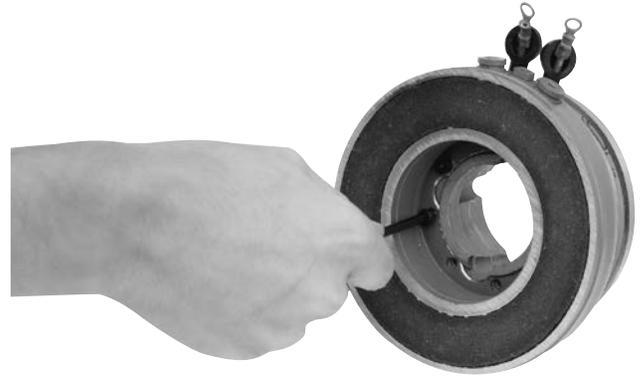
### A. Assembling the Magnet and Magnet Hub

1. Determine which side of the magnet hub will be mounted to the magnet. The hub is reversible. The side to be used will depend on which side the taperlock bushing is to enter.
2. Insert the lead wires through the rubber terminal caps and into the collector ring. The wires should be inserted from the same side of the ring that the magnet will be mounted on. (Figure 1)



**Figure 1**

3. Mount the magnet to the magnet hub using capscrews and lockwashers. (Figure 2)
4. Secure the lead wires to the magnet terminals with screws and lockwashers.
5. Pull the rubber terminal caps over the terminals.
6. Pull the excess lead wire length from the backside of the collector ring (away from the magnet) until the wire is snug.



**Figure 2**

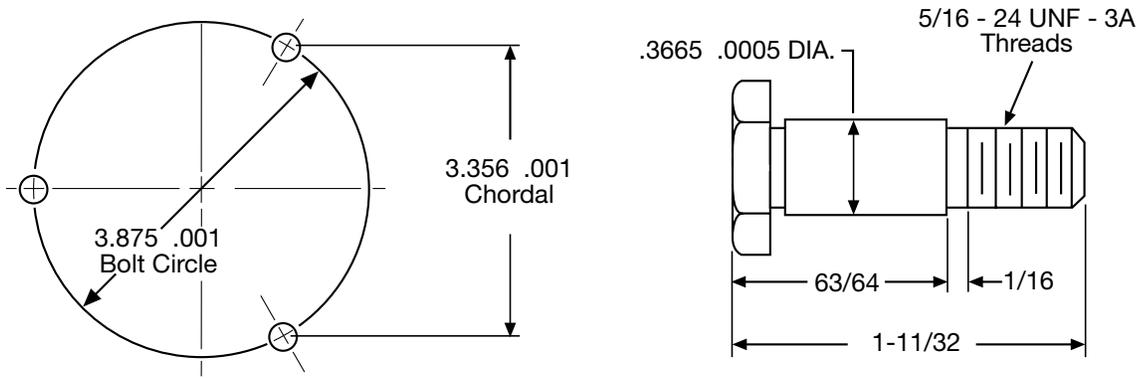
7. Tighten down the screw in the collector ring. The sharp cone point on the screw should pierce the lead wire insulation to make a good electrical contact. The head of the screw should be below the surface of the collector ring. (Figure 3)



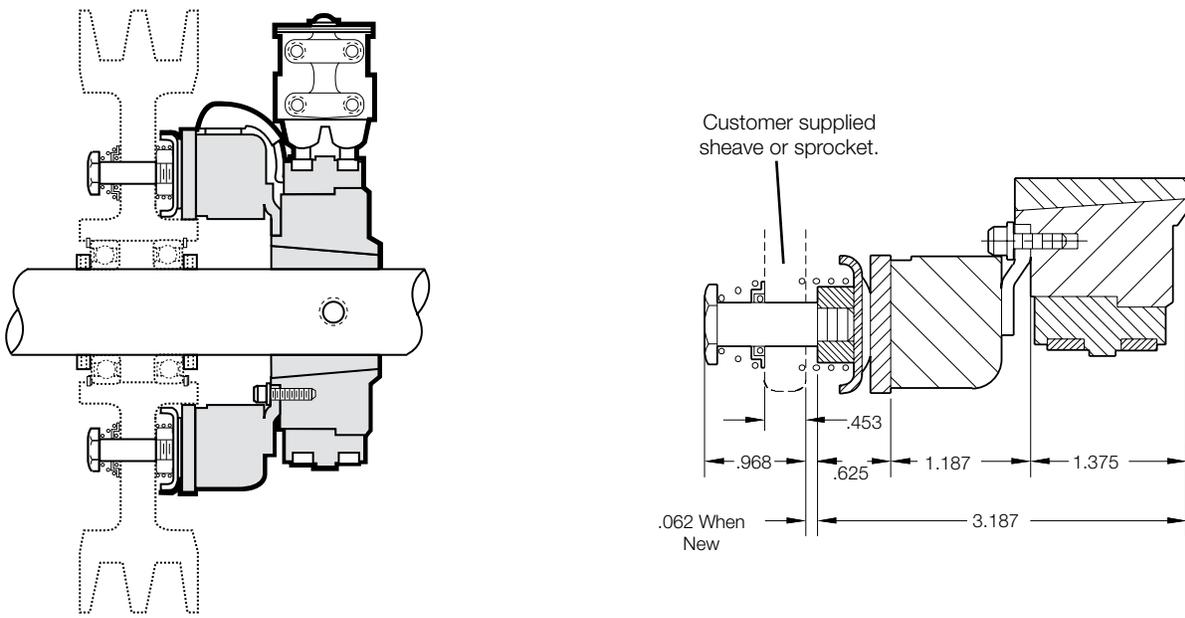
**Figure 3**

8. Cut off the excess wire.

# Mounting Instructions for Gear, Sprocket, or Pulley

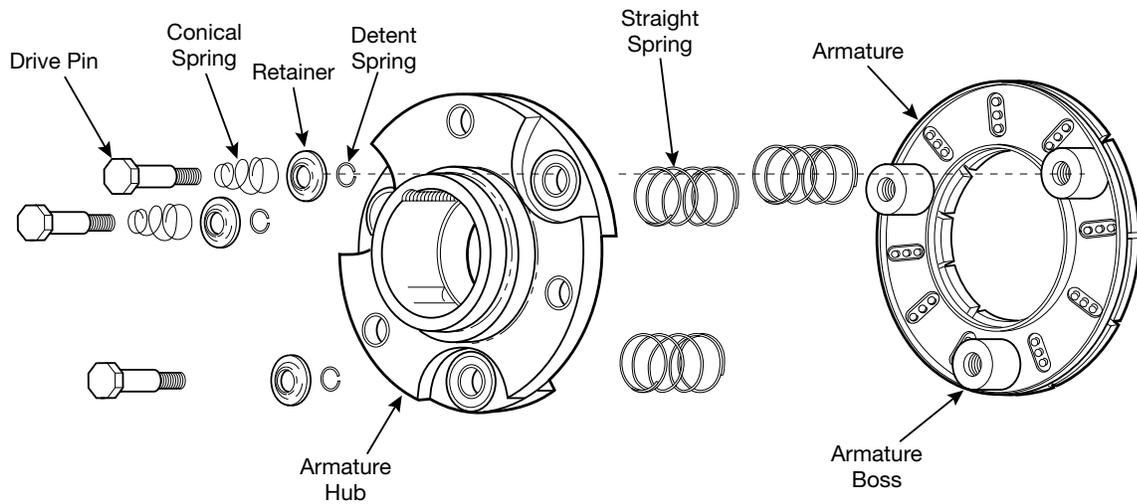


**Figure 4**



**Figure 5 - PC Clutch**

**Figure 6**



**Figure 7**

## B. Mounting the Magnet and Magnet Hub

The magnet and magnet hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. If the armature has been secured to the shaft first, then adjust the magnet's position to allow approximately 1/32-inch between the two faces. (Figure 12)
4. Secure the magnet's position on the shaft by alternately tightening each setscrew with a torque wrench to 175 in.lbs. torque. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.

## C. Assembling the Armature

1. A customer may wish to use the autogap accessory to mount a clutch armature to his own pulley, hub, gear, etc. Follow the illustrated dimensions (Figures 4, 8 and 9) to properly adapt these parts to the armature.
  - a. The chordal dimension must be held for all chords between pin holes.
  - b. Sleeve bearings (Oilite Bronze) with an I.D. of  $.376 \pm .001$  must be provided in the holes of pulley or hub at the chordal and bolt circle dimensions shown in Figure 4 and 6.
  - c. The drive pins must be square with plane of mounting surface and magnet within  $.006$  T.I.R.
2. Once the pulley, gear, etc., has been adapted to the armature according to the above directions, the armature may be mounted to it using the autogap accessory.
3. The autogap assembly is a double spring device which allows for automatic armature clearance and adjustment for wear. The smaller or conical spring pushes the armature from the magnet face, leaving a gap of about 1/32 inch, while the straight spring automatically follows up for wear. This combination maintains maximum performance efficiency throughout the life of the unit. The assembly procedure for the autogap accessory is as follows: (Figure 7)

**Note:** Autogap accessory is shipped pre-assembled.

**Step 1** Place straight springs over armature bosses on back side of armature (Figure 8).



**Figure 8**

**Step 2** Compress conical spring against retainer ring by sliding detent spring towards head of pin. (All 3 pins.) (Figure 9)



**Figure 9**

**Step 3** Insert assembled drive pins through (customer-supplied part (Figure 5) through the straight springs, and into the threaded armature bosses. Apply grade "AA" Loctite Sealant on drive pin threads. (Figure 10)



**Figure 10**

**Step 4** Tighten drive pins until shoulders of pins are against face of armature bosses. Since threads are class No. 3 fit, pins may seem to bind.

**Step 5** Compress the retainer rings against the armature hub (or customer-supplied part), and check to see that the part is held tightly to the armature bosses.

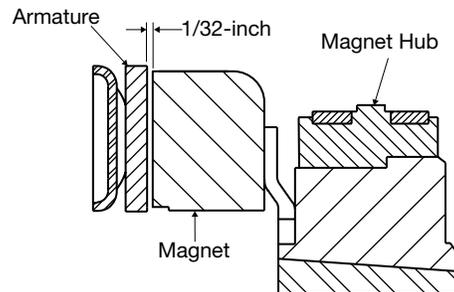


**Figure 11**

**Note:** This position must not be disturbed during completion of assembly. (Figure 11)

## D. Mounting the Armature Assembly

1. Slide the armature assembly onto the shaft. Keep adjustment in Step 5 (Figure 11) from moving.
2. If the magnet and magnet hub assembly has been secured to the shaft first, then adjust the armature's position to allow approximately 1/32" between the two faces. (Figure 12)



**Figure 12**

Once this 1/32" gap has been set, it will be automatically maintained throughout the life of the unit.

3. Secure the assembly in this position on the shaft.

## E. Mounting the Brushholder

1. The brushholder is mounted on a bracket which must be furnished by the customer. The bracket must be firmly secured to prevent vibration which could cause improper contact between the brushes and collector ring.
2. The distance from the centerline of the shaft to the top of the brushholder should be 4". Maintaining this distance will assure proper spring tension on the brushes and maximum wear follow-up. A detailed dimensional drawing is included with each brushholder.

## PCC-500 Clutch-Coupling Heavy Duty Spline Drive Armature

The illustration drawings, parts list, and exploded view for this unit can be found on pages 28 and 29.

Either the magnet half of the clutch unit or the armature half of the unit may be mounted on the shaft first, depending on the characteristics of each application. (Figure 4)

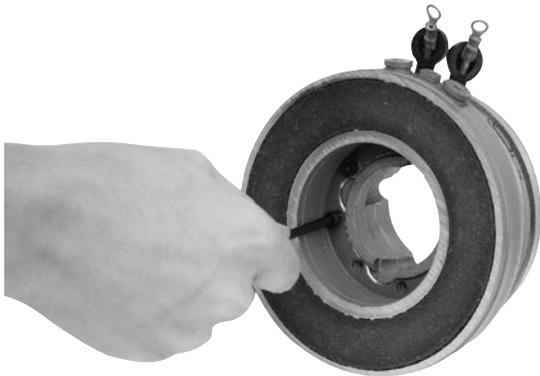
### A. Assembling the Magnet and Magnet Hub

1. Determine which side of the magnet hub will be mounted to the magnet. The hub is reversible. The side to be used will depend on which side the taperlock bushing is to enter.
2. Insert the lead wires through the rubber terminal caps and into the collector ring. The wires should be inserted from the same side of the ring that the magnet will be mounted on. (Figure 1)



**Figure 1**

3. Mount the magnet to the magnet hub using capscrews and lockwashers. (Figure 2)



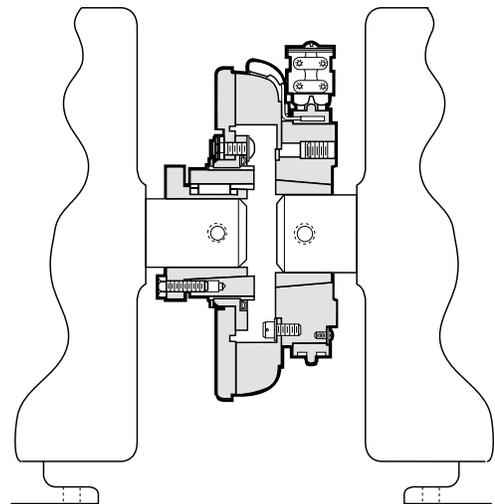
**Figure 2**

4. Secure the lead wires to the magnet terminals with screws and lockwashers.
5. Pull the rubber terminal caps over the terminals.
6. Pull the excess lead wire length from the backside of the collector ring (away from the magnet) until the wire is snug.
7. Tighten down the screw in the collector ring. The sharp cone point on the screw should pierce the lead wire insulation to make a good electrical contact. The head of the screw should be below the surface of the collector ring. (Figure 3)



**Figure 3**

8. Cut off the excess wire.



**Figure 4 - PCC Clutch Coupling**

## B. Mounting the Magnet and Magnet Hub

The magnet and magnet hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. If the armature has been secured to the shaft first, then adjust the magnets's position to allow approximately 1/32-inch between the two faces. (Figure 5)



Figure 5

4. Secure the magnet's position on the shaft by alternately tightening each setscrew with a torque wrench to 175 in.lbs. torque. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.

## C. Assembling the Armature and Hub

The heavy duty units contain spline drive armatures and hub. The armatures are shipped with a built-in autogap spring accessory. This device automatically maintains a gap of about 1/32-inch between the armature and magnet faces for the life of the unit.

Follow these instructions to assemble the armature and splined hub.

- Step 1** Place the splined hub on a flat surface. The extended portion of the hub, where the setscrew holes are located, should be down.
- Step 2** Check the detent ring in the armature assembly to make sure it is centered evenly around the spline. This ring moves freely, but it should be centered for easier assembly of the hub.

- Step 3** Holding the armature with the segmented side up, press the armature onto the splined hub. This is most easily done by applying firm rocking back-and-forth pressure (Figure 5).

- Step 4** Push the assembly against the retainer ring.

## D. Mounting the Armature-Hub Assembly

1. Slide the armature-hub assembly onto the shaft until the armature face touches the magnet face.
2. Move the assembly back to allow a gap of about 1/16-inch between the two faces.
3. Secure the armature-hub assembly in this position by tightening the two setscrews in the hub.
4. Check the assembly by pressing the armature into contact with the magnet face and then releasing it. The armature should spring back about 1/32-inch. This gap will be automatically maintained the life of the unit. (Figure 6)

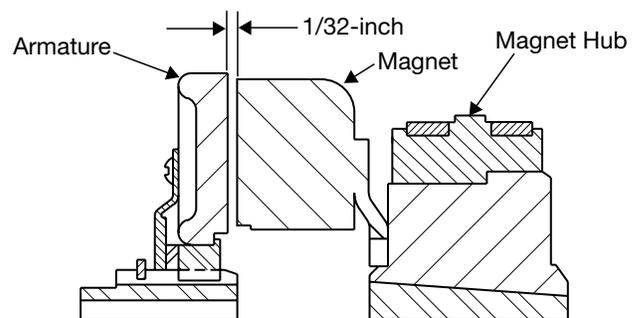


Figure 6

## E. Mounting the Brushholder

1. The brushholder is mounted on a bracket which must be furnished by the customer. The bracket must be firmly secured to prevent vibration which could cause improper contact between the brushes and collector ring.
2. The distance from the centerline of the shaft to the top of the brushholder should be 4". Maintaining this distance will assure proper spring tension on the brushes and maximum wear follow-up. A detailed dimensional drawing is included with each brushholder.

## PCC-500 Clutch Coupling Normal Duty Pin Drive Armature

The illustration drawing, parts list, and exploded view for this unit can be found on pages 26 and 27.

Either the magnet half of the clutch unit or the armature half of the unit may be mounted on the shaft first, depending on the characteristics of each application.

### A. Assembling the Magnet and Magnet Hub

1. Determine which side of the magnet hub will be mounted to the magnet. The hub is reversible. The side to be used will depend on which side the taperlock bushing is to enter.
2. Insert the lead wires through the rubber terminal caps and into the collector ring. The wires should be inserted from the same side of the ring that the magnet will be mounted on. (Figure 1)



Figure 1

3. Mount the magnet to the magnet hub using capscrews and lockwashers. (Figure 2)

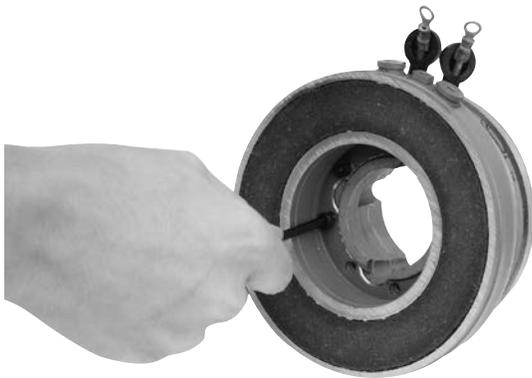


Figure 2

4. Secure the lead wires to the magnet terminals with screws and lockwashers.
5. Pull the rubber terminal caps over the terminals.
6. Pull the excess lead wire length from the backside of the collector ring (away from the magnet) until the wire is snug.
7. Tighten down the screw in the collector ring. The shaft cone point on the screw should pierce the lead wire insulation to make a good electrical contact. The head of the screw should be below the surface of the collector ring. (Figure 3)
8. Cut off the excess wire.

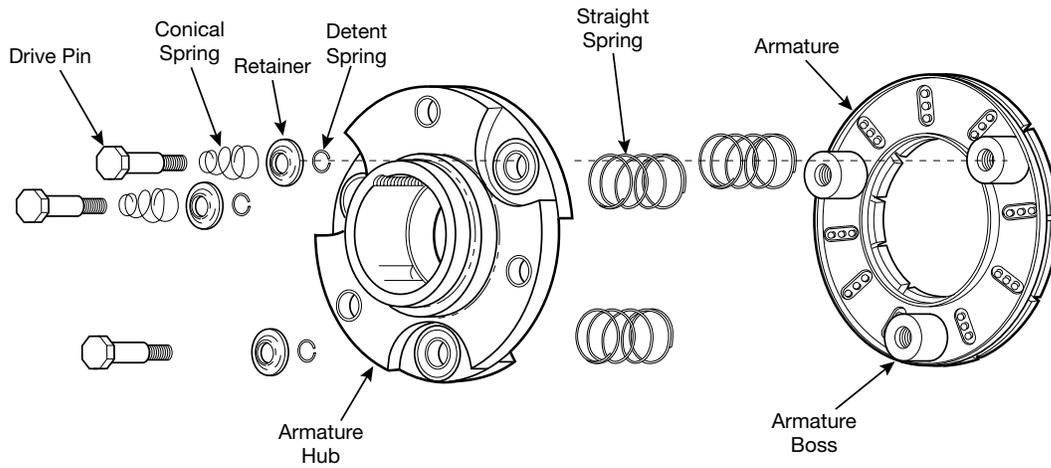


Figure 3

### B. Mounting the Magnet and Magnet Hub

The magnet and magnet hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. If the armature has been secured to the shaft first, then adjust the magnet's position to allow approximately 1/32-inch between the two faces. (Figure 10)
4. Secure the magnet's position on the shaft by alternately tightening each setscrew with a torque wrench to 175 in. lbs. torque. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.



**Figure 4**

### C. Assembling the Armature and Hub

Assemble the armature to the armature hub with the autogap mounting accessory. The hub is reversible. The side on which the armature is mounted will depend on the direction in which the taperlock bushing must enter.

The autogap assembly is a double spring device which allows for automatic armature clearance and adjustment for wear. The smaller or conical spring pushes the armature from the magnet face, leaving a gap of about 1/32-inch, while the straight spring automatically follows up for wear. This combination maintains maximum performance efficiency throughout the life of the unit.

The assembly procedure for the autogap accessory is as follows: (Figure 4)

**Note:** Autogap accessory is shipped pre-assembled.

**Step 1** Place straight springs over armature bosses on backside of armature. (Figure 5)



**Figure 5**

**Step 2** Place armature hub over straight springs.

**CAUTION** Straight springs must fit into grooves in armature hub. (Figure 6)



**Figure 6**

**Step 3** Compress conical spring against retainer ring by sliding detent spring towards head of pin. (All 3 pins) (Figure 7)



**Figure 7**

- Step 4** Insert assembled drive pins through armature hub and straight springs and into the threaded armature bosses. Apply grade “AA” Loctite Sealant on drive pin threads (Figure 8)



**Figure 8**

- Step 5** Tighten these (3) drive pins until shoulders of pins are against face of armature bosses. Since threads are class No. 3 fit, pins may seem to bind.

**Note:** Alternately tighten each drive pin a few turns at a time.

- Step 6** Compress the retainers against the armature hub and check to see that the armature hub is held tightly to the armature bosses.

**Note:** This position must not be disturbed during completion of assembly. (Figure 9)



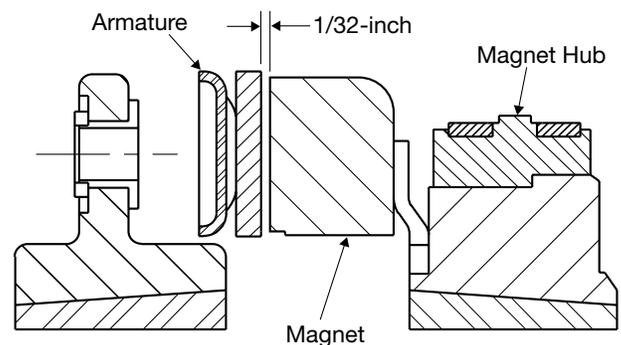
**Figure 9**

## D. Mounting the Armature Assembly

The armature and armature hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. If the magnet and magnet hub assembly has been secured to the shaft first, then adjust the armature's position to allow approximately 1/32-inch between the two faces.

Once this 1/32-inch gap has been set, it will be automatically maintained throughout the life of the unit. (Figure 10)



**Figure 10**

4. Securely fasten the armature assembly to the shaft by alternately tightening each setscrew. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.

## E. Mounting the Brushholder

1. The brushholder is mounted on a bracket which must be furnished by the customer. The bracket must be firmly secured to prevent vibration which could cause improper contact between the brushes and collector ring.
2. The distance from the centerline of the shaft to the top of the brushholder should be 4". Maintaining this distance will assure proper spring tension on the brushes and maximum wear follow-up. A detailed dimensional drawing is included with each brushholder.

## PCBC-500 Heavy Duty Spline Drive Armature Clutch/Brake Coupling (Figure 2)

The illustration drawing, parts list, and exploded view for this unit can be found on pages 32 and 33.

### A. Installing the Conduit Box

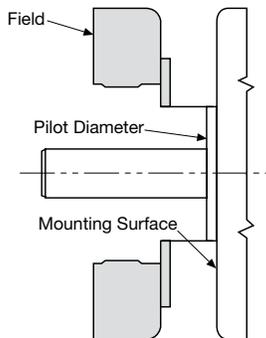
Install the conduit box on the magnet. Instructions for this procedure can be found on page 20.

### B. Mounting the Magnet

The brake half of the clutch/brake unit is usually installed first; however, in some cases it may be necessary to start with the clutch portion of the unit to assure a proper assembly when complete.

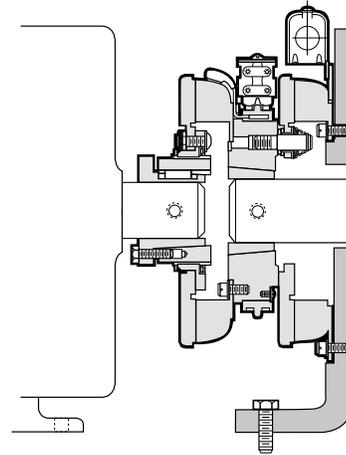
The brake magnet is mounted to a stationary machine member by a flange. Extreme care must be taken in selecting the location for the mounting of the magnet. Proper positioning is very important for the unit to function correctly.

1. A pilot diameter on the mounting surface is essential to hold the magnet within the required tolerances. (Figure 1) Also see "Customer Shall Maintain" on page 32.



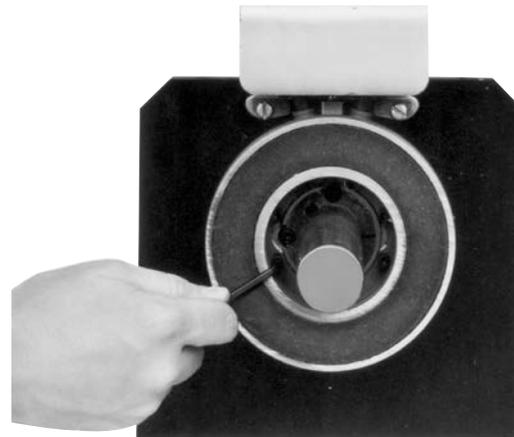
**Figure 1**

2. A machined pilot diameter is provided on the magnet mounting flange (refer to illustration drawings on page 32) to aid in the proper positioning of the magnet.



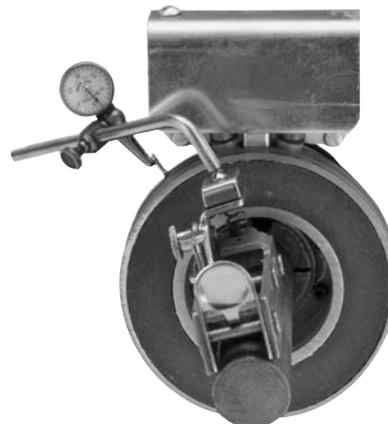
**Figure 2 - PCBC Clutch/Brake Coupling**

3. Once the mounting surface has been prepared, the magnet is bolted in place with capscrews and lock-washers. (Figure 3)



**Figure 3**

4. Use a dial indicator to check the unit for concentricity and squareness to the shaft. The unit should be concentric within .010 T.I.R. and square within .006 T.I.R. (Figure 4)



**Figure 4**

### C. Assembling the Hub and Armatures

The heavy duty units contain spline drive armatures and hubs. The armatures are shipped with a built-in autogap spring accessory. This device automatically maintains a gap of about 1/32-inch between the armature and magnet faces for the life of the unit.

Use the following method to assemble the armature and splined hub:

1. Place the armature hub up on one end.
2. Check the detent ring in the armature assembly to make sure it is evenly centered around the spline. This ring moves freely, and it should be centered for easier assembly of the hub.
3. Holding one of the armatures with the segmented side up, press the armature on to the hub using firm rocking back-and-forth pressure. (Figure 5)



**Figure 5**

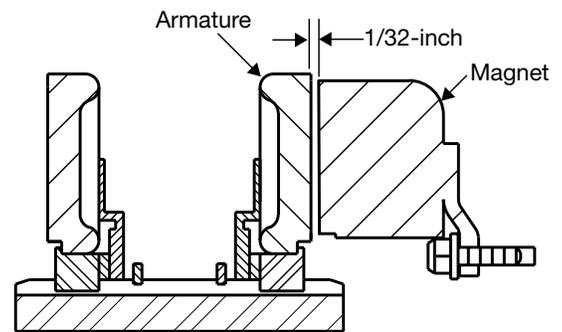
4. Push the assembly up against the retainer ring.
5. Turn the hub over and repeat Steps 3 and 4 with the other armature. (Figure 6)



**Figure 6**

### D. Mounting the Armature-Hub Assembly

1. Insert a key in the keyway of the hub and slide the armature-hub assembly on to the shaft.
2. Position the assembly so that the face of the armature is about 1/16-inch from the magnet face.
3. Secure the armature-hub assembly in this position by tightening the two setscrews in the hub.
4. Check the assembly by pressing the armature into contact with the magnet face and then releasing it. The armature should spring back about 1/32-inch. This gap will be automatically maintained for the life of the unit. (Figure 7)



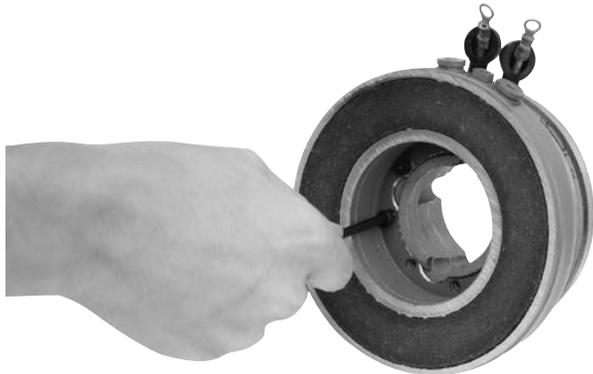
**Figure 7**

## E. Assembling the Magnet and Magnet Hub

1. Determine which side of the magnet hub will be mounted to the magnet. The hub is reversible. The side to be used will depend on which side the taperlock bushing is to enter.
2. Insert the lead wires through the rubber terminal caps and into the collector ring. The wires should be inserted from the same side of the ring that the magnet will be mounted on. (Figure 8)



**Figure 8**



**Figure 9**

3. Mount the magnet to the magnet hub using capscrews and lockwashers. (Figure 9)
4. Secure the lead wires to the magnet terminals with screws and lockwashers.
5. Pull the rubber terminal caps over the terminals.
6. Pull the excess lead wire length from the backside of the collector ring (away from the magnet) until the wire is snug.

7. Tighten down the screw in the collector ring. The sharp cone point on the screw should pierce the lead wire insulation to make a good electrical contact. The head of the screw should be below the surface of the collector ring. (Figure 10)
8. Cut off the excess wire.



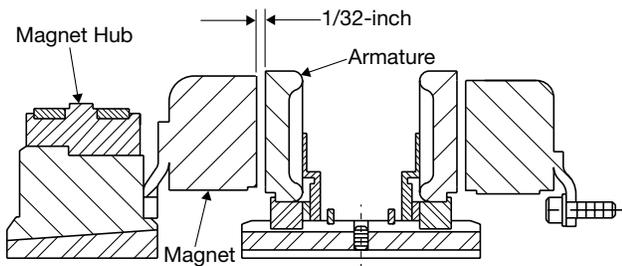
**Figure 10**

## F. Mounting the Magnet and Magnet Hub

The magnet and magnet hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. Adjust the magnet's position to allow a gap of about 1/16 inch between the magnet face and the armature face.
4. Secure the magnet's position on the shaft by alternately tightening each setscrew with a torque wrench to 175 in. lbs. torque. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.
5. Set the autogap by pressing the armature into contact with the magnet face and then releasing it. The armature should spring back about 1/32 inch. (Figure 11)

This gap will be automatically maintained for the life of the unit.



**Figure 11**

## G. Mounting the Brushholder

1. The brushholder is mounted on a bracket which must be furnished by the customer. The bracket must be firmly secured to prevent vibration which could cause improper contact between the brushes and collector ring.
2. The distance from the centerline of the shaft to the top of the brushholder should be 4". Maintaining this distance will assure proper spring tension on the brushes and maximum wear follow-up. A detailed dimensional drawing is included with each brushholder.

## PCBC-500 Clutch/Brake Coupling Normal Duty Pin Drive Armature (Figure 2)

The illustration drawing, parts list, and exploded view for this unit can be found on pages 30 and 31.

### A. Installing the Conduit Box

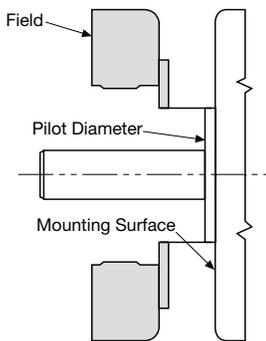
Install the conduit box on the magnet. Instructions for this procedure can be found on page 20.

### B. Mounting the Magnet

The brake half of the clutch/brake unit is usually installed first; however, in some cases it may be necessary to start with the clutch portion of the unit to assure a proper assembly when complete.

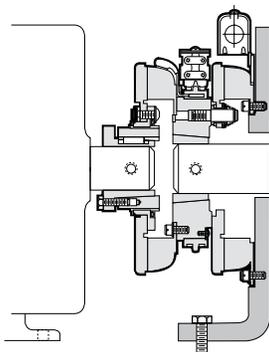
The brake magnet is mounted to a stationary machine member by a flange. Extreme care must be taken in selecting the location for the mounting of the magnet. Proper positioning is very important for the unit to function correctly.

1. A pilot diameter on the mounting surface is essential to hold the magnet within the required tolerances. (Figure 1) Also see "Customer Shall Maintain" on page 34.



**Figure 1**

2. A machined pilot diameter is provided on the magnet mounting flange (refer to illustration drawings pages 30 and 31) to aid in the proper positioning of the magnet.



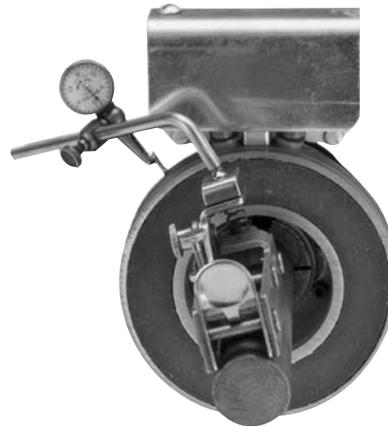
**Figure 2 - PCBC Clutch/Brake Coupling**

3. Once the mounting surface has been prepared the magnet is bolted in place with capscrews and lockwashers. (Figure 3)



**Figure 3**

4. Use a dial indicator to check the unit for concentricity and squareness to the shaft. The unit should be concentric within .010 T.I.R. and square within .006 T.I.R. (Figure 4)

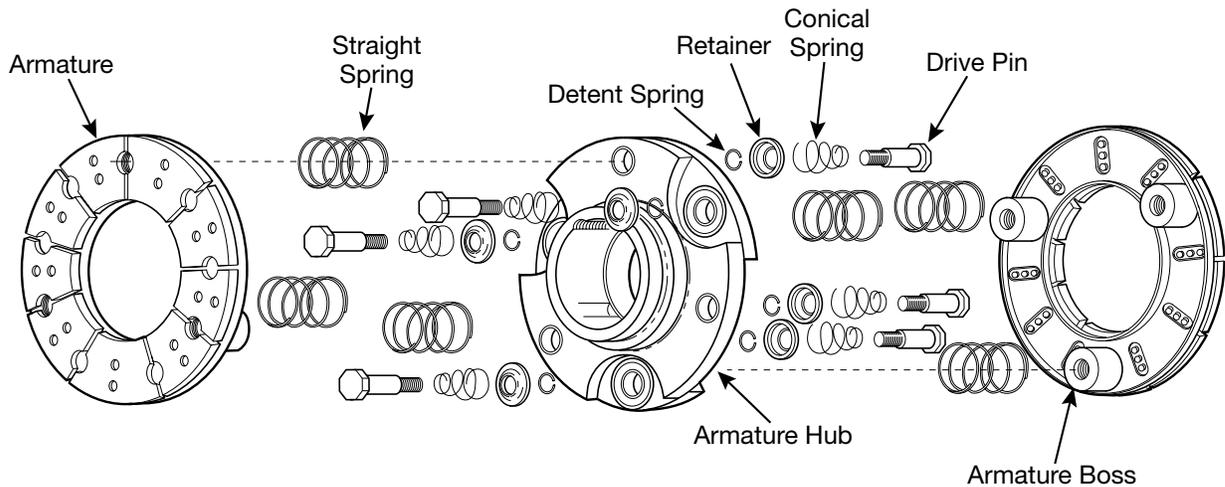


**Figure 4**

### C. Assembling the Hub and Armatures

Assemble the armatures to the armature hub with the autogap mounting accessory. The hub is reversible so that the taperlock bushing may be inserted from either side as required.

The autogap assembly is a double spring device which allows for automatic armature clearance and adjustment for wear. The smaller or conical spring pushes the armature from the magnet face, leaving a gap of about 1/32 inch, while the straight spring automatically follows up for wear. This combination maintains maximum performance efficiency throughout the life of the unit.



**Figure 5**

The assembly procedure for the autogap accessory is as follows (refer to Figure 5):

**Note:** Autogap accessories are shipped pre-assembled.

**Step 1** Place straight springs over armature bosses on back side of both armatures. (Figure 6)

**Step 2** Compress conical spring against retainer ring by sliding detent spring toward head of pin. (All 6 pins.) (Figure 7)



**Figure 6**

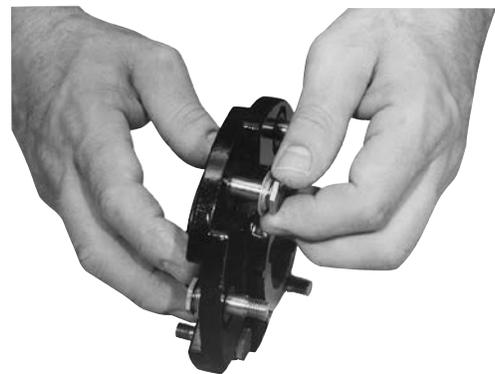


**Figure 7**

**Step 3** Insert (3) of the compressed drive pins through the armature hub. The threaded ends of the pins must come through on the side of the hub with grooves around the holes.

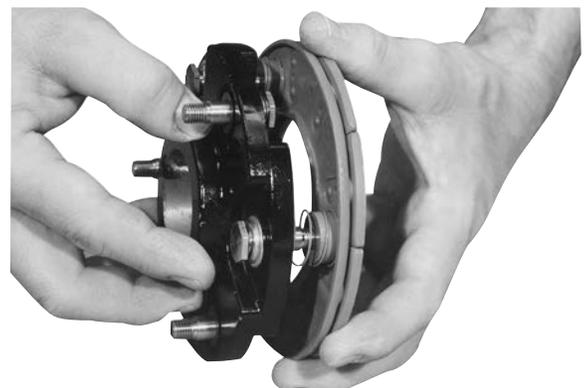
**Step 4** Insert the remaining (3) drive pins from the opposite side of the armature hub through the remaining (3) holes.

**Note:** Apply Grade “AA” Loctite Sealant on threads of all (6) drive pins. (Figure 8)



**Figure 8**

**Step 5** Holding the pins in position, place the armature hub over one armature. Make sure the straight springs on the armature bosses fit into the groove in the armature hub (Figure 9).

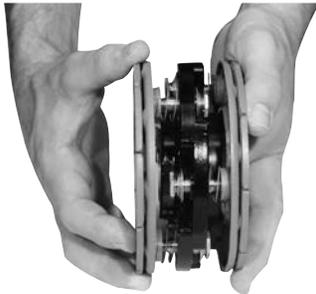


**Figure 9**

**Step 6** Tighten these (3) drive pins until shoulders of pins are against face of armature bosses. Since threads are class No. 3 fit, pins may seem to bind.

**Note:** Alternately tighten each drive pin a few turns at a time.

**Step 7** Repeat Steps 5 and 6 for the second armature. (Figures 10 & 11)



**Figure 10**



**Figure 11**

**Step 8** Compress the armature hub and one of the armatures together until the armature hub bottoms on the armature boss. Slide the retainer on each pin down tightly against the armature hub. (Figure 12)



**Figure 12**

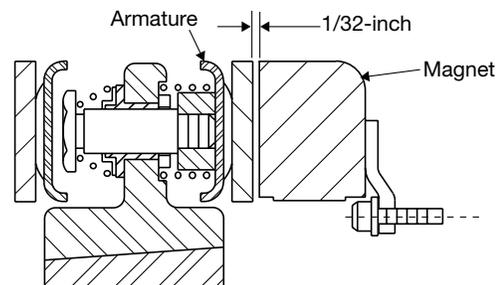
**Step 9** Turn the assembly over and repeat Step 8 for the second armature.

**Note:** This position must not be disturbed during completion of the assembly.

## D. Mounting the Armature Assembly

The armature and armature hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. Place the face of the armature approximately 1/32 inch from the face of the magnet. Once this gap is set, it will be automatically maintained throughout the life of the unit. (Figure 13)



**Figure 13**

4. Secure the armature's position on the shaft by alternately tightening each setscrew. During the tightening process, the bushing should be tapped lightly to make certain it seats-in properly.

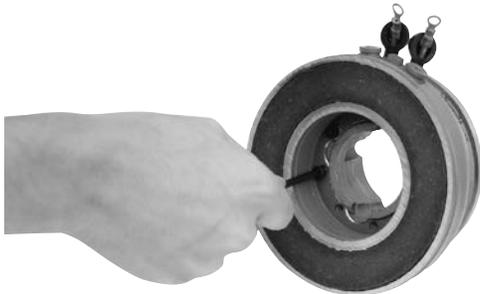
## E. Assembling the Magnet and Magnet Hub

1. Determine which side of the magnet hub will be mounted to the magnet. The hub is reversible. The side to be used will depend on which side the taperlock bushing is to enter.
2. Insert the lead wires through the rubber terminal caps and into the collector ring. The wires should be inserted from the same side of the ring that the magnet will be mounted on. (Figure 14)



**Figure 14**

3. Mount the magnet to the magnet hub using capscrews and lockwashers. (Figure 15)



**Figure 15**

4. Secure the lead wires to the magnet terminals with screws and lockwashers.
5. Pull the rubber terminal caps over the terminals.
6. Pull the excess lead wire length from the backside of the collector ring (away from the magnet) until the wire is snug.
7. Tighten down the screw in the collector ring. The sharp cone point on the screw should pierce the lead wire insulation to make a good electrical contact. The head of the screw should be below the surface of the collector. (Figure 16)



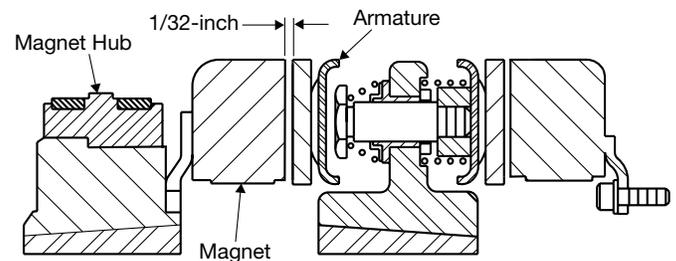
**Figure 16**

8. Cut off the excess wire.

## F. Mounting the Magnet and Magnet Hub

The magnet and magnet hub are mounted on the shaft with a taperlock bushing. All parts must be clean and free from burrs and chips before assembling.

1. Place the bushing into the hub and insert the key. The key is a side-to-side fit and should not contact the top of the keyway.
2. Insert the locking setscrews loosely into the bushing and slide the assembly onto the shaft.
3. Adjust the magnet's position to allow a gap of 1/32 inch between the magnet face and the armature face. (Figure 17)



**Figure 17**

Once this gap is set, it will be automatically maintained for the life of the unit.

4. Secure the magnet's position on the shaft by alternately tightening each setscrew with a torque wrench to 175 in. lbs. maximum torque. During the tightening process the bushing should be tapped lightly to make certain it seats-in properly.

## G. Mounting the Brushholder

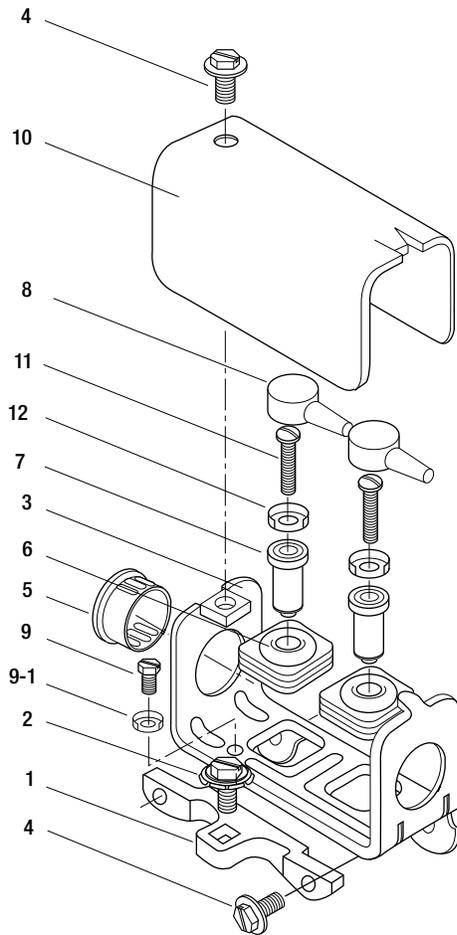
1. The brushholder is mounted on a bracket which must be furnished by the customer. The bracket must be firmly secured to prevent vibration which could cause improper contact between the brushes and collector ring.
2. The distance from the centerline of the shaft to the top of the brushholder should be 4". Maintaining this distance will assure proper spring tension on the brushes and maximum wear follow-up. A detailed dimensional drawing is included with each brushholder.

# Installation Instructions

## Conduit Box Kit No. 5200-101-010

### Description

This Warner Electric conduit box is designed to provide a proper means for field wiring terminations. It conforms to the requirements of Underwriters Laboratories. Kit No. 5200-101-010, plus magnet terminal accessory kit, contains all components needed to assemble a conduit box for the above mentioned units. Please follow these instructions carefully when installing this conduit box. Failure to comply with these instructions could result in unsafe electrical connections.



### Parts List for Kit 5200-101-010

Item	Quan.	Part Name
1	1	Bracket
2	1	Screw, Hex, Washer Hd. and Sems Conical Washer
3	1	Box, Conduit
4	3	Screw, Hex. Washer Hd.
5	1	Plug, Protective
6	2	Grommet, Wire
7	2	Spacer, Terminal
8	2	Cap, Terminal
9	1	Screw, Hex. Washer Hd.
9-1	1	Terminal, Ring
10	1	Cover Assembly
*11	2	Screw No. 6 Brass
	2	Screw No. 8 Brass
†12	2	Terminal, Ring

\* The No. 6 screws are required on Sizes 375, 400, and 475. All others use No. 8.

† Terminal Ring provided with terminal accessory kit 5311-101-003, 5311-101-001 respectively, supplied with magnets.

**Note:** All mounting screws are self-tapping.

**Step 1** Fasten bracket (1) to the clutch or brake with one No. 10-32 hex. washer head screw and washer (2). The square projection on the clutch or brake between the terminals is to be assembled into the square hole in the bracket. The bracket flange is installed toward the back of the unit. (Figure 1)



**Figure 1**

**Step 2** Assemble a 1/2" flexible conduit fitting into the desired end of the conduit box (3). If the grounding nut on this conduit fitting is tightened after the conduit box is installed on the magnet or field, avoid using excessive tapping force, which could damage the mounting. (Step 6)

**Step 3** Mount conduit box (3) to the bracket (1). The conduit box flange must be toward the back of the clutch or brake. Secure the box with two No.10-32 hex. washer head screws (4). (Figure 2)



**Figure 2**

**Step 4** Snap the two rubber grommets (6) into two square holes in the bottom of the conduit box. The grommet crowns should be in the box and the rubber flanges should be on both sides of the metal floor. (Figure 3)

**Step 5** Push two terminal spacers (7) through the grommets with the spacer flanged ends inside the conduit box. (See Figure 3)



**Figure 3**

**Step 6** Connect electric supply cable to the fitting installed on the conduit box. Use D.C. supply only.

**▲CAUTION** Rigid conduit must not be connected directly to the box. A minimum of 12" of flexible cable must be used. It is recommended that flexible "UL" listed liquid-tight, metallic or non-metallic conduit, meeting local codes, be used with appropriate fittings. Flexible cable is required to prevent side loading of bearing on bearing mounted clutches and brakes and possible deformation of the conduit box or components during assembly.

**Step 7** Press protective plug (5) into the unused conduit hole in the box.

**Step 8** Slide one rubber cap (8) onto each of the two supply conductors, small end first. Connect the two supply conductors (with rubber caps) to the magnet or field terminals using two No. 6 or No. 8 screws (11). Use wire retaining ring terminals supplied with the clutch or brake terminal accessory. The stripped wires may be wrapped around the screw between the wire terminal ring and the screw head or other ring type terminals such as "AMP" may be used. The screws are then assembled through the terminal spacers (7) and threaded into the clutch or brake terminals.

## Coil Data

Unit Size	PB & PC-500		
Voltage – DC	6	24	90
Resistance @ 20°C – Ohms	1.36	23.8	251.1
Current – Amperes	4.4	1.01	.36
Watts	26	24	32
Coil Build-up – Milliseconds	84	87	93
Coil Decay – Milliseconds	38	35	30

**Note:** Build-up time equals current to approximately 90% of steady state value and flux to 90%.

Decay time equals current to approximately 10% of steady state value and flux to 10%.

**Note:** Times are approximately because current leads or lags flux by a small amount.

## Burnishing and Maintenance

### Burnishing

Intimate metal to metal contact is essential between the armature and the metal rings (poles) of the magnet or rotor. Warner Electric clutches and brakes leave the factory with the friction material slightly undercut to assure good initial contact.

Normally, the desired wearing-in process occurs naturally as the surfaces slip upon engagement. The time for wear-in, which is necessary to obtain the ultimate torque of the unit, will vary depending on speed, load, or cycle duty.

If maximum torque is required immediately after installation, the unit should be burnished by slipping the friction surfaces together at reduced voltage. It is recommended that the burnishings be done right on the application, if at all possible.

Burnishing at high speed will result in a smoother wear-in pattern and reduce the time for burnishing. The voltage should be set at approximately 30% or 40% of the rated value.

The unit should be cycled on and off to allow sufficient time between slip cycles to prevent overheating.

When a Warner Electric brake or clutch is properly assembled and installed, no further servicing, lubrication, or maintenance should be required throughout the life of the unit.

### Maintenance

**Wear Pattern:** Wear grooves appear on the armature and magnet surfaces. This is a normal wear condition, and does not impair functioning of the unit. Normally, the magnet and armature, as a mating pair, will wear at the same rate. It is the usual recommendation that both components be replaced at the same time.

Remachining the face of a worn armature is not recommended. If a replacement armature is to be used with a used magnet, it is necessary to remachine the worn magnet face. In refacing a magnet: (1) machine only enough material to clean up the complete face of the magnet; (2) hold the face within .005" of parallel with the mounting plate; and (3) undercut the molded facing material .002" - .004" below the metal poles.

**Heat:** Excessive heat and high operating temperatures are causes of rapid wear. Units, therefore, should be ventilated as efficiently as possible, especially if the application requires fast, repetitive cycle operation.

**Foreign Materials:** If units are used on machinery where fine, abrasive dust, chips or grit are dispelled into the atmosphere, shielding of the brake may be necessary if maximum life is to be obtained.

Where units are used near gear boxes or transmissions requiring frequent lubrication, means should be provided to protect the friction surfaces from oil and grease to prevent serious loss of torque.

Oil and grease accidentally reaching the friction surfaces may be removed by wiping with a rag dampened with a suitable cleaner, which leaves no residue. In performing this operation, do not drench the friction material.

If the friction materials have been saturated with oil or grease, no amount of cleaning will be completely effective. Once such a unit has been placed back in service, heat will cause the oil to boil to the surface, resulting in further torque loss.

**Torque Loss:** If a brake or clutch slips or loses torque completely, the initial check should be the input voltage to the magnet as follows:

**90-Volt Series:** Connect a DC voltmeter with a range of 0-100 or more directly across the magnet terminals. With the power on and the potentiometer turned up, a normal reading is 90 volts, although 85 to 95 is satisfactory. The reading should drop as the potentiometer control is adjusted counterclockwise.

**24-Volt Series:** Use a DC voltmeter with a range of 0-30 volts or more. A normal reading is approximately 22-26 volts.

**6-Volt Series:** Use a DC voltmeter of approximately 0-15 volt range. A normal reading is from 5.5 to 6.5 volts.

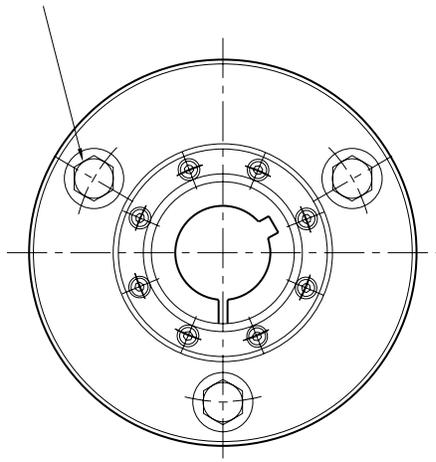
The above checks are normally sufficient. Further checks may be made as follows: a low range ammeter, when connected in series with one magnet lead, will normally indicate approximately .40 amperes for the 90 volt units, 1.0 ampere for the 24 volt, and 3.5 amperes for the 6 volt series. These readings are with the power on and the potentiometer control in the maximum position.

Ohmmeter checks should be made with the power off and the circuit open (to be certain, disconnect one lead to the magnet). Average resistance for the 90 volt series is 220 ohms; for the 24 volt, 20 ohms; and for the 6 volt series, 1.5 ohms. A very high or infinite resistance reading would indicate an open coil.

If the above checks indicate that the proper voltage and current is being supplied to the magnet, mechanical parts should be checked to assure that they are in good operating condition and properly installed.

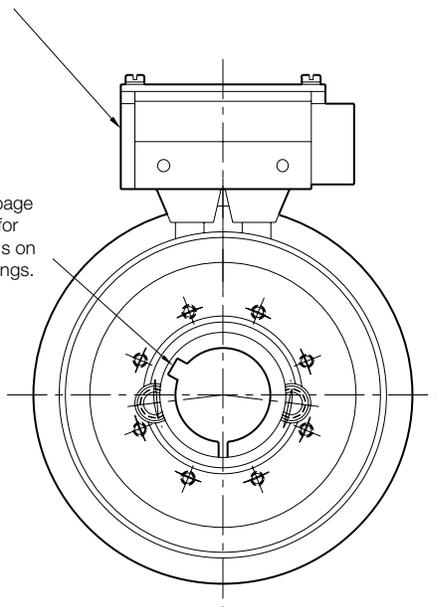
# PC-500 Clutch

See page 4 for details on drive pin mountings.



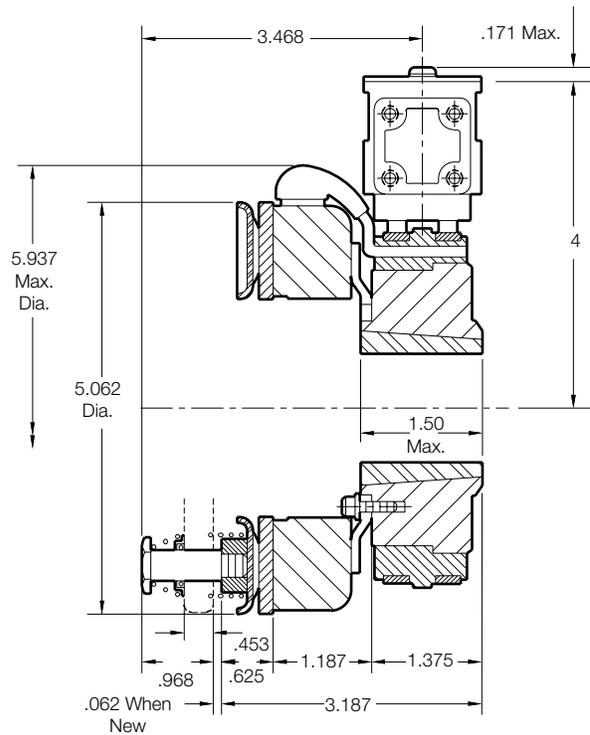
**Armature View**

1/2-14 NPSM Am. std. straight pipe tap.



See page 34 for details on Bushings.

**Collector Ring View**

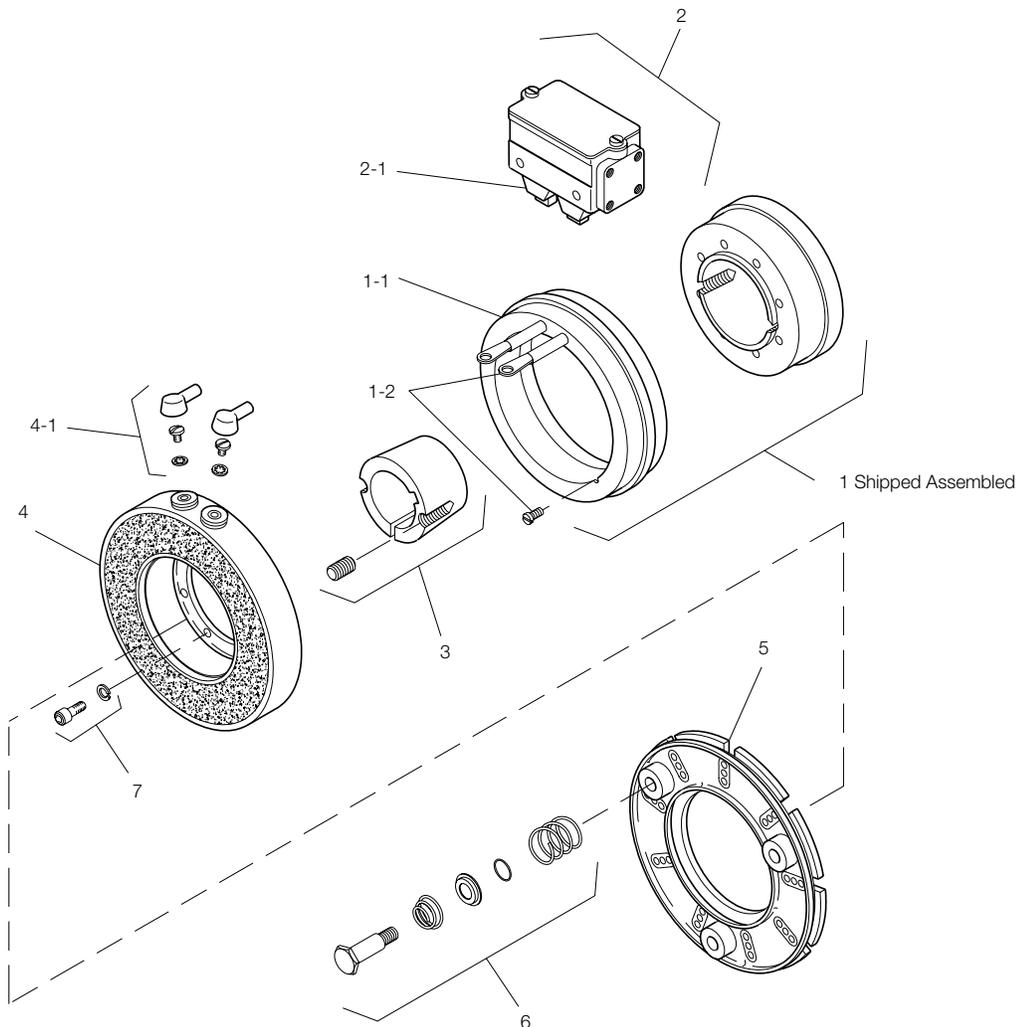


Shaft Size	.500 – 1.250
Static Torque	40 lb.ft.
Maximum Speed	5,400 RPM
Standard Voltage	D.C. 6, 24, 90

## Customer Shall Maintain:

1. Armature mounting to be concentric with magnet hub assembly within .006 T.I.R.





Item	Description	Part Number	Qty.
1	Magnet Hub	5300-541-001	1
1-1	Collector Ring	5300-749-001	1
1-2	Collector Ring Mounting Acc.	5300-101-002	1
2	Brushholder	5300-178-001	1
2-1	Brush	176-0001	4
3	Bushing		1
	1/2" to 1-1/4" Bore	180-0116 to 180-0128*	1
4	Magnet		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
4-1	Terminal Accessory	5311-101-001	1
5	Armature	5300-111-002	1
6	Autogap Accessory	5200-101-009	3
7	Mounting Accessory	5102-101-0001	4

\*See page 34 for specific part numbers.

**How to Order:**

1. Specify Bore Size for Item 3.
2. Specify Voltage for Item 4.
3. See P-1264-WE for Power Supplies.

**Example:**

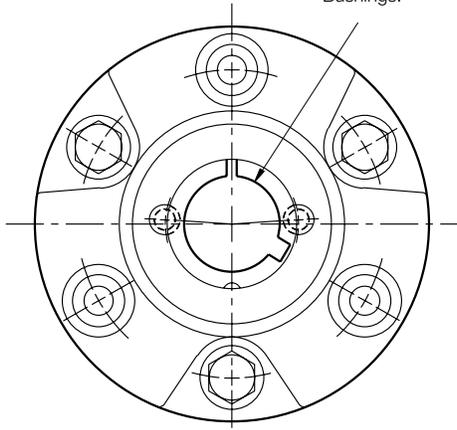
PC-500 Clutch per I-25716 - 90 Volt 3/4" Bore

These units, when used in conjunction with the correct Warner Electric conduit box, meet the standards set of forth in UL508 and are listed under guide card #NMTR2, file #59164.

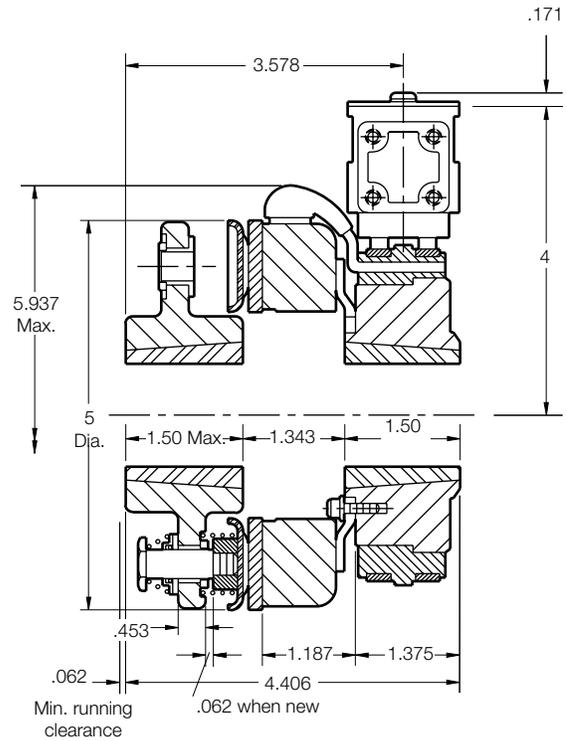
These units are CSA certified under file #LR11543.

# PCC-500 Clutch Coupling Normal Duty

See page 34 for details on Bushings.

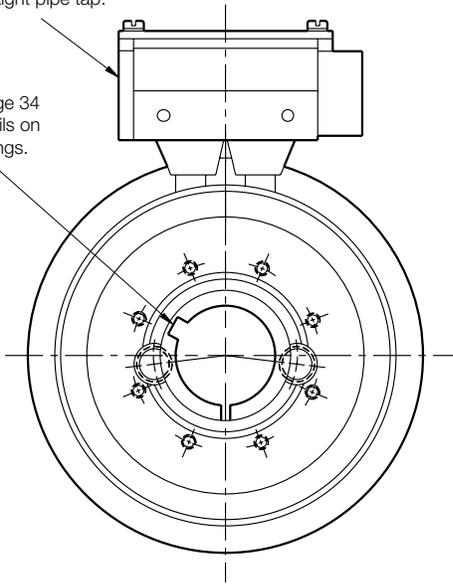


**Armature View**



1/2-14 NPSM Am. std. straight pipe tap.

See page 34 for details on Bushings.

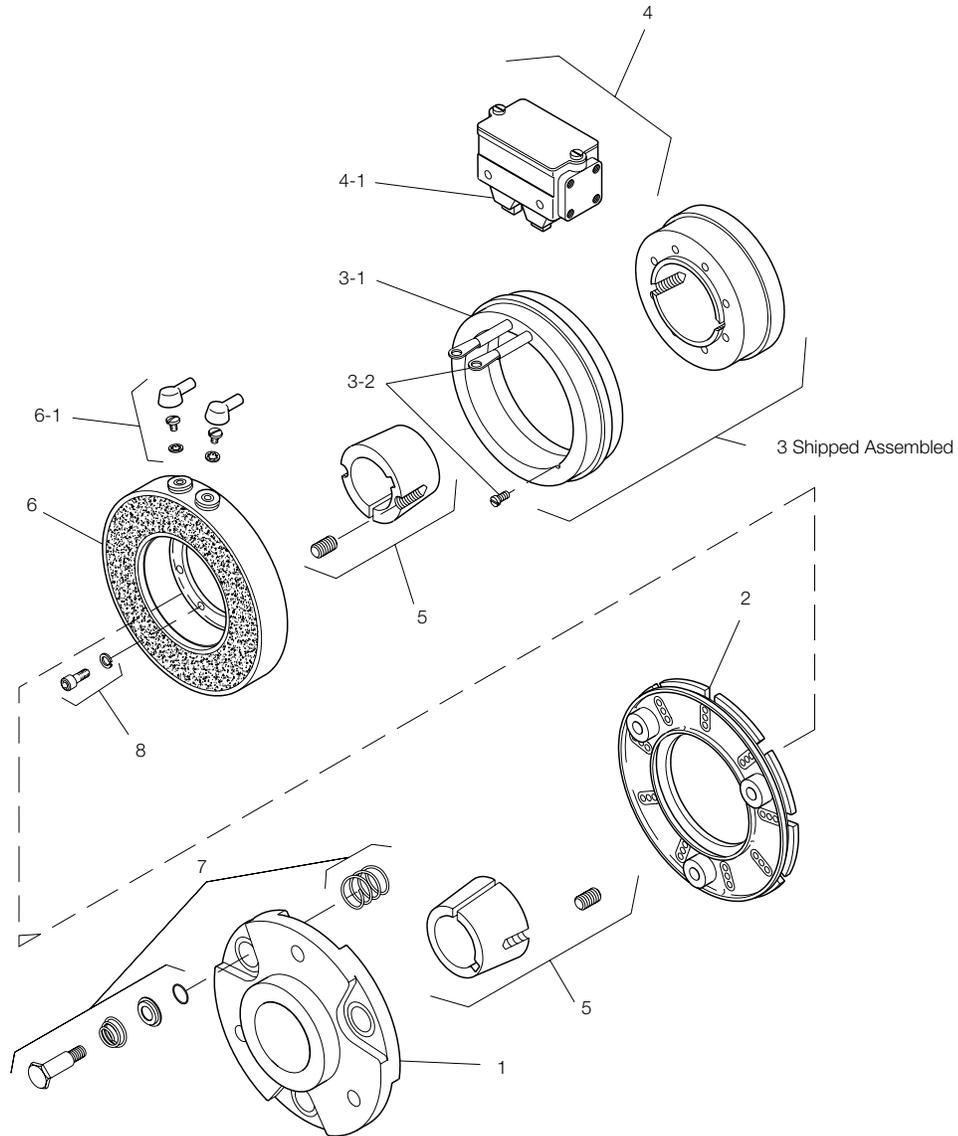


**Collector Ring View**

Armature Shaft	.500 – 1.250
Rotor Shaft	.500 – 1.250
Static Torque	40 lb.in.
Maximum Speed	5,400 RPM
Standard Voltage	D.C. 6, 24, 90

## Customer Shall Maintain:

1. Armature mounting shaft concentric with magnet mounting shaft within .006 T.I.R.



Item	Description	Part Number	Qty.
1	Armature Hub	5300-541-004	1
2	Armature	5300-111-002	1
3	Magnet Hub	5300-541-001	1
3-1	Collector Ring	5300-749-001	1
3-2	Collector Ring Mounting Acc.	5300-101-002	1
4	Brushholder	5300-178-001	1
4-1	Brush	176-0001	4
5	Bushing		
	1/2" to 1-1/4" Bore	180-0116 to 180-0128*	2
6	Magnet		
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
6-1	Terminal Accessory	5311-101-001	1
7	Autogap Accessory	5200-101-009	3
8	Mounting Accessory	5102-101-001	2

\*See page 34 for specific part numbers.

**How to Order:**

1. Specify Bore Size for Item 5.
2. Specify Voltage for Item 6.
3. See P-1264-WE for Power Supplies.

**Example:**

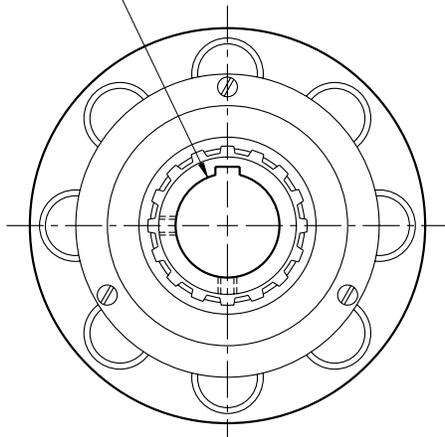
PCC-500 Clutch Coupling per I-25542 - 90 Volt 3/4" Bore

These units meet standards set forth in UL508 and are listed under guide card #NMTR2, file #59164.

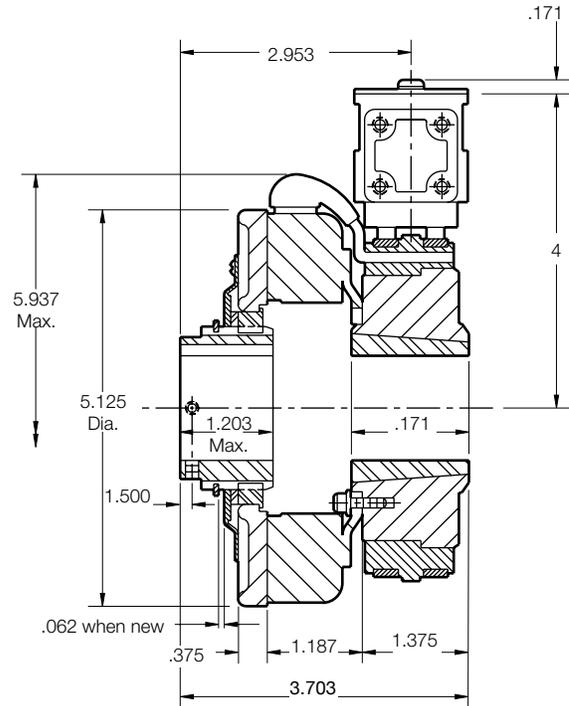
These units are CSA certified under file #LR11543.

# PCC-500 Clutch Coupling Heavy Duty

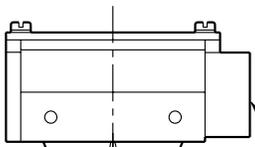
For Bore & Keyway sizes see chart below.



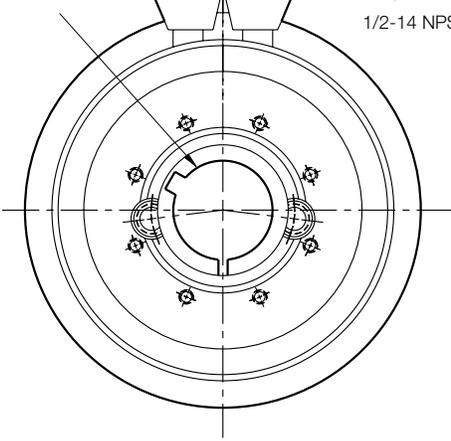
**Armature View**



See page 34 for details on Bushings.



1/2-14 NPSM Am. std. straight pipe tap.



**Collector Ring View**

## Bore & Keyway Dimensions

Rotor Bore Dia.	Keyway
.751/.750	.187 x .093
.876/.875	
.9385/.9375	
1.001/1.000	.250 x .125
1.126/1.125	
1.251/1.250	

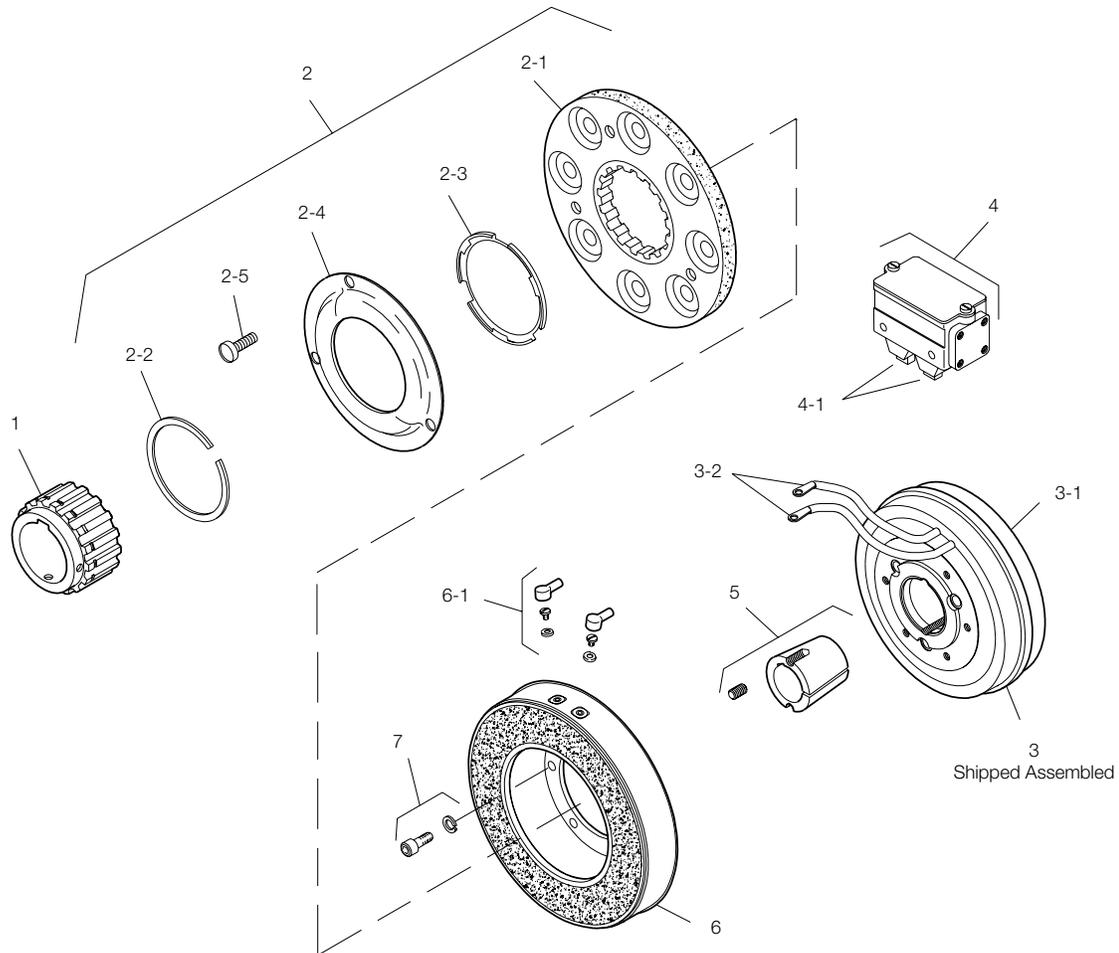
Armature Shaft	.750 – 1.250
Rotor Shaft	.500 – 1.250
Static Torque	40 lb.in.
Maximum Speed	5,400 RPM
Standard Voltage	D.C. 6, 24, 90

### Customer Shall Maintain:

1. Armature mounting shaft concentric with magnet mounting shaft within .006 T.I.R.

# PCC-500 Clutch Coupling Heavy Duty

# Drawing I-25543



Item	Description	Part Number	Qty.
1	Armature Hub		1
	3/4" Bore	5200-541-002	
	7/8" Bore	5200-541-003	
	15/16" Bore	5200-541-004	
	1" Bore	5200-541-005	
	1-1/8" Bore	5200-541-006	
	1-1/4" Bore	5200-541-007	
2	Armature Assembly	5230-111-002	1
2-1	Armature	5230-111-001	2
2-2	Retainer Ring	748-0355	1
2-3	Autogap Spring	808-0412	1
2-4	Retainer Plate	748-0364	1
2-5	Screw	797-0028	3
3	Magnet Hub	5300-541-001	1
3-1	Collector Ring	5300-749-001	1
3-2	Collector Ring Mounting Acc.	5300-101-002	1
4	Brushholder	5300-178-001	1
4-1	Brush	176-0001	4
5	Bushing		
	1/2" to 1-1/4" Bore	180-0116 to 180-0128*	2

Item	Description	Part Number	Qty.
6	Magnet		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
6-1	Terminal Accessory	5311-101-001	1
7	Mounting Accessory	5102-101-001	2

\*See page 34 for specific part numbers.

## How to Order:

1. Specify Bore Size for Item 1 and Item 5.
2. Specify Voltage for Item 6.
3. See P-1264-WE for Power Supplies.

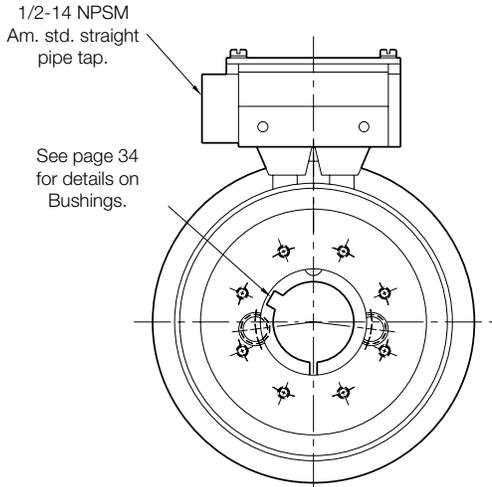
## Example:

PCC-500 Clutch Coupling per I-25543 - 90 Volt  
3/4" Armature Hub Bore 1" Bushing Bore

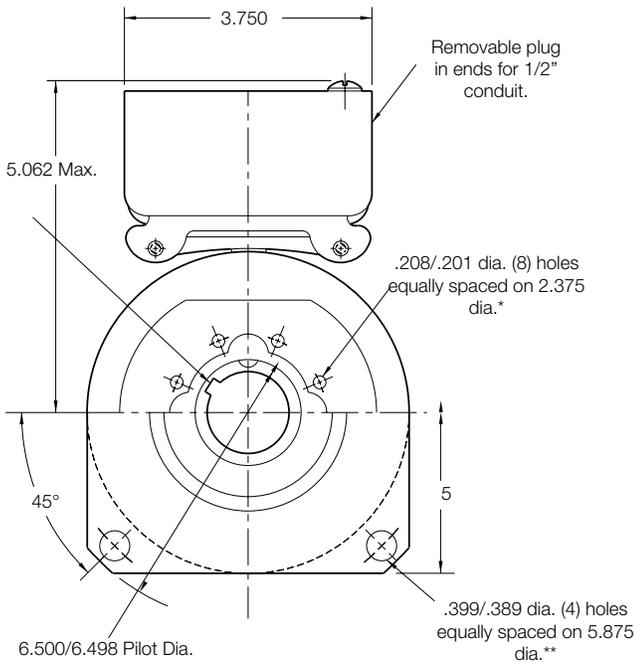
These units meet standards set forth in UL508 and are listed under guide card #NMTR2, file #59164.

These units are CSA certified under file #LR11543.

# PCBC-500 Clutch/Brake Coupling Normal Duty



**Collector Ring View**

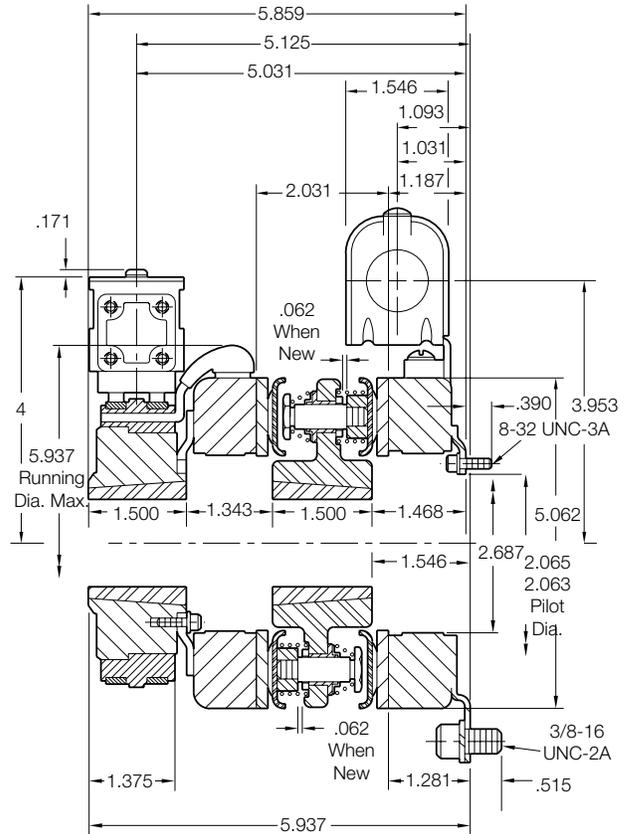


**Magnet View  
(Inside & Outside Mounted)**

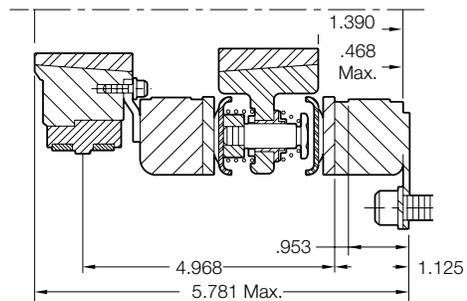
\* Mounting holes are within .010 of true position relative to pilot diameter.  
 \*\* Mounting holes are within .008 of true position relative to pilot diameter.

**Customer Shall Maintain:**

1. Squareness of brake mounting face with armature hub shaft within .006 T.I.R.
2. Concentricity of brake mounting pilot diameter with armature hub shaft within .010 T.I.R.
3. Concentricity of clutch magnet hub assembly shaft with armature hub shaft within .006 T.I.R.



**Outside Mounted Offset Backing Plate**

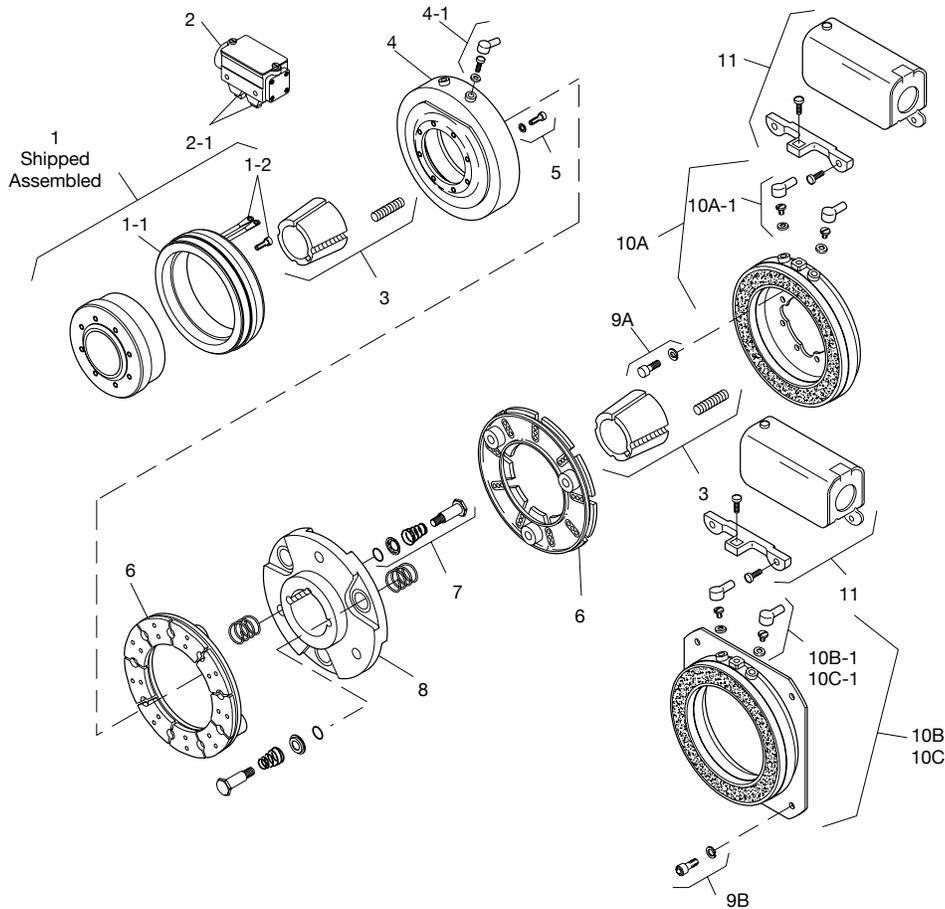


**Outside Mounted Flush Backing Plate**

Armature Shaft	.500 – 1.250
Magnet Shaft	.500 – 1.250
Static Torque	40 lb.ft.
Maximum Speed	5,400 RPM
Standard Voltage	D.C. 6, 24, 90

# PCBC-500 Clutch/Brake Coupling Normal Duty

# Drawing I-25547



Item	Description	Part Number	Qty.
1	Magnet Hub	5300-541-001	1
1-1	Collector Ring	5300-749-001	1
1-2	Collector Ring Mounting Access.	5300-101-002	1
2	Brushholder	5300-178-001	1
2-1	Brush	176-0001	4
3	Bushing		
	1/2" - 1/4" Bore	180-0116 to 180-0128*	2
4	Magnet, Clutch		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
4-1	Terminal Accessory	5311-101-001	1
5	Mounting Accessory	5102-101-001	2
6	Armature	5300-111-002	2
7	Autogap Accessory	5200-101-009	6
8	Armature Hub	5300-541-004	1
9A	Mounting Accessory - I.M.	5102-101-001	2
9B	Mounting Accessory - O.M.	5300-101-008	1
10A	Magnet - I.M.		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
10A-1	Terminal Accessory	5311-101-001	1
10B	Magnet - O.M. - Offset		1
	90 Volt	5300-631-014	
10B-1	Terminal Accessory	5311-101-001	1
10C	Magnet - O.M. - Flush		1
	6 Volt	5300-631-009	
	24 Volt	5300-631-010	
	90 Volt	5300-631-011	

Item	Description	Part Number	Qty.
10C-1	Terminal Accessory	5311-101-001	1
11	Conduit Box	5200-101-010	1

\*See page 34 for specific part numbers.

## How to Order:

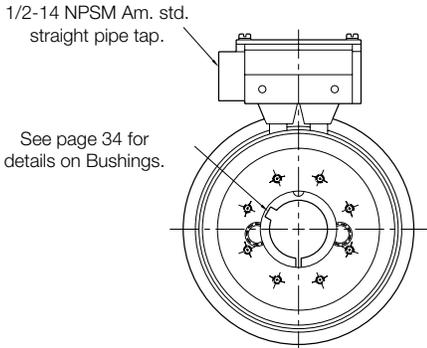
1. Specify Bore Size for Item 3.
2. Specify Voltage for Item 4 and Item 10A, 10B or 10C.
3. Specify Inside Mounted for Item 10A and Outside Mounted (Offset) for Item 10B or Outside Mounted (Flush) for Item 10C.
4. See P-1264-WE for Power Supplies.

## Example:

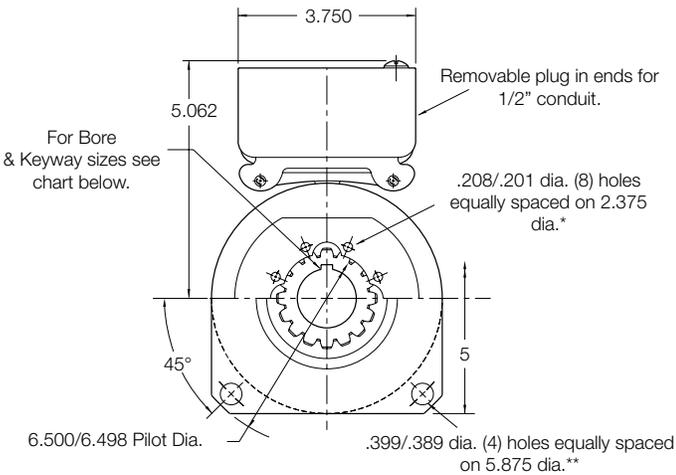
PCBC-500 Clutch Brake Coupling per I-25547 - 90 Volt, Inside Mounted, 1" Bore

These units meet the standards of UL508 and are listed under guide card #NMTR2, file #59164. These units are CSA certified under file #LR11543.

# PCBC-500 Clutch/Brake Coupling Heavy Duty



**Collector Ring View**



**Magnet View  
(Inside & Outside Mounted)**

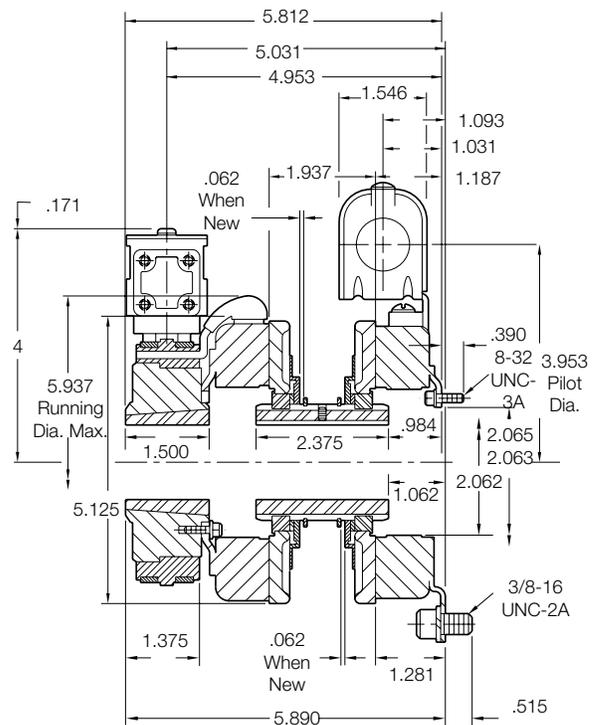
\* Mounting holes are within .010 of true position relative to pilot diameter.  
 \*\* Mounting holes are within .008 of true position relative to pilot diameter.

## Bore & Keyway Dimensions

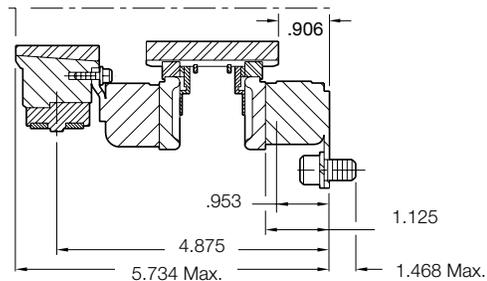
Rotor Bore Dia.	Keyway
.751/.750	.187 x .093
.876/.875	
.9385/.9375	
1.001/1.000	
1.126/1.125	.250 x .125
1.251/1.250	

## Customer Shall Maintain:

1. Squareness of brake mounting face with armature hub shaft within .006 T.I.R.
2. Concentricity of brake mounting pilot diameter with armature hub shaft within .010 T.I.R.
3. Concentricity of clutch magnet hub assembly shaft with armature hub shaft within .006 T.I.R.



**Outside Mounted Offset Backing Plate**

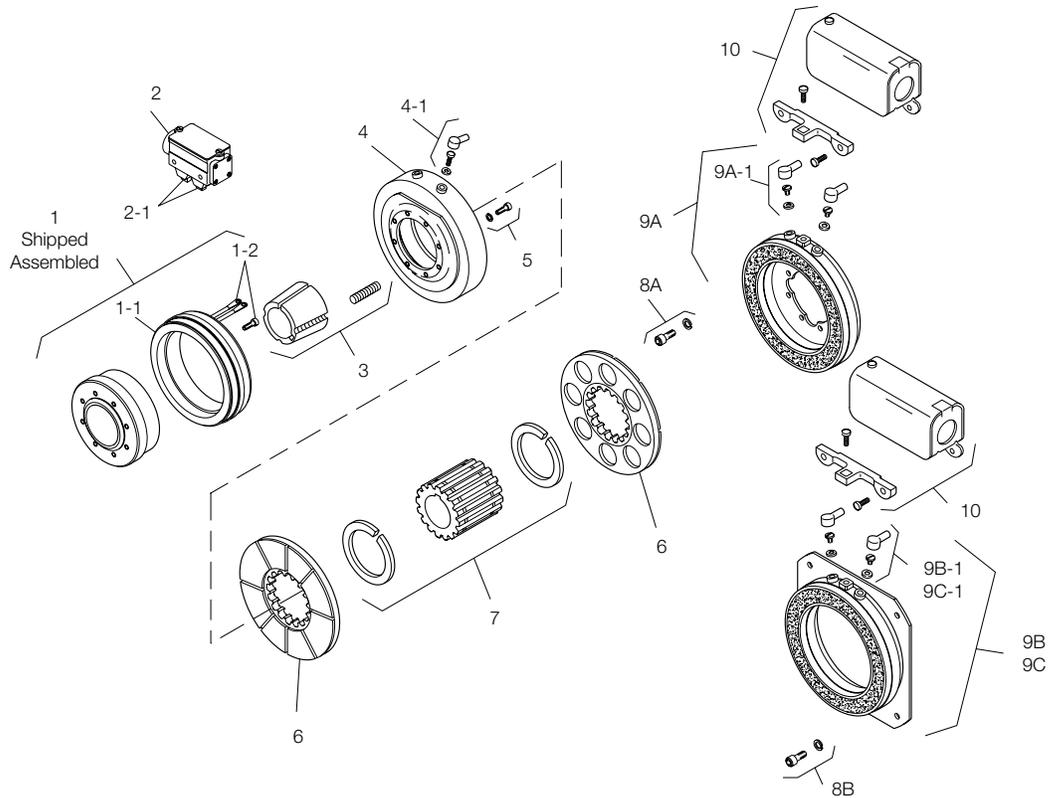


**Outside Mounted Flush Backing Plate**

Armature Shaft	.500 – 1.250
Magnet Shaft	.750 – 1.250
Static Torque	40 lb.ft.
Maximum Speed	5,400 RPM
Standard Voltage	D.C. 6, 24, 90

# PCBC-500 Clutch/Brake Coupling Heavy Duty

# Drawing I-25553



Item	Description	Part Number	Qty.
1	Magnet Hub	5300-541-001	1
1-1	Collector Ring	5300-749-001	1
1-2	Collector Ring Mounting Access.	5300-101-002	1
2	Brushholder	5300-178-001	1
2-1	Brush	176-0001	4
3	Bushing		
	1/2" - 1-1/4" Bore	180-0116 to 180-0128	1
4	Magnet, Clutch		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-531-005	
4-1	Terminal Accessory	5311-101-001	1
5	Mounting Accessory	5102-101-001	2
6	Armature	5300-111-002	2
7	Armature Hub		1
	Bore	Keyway	
	3/4"	3/16 x 3/32	5300-541-006
	7/8"	3/16 x 3/32	5300-541-007
	15/16"	1/4 x 1/8	5300-541-008
	1"	1/4 x 1/8	5300-541-009
	1-1/8"	1/4 x 1/8	5300-541-010
	1-1/4"	1/4 x 1/8	5300-541-011
8A	Mounting Accessory - I.M.	5102-101-001	2
8B	Mounting Accessory - O.M.	5300-101-008	1
9A	Magnet - I.M.		1
	6 Volt	5300-631-002	
	24 Volt	5300-631-003	
	90 Volt	5300-631-005	
9A-1	Terminal Accessory	5311-101-001	1
9B	Magnet - O.M. - Offset		1
	90 Volt	5300-631-014	
9B-1	Terminal Accessory	5311-101-001	1

Item	Description	Part Number	Qty.
9C	Magnet - O.M. - Flush		1
	6 Volt	5300-631-009	
	24 Volt	5300-631-010	
	90 Volt	5300-631-011	
9C-1	Terminal Accessory	5311-101-001	1
10	Conduit Box	5200-101-010	1

\*See page 34 for specific part numbers.

## How to Order:

1. Specify Bore Size for Item 3.
2. Specify Voltage for Item 4 and Item 9A, 9B or 9C.
3. Specify Inside Mounted for Item 9A and Outside Mounted (Offset) for Item 9B or Outside Mounted (Flush) for Item 9C.
4. See P-1264-WE for Power Supplies.

## Example:

PCBC-500 Clutch Brake Coupling per I-25553 - 90 Volt, Outside Mounted Flush, 1" Bore

These units meet the standards of UL508 and are listed under guide card #NMTR2, file #59164. These units are CSA certified under file #LR11543.

# Bushing Part Numbers

## Browning Bushing

Shaft Size	Keyway Size	Bushing Number	
		Warner Electric	Browning
1/2	1/8 x 1/16	180-0002	H-1
9/16	1/8 x 1/6	180-0003	
5/8	3/16 x 3/32	180-0004	
11/16	3/16 x 3/32	180-0005	
3/4	3/16 x 3/32	180-0006	
13/16	3/16 x 3/32	180-0007	
7/8	3/16 x 3/32	180-0008	
15/16	1/4 x 1/8	180-0009	
1	1/4 x 1/8	180-0010	
1-1/6	1/4 x 1/8	180-0011	
1-1/8	1/4 x 1/8	180-0012	
1-3/16	1/4 x 1/8	180-0013	
1-1/4	1/4 x 3/16	180-0014	
1-5/16	5/16 x 7/32	180-0015	
1-3/8	5/16 x 7/32	180-0016	
1-7/16	3/8 x 1/4	180-0017	H-2
1-1/2	3/8 x 7/32	180-0018	
3/4	1/2 x 3/8	180-0026	
13/16	1/2 x 3/8	180-0027	QI-1
7/8	1/2 x 3/8	180-0028	
15/16	1/2 x 3/8	180-0029	
1	1/2 x 3/8	180-0030	
1-1/16	1/2 x 3/8	180-0031	
1-1/8	1/2 x 3/8	180-0032	
1-3/16	1/2 x 3/8	180-0033	
1-1/4	1/2 x 3/8	180-0034	
1-5/16	1/2 x 3/8	180-0035	
1-3/8	1/2 x 3/8	180-0036	
1-7/16	1/2 x 3/8	180-0037	
1-1/2	1/2 x 3/8	180-0038	
1-9/16	1/2 x 3/8	180-0039	
1-5/8	1/2 x 3/8	180-0040	
1-11/16	1/2 x 3/8	180-0041	
1-3/4	1/2 x 3/8	180-0042	
1-13/16	1/2 x 3/8	180-0043	
1-7/8	1/2 x 3/8	180-0044	
1-15/16	1/2 x 3/8	180-0045	
2	1/2 x 3/8	180-0046	QI-2
2-1/16	1/2 x 3/8	180-0047	
2-1/8	1/2 x 3/4	180-0048	
2-3/16	1/2 x 23/32	180-0049	
2-1/4	1/2 x 11/16	180-0050	
2-5/16	5/8 x 5/16	180-0051	
2-3/8	5/8 x 5/16	180-0052	
2-7/16	5/8 x 5/16	180-0053	
2-1/2	5/8 x 5/16	180-0054	
2-9/16	5/8 x 5/16	180-0055	
2-5/8	5/8 x 5/16	180-0056	
2-11/16	5/8 x 5/16	180-0057	

## Dodge Bushing

Shaft Size	Keyway Size	Bushing Number		
		Warner Electric	Dodge	
1/2	1/8 x 1/16	180-0101	1210	
9/16	1/8 x 1/16	180-0102		
5/8	3/16 x 3/32	180-0103		
11/16	3/16 x 3/32	180-0104		
3/4	3/16 x 3/32	180-0105		
13/16	3/16 x 3/32	180-0106		
7/8	3/16 x 3/32	180-0107		
5/16	1/4 x 1/8	180-0108		
1	1/4 x 1/8	180-0109		
1-1/16	1/4 x 1/8	180-0110		
1-1/8	1/4 x 1/8	180-0111		
1-3/16	1/4 x 1/8	180-0112		
1-1/4	1/4 x 1/8	180-0113		
1/2	1/8 x 1/16	180-0116		1215
9/16	1/8 x 1/16	180-0117		
5/8	3/16 x 3/32	180-0118		
11/16	3/16 x 3/32	180-0119		
3/4	3/16 x 3/32	180-0120		
13/16	3/16 x 3/32	180-0121		
7/8	3/16 x 3/32	180-0122		
15/16	1/4 x 1/8	180-0123		
1	1/4 x 1/8	180-0124		
1-1/16	1/4 x 1/8	180-0125		
1-1/8	1/4 x 1/8	180-0126		
1-3/16	1/4 x 1/8	180-0127		
1-1/4	1/4 x 1/8	180-0128		
1/2	1/8 x 1/16	180-0131	1615	
9/16	1/8 x 1/16	180-0132		
5/8	3/16 x 3/32	180-0133		
11/16	3/16 x 3/32	180-0134		
3/4	3/16 x 3/32	180-0135		
13/16	3/16 x 3/32	180-0136		
7/8	3/16 x 3/32	180-0137		
15/16	1/4 x 1/8	180-0138		
1	1/4 x 1/8	180-0139		
1-1/16	1/4 x 1/8	180-0140		
1-1/8	1/4 x 1/8	180-0141		
1-3/16	1/4 x 1/8	180-0142		
1-1/4	1/4 x 1/8	180-0143		
1-5/16	5/16 x 5/32	180-0144		
1-3/8	5/16 x 5/32	180-0145		
1-7/16	3/8 x 3/16	180-0146		
1-1/2	3/8 x 3/16	180-0147		
1-9/16	3/8 x 3/16	180-0148		
1-5/8	3/8 x 3/16	180-0149		
1/2	1/8 x 1/16	180-0155	2012	
9/16	1/8 x 1/16	180-0156		
5/8	3/16 x 3/32	180-0157		
11/16	3/16 x 3/32	180-0158		
3/4	3/16 x 3/32	180-0159		
13/16	3/16 x 3/32	180-0160		
7/8	3/16 x 3/32	180-0161		
15/16	1/4 x 1/8	180-0162		
1	1/4 x 1/8	180-0163		
1-1/16	1/4 x 1/8	180-0164		
1-1/8	1/4 x 1/8	180-0165		
1-3/16	1/4 x 1/8	180-0166		
1-1/4	1/4 x 1/8	180-0167		



## Warranty

Warner Electric LLC warrants that it will repair or replace (whichever it deems advisable) any product manufactured and sold by it which proves to be defective in material or workmanship within a period of one (1) year from the date of original purchase for consumer, commercial or industrial use.

This warranty extends only to the original purchaser and is not transferable or assignable without Warner Electric LLC's prior consent.

Warranty service can be obtained in the U.S.A. by returning any defective product, transportation charges prepaid, to the appropriate Warner Electric LLC factory. Additional warranty information may be obtained by writing the Customer Satisfaction Department, Warner Electric LLC, 449 Gardner Street, South Beloit, Illinois 61080, or by calling 815-389-3771.

A purchase receipt or other proof of original purchase will be required before warranty service is rendered. If found defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs. If found not to be defective, you will be notified and, with your consent, the item will be repaired or replaced and returned to you at your expense.

This warranty covers normal use and does not cover damage or defect which results from alteration, accident, neglect, or improper installation, operation, or maintenance.

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Warner Electric LLC's obligation under this warranty is limited to the repair or replacement of the defective product and in no event shall Warner Electric LLC be liable for consequential, indirect, or incidental damages of any kind incurred by reason of the manufacture, sale or use of any defective product. Warner Electric LLC neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

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