

# Electromagnetic Particle Clutches

## Models: PMC-10A3, PMC-20A3, and PMC-40A3

P-223-2  
819-0369

Installation Instructions



 **Warner**<sup>®</sup>  
*Electric*

*An Altra Industrial Motion Company*

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

**⚠ WARNING** Make sure all power is turned off to this equipment when installing, as injury (or even death) may result from contact with live wires or rotating shafts.

## Introduction

This service manual provides information required for the installation, wiring, and maintenance of Warner Electric's Magnetic Particle Micro Clutch series. It also includes dimensions and specifications. The three models covered in this service manual are PMC-10A3, PMC-20A3, and PMC-40A3. These models with their flanged input hubs, also lend themselves to be mounted as brakes. For selection information, please refer to your Warner Electric Tension Control Systems Catalog.

Warner Electric's Magnetic Particle clutches provide smooth and controllable torque for a variety of applications, including tension control, cycling, and positioning. Quick response is achieved by applying full rated voltage. Lower voltage can be applied for softer engagements. Extremely accurate tension control can be achieved when these brakes are used with one of Warner Electric's wide range of tension controls for electric clutches.

## Installation Instructions

### Introduction

The design of the PMC-A3 series clutches makes them easy to mount in various configurations. They have a mounting flange on the outside diameter of the housing. The input is a flanged hub, which is concentric to the double ended output shaft. See Figure 1 for typical mounting. To use the PMC-A3 as a brake, the output shaft must be secured. See Figure 2.

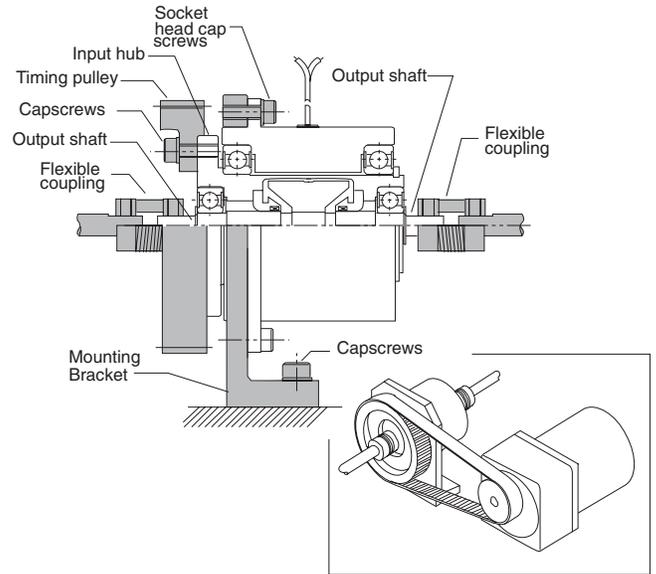


Figure 1\* - Mounted as a clutch

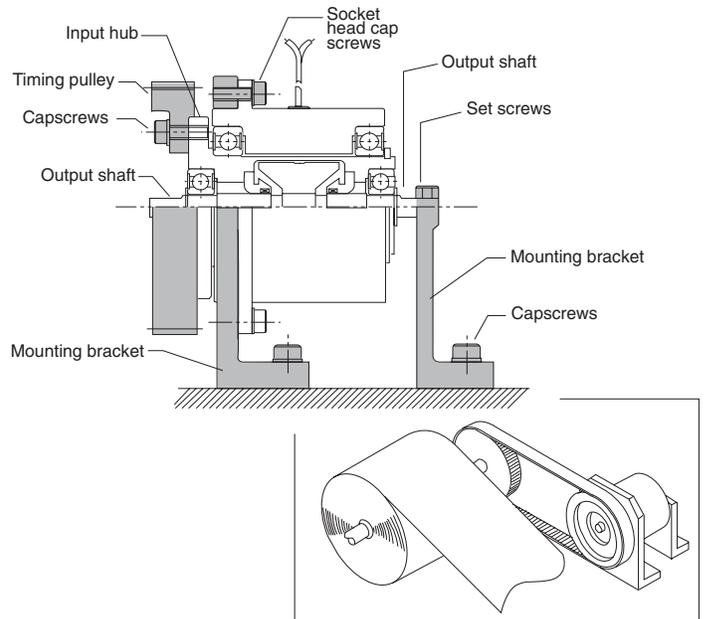


Figure 2\* - Mounted as a brake

\*Note: Shaded items are customer supplied

## Pre-Mounting

**Note:** Unit performance can be affected by prolonged exposure to humid environments. Please store in a dry location.

**Note:** The equipment covered by this service manual must be installed in accordance with these instructions. Failure to do so may damage the equipment and void the warranty.

1. Remove the magnetic particle clutch from its shipping carton and inspect it thoroughly to ensure that it has arrived in good condition. When handling, please take care not to damage lead wires.
2. Check the input hub to make sure it turns freely when the output shaft and housing are held stationary. The powder inside the unit may settle due to shock and vibration caused during shipping. This can make rotation noticeably difficult and can be easily remedied by turning the unit upside down and gently tapping the outside to loosen the powder.
3. Make sure the location chosen for mounting will not expose the unit to water or oil. If water or oil gets into the powder cavity, the performance of the unit may be affected. If the unit is mounted next to a gearbox, special care should be taken to prevent oil from working its way into the unit.
4. If couplings are used to make drive system connections, the mounting surface must properly locate the housing to ensure that alignment is within the coupling manufacturer's specifications.

## Mounting

**Note:** Do not use excessive force when mounting couplings, pulleys, or sprockets on shafts.

**Note:** For proper function, mount magnetic particle units horizontally.

For mounting dimensions, please refer to pages 5-7 of this service manual.

### As A Clutch

#### Step 1: Bolt Unit in Place

Mount the unit to a vertical surface, using customer supplied fasteners. See Figure 1.

#### Step 2: Make Mechanical Connections

Mount couplings, pulleys, or sprockets to the male shafts per the manufacturer's recommendations. The pulleys, sprockets, couplings, mounting brackets, and bolts are customer supplied. (The output shaft can be used as the input and the input hub as the output, but the output inertia will be higher.)

### As A Brake

#### Step 1: Bolt Unit Into Place

Secure the mounting flange and the output shaft as shown in Figure 2. Take care to insure that alignment is true and there is no binding in the bearings.

#### Step 2: Mount Pulley, Sprocket, or Coupling

Bolt the pulley, sprocket, or coupling to the input hub of the unit. The pulleys, sprockets, couplings, mounting brackets and bolts are customer supplied.

## Electrical Connections

**⚠ WARNING** To avoid injury (or even death), always make certain all power is off before attempting to install or service the control or any electrical equipment.

The PMC-A3's operate on DC voltage. Warner Electric offers a full line of AC powered controls to meet the needs of almost every application. The service and installation instructions included with each Warner Electric control show the proper electrical connections.

After wiring your Magnetic Particle unit, confirm that the control circuit is functioning. Without rotating the input shaft, verify that voltage is applied when the control output is turned on. Also, if appropriate, set the current for the proper output. Your magnetic particle unit is now ready for operation. For information on start up and maintenance, see page 4 of this manual.

## Electrical Data

### Electrical Coil Data

Unit Size	Voltage	Resistance [ohms @ 75°F (25°C)]	Amperes [@ 75°F (25°C)]	Watts [@ 75°F (25°C)]	Torque Build Up (msec)	Torque Decay (msec)
10	24	35.1	0.684	16.4	20	8
20	24	31.6	0.760	18.2	30	10
40	24	26.3	0.912	21.9	40	12

**Note:** Build up time equals time for torque to build to approximately 63.2% of steady state value after a step change in voltage. Decay time equals time for current to drop to approximately 36.8% of the steady state value after a voltage change.

### Mechanical Data

Unit	Part Number	Torque (lb. in.)	Drag Torque (lb. in.)	Maximum Speed (rpm)	Inertia Input (in. lb. <sup>2</sup> )	Output (in. lb. <sup>2</sup> )	Weight (lbs.)
PMC-10A3	5401-270-111	8.6	.25	1800	.239	.0291	2.0
PMC-20A3	5401-270-121	17	.51	1800	.413	.0752	2.9
PMC-40A3	5401-270-131	34	1.0	1800	1.14	.372	5.5

## Start Up

The powder in the magnetic particle units sometimes settles during shipment and will need to be redistributed. A simple run-in procedure should be performed to ensure proper performance.

### Run in Procedure

**Notes:** 1. Before running in, make sure the unit does not bind. See step 2 of the pre-mounting instructions.

2. If mounted as a clutch, the output shaft must be locked to prevent it from turning.

Set the control output voltage for 5 to 6 volts. Turn off the control and run the input for one minute. Run at a speed close to, but not exceeding 1000 RPM. Then cycle the unit at 5 or 6 volts for five seconds and off for ten seconds. Repeat this for 20 cycles.

When the powder is redistributed properly, the torque will be consistent and proportional to current.

## Maintenance

### Heat

Make sure your unit does not overheat. This occurs when the heat generated is greater than the heat dissipation capability of the unit. The maximum allowable surface temperature for the PMC-A3 series unit is 167° F.

### Slip Applications

With most controls, torque is easily adjusted. However, care must be taken when adjusting torque to make sure that too much heat is not generated in the unit. The heat generated is proportional to torque and slip rpm. Refer to the sizing procedure in the catalog to make sure the unit has adequate heat dissipation capability. Also, do not increase the slip speed or the torque without verifying that the unit can dissipate the heat.

### Cycling Applications

In cycling applications, the speed and inertia of the load and the cycle rate determines the heat generated. Refer to the selection procedure in the catalog to verify that the unit can handle the thermal energy generated in your application. Also, do not increase the speed, cycle rate, or inertia without checking the units ability to dissipate the heat generated.

### Contamination

Do not expose the unit to water or oil. If water or oil gets into the powder cavity, the performance of the unit may be affected. If the unit is mounted next to a gearbox, special care must be taken to prevent oil from working its way into the unit.

## PMC-10A3 and PMC-20A3 Dimensional Data

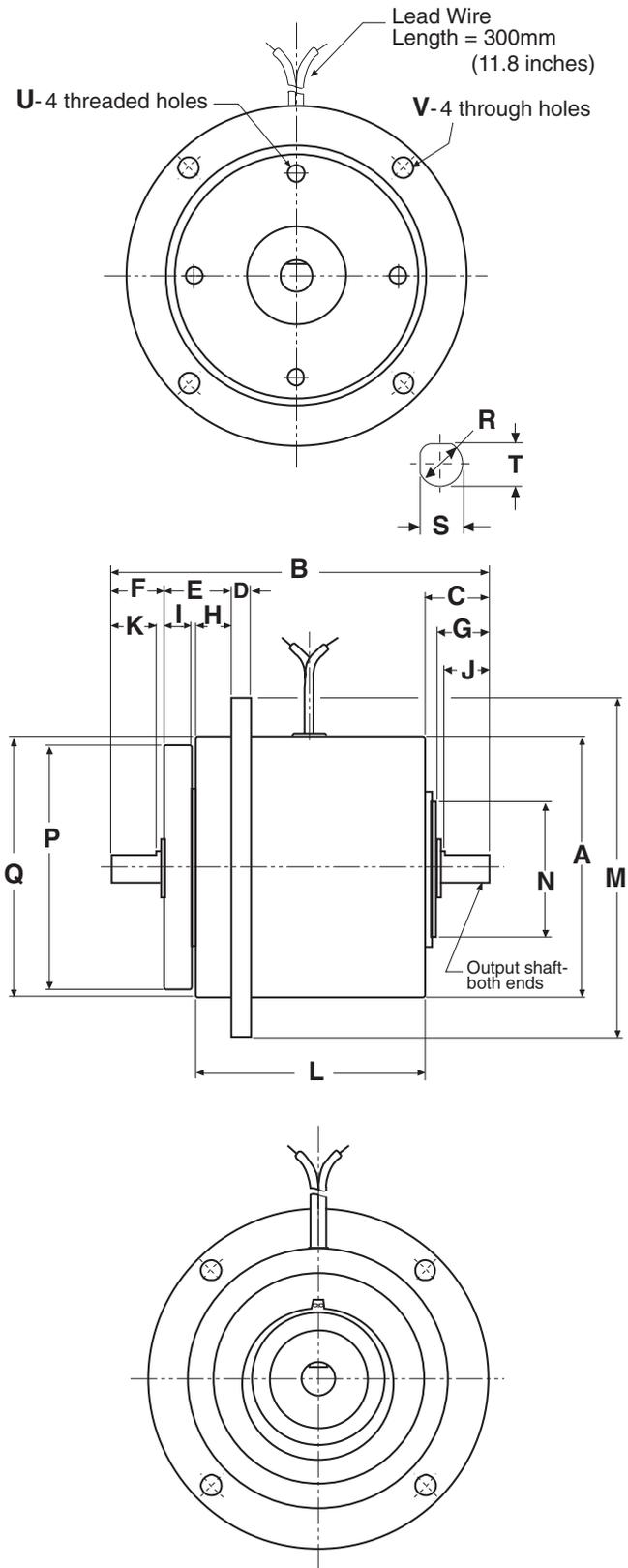
**Note:** All dimensions are nominal unless otherwise noted.

Model	A mm (in.)	B mm (in.)	C mm (in.)	D mm (in.)	E mm (in.)	F mm (in.)	G mm (in.)	H mm (in.)	I mm (in.)	J mm (in.)	K mm (in.)	L mm (in.)	M mm (in.)	N mm (in.)
PMC-10A3	58 (2.28)	77 (3.03)	14 (0.55)	4 (0.16)	15 (0.59)	12 (0.47)	12 (0.47)	8 (0.31)	6 (0.24)	10 (0.39)	10 (0.39)	51 (2.01)	76 (2.99)	30 (1.18)
PMC-20A3	69 (2.72)	116 (4.57)	33 (1.30)	4 (0.16)	22 (0.87)	25 (0.98)	24 (0.94)	15 (0.59)	6 (0.24)	20 (0.79)	20 (0.79)	51 (2.01)	92 (3.62)	35 (1.38)

P		Q		Shaft Dimensions R		S	T	U		V		
mm	(in.)	mm	(in.)	mm	(in.)	mm (in.)	mm (in.)	Thread Size	Thread Depth mm (in.)	Bolt Circle mm (in.)	Hole Size mm (in.)	Bolt Circle mm (in.)
54.000	2.1260	58.000	2.2835	7.000	0.2756	6	—	M4	6	46	4.5	68
53.970	2.1248	57.970	2.2823	6.985	0.2750	0.24	—		(0.24)	(1.81)	(0.18)	(2.68)
54.000	2.1260	69.000	2.7165	12.000	0.4724	11.5	11.5	M4	6	46	4.5	82
53.970	2.1248	68.970	2.7154	11.988	0.4720	(0.45)	(0.45)		(0.24)	(1.81)	(0.18)	(3.23)

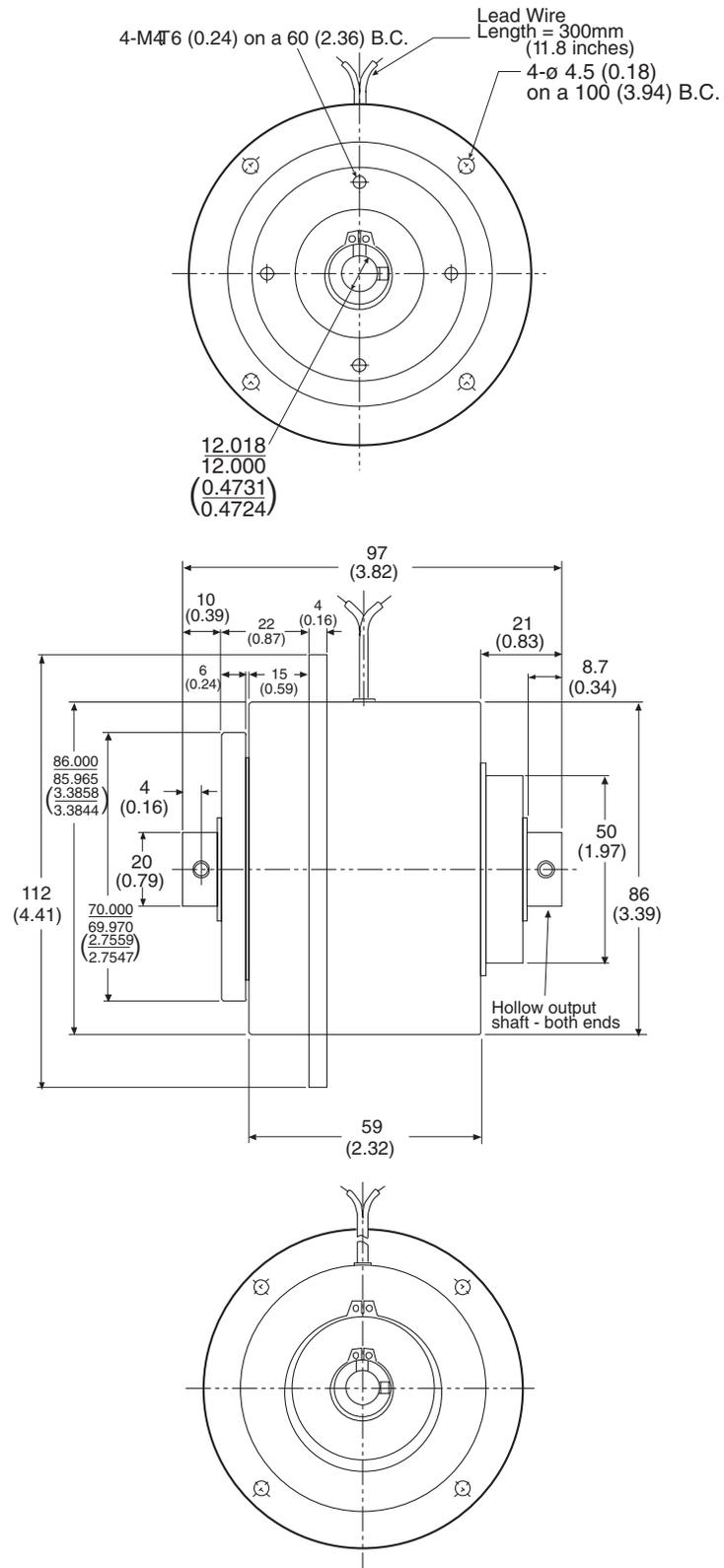
# Dimensions

## PMC – 10 & 20



# Dimensions

## PMC - 40



# 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.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

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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Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## **Changes in Dimensions and Specifications**

All dimensions and specifications shown in Warner Electric catalogs are subject to change without notice. Weights do not include weight of boxing for shipment. Certified prints will be furnished without charge on request to Warner Electric.



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