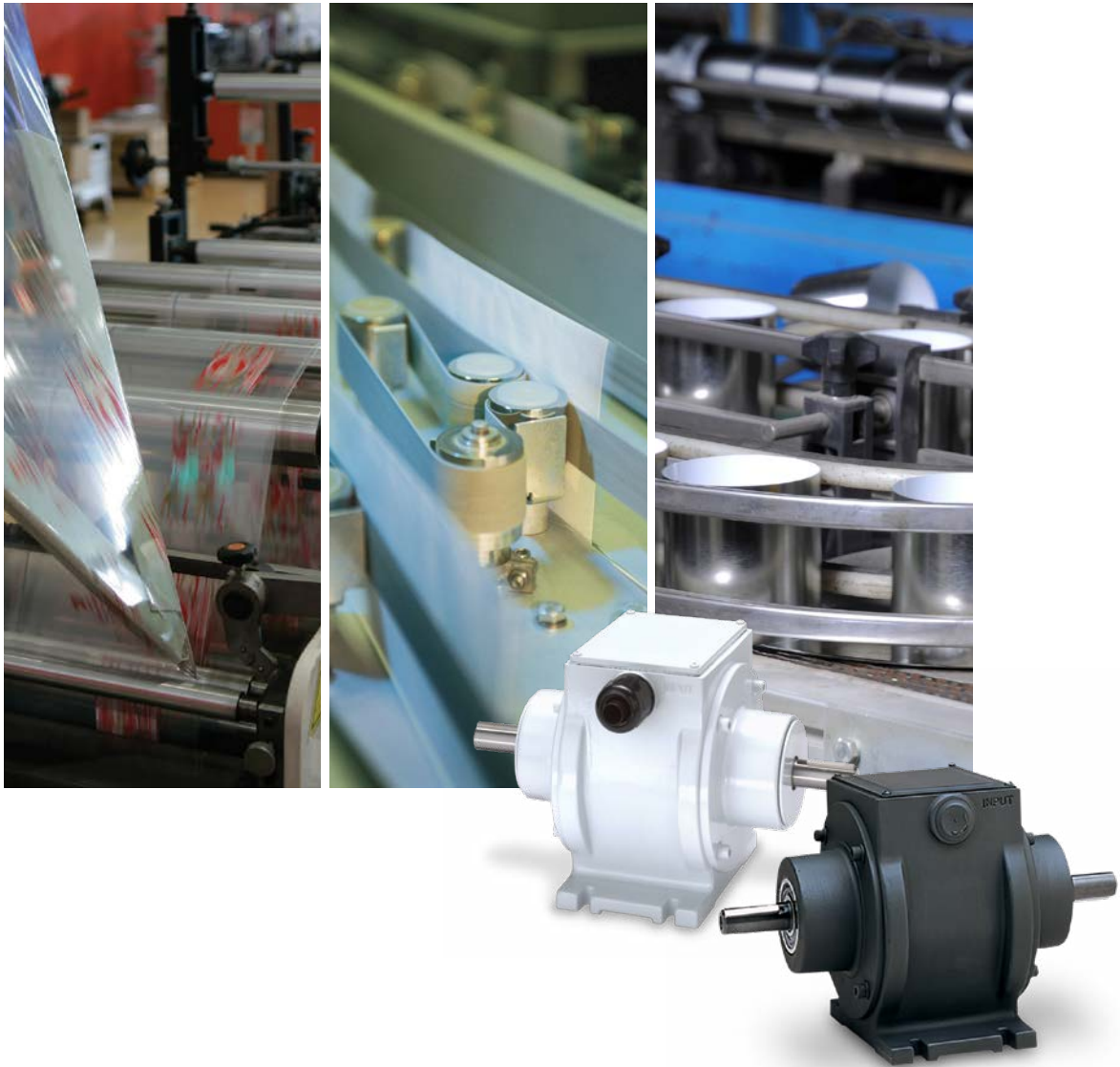


ALTRA INDUSTRIAL MOTION

## Base Mounted Clutch/Brake Combinations



# Warner Electric

Founded in 1927, Warner Electric has grown to become a global leader in the development of innovative electromagnetic clutch & brake solutions. Warner Electric engineers utilize the latest materials and manufacturing technologies to design long life, easy-to-use clutches and brakes that provide improved accuracy and repeatability. Warner Electric offers the broadest selection of industrial clutches, brakes, controls and web tension systems available from a single manufacturer.

Reliable Warner Electric components are used in a wide range of markets including material handling, packaging machinery, food & beverage, elevator & escalator, turf & garden, agriculture, off-highway, forklift, crane and motion control. Applications include conveyors, lift trucks, wrapping machines, servo motors, capping equipment, combines, balers, baggage handling systems, military vehicles, hoists and lawn mowers.

VISIT US ON THE WEB AT **[WARNERELECTRIC.COM](http://WARNERELECTRIC.COM)**



# Altra Motion

Altra is a leading global designer and producer of a wide range of electromechanical power transmission and motion control components and systems. Providing the essential control of equipment speed, torque, positioning, and other functions, Altra products can be used in nearly any machine, process or application involving motion. From engine braking systems for heavy duty trucks to precision motors embedded in medical robots to brakes used on offshore wind turbines, Altra has been serving customers around the world for decades.

Altra's leading brands include **Ameridrives**, **Bauer** Gear Motor, **Bibby** Turboflex, **Boston** Gear, **Delevan**, **Delroyd** Worm Gear, **Deltran**, **Formsprag** Clutch, **Guardian** Couplings, **Huco**, **Jacobs** Vehicle Systems, **Kilian**, **Kollmorgen**, **Lamiflex** Couplings, **Marland** Clutch, **Matrix**, **Nuttall** Gear, **Portescap**, **Stieber**, **Stromag**, **Svendborg** Brakes, **TB Wood's**, **Thomson**, **Twiflex**, **Warner** Electric, **Warner** Linear and **Wichita** Clutch.

VISIT US ON THE WEB AT **[ALTRAMOTION.COM](http://ALTRAMOTION.COM)**



# Base Mounted Clutch/Brake Combinations

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# Packaged Performance Products

## Electromagnetic Clutches and Brakes

### Packaged Products Benefits

Warner Electric Packaged Products come pre-assembled, ready to install right out of the box.

Warner Electric Packaged Products consist of a single part number in most cases. One part number to inventory, one part number to track in your engineering system.

All Warner Electric packaged products incorporate our Autogap™ mechanism that automatically adjusts for wear. This eliminates the need for maintenance, but more importantly, it ensures the same engagement time cycle after cycle after cycle through the whole life of the unit ensuring consistent product manufacturing processes.

Warner Electric Packaged designs are available for:

- C-face mount applications
- Parallel shaft applications
- Base mount applications

### The Basics

The electric clutch and brake has been called the best thing that ever happened to the electric motor. It's simple, electric clutches and brakes do all the work, while permitting motors to run smoothly and continuously at their most efficient speed by connecting/disconnecting the motor and the load. Fast starts and stops, easy control interface, remote pushbutton operation and smooth acceleration and deceleration are outstanding user benefits.

### Reliable Performance

- ☐ High cycle rates
- ☐ Smooth soft starts
- ☐ Cushioned stops
- ☐ Accurate positioning
- ☐ Indexing
- ☐ Jogging
- ☐ Reversing
- ☐ Speed changing

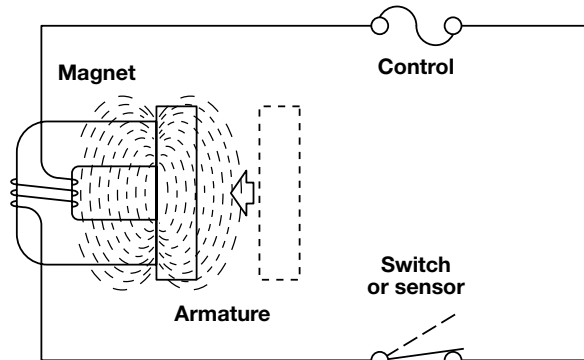


# Packaged Performance Products

## Electromagnetic Clutches and Brakes

### Principle of Operation

A key feature of Warner Electric brakes and clutches is the method of actuation. Like an electromagnet, they have two basic parts. A magnetic field is generated as soon as the current flows through the magnet coil. This draws the armature into direct contact with the magnet. The strength of the magnetic field is directly proportional to the amount of current applied. Full range torque control from 0 to 100% is as simple as turning the knob on a light dimmer.



### Fast and Accurate

The benefits of electric actuation combined with the use of small, low inertia components is fast response, high cycle rates, and increased accuracy. While other devices are often sluggish and slow to respond, electric brakes and clutches respond instantly, resulting in higher productivity and better consistency.

### Easy to Select

Most of the time, all you need to know is motor horsepower and the speed at the brake or clutch location. Warner Electric takes care of the rest. The performance you require is built in, and with the broad range of products to choose from, you won't have to compromise with a clutch or brake that's a little too big or a little too small.

### Maintenance Free

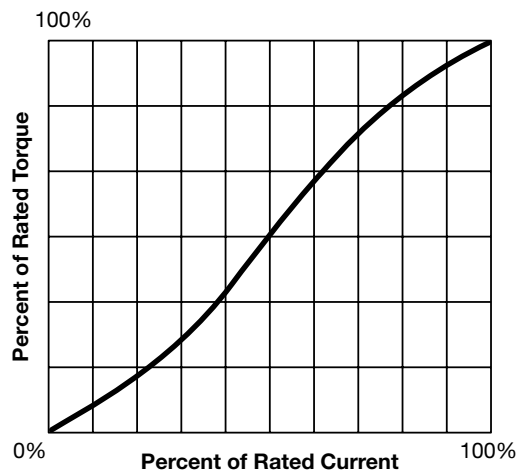
Warner Electric brakes and clutches are clean and quiet. They require no maintenance. They never need lubrication, and they're completely self adjusting for wear. No complicated air system or messy hydraulics. Warner Electric brakes and clutches are outstandingly trouble free.

### Controllable

Electric brakes and clutches are incredibly easy to control. The shift from positive, instantaneous engagement to soft, cushioned starts and stops is as simple as turning a knob.



### Torque/Current Curve



# Packaged Performance Products



## NEMA C-face Clutches, Brakes and Clutch Brake Combinations P-8586-WE

### Electro Module

**Individual Clutch and Brake Modules**



#### EM Series

**Modular Components that are Easily Combined**

- ☐ 5 sizes
- ☐ 16 clutch and brake modules
- ☐ 16 to 95 lb. ft. torque range

Individual modules may be used in combination to form clutches, brakes or clutch/brake packages.

Electro Modules can be bolted directly to NEMA C-face motors or reducers, or base mounted for stand alone operation.

See P-8586-WE for Service Parts

### UniModule®

**One Piece Preassembled Clutches and Clutch/Brakes**



#### UM Series

**C-face or Base Mounted Units**

- ☐ 5 sizes
- ☐ 20 combinations
- ☐ 16 to 95 lb. ft. torque range

UniModule clutches and clutch/brake packages offer the ultimate in installation convenience.

Can be motor or reducer mounted, or used as a separate drive unit powered from a prime mover.

See P-8586-WE for Service Parts

#### UM Smooth-Start

**Soft Engage Designs**

- ☐ 5 sizes
- ☐ 10-57 lb.ft. torque range

Smooth-Start designs allow for a soft engage clutch and brake without sacrificing unit life.

#### UM-C Series

**High Performance Version for High Cycle Rate Applications**

- ☐ 3 sizes
- ☐ 6 combinations
- ☐ 16 to 95 lb. ft torque range

The UM-C units are UniModules with ceramic faced components, specifically designed for long life, high energy, and high cycle rate applications.

### Enclosed UniModule®

**Preassembled Units Offer Clean, Quiet Operation**



#### EUM Series

**Totally Enclosed Clutch and Brake Packages**

- ☐ 5 sizes
- ☐ 3 combinations
- ☐ 16 to 95 lb. ft. torque range

Totally enclosed, rugged enclosure keeps wear particles in and contaminants out. Finned for rapid heat dissipation and long life.

See P-8586-WE for Service Parts

#### EUM-W Series

**Washdown Version**

- ☐ 5 sizes
- ☐ 8 combinations
- ☐ 16 to 95 lb. ft. torque range

The washdown version of the EUM uses stainless steel shafting, USDA approved coating, corrosion resistant fasteners and special seals.

See P-8586-WE for Service Parts

# Packaged Performance Products



## Shaft Mounted Clutches & Brakes P-8587-WE



## Base Mounted Clutch/Brake Combinations P-8588-WE

### Electro Clutches Electro Brakes

#### Shaft Mounted Units



#### EC Series Clutches

##### Pre-Packaged Convenience

- ❑ 6 sizes
- ❑ 16 to 465 lb. ft. torque range

All the features of an electric clutch in a convenient, pre-packaged assembly. Mounts on any through shaft or extended motor shaft. Easy-to-assemble with standard sheaves, pulleys, gears and sprockets. Packaged design. No assembly required. Long life. No maintenance.

See P-8587-WE for Service Parts

#### EB Series Brakes

##### Torque Arm Mounting

- ❑ 6 sizes
- ❑ 16 to 465 lb. ft. torque range

Torque arm feature makes Electro Brakes easy to mount on any motor or through shaft. Packaged design. No assembly required. Long life. No maintenance.

See P-8587-WE for Service Parts

### Advanced Technology Clutches and Brakes

#### Extra Rugged Design



#### ATC Series Clutches ATB Series Brakes

##### Replaceable Friction Faces

- ❑ 3 sizes
- ❑ 25 to 115 lb. ft. torque range

Rugged, heavy duty units designed for extra long life and efficient operation. Cast components for durability. Finned armatures for high heat dissipation.

Friction faces are designed to allow for replacement without replacing valuable, non-wear components. Provides superior wear life with reduced engagement noise.

See P-8587-WE for Service Parts

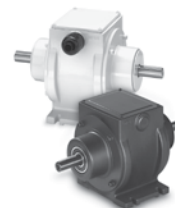
#### SFP Series Clutches

- ❑ Pre-assembled SF – No assembly required
- ❑ Ball bearing mounted field and armature
- ❑ 70 inch pound and 270 inch pound sizes
- ❑ Bore sizes from 3/8" to 1/2" and 1/2" to 1"

SFP clutches provide the simplicity and cost efficiency of the Basic SF design, but with a ball bearing mounted armature hub.

### Electro Pack Clutch/Brakes

#### Foot Mounted Units



#### EP Series

##### Totally Enclosed Units

- ❑ 8 sizes
- ❑ 15 lb. to 1350 lb. ft. torque range

Electro Packs are rugged, pre-assembled clutch and brake combinations in enclosed, foot mounted housings.

See P-8588-WE for Service Parts

#### EP-C Series

##### High Performance Version

- ❑ 2 sizes
- ❑ 15 and 70 lb. in. torque

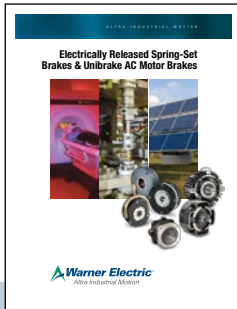
Ceramic faced wear components provide long life for high cycle rate use. Consistent torque and cycle repeatability with Smooth-Start/stop control.

#### EP-W Series

##### Washdown Design

- ❑ 2 sizes
- ❑ 70 and 270 lb. in. static torque ranges
- ❑ USDA approved coating
- ❑ Stainless steel shaft and hardware
- ❑ Available in 24 or 90 volt DC

# Packaged Performance Products



## Electrically Released Spring-Set Brakes & Unibrake AC Motor Brakes P-8589-WE

### Spring-Set Brakes

**For Power-Off Static Holding and Emergency Stopping Applications**

**WARNING** For general use in horizontal shaft applications only. For possible vertical applications, contact technical support.



#### ERS Series

**Static Engaged**

- 5 sizes
- 1.5 to 100 lb. ft. holding torque

Designed for static holding. ERS models feature multiple coil springs that force armature and friction faces together to generate braking torque when power is off. The Electromagnet counters the spring force to disengage the brake when power is applied.

Although this brake should be engaged only when the shaft is at rest, it can occasionally act as a dynamic braking device to stop a rotating load in an emergency situation.

#### Spring Set Brake Module

- 7 to 100 lb. ft. holding torque
- NEMA C-face version of the ERS Series



#### ERD Series

**Dynamic Braking**

- 8 sizes
- 4 to 221 lb. ft. holding torque

ERD units are electrically released, static and dynamic engaged, spring-set brakes for power-off load holding applications. These spring-set brakes automatically stop and hold a load in the event of a power failure or other emergency stop situations. Fully dynamic friction material allows for repeated braking cycles from full motor speed with no torque fade. An optional manual release allows the brake to be released by hand.

#### Unibrake Series AC Motor Brakes

- Spring Set/Solenoid Released
- Direct acting/manual release standard 3 families
- 3, 6, 10 and 15 lb. ft. capacity
- Steel or cast iron covers
- Rear mount or double C-face designs

### Permanent Magnet Brakes

**For Power-Off Dynamic Stopping and Cycling Applications**



#### FB Series

**Shaft Mounted, Dynamic Braking**

- 3 models
- 10.5 to 56 lb. ft. static torque

Permanent magnet brakes are designed to dynamically stop and hold a moving load and also for high cycle rate stopping. Electric power to the coil nullifies the attraction of the permanent magnet, releasing the brake.

FB models are pre-assembled and feature a torque arm for convenient shaft mounting.

See P-8590-WE for Service Parts.

#### ER Series

**Flange Mounted, Dynamic Braking**

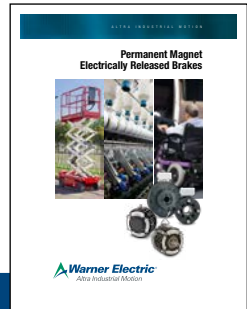
- 5 models
- 10.5 to 400 lb. ft. static torque

The ER style brake offers a bulk head flange mounting system, the highest torque rating offered by Warner Electric in the power released series, high cycle rate capability, and excellent life. They require some assembly.

See P-8590-WE for Service Parts.

# Packaged Performance Products

## Permanent Magnet Electrically Released Brakes P-8590-WE



### Electro Module

#### C-face Brake Modules



### EM-FBC Clutch/Brakes

#### Individual Module Components

- ❑ 3 sizes
- ❑ 10.5 to 56 lb. ft. torque range

Used in combination with an Electro Module motor or input clutch module for clutch/brake applications. Electrical power applied to the brake coil nullifies the permanent magnets' force and the brake releases. No springs to limit cycle rates.

### EM-FBB

#### Brake Modules

- ❑ 5 sizes
- ❑ 10.5 to 56 lb. ft. torque range

Use for brake alone applications. Mounts between a C-face motor and reducer. Recommended for dynamic cycling operations only.

### EM-MBFB

#### Motor Brakes

- ❑ 4 sizes
- ❑ 56C to 215C frame motors

Mounts to the back of a double shafted C-face motor. Never needs adjustment or lubrication.

### UniModule

#### C-face Brake Modules



### UM-FBC Clutch/Brakes

#### One Piece Packages

- ❑ 4 sizes
- ❑ 7 combinations
- ❑ 10.5 to 56 lb. ft. static brake torque

UniModule pre-assembled clutch and electrically released brake packages are available in both C-face and base mounted versions.

Unique design employs powerful permanent magnets for maximum torque when power is removed from the brake coil. A small amount of electrical power applied to the brake coil nullifies the permanent magnets and the brake releases. No springs to limit cycle rates. Never any adjustment. No lubrication. These brakes are recommended for dynamic cycling operations only.

### Enclosed UniModule

#### C-face Brake Modules



### EUM-FBB Brake Modules

#### Totally Enclosed

- ❑ 4 sizes
- ❑ 6 to 32 lb. ft. static torque

Totally enclosed UniModule electrically released brake packages keep contaminants out and wear particles in for clean, quiet operation. Assembly, alignment, and preburnishing have been done at the factory. Use for brake alone applications, mountings between a motor and a gear reducer. Select the torque required for the application. Higher torque brakes stop loads faster. Lower torque models provide softer stopping to prevent boxes on conveyors from tipping or skidding.

### EUM-MBFB

#### Motor Brakes

- ❑ 4 sizes
- ❑ 56C to 215C frame motors

UniModule motor brakes are used for dynamic stopping and holding of loads when power is removed from the motor. Typical applications include conveyors, process equipment, and lifting devices. Mounts to a double shafted C-face motor.

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# **EP Base Mounted Clutch/Brake**

# **EP-C Ceramic Faced Base Mounted Clutch/Brake**

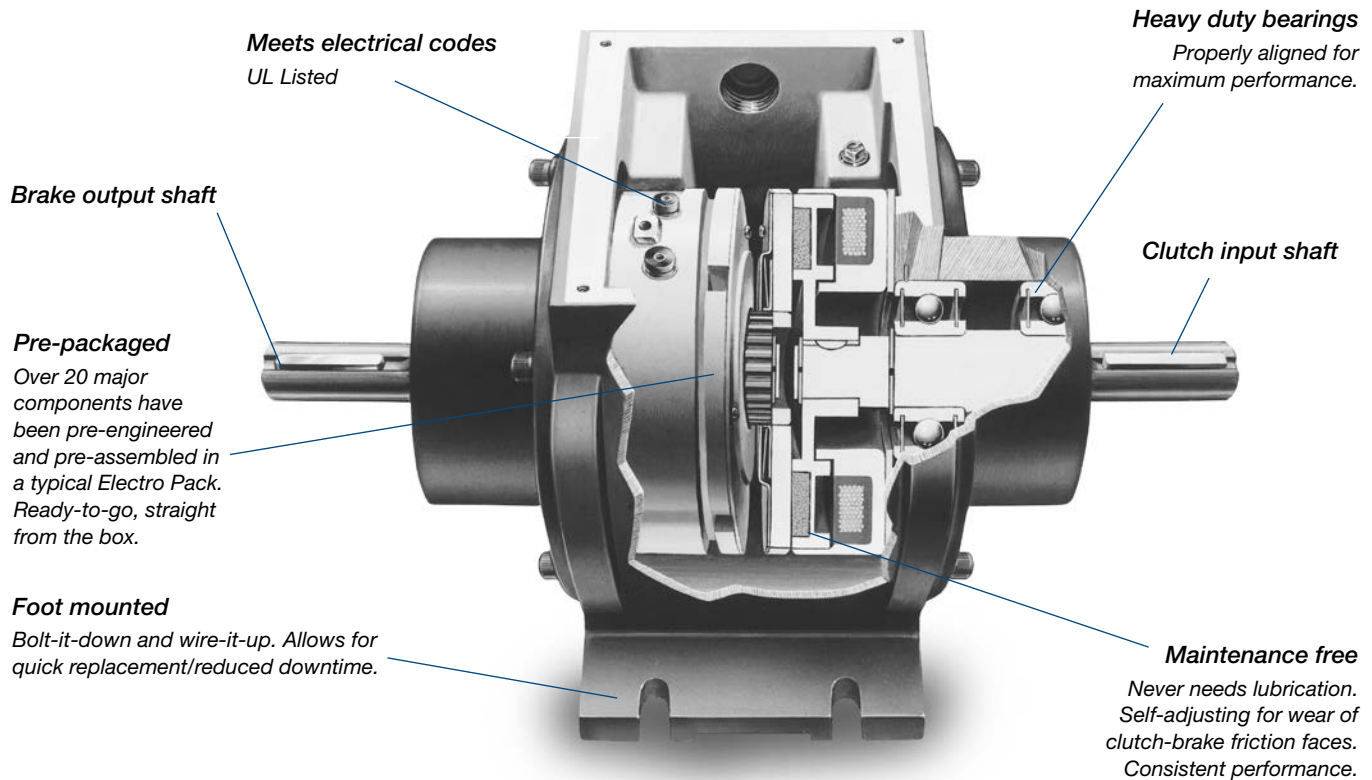
# **Washdown Electro Pack**



**A**

# EP Series Electro Pack

## Base Mounted Clutch/Brake Combinations in a Rugged Housing



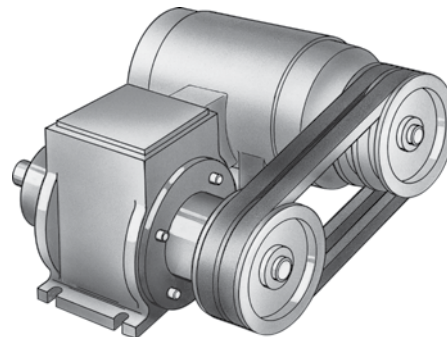
Electro Packs are rugged, pre-assembled clutch and brake combinations in an enclosed, foot mounted housing.

They are factory aligned and pre-assembled and have been designed to mate easily with industry standard motors and reducers with v-belts, pulleys, chain and sprockets, in line couplings and timing belt drives.

### Features

- Bolt-it-down and wire-it-up . . . it's ready to go!
- Maintenance free
- A wide torque range from 15 lb. in. to 1350 lb. ft.

### Typical Application



A foot mounted Electro Pack combines with a motor in a parallel shaft drive application.

# EP Series Electro Pack

## Selection/Ordering Information

### Horsepower vs. Shaft Speed

HP ▼	SHAFT SPEED AT CLUTCH (IN RPM)																				
	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4500	5000
1/50																					
1/20										EP-170											
1/12																					
1/8																					
1/6										EP-250											
1/4																					
1/3																					
1/2																					
3/4										EP-400											
1																					
1-1/2										EP-500											
2																					
3																					
5										EP-825											
7-1/2																					
10										EP-1000											
15																					
20										EP-1525											
25																					
30																					
40										EP-1525HT											

\*For applications with speeds below 100RPM, please contact Warner Electric Application Support.

### Selection Procedure

Determine the shaft speed at the Electro Pack location. The number listed at the intersection of horsepower and speed is the size Electro Pack you require.

### Part Numbers

Model No.	Voltage DC	Part No.
EP-170	6	5633-273-002
	24	5633-273-003
	90	5633-273-005
EP-250	6	5130-273-031
	24	5130-273-032
	90	5130-273-034
EP-400	6	5131-273-009
	24	5131-273-010
	90	5131-273-011
EP-500	6	5230-273-003
	24	5230-273-011
	90	5230-273-002
EP-825	6	5231-273-003
	24	5231-273-004
	90	5231-273-002
EP-1000	6	5232-273-003
	24	5232-273-005
	90	5232-273-002
EP-1525	6	5234-273-003
	90	5234-273-002
EP-1525HT	24	5234-273-017
	90	5234-273-012

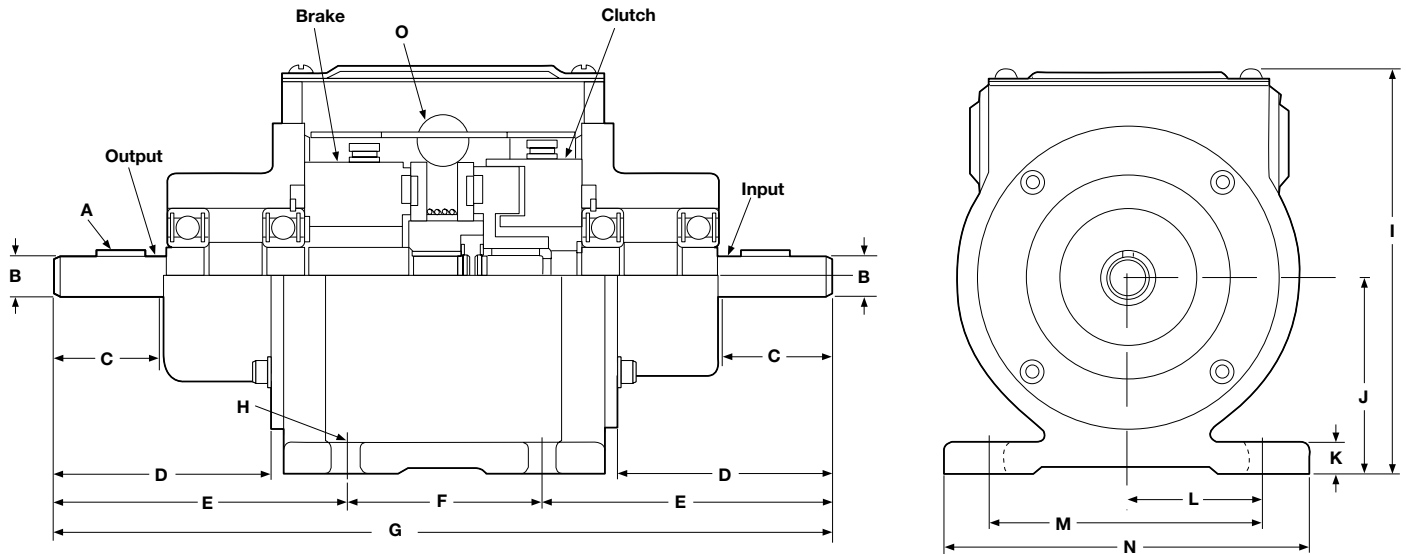
When ordering, specify size, voltage, and part numbers.

### Specifications

Electro-Pack Size	Horsepower @ 1800 RPM	Static Torque	Max. RPM	Voltage DC
EP-170	1/8	15 lb. in.	10,000	6, 24 or 90
EP-250	1/2	70 lb. in.	7,500	6, 24 or 90
EP-400	1	270 lb. in.	4,500	6, 24 or 90
EP-500	2	50/40 lb. ft.	4,000	6, 24 or 90
EP-825	7-1/2	125 lb. ft.	3,600	6, 24 or 90
EP-1000	10	240 lb. ft.	3,000	6, 24 or 90
EP-1525	25	700 lb. ft.	1,800	6 or 90
EP-1525HT	40	1350 lb. ft. clutch 700 lb. ft. brake	1,800	24, 90

# EP Series Electro Pack

## EP-170, EP-250, EP-400



### Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B	C Min.	D	E	F	G Max.	H	I	J	K	L	M	N	O
170	3/32 x 3/64	.3745 .3735 Dia.	.750	1.406	2.203	1.500	6.000	.250 Wide (4 slots)	3.437	$\frac{1.662}{1.652}$	.312	1.110	2.220	3.250	1/2 14 NPT Conduit x 2
250	1/8 x 1/16	.4995 .4985 Dia.	1.250	2.468	3.312	2.250	8.968	.312 Wide (4 slots)	5.281	$\frac{2.318}{2.308}$	.375	1.625	3.250	4.250	1/2 14 NPT Conduit x 2
400	3/16 x 3/16 x 1-1/2	.7495 .7485 Dia.	1.875	3.515	4.593	2.500	11.781	.312 Wide (4 slots)	6.937	$\frac{3.474}{3.464}$	.500	2.578	5.156	6.000	1/2 14 NPT Conduit x 2

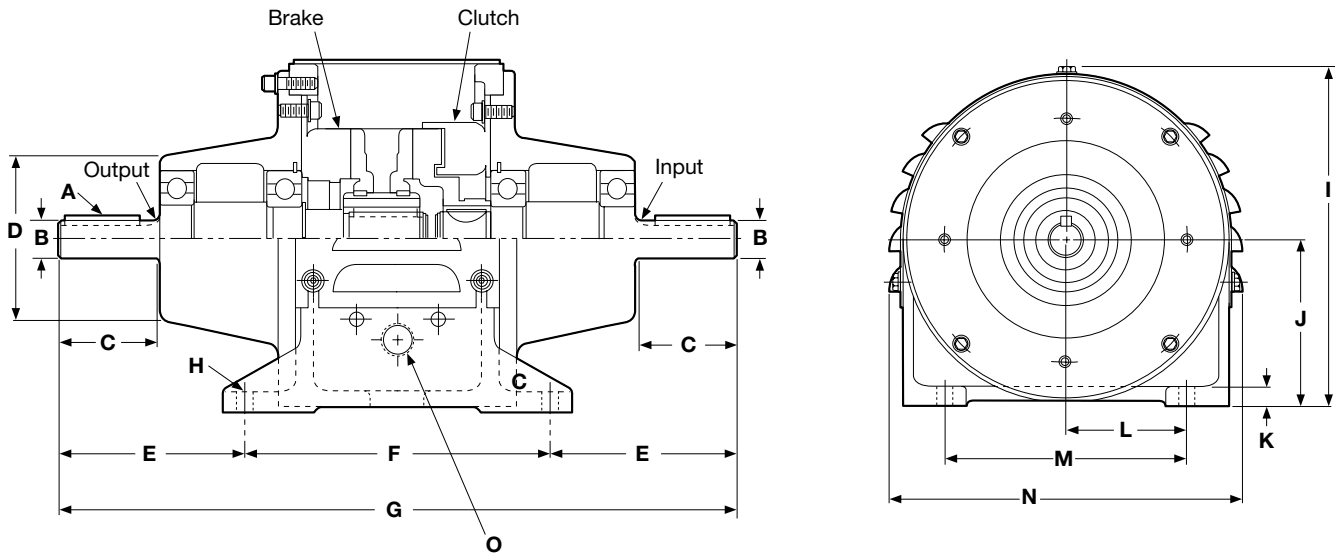
### Specifications

Model Size	Voltage DC	Static Torque lb. in.	Inertia* -WR <sup>2</sup> (lb-in <sup>2</sup> )		Max. RPM	Weight lbs.
			Output	Input		
EP-170	6	15	.031	.036	10,000	2.5
	24	15	.031	.036	10,000	2.5
	90	15	.031	.036	10,000	2.5
EP-250	6	70	.331	.293	7,500	7.1
	24	70	.331	.293	7,500	7.1
	90	70	.331	.293	7,500	7.1
EP-400	6	270	2.566	2.222	4,500	19.7
	24	270	2.566	2.222	4,500	19.7
	90	270	2.566	2.222	4,500	19.7

For Information on Coil Data see page G-10, SF/PB units of the appropriate size.

# EP Series Electro Pack

EP-500



## Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B Dia.	C Min.	D Max. Dia.	E	F	G Max.	H Dia.	I	J	K	L	M	N Max.	O
500	3/16 x 1-3/4	.8750	2.218	3.796	4.234	7.000	15.515	.406 (4 holes)	8.218	4.004	.500	2.937	5.875	8.734	1/2 NPT Conduit x 2

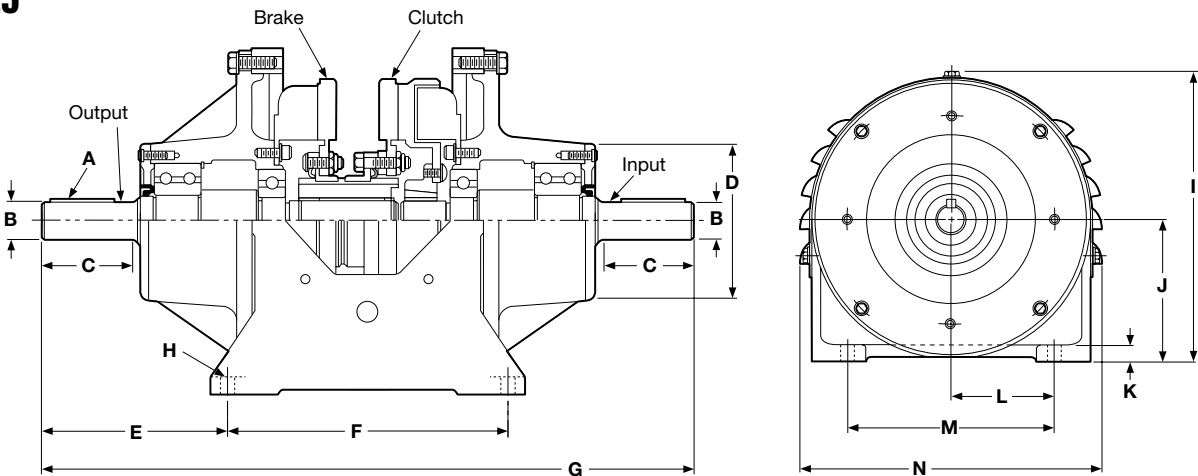
## Specifications

Model Size	Voltage DC	Unit	Static Torque	Inertia*-WR² lb.ft.²	Max. RPM	Weight lbs.
EP-500	6, 24 and 90	Clutch Brake	50 40	.039 .063	4000	56

For Information on Coil Data see page G-10, SF/PB units of the appropriate size.

# EP Series Electro Pack

## EP-825



Dimensions

All dimensions are nominal, unless otherwise noted.

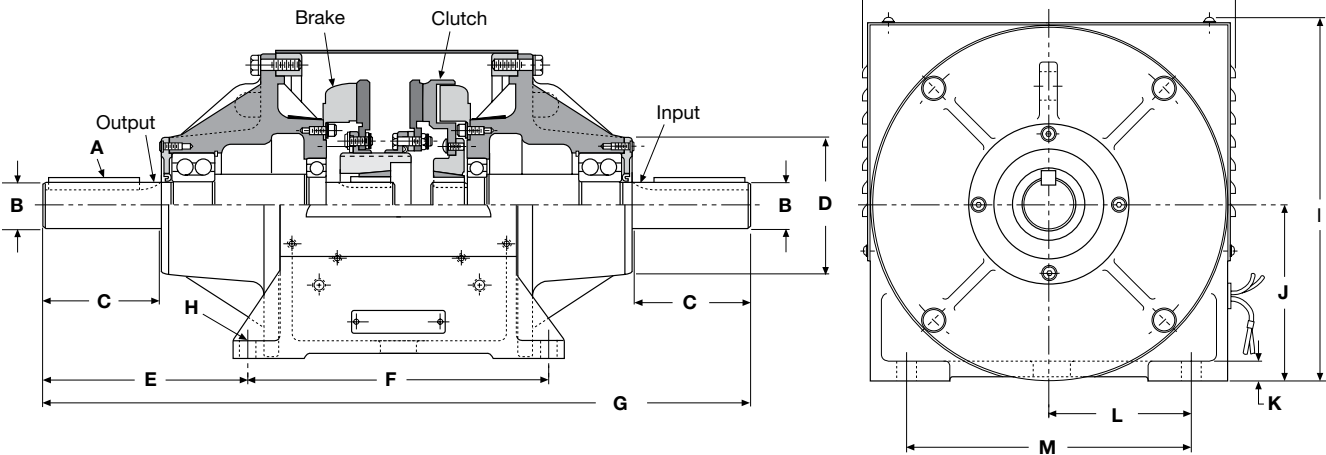
Size	A	B Dia.	C Min.	D Max. Dia.	E	F	G Max.	H	I	J	K	L	M	N Max.
825	1/4 x	1.1250	2.875	5.000	5.734	8.500	20.031	.406 Dia. (4 holes)	10.812	5.254	.562	4.250	8.500	11.609
	1/4 x 2	1.1245								5.252				

## Specifications EP-825

Model Size	Voltage DC	Unit	Static Torque	Inertia*-WR <sup>2</sup> (lb.ft. <sup>2</sup> )	Max. RPM	Weight lbs.
EP-825	6, 24 & 90	Clutch	125	.651	3600	123
		Brake	125	.242		

For Information on Coil Data see page G-10,  
SF/PB units of the appropriate size.

## EP-1000



Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B Dia.	C Min.	D Dia.	E	F	G Max.	H	I	J	K	L	M	N Max.
1000	1/2 x	1.875	4.750	5.687	8.250	12.250	28.750	.656 Dia. (4 holes)	12.500	6.255	.718	5.000	10.000	12.875
	1/2 x	1.874								6.241				
	3-3/4													

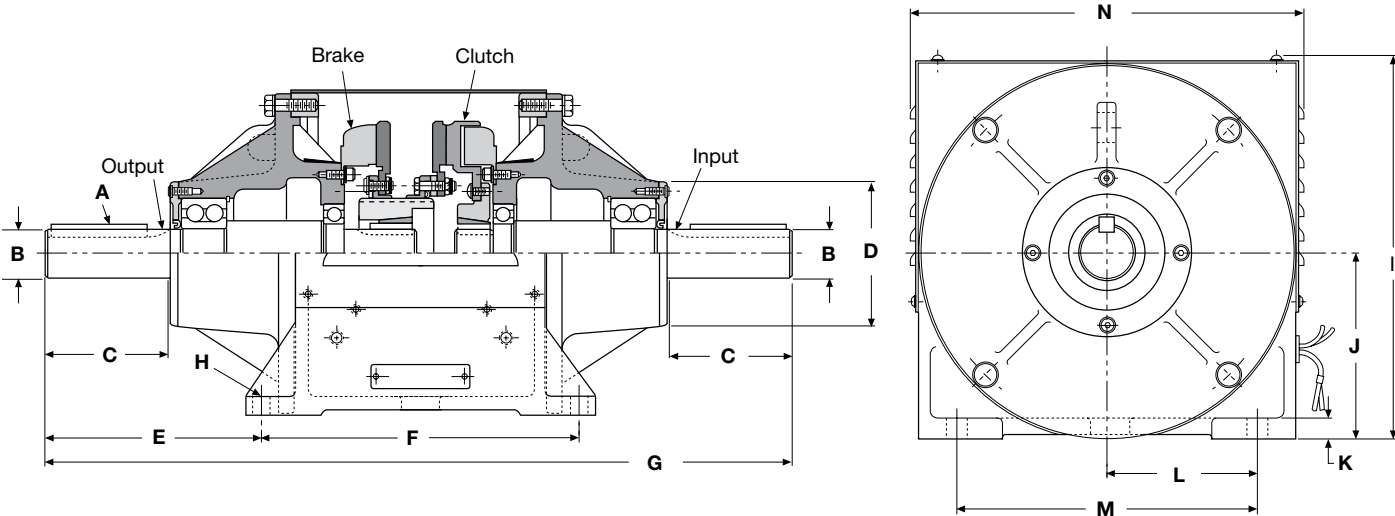
## Specifications EP-1000

Model Size	Voltage DC	Static Torque	Inertia*-WR <sup>2</sup> (lb.ft. <sup>2</sup> )		Max. RPM	Weight lbs.
			Output Side	Input Side		
EP-1000	6	240 lb.ft.	1.45	1.01	3000	288
	24	240 lb.ft.	1.45	1.01	3000	288
	90	240 lb.ft.	1.45	1.01	3000	288

For Information on Coil Data see page G-10,  
SF/PB units of the appropriate size.

# EP Series Electro Pack

## EP-1525, EP-1525HT



### Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B Dia.	C Min.	D Max. Dia.	E	F	G Max.	H	I	J	K	L	M	N Max.
1525	5/8 x	2.375						.796 Dia.		9.005				
	5/8 x	2.374	5.750	7.500	8.468	16.500	33.500	(4 holes)	18.250	8.991	1.000	7.000	14.000	18.875
	4-1/4													
1525HT	5/8 x	2.375						.796 Dia.		9.005				
	5/8 x	2.374	5.750	7.500	8.468	16.500	33.500	(4 holes)	18.250	8.991	1.000	7.000	14.000	18.875
	4-1/4													

### Specifications

Model Size	Voltage DC	Unit	Static Torque lb.ft.	Inertia*-WR <sup>2</sup> (lb.ft. <sup>2</sup> )		Max. RPM	Weight lbs.
				Output Side	Input Side		
EP-1525	6, 90	Clutch	700	7.89	5.68	1800	655
		Brake	700				
EP-1525HT	24, 90	Clutch	1350	7.89	6.41	1800	656
		Brake	700				

For Information on Coil Data see page G-10, SF/PB units of the appropriate size.

# EP-C Series Electro Pack – Ceramic Faced

## PerformancePlus™ clutch/brake combination in a foot mounted housing

**Single point wire exit**

### Pre-packaged

Major components have been pre-engineered and pre-assembled in a typical Electro Pack. Ready-to-go, straight from the box.

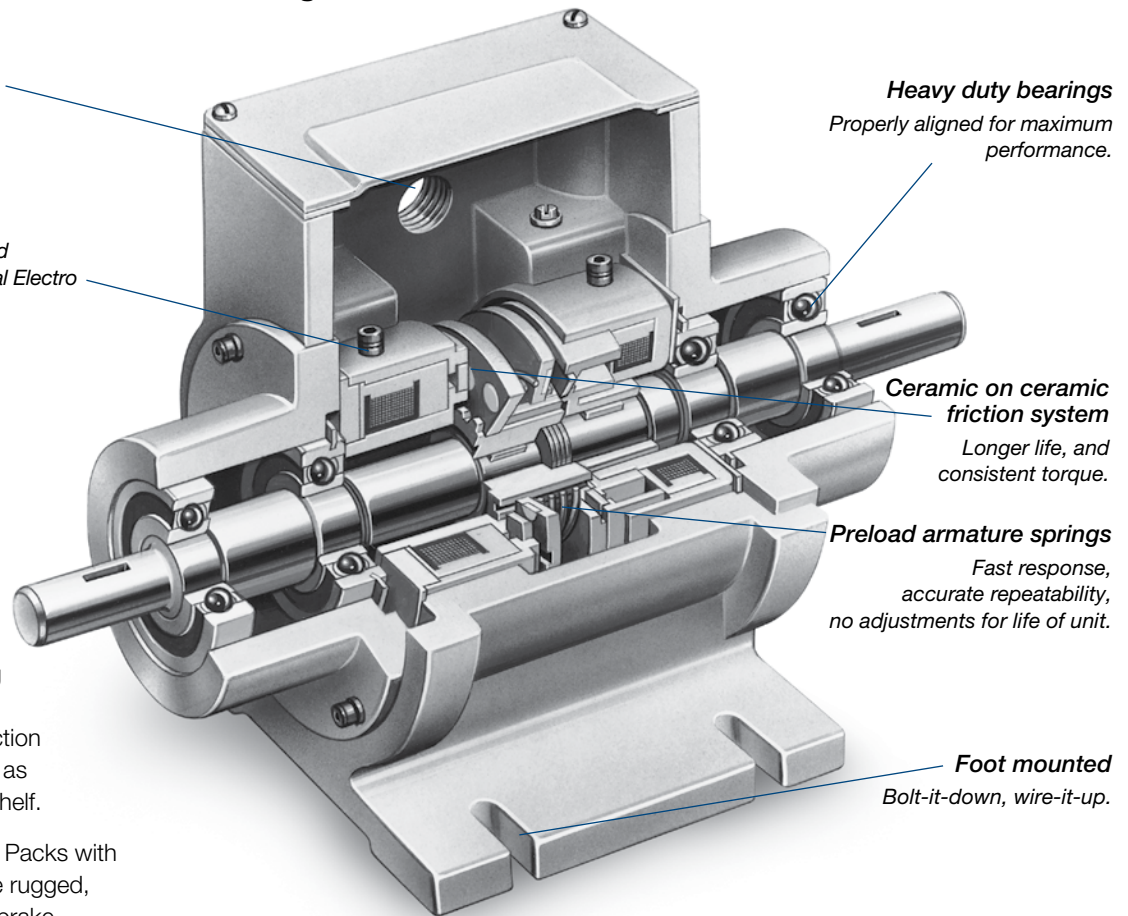
PerformancePlus™ Electro Packs use ceramic friction system technology. This technology has been in use for many years in specialized applications. Through the development of advanced manufacturing techniques, the improved performance of ceramic friction materials are now available as standard products off the shelf.

PerformancePlus™ Electro Packs with ceramic friction material are rugged, pre-assembled clutch and brake combinations in base mounted housings. They have been designed to be installed in standard power transmission systems with V-belts and pulleys, chain and sprockets, in line couplings, and timing belt drives.

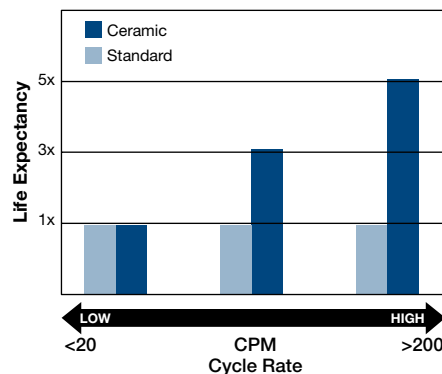
When your application calls for a long life clutch/brake because of high cycle rates or demanding consistency, choose the PerformancePlus solution.

- Bolt-it-down and wire-it-up . . . it's ready to go!
- Available in two size; 170 and 250. Standard voltages are 24V and 90V DC.
- Maintenance free.
- Ideal for use with CBC 1000 indexers and CBC 700 OEX control.

PerformancePlus™ . . . the demanding application choice.



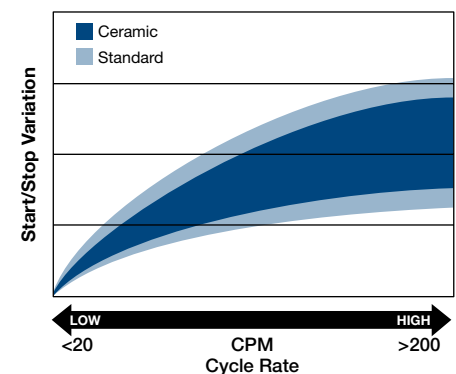
### EP-C Product Life



### Extended Life for High Cycle Rate Use

Ceramic faced clutches and brakes have been designed specifically for rapid cycling applications to satisfy today's needs for high speed equipment. Ceramic friction material provides excellent wear resistance that extends life 3 to 5 times that of standard clutch/brakes in demanding applications.

### EP-C Cycle Repeat



### Consistent Torque and Cycle Repeatability

Preloaded armatures keep the ceramic friction surfaces in light contact, providing consistent torque and cycle-to-cycle repeatability. Variation is reduced by up to 30% over standard units.

# EP-C Series Electro Pack – Ceramic Faced

## Applications/Selection

### Controllability Smooth Start/Stop

With the ceramic friction surfaces always in contact, dynamic torque response is fast and precise. When used with a CBC-700 over-excitation control and CBC-1000 programmable counter, exceptional closed loop clutch/brake performance can be achieved approaching that of more expensive motion control technologies – The PerformancePlus difference!

### Selection

PerformancePlus Electro Packs are best suited for high energy applications where long life is a premium concern. The harder a ceramic friction surface is worked, the more wear life benefit is achieved. For slower cycle rates, up to 75 cycles per minute, dependable standard clutch/brakes are still a good choice.

For high cycle rates and high energy use (generally more than 50 cycles/minute for EP-170's and EP-250's) PerformancePlus clutch/brakes are the choice.

Technical considerations for sizing and selection are torque and heat dissipation. Each merits careful consideration, especially heat dissipation. Over temperature use will have an adverse effect on bearing life and coil wire insulation integrity.

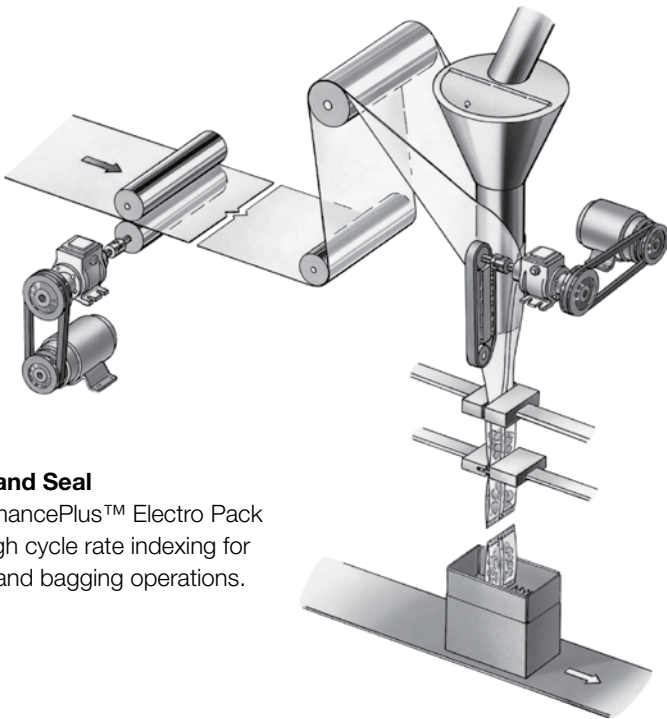
For proper sizing information, refer to the Horsepower vs. Shaft Speed chart, and the technical sizing considerations below. When ordering, specify size, voltage, and part number.

### Horsepower vs. Shaft Speed

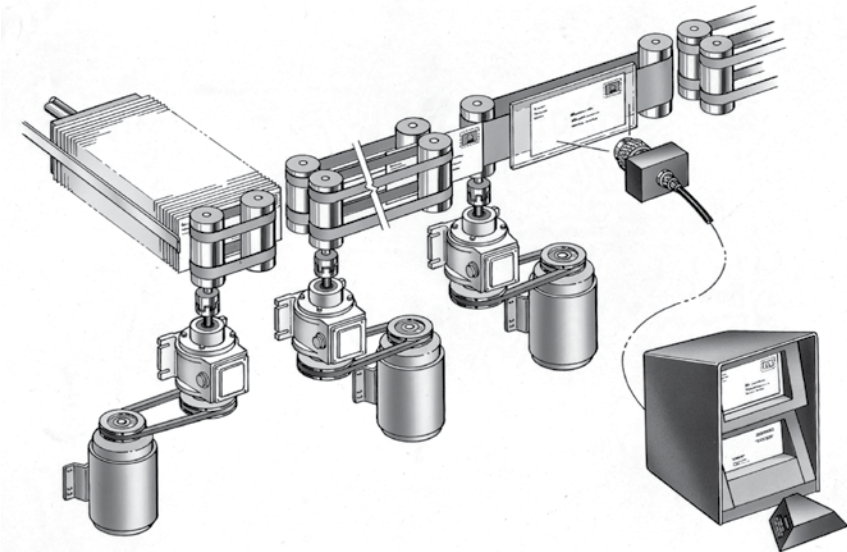
HP	SHAFT SPEED AT CLUTCH (IN RPM)																			
▼	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	5000
1/50																				
1/20										EP-170-C										
1/12																				
1/8																				
1/6										EP-250-C										
1/4																				
1/3																				
1/2																				
1																				

\*For applications with speeds below 100RPM, please contact Warner Electric Application Support.

### Typical Applications



**Form, Fill and Seal**  
The PerformancePlus™ Electro Pack provides high cycle rate indexing for packaging and bagging operations.



**Mail Processing**  
The PerformancePlus Electro Pack provides fast cycling and accurate starting and stopping.

# EP-C Series Electro Pack – Ceramic Faced

## Selection/Ordering Information

### Heat Dissipation Sizing

Friction surfaces slip during the initial period of engagement and, as a result, heat is generated. The clutch/brake selected must have a heat dissipation rating greater than the heat generated by the application. Therefore, in high inertia or high cycle rate applications, it is necessary to check the heat dissipation carefully. Inertia, speed and cycle rate are the required parameters.

These curves show the heat dissipation capability of the ceramic units.

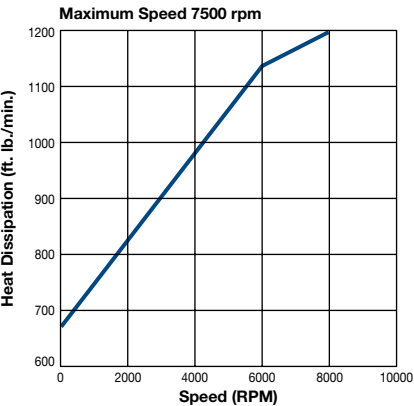
Heat dissipation requirement is calculated as follows:

$$E = 1.7 \times WR^2 \times \left(\frac{N}{100}\right)^2 \times F$$

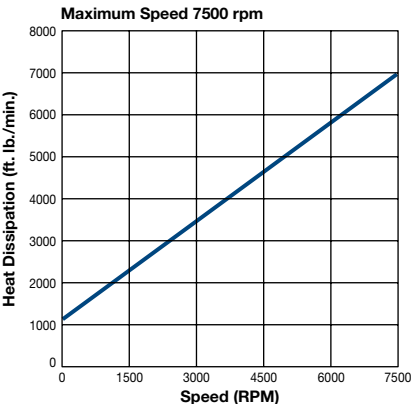
- where:
- E = Heat (lb.ft./min.)
  - WR<sup>2</sup> = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. (lb.ft.<sup>2</sup>)
  - N = Speed in revolutions per minute. (RPM)
  - F = Cycle rate in cycles per minute. (CPM)

Compare the calculated heat generated in the application to the unit ratings using the heat dissipation curves. Select the appropriate unit that has adequate heat dissipation ability.

EP-170-C



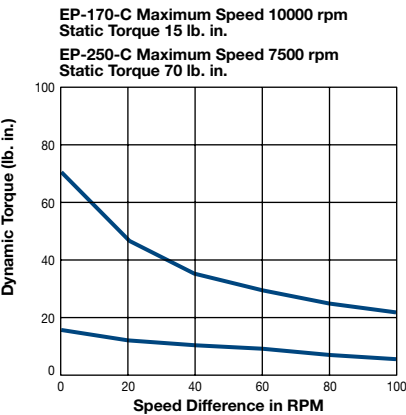
EP-250-C



### Dynamic Torque Sizing

These curves show the average dynamic torque during the slip period of engagement. Find the dynamic torque value on the curve at the clutch/brake input speed.

EP-170-C EP-250-C



For most applications, the correct size clutch/brake can be selected from the horsepower/shaft speed selection chart. Determine the motor horsepower and the RPM at the clutch/brake. The correct size unit is shown at the intersection of horsepower and shaft speed.

If the static torque requirements are known, refer to the technical ratings chart to select a unit.

### Torque Ratings

Model Size	Max. RPM	Static Torque	Voltage DC
EP-170-C	10,000	15 lb. in.	24 & 90
EP-250-C	7500	70 lb. in.	24 & 90

For some applications, the torque requirement is determined by the time allowed to accelerate and decelerate the load. (This time is generally specified in milliseconds.) For these applications, it is necessary to determine the torque requirement based on load inertia and the time allowed for engagement.

The torque requirements are calculated as follows:

$$T = \frac{WR^2 \times N}{308 \times t}$$

- where:
- T = Average Dynamic Torque (lb. ft.)  
(For EP selection, multiply by 12 to convert to units of lb. in.)
  - WR<sup>2</sup> = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. (lb. ft.<sup>2</sup>)
  - N = Speed in revolutions per minute. (RPM)
  - t = Time allowed for the engagement (sec)

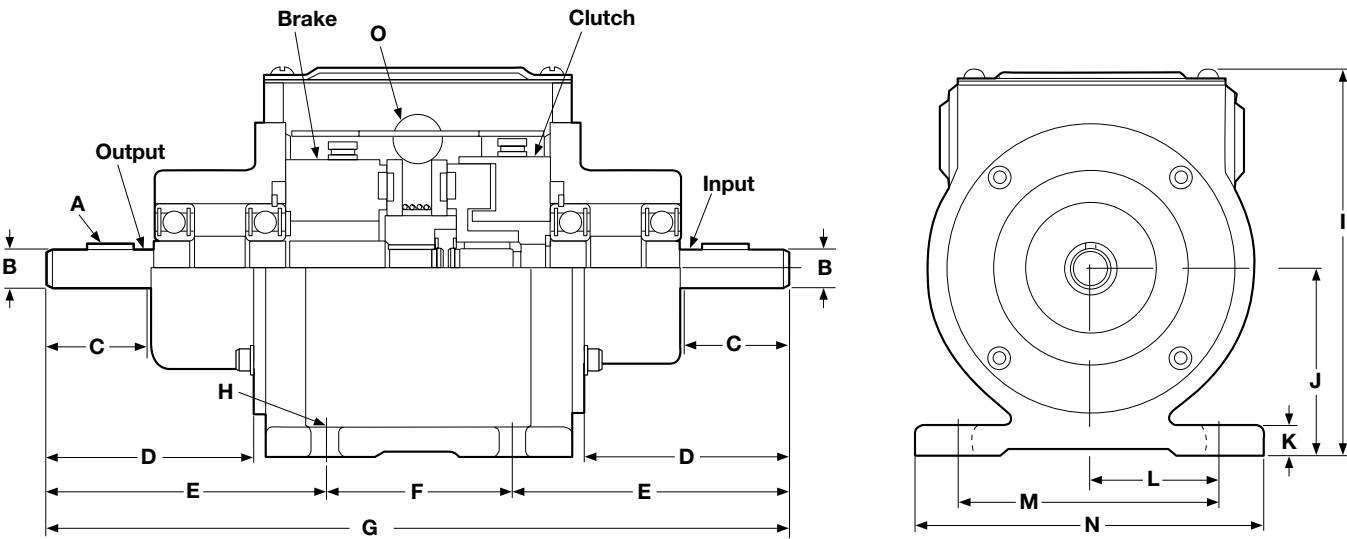
Compare the calculated torque requirement with the average dynamic torque ratings. Select a unit with adequate torque. If the unit selected on torque is different than the unit selected based on heat, select the larger unit size.

### Part Numbers

Model Size	Voltage DC	Part No.
EP-170-C	24V	5633-273-018
	90V	5633-273-019
EP-250-C	24V	5130-273-053
	90V	5130-273-054

# EP-C Series Electro Pack – Ceramic Faced

## EP-170-C, EP-250-C



### Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B Dia.	C Min.	D	E	F	G Max.	H	I	J	K	L	M	N	O
70-C	3/32 x 3/64	.3745 .3735	.750	1.406	2.203	1.500	6.000	.250 Wide (4 slots)	3.437	1.662 1.652	.312	1.125	2.250	3.250	14 NPT 1/2 conduit
250-C	1/8 x 1/16	.4995 .4985	1.230	2.468	3.312	2.250	8.968	.312 Wide (4 slots)	5.281	2.318 2.308	.375	1.625	3.250	4.250	14 NPT 1/2 conduit

### Specifications

Model Size	Voltage DC	Unit	Static Torque lb.ft.	Inertia*–WR <sup>2</sup> (lb.ft. <sup>2</sup> )		Max. RPM	Weight lbs.
				Output	Input		
170-C	24	Clutch	15	.031	.036	10,000	2.8
		Brake	15	.031	.036	10,000	2.8
	90	Clutch	15	.031	.036	10,000	2.8
		Brake	15	.031	.036	10,000	2.8
250-C	24	Clutch	70	.331	.293	7,500	7.5
		Brake	70	.331	.293	7,500	7.5
	90	Clutch	70	.331	.293	7,500	7.5
		Brake	70	.331	.293	7,500	7.5

For Information on Coil Data see page G-10, SF/PB units of the appropriate size.

# Washdown Electro Pack

If your clutch/brake application demands consistent, repeatable performance cycle after cycle, through wet and dry conditions, choose Warner Electric's Washdown Electro Pack Clutch/Brakes.

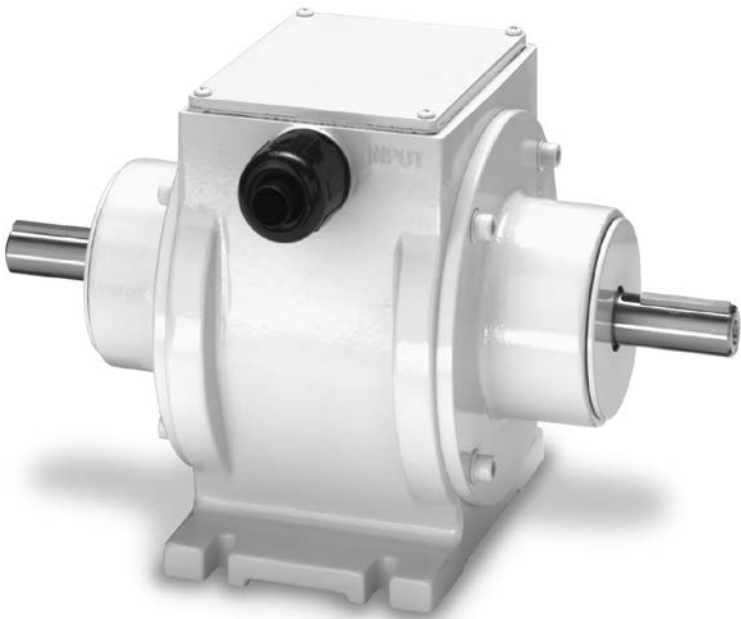
Even in the most demanding environments, Washdown Electro Pack Clutch/Brakes (EP-W) will weather the storm. Designed specifically for use in food, sanitary or any other washdown application, these packaged clutch/brakes are totally enclosed in smooth, completely sealed, rugged enclosures to keep wear particles in and contaminants out.

Washdown Electro Packs are factory aligned, assembled and burnished for consistent out-of-the-box performance.

- USDA Approved coating
- Smooth exterior
- Shielded/sealed bearings
- Available in 70 and 270 lb-in Static torque configurations
- Available in 24 and 90 vdc

## Washdown Electro Pack Clutch/Brakes

Warner Electric's new Washdown Electro Packs are currently available in two sizes, and in 24 and 90 volt configurations. If your application requires a different voltage or mounting configuration, please contact Warner Electric for assistance.



Horsepower vs. Shaft Speed

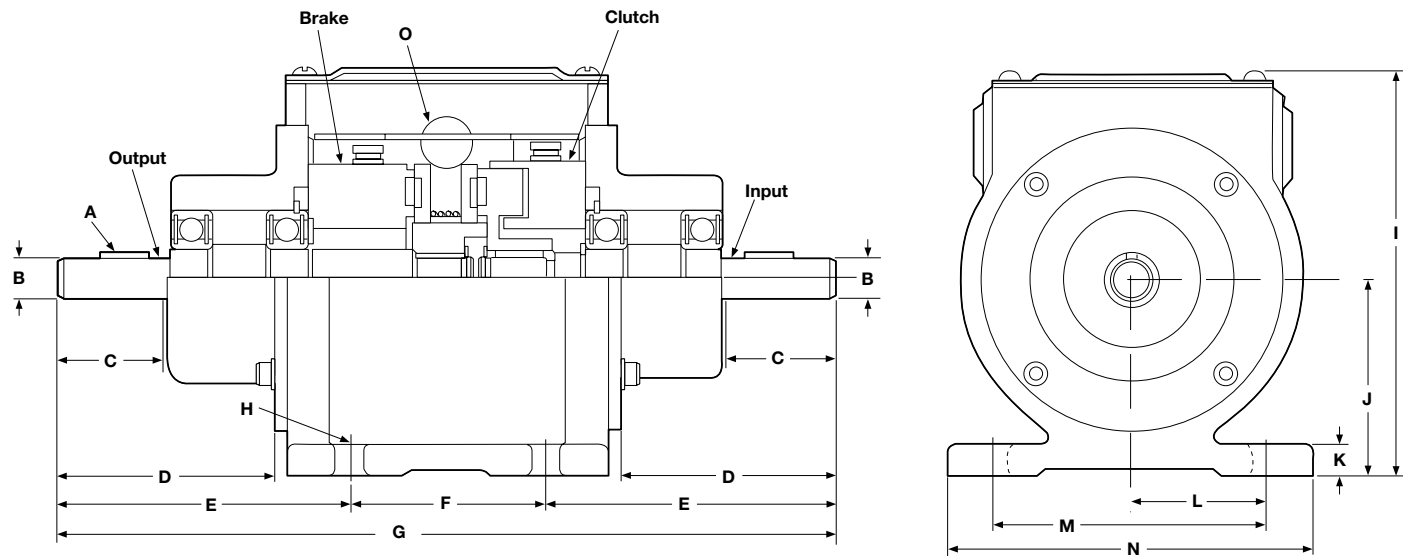
HP ▼	SHAFT SPEED AT CLUTCH (IN RPM)																				
	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4500	5000
1/50																					
1/20																					
1/12																					
1/8																					
1/6																					
1/4																					
1/3																					
1/2																					
3/4																					
1																					
1-1/2																					
2																					
3																					

\*For applications with speeds below 100RPM, please contact Warner Electric Application Support.

Model	Voltage (DC)	Max RPM	Static Torque (lb-in)	Part Number
EP-250-W	24	7500	70	5130-273-060
	90			5130-273-061
EP-400-W	24	4500	270	5131-273-030
	90			5131-273-031

# Washdown Electro Pack

## EP-250 and EP-400



### Dimensions

All dimensions are nominal, unless otherwise noted.

Size	A	B	C Min.	D	E	F	G Max.	H	I	J	K	L	M	N	O
250	1/8 x 1/16	.4995 .4985 Dia.	1.250	2.468	3.312	2.250	8.968	.312 Wide (4 slots)	5.281	2.318 2.308	.375	1.625	3.250	4.250	1/2 14 NPT Conduit x 2
400	3/16 x 3/16 x 1-1/2	.7495 .7485 Dia.	1.875	3.515	4.593	2.500	11.781	.312 Wide (4 slots)	6.937	3.474 3.464	.500	2.578	5.156	6.000	1/2 14 NPT Conduit x 2

### Specifications

Model Size	Voltage DC	Static Torque lb.ft.	Inertia*-WR <sup>2</sup> (lb.ft. <sup>2</sup> )		Max. RPM	Weight lbs.
			Output	Input		
EP-250-W	6	70	.331	.293	7,500	7.1
	24	70	.331	.293	7,500	7.1
	90	70	.331	.293	7,500	7.1
EP-400-W	6	270	2.566	2.222	4,500	19.7
	24	270	2.566	2.222	4,500	19.7
	90	270	2.566	2.222	4,500	19.7

For Information on Coil Data see page G-10, SF/PB units of the appropriate size.

[illegible]

# Packaged Performance Products Service Parts

## Base Mounted Units

### Packaged Performance Products Service Parts for Base Mounted Units

<b>Electro Pack</b>	
EP Series Base Mounted Clutch/Brakes . . . . .	SP-2
EP-C Series Ceramic Faced Base Mounted Clutch/Brakes . . . . .	N/A
**EP-W Electro Pack Washdown Clutch/Brakes . . . . .	N/A

\*\* It is not possible to rebuild an EP-W unit without damage to the unit coating. Damaging the coating will leave the unit prone to water damage and/or provide access for bacteria. Therefore, replacement components for these products are not available.



When replacing components in clutches and brakes several guidelines are appropriate. In all cases, when replacing worn friction surfaces both the components need to be replaced. In many cases, the splined hubs should be inspected and replaced if worn.

### Common Replacement Practices:

#### Electro-Pack clutch/brake

- Replace clutch rotor and armature
- Replace brake magnet and armature
- Inspect splined hub

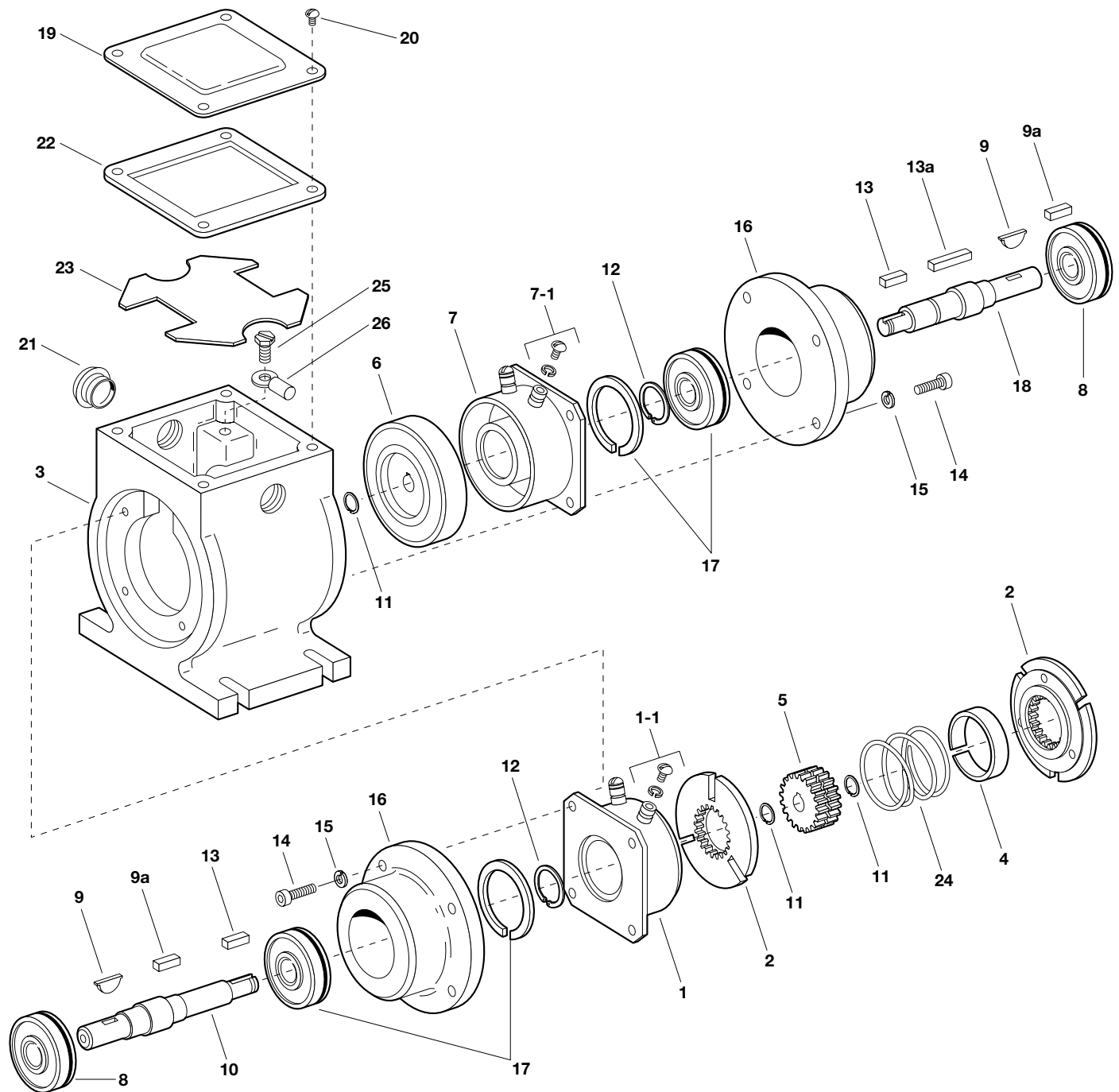
#### A note on burnishing:

When new friction surfaces are installed it will be necessary to burnish the unit prior to returning to full production rates. Burnishing is the act of wearing in the friction faces to ensure full engagement and therefore full torque. Burnishing is achieved by simply cycling the unit under less than full load (machine empty, if possible). Most units will achieve full torque in less than 100 cycles. Refer to the service manual for more details.

### Service Parts

# EP Series Electro Pack

## EP-170, EP-250, EP-400



### Service Parts

# EP Series Electro Pack

## EP-170, EP-250, EP-400

### Component Parts

Item	Description	EP-170		EP-250		EP-400	
		Part No.	Qty.	Part No.	Qty.	Part No.	Qty.
<b>1</b>	Magnet Assembly		1		1		1
	6 volt	5375-631-003		5319-631-002		5115-631-002	
	24 volt	5375-631-005		5319-631-003		5115-631-003	
	90 volt	5375-631-007		5319-631-005		5115-631-004	
<b>1-1</b>	Terminal Accessory	†		5103-101-002	1	5103-101-002	1
<b>2</b>	Armature Assembly with Autogap	110-0111	2	5130-111-008	2	5131-111-001	2
<b>3</b>	Housing	535-0079	1	535-0082	1	535-0083	1
<b>4</b>	Armature Spacer	807-1021	1				
<b>5</b>	Splined Armature Hub	540-1250	1	540-1635	1	540-2034	1
<b>6</b>	Rotor Assembly	5603-751-029	1	5103-751-010	1	5104-751-034	1
<b>7</b>	Field Assembly		1		1		1
	6 volt	5603-451-047		5103-451-002		5104-451-032	
	24 volt	5603-451-049		5103-451-004		5104-451-033	
	90 volt	5603-451-051		5103-451-007		5104-451-034	
<b>7-1</b>	Terminal Accessory	†		5103-101-002	1	5103-101-002	1
<b>8</b>	Ball Bearing	166-0112	2	166-0114	2	166-0116	2
<b>9</b>	Key	590-0095	2	590-0014	2		
<b>9a</b>	Key					590-0016	2
<b>10</b>	Shaft, Brake	798-0136	1	798-0133	1	798-0131	1
<b>11</b>	Retainer Ring	748-0346	2	748-0347	2	748-0348	2
<b>12</b>	Retainer Ring	748-0042	2	748-0024	2	748-0022	2
<b>13</b>	Key	590-0089	2	590-0088	2	590-0087	1
<b>13a</b>	Key					590-0106	1
<b>14</b>	Capscrew	797-1219	8	797-1219	8	797-1220	8
<b>15</b>	Lockwasher	950-0351	8	950-0351	8	950-0355	8
<b>16</b>	Bearing Housing	535-0080	2	535-0081	2	535-0084	2
<b>17</b>	Ball Bearing, with Retainer	166-0111	2	166-0113	2	166-0115	2
<b>18</b>	Shaft, Clutch	798-0135	1	798-0134	1	798-0132	1
<b>19</b>	Cover Plate	686-1017	1	686-1018	1	686-1019	1
<b>20</b>	Screw	797-0015	4	797-0015	4	797-0015	4
<b>21</b>	Dust Plug	680-0037	2	680-0037	2	680-0037	2
<b>22</b>	Gasket	495-0003	1	495-0004	1	495-0005	1
<b>23</b>	Insulator	572-0573	1	572-0572	1	572-0574	1
<b>24</b>	Vertical Mfg. Spring Kit Optional	5603-101-001	1	5103-101-006	1	5104-101-005	1
<b>25</b>	Ground Screw		1	797-1245	1	797-1245	1
<b>26</b>	Terminal		1	900-0116	1	900-0016	1

†Lead wires used on EP-170.

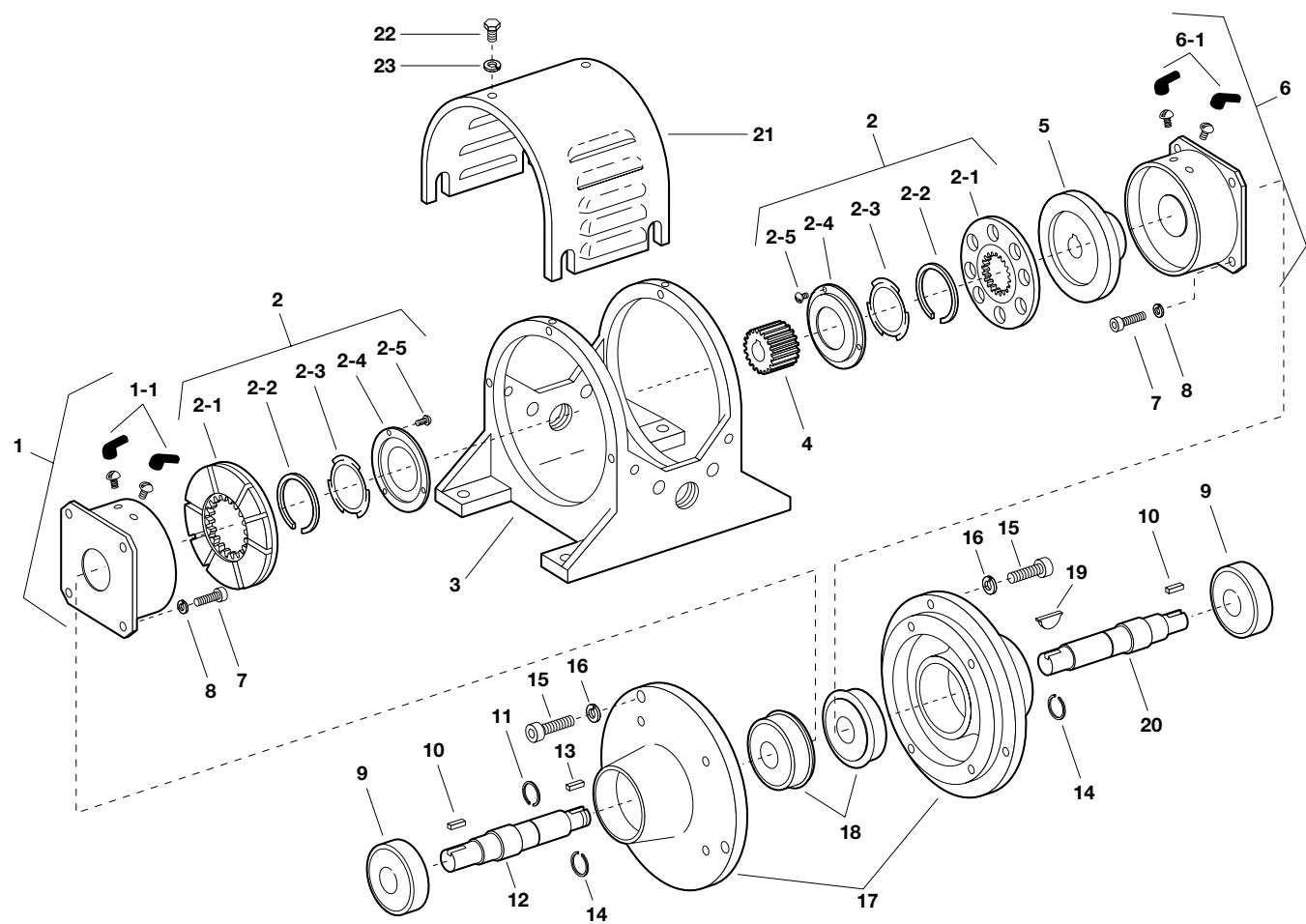
These units meet the standards of UL508 and are listed under guide card #NMTR, file #59164.



### Service Parts

# EP Series Electro Pack

## EP-500



### Component Parts

EC-825			
Item	Description	Part No.	Qty.
1	Magnet Assembly		1
	6 volt	5300-631-009	
	24 volt	5300-631-010	
	90 volt	5300-631-011	
1-1	Terminal Accessory	5311-101-001	1
2	Armature Assembly	5230-111-002	2
2-1	Armature	5230-111-001	2
2-2	Retainer Ring	748-0355	2
2-3	Spring	808-0412	2
2-4	Retainer Plate	748-0364	2
2-5	Screw	797-0028	12
3	Mounting Frame	174-0028	1
4	Splined Hub	540-2035	1
5	Rotor	5230-751-001	1
6	Field		1
	6 volt	5230-451-003	
	24 volt	5230-451-005	
	90 volt	5230-451-002	

EC-825			
Item	Description	Part No.	Qty.
6-1	Terminal Accessory	5311-101-001	1
7	Capscrew	797-0416	8
8	Lockwasher	950-0107	8
9	Ball Bearing	166-0125	2
10	Key	590-0020	2
11	Retainer Ring	748-0361	1
12	Shaft, Brake	798-0022	1
13	Key	590-0022	1
14	Retainer Ring	748-0335	2
15	Capscrew	797-0418	8
16	Lockwasher	950-0107	8
17	Endbell Housing	535-0010	2
18	Ball Bearing	166-0127	2
19	Key	590-0021	1
20	Shaft, Clutch	798-0023	1
21	Cover Drip Proof	287-0068	1
22	Capscrew	797-1214	6
23	Lockwasher	950-0102	6

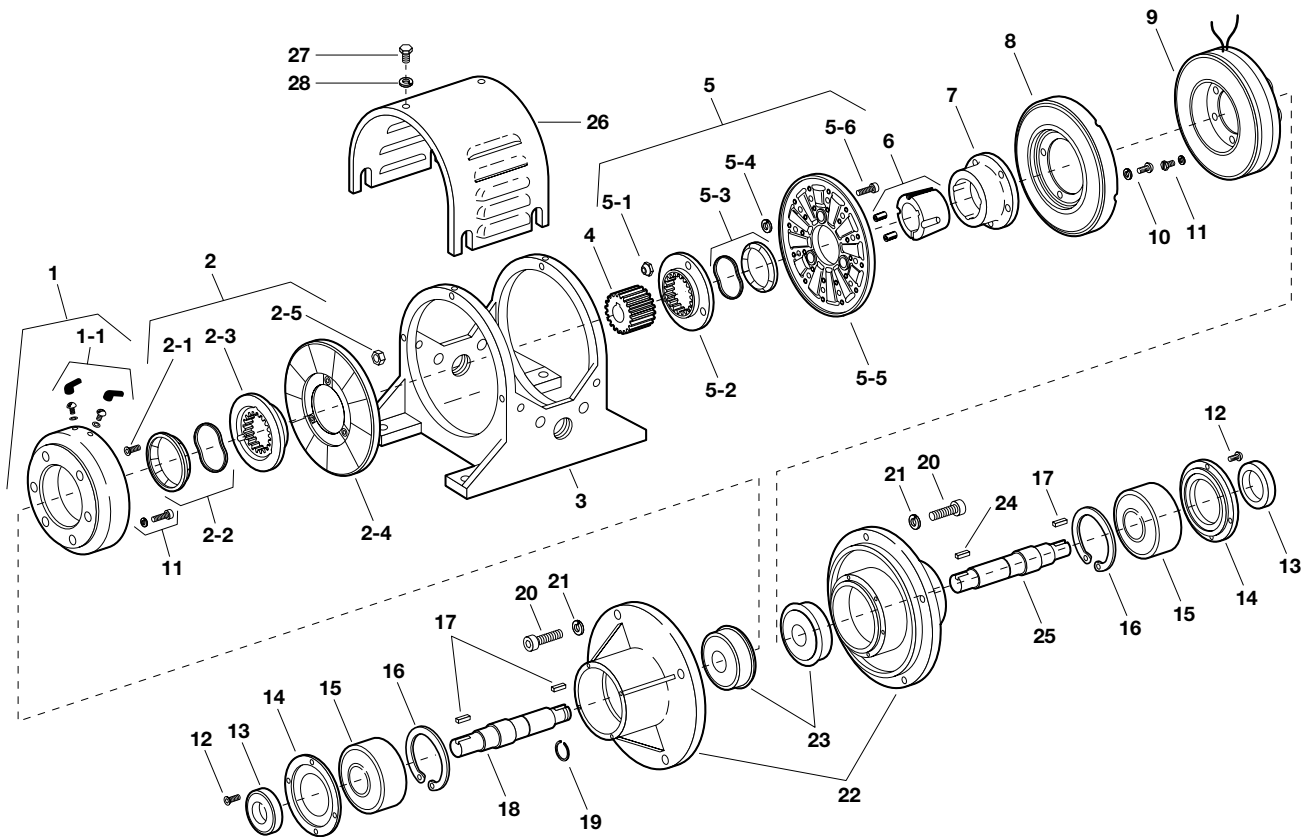
Refer to Service Manual P-0212.  
These units meet the standards of UL508 and are listed under guide card #NMTR,  
file #59164.



### Service Parts

EP Series Electro Pack

EP-825



Component Parts

EC-825			
Item	Description	Part No.	Qty.
1	Magnet Assembly		1
	6 volt	5311-631-002	
	24 volt	5311-631-003	
	90 volt	5311-631-004	
1-1	Terminal Accessory	5311-101-001	1
2	Armature Assembly & Splined Adapter	5321-111-001	1
2-1	Screw	797-0272	3
2-2	Autogap Accessory	5321-101-006	1
2-3	Splined Adapter	104-0008	1
2-4	Armature	5321-111-022	1
2-5	Locknut	661-0004	3
3	Frame	174-0019	1
4	Splined Hub	540-0320	1
5	Armature & Splined Adapter	5201-111-001	1
5-1	Locknut	661-0004	3
5-2	Splined Adapter	104-0008	1
5-3	Autogap Accessory	5321-101-006	1
5-4	Spacer	748-0333	3
5-5	Armature	5321-111-022	1
5-6	Screw	797-0341	3
6	Bushing, 1-1/4" Bore	180-0113	1
7	Rotor Hub	540-0013	1
8	Rotor	5201-751-003	1
9	Field		1
	6 volt	5201-451-006	
	24 volt	5201-451-008	
	90 volt	5201-451-010	

EC-825			
Item	Description	Part No.	Qty.
10	Mounting Accessory	5201-101-007	1
11	Mounting Accessory	5321-101-001	2
12	Screw	797-1008	8
13	Oil Seal	795-0023	2
14	Retainer Plate	686-0031	2
15	Ball Bearing	166-0126	2
16	Retainer Ring	748-0336	2
17	Key	590-0019	3
18	Shaft, Brake	798-0019	1
19	Retainer Ring	748-0335	1
20	Capscrew	797-0351	8
21	Lockwasher	950-0354	8
22	Endbell Housing	535-0005	2
23	Ball Bearing	166-0125	2
24	Key	590-0018	1
25	Shaft, Clutch	798-0020	1
26	Cover, Drip Proof	287-0069	1
27	Capscrew	797-1214	6
28	Lockwasher	540-0102	6

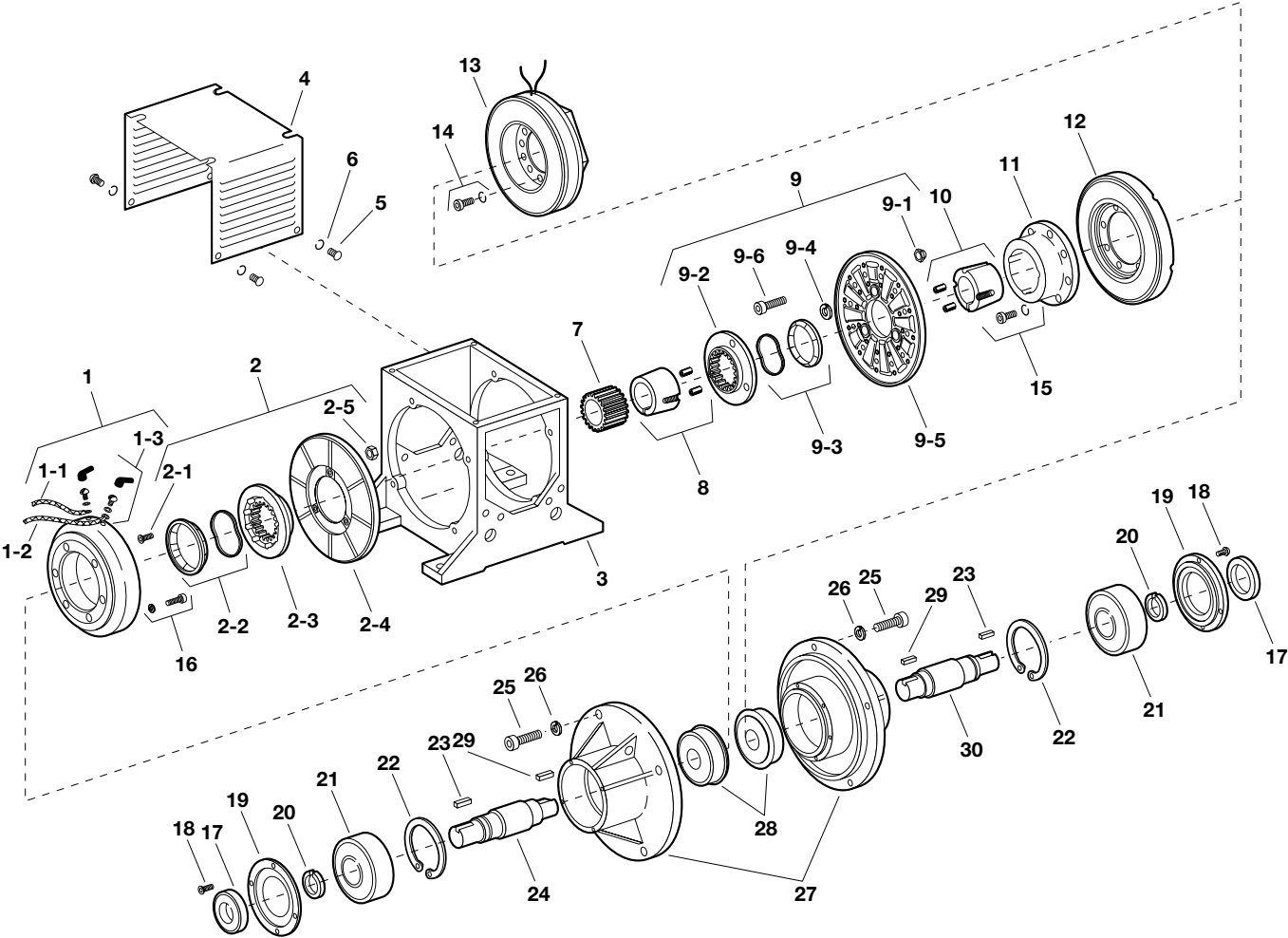
Refer to Service Manual P-0212.  
These units meet the standards of UL508 and are listed under guide card #NMTR, file #59164.



Service Parts

# EP Series Electro Pack

## EP-1000



### Service Parts

# EP Series Electro Pack

## EP-1000

### Component Parts

Item	Description	Part No.	Qty.
<b>1</b>	Magnet Assembly		1
	6 volt	5312-631-004	
	24 volt	5312-631-005	
	90 volt	5312-631-006	
<b>1-1</b>	Wire Assembly	5232-954-003	1
<b>1-2</b>	Wire Assembly	5232-954-004	1
<b>1-3</b>	Terminal Accessory	5311-101-001	1
<b>2</b>	Armature & Splined Adapter	5322-111-002	1
<b>2-1</b>	Button Head Screw	797-0272	1
<b>2-2</b>	Autocap Accessory	5322-101-004	1
<b>2-3</b>	Splined Arm, Adapter	104-0009	1
<b>2-4</b>	Armature	5322-111-036	1
<b>2-5</b>	Locknut	661-0004	3
<b>3</b>	Frame	174-0043	1
<b>4</b>	Dust Cover	287-0052	1
<b>5</b>	Button Head Screw	797-1175	8
<b>6</b>	Lockwasher	950-0103	8
<b>7</b>	Splined Armature Hub	540-0061	1
<b>8</b>	Bushing, 1-7/8" Bore	180-0177	1
<b>9</b>	Armature & Splined Adapter	5202-111-001	1
<b>9-1</b>	Locknut	661-0004	3
<b>9-2</b>	Splined Armature Adapter	104-0009	1
<b>9-3</b>	Autogap Accessory	5322-101-004	1
<b>9-4</b>	Spacer	748-0333	3
<b>9-5</b>	Armature	5322-111-036	1

Refer to Service Manual P-0212.

These units meet the standards of UL508 and are listed under guide card #NMTR, file #59164.

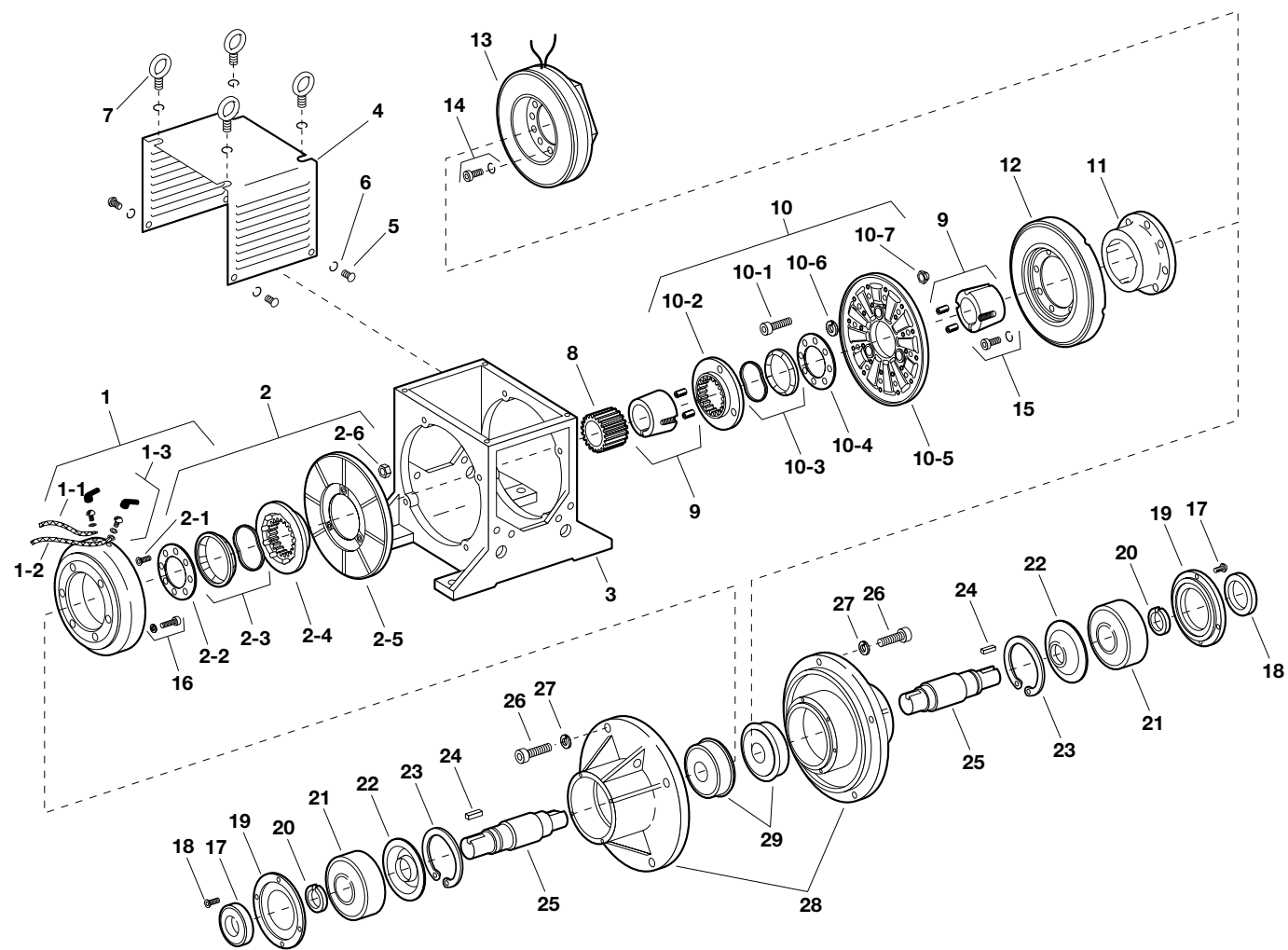


Item	Description	Part No.	Qty.
<b>9-6</b>	Capscrew	797-0341	3
<b>10</b>	Bushing, 2" Bore	180-0179	1
<b>11</b>	Rotor Hub	540-0315	1
<b>12</b>	Rotor	5202-751-003	1
<b>13</b>	Field Assembly		1
	6 volt	5202-451-004	
	24 volt	5202-451-006	
	90 volt	5202-451-007	
<b>14</b>	Mounting Accessory	5321-101-001	1
<b>15</b>	Mounting Accessory	5201-101-007	1
<b>16</b>	Mounting Accessory	5321-101-001	1
<b>17</b>	Oil Seal	795-0024	2
<b>18</b>	Button Head Screw	797-1008	8
<b>19</b>	Retainer Plate	686-0047	2
<b>20</b>	Retainer Ring – External	748-0504	2
<b>21</b>	Ball Bearing	166-0130	2
<b>22</b>	Retainer Ring – Internal	748-0375	2
<b>23</b>	Key	590-0024	2
<b>24</b>	Shaft, Brake	798-0026	1
<b>25</b>	Capscrew	797-0361	8
<b>26</b>	Lockwasher	950-0362	8
<b>27</b>	Bearing Housing	535-0012	2
<b>28</b>	Ball Bearing	166-0131	2
<b>29</b>	Key	590-0025	2
<b>30</b>	Shaft, Clutch	798-0025	1

### Service Parts

# EP Series Electro Pack

## EP-1525, EP-1525HT



### Service Parts

# EP Series Electro Pack

## EP-1525, EP-1525HT

### Component Parts

Item	Description	EP-1525		EP-1525HT	
		Part No.	Qty.	Part No.	Qty.
1	Magnet		1		1
	6 volt	5314-631-004		5314-631-004	
	24 volt	5314-631-006		5314-631-006	
	90 volt	5314-631-005		5314-631-005	
*1-1	Wire Assembly	5232-954-003	1	5232-954-003	1
*1-2	Wire Assembly	5232-954-004	1	5232-954-004	1
*1-3	Terminal Accessory	5311-101-001	1	5311-101-001	1
2	Armature & Splined Adapter	5324-111-001	1	5324-111-001	1
*2-1	Button Head Screw	797-0272	8	797-0272	8
*2-2	Armature Plate	686-0003	1	686-0003	1
*2-3	Autogap Accessory	5323-101-002	1	5323-101-002	1
*2-4	Splined Armature Adapter	104-0011	1	104-0011	1
*2-5	Armature	5324-111-034	1	5324-111-034	1
*2-6	Locknut	661-0004	8	661-0004	8
3	Frame	174-0044	1	174-0044	1
4	Dust Cover	287-0040	1	287-1002	1
5	Button Head Screw	797-1175	8	797-1175	8
6	Lock Washer	950-0103	8	950-0103	8
7	Eye Bolts	171-0006	4	171-0006	4
8	Splined Armature Hub	540-0063	1	540-0063	1
9	Bushing, 2-3/8" Bore	180-0215	2	180-0215	2
10	Armature & Splined Adatper	5204-111-004	1	5204-111-004	1
*10-1	Capscrew	797-0342	8	797-0342	8
*10-2	Splined Armature Adapter	104-0011	1	104-0011	1
*10-3	Autogap Accessory	5323-101-002	1	5323-101-002	1
*10-4	Retainer Plate	686-0003	1	686-0003	1
*10-5	Armature	5324-111-034	1	5324-111-034	1
*10-6	Spacer	748-0333	8	748-0333	8
*10-7	Locknut	661-0004	8	661-0004	8
11	Rotor Hub	5234-541-001	1	5234-541-001	1
12	Rotor	5204-751-002	1	5204-751-001	1
13	Field Assembly		1		1
	6 volt	5204-451-013		5204-451-005	
	24 volt	5204-451-015		5204-451-066	
	90 volt	5204-451-016		5204-451-006	
14	Mounting Accessory	5321-101-002	2	5321-101-002	2
15	Mounting Accessory	5321-101-001	2	5321-101-001	2
16	Mounting Accessory	5321-101-001	2	5321-101-001	2
17	Screw	797-0294	8	797-0294	8
18	Oil Seal	795-0025	2	795-0025	2
19	Retainer Plate	686-0048	2	686-0048	2
20	Retaining Ring – External	748-0503	2	748-0503	2
21	Ball Bearing	166-0132	2	166-0132	2
22	Bearing Seal	795-0036	2	795-0036	2
23	Retainer Ring – Internal	748-0552	2	748-0052	2
24	Key	590-0028	2	590-0028	2
25	Shaft	798-0027	2	798-0027	2
26	Capscrew	797-0362	12	797-0362	12
27	Lock Washer	950-0362	12	950-0362	12
28	Bearing Housing	535-0013	2	535-0013	2
29	Ball Bearing	166-0133	2	166-0133	2

\*Shipped Assembled

Refer to Service Manual P-0212.

These units meet the standards of UL508 and are listed under guide card #NMTR, file #59164.



### Service Parts

[illegible]

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# General Engineering Data

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# Mechanical Data Application Engineering

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Ordering Information / Standard NEMA Frame Dimensions..... G-3

Mechanical Data / Dynamic Torque ..... G-4

Mechanical Data / Rotational Speed ..... G-6

Mechanical Data / Clutch Field Restraining Devices..... G-7

Electrical Data / Coil Ratings ..... G-8

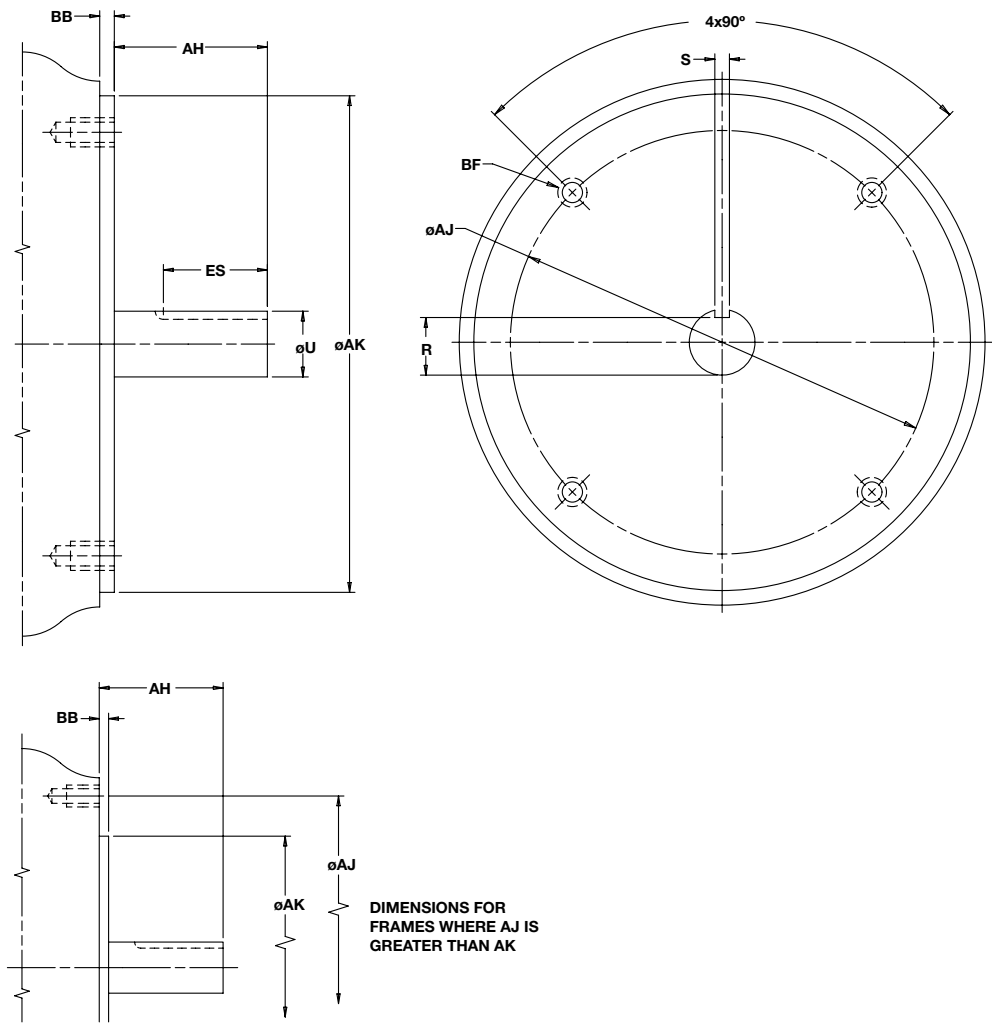
Electrical Data / Installation Procedure ..... G-11

Electrical Data / Coil Suppression & Clutch/Brake Overlap ..... G-12

Electrical Data / Overexcitation ..... G-13

# Standard NEMA Frame Dimensions

## Ordering Information



### Specifications

Module Size	NEMA Frame Size	AH	AJ	AK	BB	BF	ES	R	S	U
50	56C/48Y	2.06	5.875	4.500	.16 MAX	3/8-16 UNC	1.41 MIN	0.517	0.188	0.625
100	56C/48Y	2.06	5.875	4.500	.16 MAX	3/8-16 UNC	1.41 MIN	0.517	0.188	0.625
180	143TC/145TC	2.12	5.875	4.500	.16 MAX	3/8-16 UNC	1.41 MIN	0.771	0.188	0.875
210	182TC/184TC	2.62	7.250	8.500	.25 MIN	1/2-13 UNC	1.78 MIN	0.986	0.250	1.125
215	213TC/215TC	3.12	7.250	8.500	.25 MIN	1/2-13 UNC	2.41 MIN	1.201	0.312	1.375

Note: Warner Electric Modules are designed to comply with standard NEMA frame dimensions for mounting. Reference to each particular frame size is given in the individual selection tables for each type of Warner Electric module.

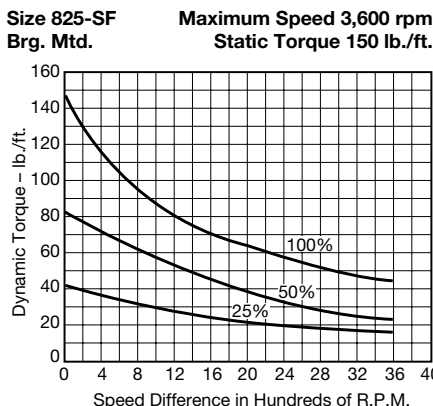
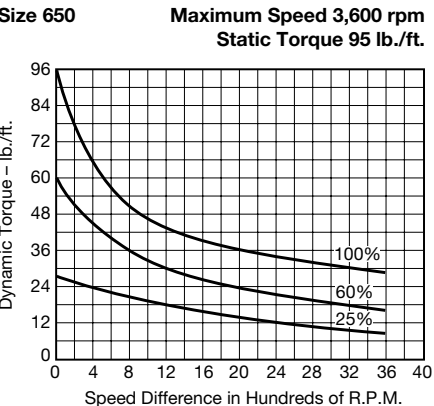
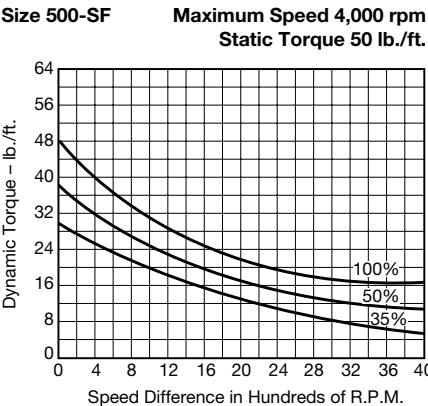
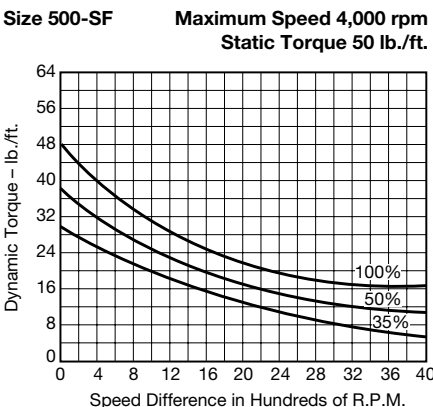
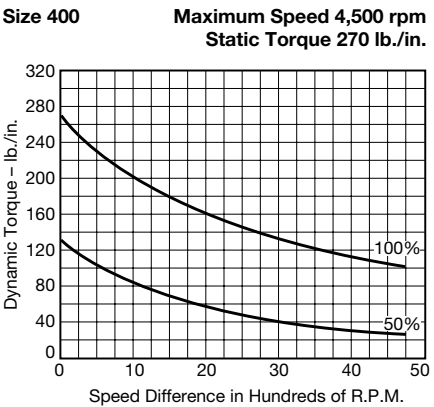
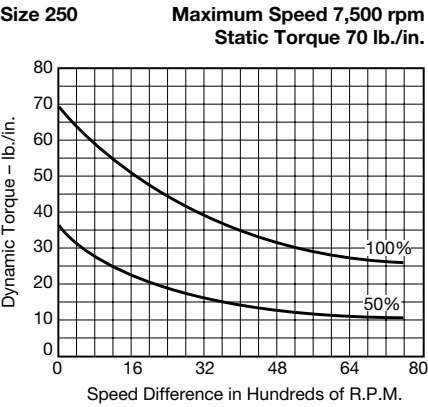
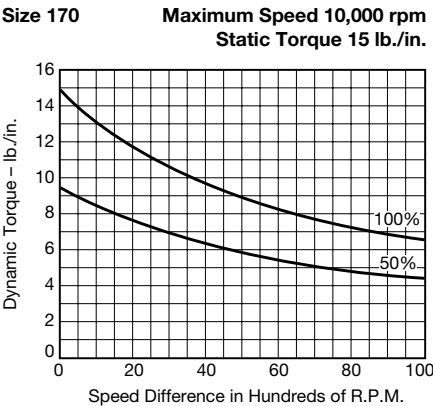
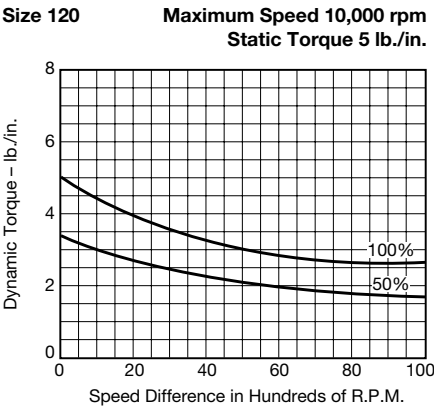
# Mechanical Data Dynamic Torque

### NOTES:

Speed difference means the difference in speed between one friction face and the other at the moment of engagement. The intersection of the top curve and the speed difference is the maximum torque produced by the unit. When both friction faces are engaged and rotating at the same speed, the unit is said to be locked-in and produces the maximum static torque (zero speed difference).

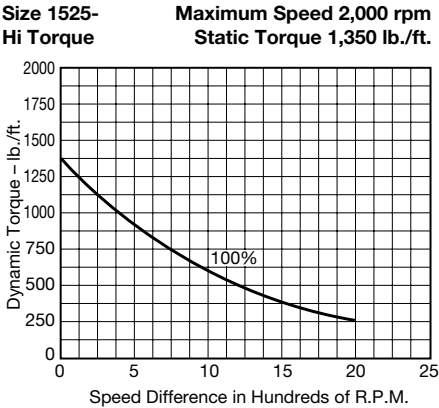
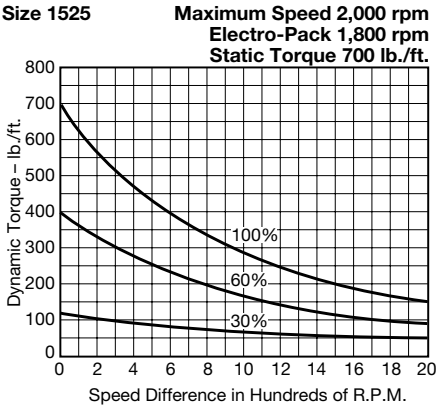
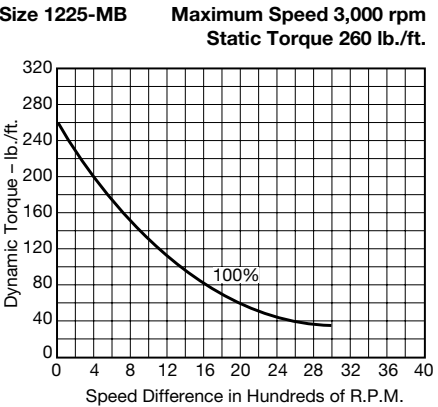
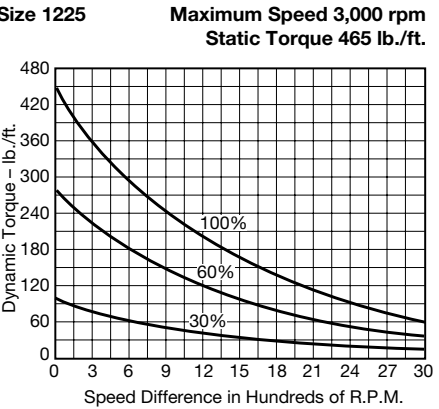
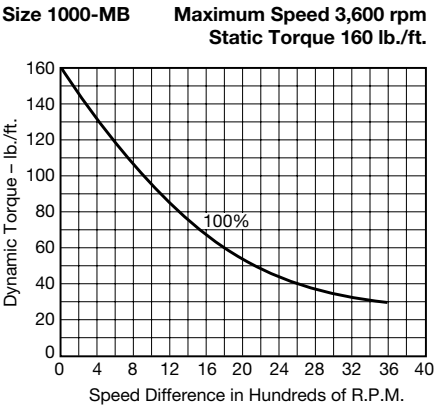
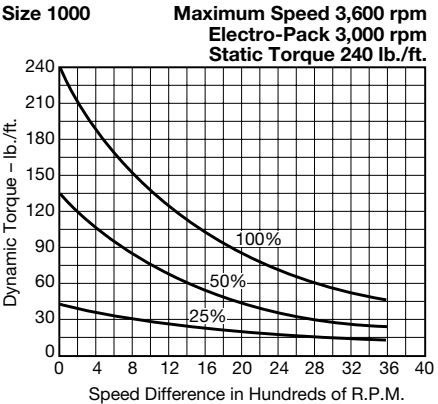
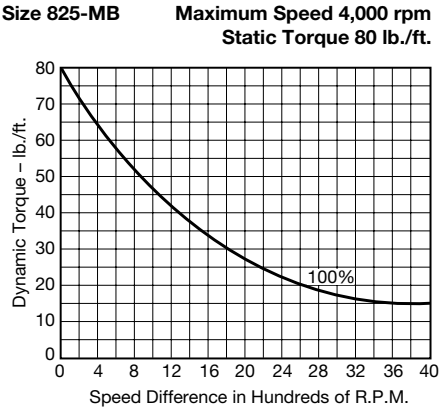
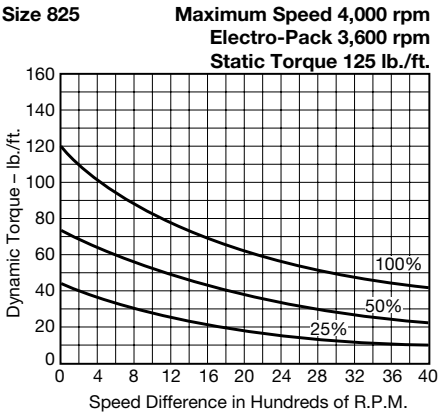
The % lines indicate the percentage of full voltage being used. Example: If 90 volt unit runs at 45 volts, use the 50% line.

Average Torque = Dynamic Torque at  $\frac{1}{2}$  operating speed. Example: If operating speed is 1800, use dynamic torque at 900.



NOTE: Torque values are in inch lbs. for size 400 and smaller, and in ft.lbs. for size 500 and larger.

# Mechanical Data Dynamic Torque



# Mechanical Data Rotational Speed

## Rotational Speed

Rotational speed of a clutch or brake is an important consideration when selecting a unit for a particular application. Numerous factors must be considered, such as the maximum rated speed of the clutch/brake unit, the dynamic torque required, the heat dissipation needed, the effect of speed on wear rate, and torque stability at very low speeds. Each of these issues are separate, and sometimes interrelated, but always important in selecting the right product for an application.

## Maximum RPM Rating

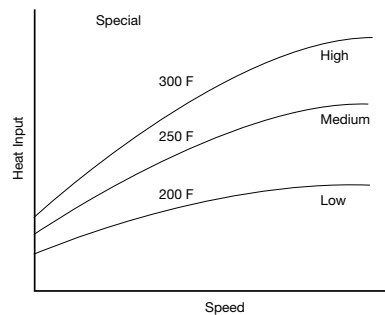
The most important rotational speed consideration is the maximum rated RPM capability of a unit. DO NOT exceed this rating. Exceeding the maximum RPM of a unit may cause personal injury and/or machine damage. Maximum rated speeds are based on the structural integrity of the rotating components and associated shaft and bearing capabilities. If the RPM rating is exceeded, structural failure may occur, or the unit may experience premature bearing failure and/or premature friction material wear out.

## Dynamic Torque

When determining the correct size clutch/brake for an application, dynamic torque at the highest slip speed is often the determining factor. As you can see by reviewing the dynamic torque curves for different units as shown starting on page G-4, dynamic clutch/brake torque usually decreases with higher speeds. As slip RPM increases, the coefficient of friction of a unit decreases, causing a decrease in dynamic torque availability. Be careful to consider this when selecting the appropriate unit size needed.

## Heat Dissipation

Heat dissipation is inversely related to dynamic torque. As RPM increases, the heat dissipation ability of a unit increases. When an armature is rotating, the heat dissipation rate is proportional to the aerodynamic fan effect of the rotating armature. The faster the armature rotates, the greater the heat dissipation. This is illustrated with a typical catalog curve as shown in Figure 1. It's interesting to note that, at zero RPM, the unit still has some heat dissipation capability. This is due to convection and radiation, but is usually not an important consideration.



**Figure 1:** Typical Heat Dissipation Characteristics

## Wear Rate

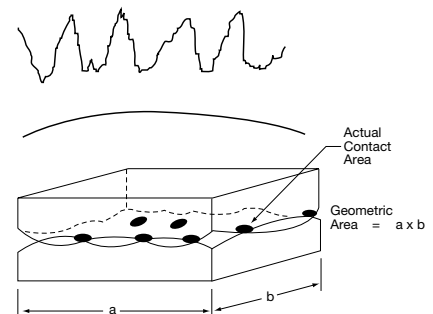
The wear rate of friction surfaces is dependent on the clamping pressure of the mating surfaces as well as the surface velocity between the wearing surfaces. Many variables are involved in predicting wear life, of which RPM is probably the most influential. Typically, the wear rate will increase directly with the rubbing velocity distance. Another way of stating this is the higher the relative engagement speeds of two rotating parts, the longer they are allowed to slip against each other and the faster the wear rate.

## Low Speed Operation

The effect of low speed usage should also be considered in applications. Performance of clutch/brake units at less than 100 RPM may be very different than at higher RPM. This is due to "burnish" characteristics of friction surfaces.

## Wear In

"Burnish" is the wear in, or mating of two surfaces. When new, these surfaces have manufacturing features which include roughness and waviness. When these surfaces come into initial contact, only the high spots actually meet. See Figure 2. This results in only a small surface area in contact, while the non-contact surface area is "air." The result is low torque. As the mating surfaces continue to engage and slip against each other, the high spots are worn down and more surface area is in contact, thus increasing torque capability. This wear in period, or burnish, typically occurs in the first few hundred cycles of a clutch/brake's life. Faster slip speeds and higher loads mean fewer cycles needed to complete the burnish process. For applications where the speed is less than 100 RPM, the required application torque



**Figure 2:** Unburnished Contact Areas

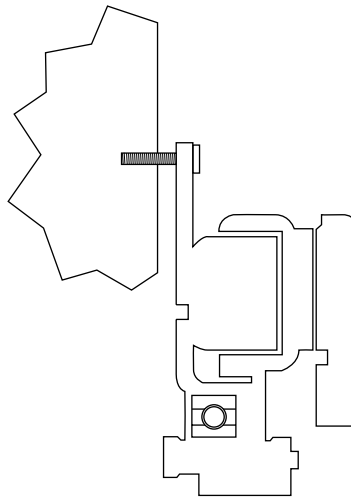
should be doubled to compensate for the low speed "burnish" that the unit experiences. A low speed burnish will require many cycles before full torque and stability are achieved. For example, if an application is determined to need 20 ft.lbs. of static torque, an SF-400 clutch could be selected. But, if the application is only 100 RPM or less, then an SF-500 unit should be the choice to compensate for the low RPM usage, as indicated on the selection chart found on page G-4.

Careful consideration of rotating speeds will help the selection process of an application. Follow these guidelines and the proper clutch/brake selected will provide troublefree operation.

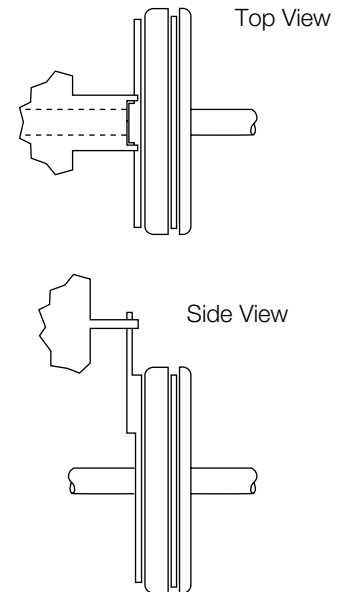
# Mechanical Data Clutch Field Restraining Devices

Many Warner Electric clutch assemblies have a bearing mounted stationary field. By design the bearing maintains its proper position between the field and rotor making it easy for the customer to mount the field-rotor assembly. However, the bearing has a slight drag which tends to make the field rotate if not restrained. And, since the field has lead wires attached, it must be restrained to prevent rotation and pulling of these wires. To counteract this rotational force, the field has a "torque tab" to which the customer must attach an appropriate anti-rotational restraint.

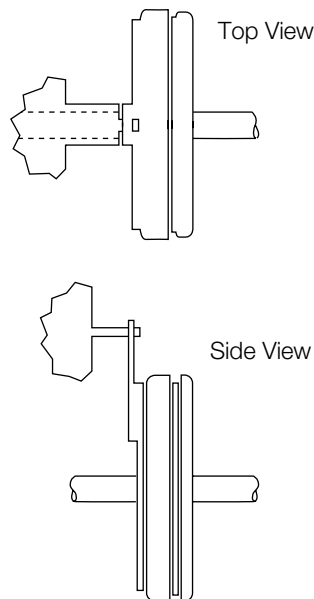
A few hints regarding proper torque tab restraints are in order. First and foremost, it is important to recognize that the force to be overcome is very small and the tab should not be restrained in any manner which will preload the bearing. For example, if the clutch is mounted with the back of the field adjacent to a rigid machine member the customer should not attach a capscrew tightly between the tab and the machine member. This may pull the tab back against the rigid member as shown in Figure 1 and preload the bearing. The recommended methods are illustrated in Figures 2, 3, and 4. The method selected is primarily a matter of customer preference or convenience.



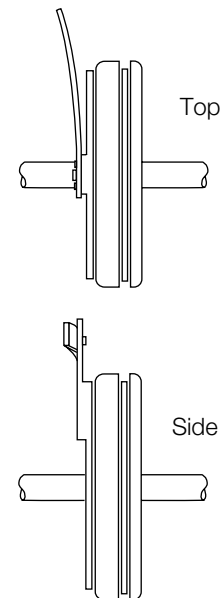
**Figure 1:**  
Rigid member



**Figure 2:**  
Rigid Member with Slot  
Straddling Tab  
(Preferred)



**Figure 3:**  
Pin in Hole  
Loosely  
(Preferred)



**Figure 4:**  
Flexible Strap  
(Preferred)

# Electrical Data Coil Ratings

EC/EB-375	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	453.5	29.3	2.10	446.8	29.3	1.96
Current – Amperes	.198	.82	2.85	.201	.82	3.07
Watts	17	20	17	18	20	18
Coil Build-up – milliseconds	62	60	59	50	60	52
Coil Decay – milliseconds	13	14	15	8	14	10

EC/EB-475	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	368.9	37.8	2.32	443.1	28.8	2.05
Current – Amperes	.244	.64	2.58	.203	.88	2.93
Watts	22	15	16	18	21	18
Coil Build-up – milliseconds	92	91	90	80	75	70
Coil Decay – milliseconds	18	17	16	8	9	9

EC/EB-650	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	225	17.7	1.16	257.2	18.3	1.24
Current – Amperes	.4	1.36	5.19	.35	1.3	4.84
Watts	36	33	31	32	31	29
Coil Build-up – milliseconds	120	115	110	112	108	105
Coil Decay – milliseconds	20	20	20	12	13	14

FB/ER-375, 475, 650	FB-375		FB-475		FB-650	
Voltage – DC	90	24	90	24	90	24
Resistance @ 20° C – Ohms	446	29	310	22	235	16
Current – Amperes	.201	.822	.300	1.09	.380	1.426
Watts	18	19	27	26	34	34
Coil Build-up – milliseconds	40	40	80	80	90	90
Coil Decay – milliseconds	5	10	8	10	10	10

ER-825, 1225	ER-825		ER-1225	
Voltage – DC	90	24	35-75	
Resistance @ 20° C – Ohms	305	21.5	235	
Current – Amperes	.29	1.1	.383	
Watts	26	27	35	
Coil Build-up – milliseconds	400	–	700	
Coil Decay – milliseconds	20	–	20	

EC/EB-825	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	221	20.9	1.098	223.3	20.4	1.27
Current – Amperes	.407	1.15	5.464	.4	1.18	4.74
Watts	37	28	33	36	28	28
Coil Build-up – milliseconds	225	200	180	170	170	170
Coil Decay – milliseconds	130	122	115	80	75	70

EC/EB-1000	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	248.7	19.7	1.23	248.7	19.7	1.23
Current – Amperes	.36	1.22	4.87	.36	1.22	4.87
Watts	33	29	29	33	29	29
Coil Build-up – milliseconds	250	235	220	235	220	205
Coil Decay – milliseconds	70	75	80	70	75	80

EC/EB-1225	EC			EB		
Voltage – DC	90	24	6	90	24	6
Resistance @ 20° C – Ohms	207.3	15.1	1.04	261.7	22.3	1.33
Current – Amperes	.43	1.59	5.79	.34	1.08	4.5
Watts	39	38	35	31	26	27
Coil Build-up – milliseconds	500	490	480	460	445	435
Coil Decay – milliseconds	220	230	240	190	160	140

ATC, ATTC, ATB, ATTB-25	ATC			ATB		
Voltage – DC	6	24	90	6	24	90
Resistance @ 20° C – Ohms	1.37	20.2	290	1.37	20.2	290
Current – Amperes	4.38	1.19	.31	4.38	1.19	.31
Watts	26.3	28.6	27.9	26.3	28.6	27.9
Coil Build-up – milliseconds	145	145	145	145	145	145
Coil Decay – milliseconds	8	8	8	9	9	9

ATC, ATTC, ATB, ATTB-55	ATC			ATB		
Voltage – DC	6	24	90	6	24	90
Resistance @ 20° C – Ohms	1.21	19.6	230	1.21	19.6	230
Current – Amperes	4.96	1.22	.39	4.96	1.22	.39
Watts	29.8	29.3	35.2	29.8	29.3	35.2
Coil Build-up – milliseconds	200	200	200	210	210	210
Coil Decay – milliseconds	20	20	20	35	35	35

ATC, ATTC, ATB, ATTB-115	ATC			ATB		
Voltage – DC	6	24	90	6	24	90
Resistance @ 20° C – Ohms	1.02	16.5	182	1.02	16.5	182
Current – Amperes	5.91	1.46	.50	5.91	1.46	.50
Watts	35.4	35	44.6	35.4	35	44.6
Coil Build-up – milliseconds	145	145	145	150	150	150
Coil Decay – milliseconds	40	40	40	45	45	45

# Electrical Data Coil Ratings

UM/EM/UMFB/EMFB		Clutch	UM/EM Brake	Clutch	UM/EM Brake	Clutch	UM/EM Brake	UMFB/ EMFB Brake	UMFB/ EMFB Brake
Voltage – DC		90	90	24	24	6	6	24	90
Resistance (ohms)	EM-50	452	429	31.8	28.8	1.9	1.9	28.8	429
	EM-100	392	392	26.7	26.7	1.8	1.8	21.7	308
	EM-180	392	392	26.7	26.7	1.8	1.8	21.7	308
	EM-210/215	248	248	17.9	17.9	1.22	1.22	13.3	205
Amperes	EM-50	.20	.21	.76	.83	3.2	3.2	.83	.21
	EM-100	.23	.23	.90	.90	3.3	3.3	1.1	.29
	EM-180	.23	.23	.90	.90	3.3	3.3	1.1	.29
	EM-210/215	.36	.36	1.3	1.3	4.9	4.9	1.8	.38
Watts	EM-50	18	19	19	20	20	20	20	19
	EM-100	21	21	22	22	20	20	27	27
	EM-180	21	21	22	22	20	20	27	27
	EM-210/215	33	33	32	32	30	30	43	34
Build-up (millisecond)	EM-50	52	53	52	53	52	53	40	40
	EM-100	72	75	72	75	72	70	80	80
	EM-180	72	75	72	75	72	70	80	80
	EM-210/215	120	100	120	100	110	100	90	90
Decay (millisecond)	EM-50	6	5	6	5	6	5	5	5
	EM-100	12	10	12	10	12	10	8	8
	EM-180	12	10	12	10	12	10	8	8
	EM-210/215	20	10	20	10	20	10	10	10

# Electrical Data Coil Ratings

Unit Size	SF/PB 120			SF/PB 170			SF/PB 250		
Voltage – DC	6	24	90	6	24	90	6	24	90
Resistance @ 20°C – Ohms	6.32	104	1386	6.96	111.2	1506	5	76.4	1079
Current – Amperes	.949	.230	.065	.861	.215	.060	1.2	.314	.084
Watts	5.69	5.52	5.85	5.85	5.16	5.37	7.2	7.5	7.51
Coil Build-up – milliseconds	12	12	11	17	17	16	48	48	44
Coil Decay – milliseconds	8	8	7	8	7	6	15	15	13

Unit Size	SF/PB 400			SF-500			PB & PC 500			SF-650		
Voltage – DC	6	24	90	6	24	90	6	24	90	6	24	90
Resistance @ 20°C – Ohms	4.88	73	1087	1.076	14.9	206.1	1.36	23.8	251.1	1.16	17.7	225
Current – Amperes	1.23	.322	.083	5.58	1.61	.44	4.4	1.01	.36	5.19	1.36	.4
Watts	7.39	7.96	7.45	34	39	39	26	24	32	31	33	36
Coil Build-up – milliseconds	154	154	154	82	85	90	84	87	93	110	115	120
Coil Decay – milliseconds	62	60	55	40	40	40	38	35	30	50	50	50

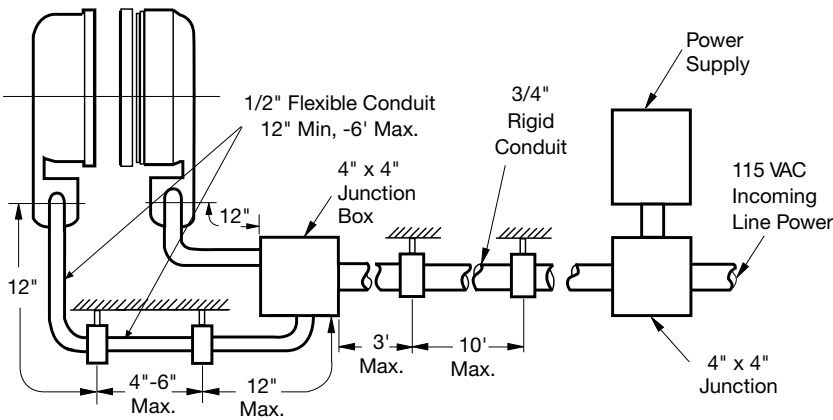
Unit Size	PB-650			SF-825			SF-825 Brg			PB & PC 825			SF-1000			PB & PC 1000		
Voltage – DC	6	24	90	6	24	90	6	24	90	6	24	90	6	24	90	6	24	90
Resistance @ 20°C – Ohms	1.24	18.3	257.2	1.23	20.9	267.0	1.098	14.6	221	1.27	20.4	223.3	1.07	14.4	214.4	1.23	19.7	248.7
Current – Amperes	4.84	1.31	.35	4.9	1.15	.34	5.464	1.65	.407	4.74	1.18	.4	5.61	1.67	.42	4.87	1.22	.36
Watts	29	31	32	29	28	30	33	40	37	28	28	36	34	40	38	29	29	33
Coil Build-up – milliseconds	100	105	110	222	200	245	180	200	225	170	170	170	256	275	283	205	220	235
Coil Decay – milliseconds	50	50	50	105	120	100	115	120	130	70	75	80	123	105	90	70	75	80

Unit Size	SF-1225			PB & PC 1225			SF-1525			PB & PC 1525			SF-1525 H.T.		
Voltage – DC	6	24	90	6	24	90	6	24	90	6	24	90	6	24	90
Resistance @ 20°C – Ohms	1.21	19.5	268.3	1.33	22.3	261.7	1.11	15.5	239.1	1.45	19.8	258.4	.55	7.63	113.4
Current – Amperes	4.97	1.23	.34	4.5	1.08	.34	5.41	1.55	.38	4.13	1.21	.35	10.83	3.14	.794
Watts	30	30	30	27	26	31	32	37	34	25	29	31	65	75	72
Coil Build-up – milliseconds	475	490	510	300	320	350	505	535	575	470	490	512	480		560
Coil Decay – milliseconds	240	230	220	190	190	190	230	237	215	200	170	140	210		160

NOTES: 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%. Approximately because current leads or lags flux by a small amount.

# Electrical Data Installation Procedure



## Recommended Electrical Installation Procedure for Warner Electric Clutches and Brakes

Warner Electric clutches and brakes conform to UL (Underwriters Laboratories) requirements. All packaged products come with conduit boxes or are enclosed in housings with provision for electrical conduit connection. All sizes 400 and larger SF clutch fields and brake magnets accept UL conforming conduit boxes available from Warner Electric.

The National Electrical Code (NEC) requires that conductors subject to physical damage be adequately protected. When electrical conduit is used, a minimum of 12" of 1/2" flexible conduit is to be used between each brake and/or clutch and its box. This construction will prevent improper bearing loading in bearing mounted units and ease field and magnet assembly and disassembly.

Refer to the information below for proper installation practices and wire sizes.

Notwithstanding the above recommendations, all electrical installations should conform to NEC and/or other governing electrical codes.

## Recommended wire size versus maximum distance

Wire Size AWG	Fractional Horsepower Sizes 170-400			Integral Horsepower Sizes 500-1525		
	Distance (feet)			Distance (feet)		
	6 Volt	24 Volt	90 Volt	6 Volt	24 Volt	90 Volt
18	20	280	1000	4	65	700
16	30	430		6	95	
14	50	720		10	160	
12	75	720		10	160	
10	125			25	400	
8	200			40		

General construction wire type MTW or THW recommended.  
#6 terminal screws (size 400 and smaller) are to be torqued to 15 in.lb.  
#8 terminal screws (size 500 and larger) are to be torqued to 20 in.lb.

# Electrical Data Coil Suppression & Clutch/Brake Overlap

Users of electric clutch and brake systems are sometimes concerned that a clutch and brake will oppose each other or “overlap” during switching, i.e., when the clutch is switched off and the brake is switched on, or vice versa. This concern relates primarily to dual armature type clutch/brakes similar to the Warner Electric Electro Module product line, as compared to shuttle armature clutch/brakes.

In use, Warner Electric clutches and brakes are not subject to overlap when Zener diode coil suppression techniques are applied to the clutch/brake control. All Warner Electric clutch/brake controls use Zener diode suppression to eliminate any overlap situations.

The charts below graphically display current decay of the clutch and current rise of the brake with Zener diode and with straight diode suppression. In Chart 1, which shows brake and clutch operation with Zener diode suppression, the “Overlap Area” below the intersection of the brake and clutch current lines shows potential for the devices to fight one another. But this

intersection occurs at an extremely low current level and the armature Autogap® springs keep the friction surfaces of the brake armature and magnet separate at such low currents. Even though there is the appearance of a minor clutch/brake overlap in this instance, the brake armature has not yet contacted the brake magnet. Chart 2 shows a much larger overlap area since straight diode suppression is used in this circuit. Clutch current has not decayed fully as the brake is engaged and the load is brought to zero speed.

Clutch and brake coils are inductors. Inductance is the electrical equivalent to mechanical inertia and an energized coil dissipates its energy when turned “off.” Upon removal of power, voltage across an inductor reverses and current continues to flow in the same direction until the energy is fully dissipated. Without suppression in the control circuit, an arc can result from this potentially very large reverse voltage which can damage the electrical switching contacts.

Consequently, Zener diode suppression circuitry, by limiting the reverse voltage to

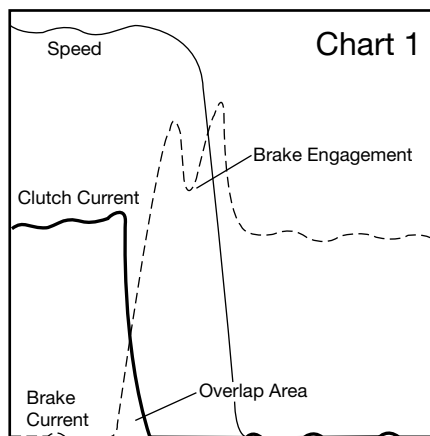
a sufficiently high but safe level, has two major benefits:

- Hastens coil decay
- Protects the switching contacts

The schematics below show circuits with no suppression and both straight diode and Zener diode suppression.

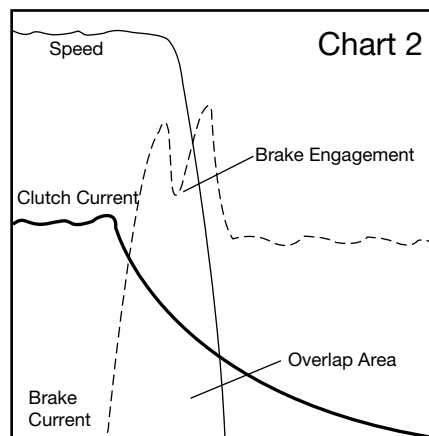
The rapid coil decay of Zener diode suppression lets users enjoy the major advantages which dual armatures have over single, “shuttle” armatures. These include:

- Better heat dissipation – greater area to give off heat and more “off” time.
- Longer life – two armatures absorb wear.
- Armature Autogap® self adjusting for the life of the unit
- Enhanced repeatability and controllability with the use of a light preload spring to keep the armatures in light contact with their mating surfaces, eliminating armature movement time and reducing noise and spline wear. Warner Electric utilizes this preload spring in some packaged clutch/brake models including ceramic EPs and Unimodules and Smooth Start Unimodules.



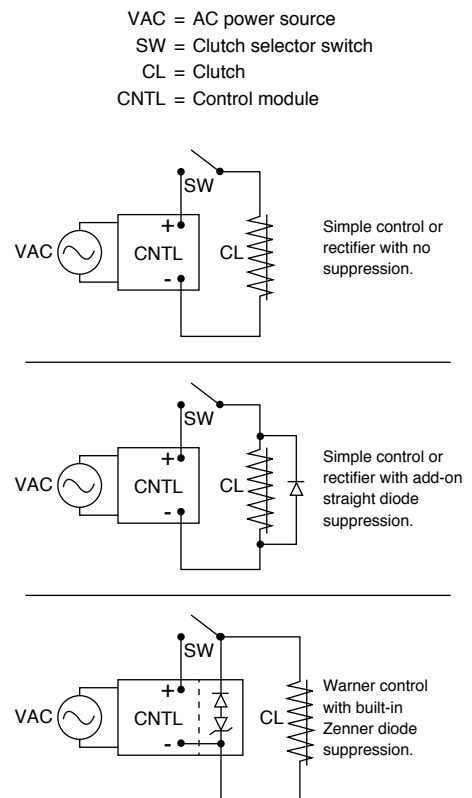
## Brake Engagement with Zener Diode Suppression

Clutch current decay and brake current rise overlap, but the brake armature is not engaged until well past the overlap point. Note that the “blip” in the brake current trace coincides with the sharp decline in the “speed” trace, indicating brake armature engagement at that point.



## Brake Engagement with Straight Diode Suppression

Clutch current decay is much slower than with Zener diode suppression as shown in Chart 1, greatly increasing the overlap area. The current level in the clutch coil is much higher at the point of brake engagement than with Zener diode suppression.



# Electrical Data Overexcitation

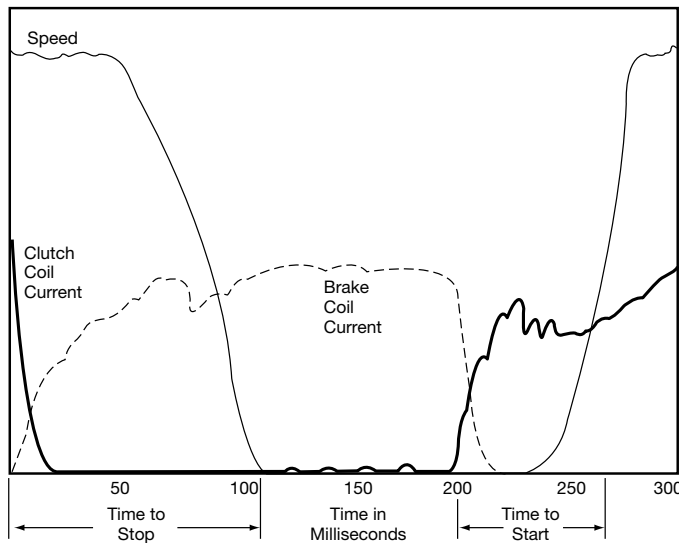
Overexcitation is a technique which makes a clutch or brake engage faster and have greatly improved starting and stopping accuracy. It involves applying over voltage to the clutch or brake coil to reduce current build up time, thereby reducing the magnetizing time.

The graphs below show current rise and shaft speed for an identical system using a Warner Electric EP-400 clutch/brake both with and without overexcitation. The effect of overexcitation is to reduce the time needed to achieve full current and thereby reduce the time required to achieve full speed with a clutch or zero speed with a brake. In the example below, "time to start" is approximate-

ly 70 ms without overexcitation. This is reduced to 30 ms when overexcitation is applied. This time is comparable to the coil buildup times stated on page G-10. The "time to stop" has been similarly reduced; the nominally excited system requires about 110 ms to stop the load, while this is accomplished in only 50 ms with overexcitation.

Overexcitation does not increase torque. Rather, the reduction in start-stop times comes from reduced coil current build up times (or "time to current"). For many common industrial applications, the reduction in "time to speed" and "time to stop" is one half when using overexcitation.

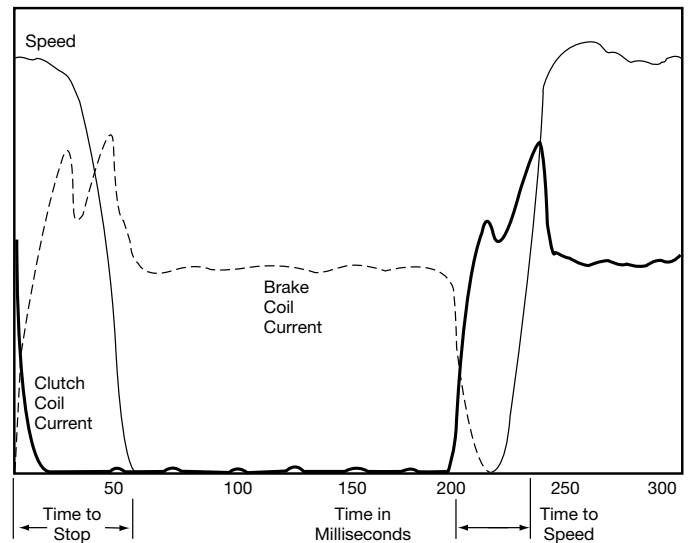
The use of overexcitation on a clutch/brake system does not increase system wear. In fact, the clutch/brake wear rate may be reduced because slippage and energy dissipation is marginally reduced in the clutch/brake. Compliance in the drivetrain may absorb some of the start/stop inertia or wear may be observed in other drivetrain components. Whenever overexcitation is used, adequate coil suppression must be employed. Please refer to "Coil Suppression and Clutch/Brake Overlap" on page G-12.



**Chart 1**

## Without Overexcitation

Current/speed trace of EP400 clutch/brake being run through a single stop/start cycle. Note that 110 milliseconds is required to stop from the time the clutch coil is de-energized and the brake coil is energized. At the 200 milliseconds point on the graph the clutch coil is energized and the load is at speed 70 milliseconds later. Note that the coil current is still increasing after the load is at full speed.



**Chart 2**

## With Overexcitation

Current/speed trace of EP400 clutch/brake being run through a single stop/start cycle. With overexcitation, both brake and clutch coil currents build much faster with concurrent reductions in both stop and start times, when compared with Chart 1.



**Email, Mail or FAX to:**

Brake and Clutch Application Engineering  
449 Gardner Street, South Beloit, Illinois 61080

info@warnerelectric.com • Phone number: 800-825-9050 • FAX number: 815-389-2582

Date \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

Phone (\_\_\_\_\_) \_\_\_\_\_

**Desired life:**

Cycles \_\_\_\_\_ Months \_\_\_\_\_ Years \_\_\_\_\_

**Environmental ambient temp:**\_\_\_\_\_°F

If brake: ☐ Dynamic stopping only ☐ Static holding only ☐ Both

If power-off, is manually released required: ☐ Yes ☐ No

**Additional comments about application or sketch:**

**Prime mover:**

Mounting: ☐ Flange ☐ Shaft ☐ NEMA

NEMA Frame size \_\_\_\_\_

H.P. \_\_\_\_\_

Speed of Clutch/Brake \_\_\_\_\_

**Load inertia to be accelerated and/or decelerated ( $WR^2$ ):**

State units \_\_\_\_\_

### How is clutch/brake to be controlled?

On/off \_\_\_\_\_ Torque adjust \_\_\_\_\_ OEX \_\_\_\_\_

**Power supply/Control:** ☐ Warner supplied ☐ Other

**Total single cycle time:** \_\_\_\_\_

**Maximum cycle rate:**

Per min. \_\_\_\_\_ Per hour \_\_\_\_\_ Per day \_\_\_\_\_

**info@warnerelectric.com • Application Support: 800-825-9050**

[illegible]

# Clutch and Brake Controls

## Contents

Warner Electric’s electronic controls are designed to provide simple setup and maximum performance when used with electric clutches and brakes. Our controls offer a range of functions from on-off to torque control to over-excitation.

### Selection

Many parameters beyond function can impact control selection. Warner Electric produces a variety of control options to suit numerous application requirements. Control selection parameters include:

- Mounting Location – Panel or conduit box mounting
- Switching – Relay switching of A.C. or D.C. lines or solid state switching
- Output Voltage – Controls are available for 6, 24 and 90 VDC clutch/brake coils
- Input Voltage – Controls with input power transformers are available for connection to high voltage mains.

If your application requires something special, please call us. We will be happy to provide solutions.

**Clutch and Brake Controls** . . . . . CTL-2

**On-Off Controls**

CBC-100 . . . . . CTL-4  
CBC-150 . . . . . CTL-4  
CBC-160 . . . . . CTL-5  
CBC-801 . . . . . CTL-6  
CBC-802 . . . . . CTL-7

**Adjustable Torque Controls**

MCS-103-1 . . . . . CTL-8  
MCS-805-1 . . . . . CTL-9  
MCS-805-2 . . . . . CTL-9  
CBC-300 . . . . . CTL-10  
CBC-500 . . . . . CTL-12  
CBC-550 . . . . . CTL-14  
CBC-1825R . . . . . CTL-16

**Overexcitation Controls**

CBC-700 . . . . . CTL-18  
CBC-750 . . . . . CTL-20

**Appendix** . . . . . CTL-22

**Questions & Answers** . . . . . CTL-23

**Ordering Information** . . . . . CTL-24



# Clutch and Brake Controls

## Functions

### On-Off (Basic start-stop)

Many applications are controlled by energizing the clutches and brakes with their rated D.C. voltages. Warner Electric controls are available with various mounting, input voltage and switching options.

### Adjustable Torque

#### (Soft start-stop)

The torque transmitted by a clutch or brake is proportional to the coil current. Warner Electric offers several products that provide torque control for smooth and repeatable starts and stops.

### Adjustable Accel-Decel

#### (Soft start-stop with full torque)

Warner Electric offers a control that allows for adjustment of the acceleration and deceleration time ramps to achieve a repeatable soft start or stop while still allowing for full torque.


### Overexcitation

#### (Rapid cycling)


The clutch/brake speed of response can be increased for improved accuracy and performance through overexcitation, which is the application of a short high voltage pulse to provide nearly instantaneous torque.

Control Type


On-Off Conduit Box Mount




On-Off Octal Socket Mount



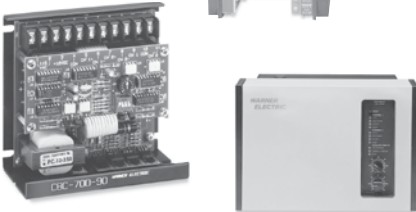
Adjustable Torque



Adjustable Accel-Decel



Overexcitation



# Clutch and Brake Controls

Model Number	No. of Channels	Torque Control Channels	A.C. Input Voltages	D.C. Output Voltages	Over-Excitation	Customer Supplied Switching Options	Description	Page Number
CBC-100-1	1	No	120	90	No	Relay A.C.	Single channel control to mount inside standard conduit box	CTL-4
CBC-100-2	1	No	220/240					
CBC-150-1	2	No	120	90	No	Relay A.C.	Dual channel control for clutch/brake to mount inside module conduit box	CTL-4
CBC-150-2	2	No	220/240					
CBC-160-1	1	1	120	90	No	Relay A.C.	Single channel control with torque adjust for module electrically released brakes	CTL-5
CBC-160-2			220/240					
CBC-801-1	2	No	120	90	No	Relay D.C.	Dual channel control for 2 clutches and/or brakes	CTL-6
CBC-801-2	2		220/240					
CBC-802	2	No	120	90	No	Transistor or Relay D.C.	Dual channel control with transistor switching	CTL-7
MCS-103-1	2	1	120	90	No	Relay D.C.	Dual channel control with torque adjust for one channel	CTL-8
MCS-805-1	1	1	120/240	35-75	No	Relay D.C.	Single adjustable channel control for use with ER-1225 brake.	CTL-9
MCS-805-2								
CBC-300	2	2	120	90	No	Transistor or Relay D.C.	Dual channel adjustable current control	CTL-10 to CTL-11
CBC-300-1								
CBC-500-90	2	2	120	90	No	Transistor or Relay D.C.	Dual channel control for two clutches and/or brakes with two torque adjust channels; Emergency stop input	CTL-12 to CTL-15
CBC-500-24	2	2	24-30	24	No			
CBC-550-90	2	2	120/220/240/380/480	90	No			
CBC-550-24	2	2	120/220/240/380/480	24	No			
CBC-1825-R	2	2	120	90	No	Transistor or Relay D.C.	Dual channel adjustable time ramp with short circuit protection	CTL-16 to CTL-17
CBC-700-90	2	No	120	90	Yes	Transistor or Relay D.C.	Dual channel compact overexcitation control for 24 or 90 volt clutches and brakes	CTL-18 to CTL-19
CBC-700-24	2		24-28	24				
CBC-750-6	2	2	120/220/240	6	Yes	Transistor, Relay D.C. or Triac A.C.	Dual channel full function overexcitation control; provides input/output logic, torque adjustable current and remote inputs	CTL-20 to CTL-21

# CBC-100/CBC-150 On-Off Controls

## Integral/Conduit Box Mounted Controls

The CBC-100 and CBC-150 series are UL listed, conduit box mounted controls for 90 volt clutches and brakes. Models are available for either 120 VAC or 220/240 VAC input.



### CBC-100 series Single unit capacity

The CBC-100 mounts inside a standard Warner Electric conduit box and includes rectification and suppression circuits.

- cULus
- Compact
- Single channel
- Mounts inside conduit box



### CBC-150 series Dual channel capacity

The CBC-150 replaces the cover on the standard module conduit box (part no. 5370-101-042). Provides rectification and suppression for two devices. Green LED indicates power to clutch. Red LED indicates power to brake.

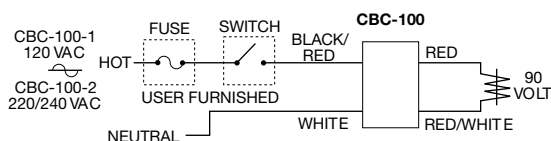
- cULus
- Dual channel
- Replaces the cover on the module conduit box

## Specifications

	CBC-100-1	CBC-100-2	CBC-150-1	CBC-150-2
Part No.	6003-448-101	6003-448-103	6004-448-001	6004-448-002
Input	120 VAC 50/60 Hz	220/240 VAC 50/60 Hz	120 VAC 50/60 Hz	220/240 VAC 50/60 Hz
Output	90 VDC full wave rectified .8 Amp max.	90 VDC half wave .8 Amp	90 VDC full wave rectified Dual .8 Amp	90 VDC half wave Dual .8 Amp
Ambient Temperatures	-20° to 113°F (-29° to 45°C)			
Switching	External to control, accomplished on A.C. line using relay or triac.			
	SPST	SPST	SPDT	SPDT
Solid State (maximum leakage current <2 mA)	140 VAC, 1 Amp min.	280 VAC, 1 Amp min.	140 VAC, 2 Amp min.	280 VAC, 2 Amp min.
Electro-mechanical	120 VAC, 1 Amp min.	240 VAC, 1 Amp min.	120 VAC, 1 Amp min.	240 VAC, 1 Amp min.

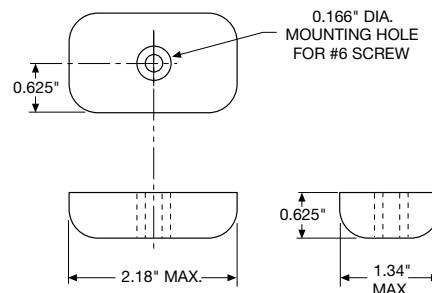
## Connection diagrams

### CBC-100-1, -2

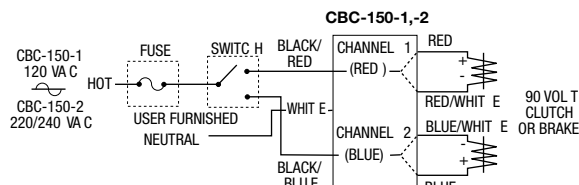


## Dimensions

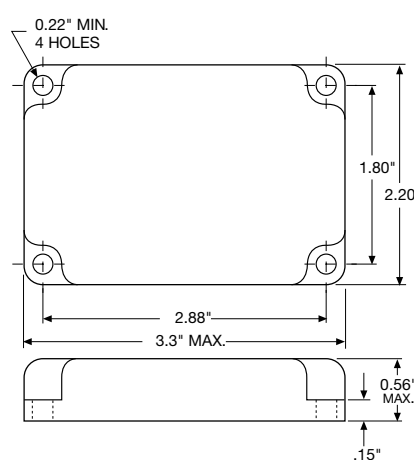
### CBC-100-1, -2



### CBC-150-1, -2



### CBC-150-1, -2



All dimensions nominal unless otherwise specified.

# CBC-160 On-Off Controls

## Integral/Electrically Released Motor Brake Controls


### CBC-160

The CBC-160 series clutch/brake controls provide a single 90 VDC adjustable output for use with any clutch/brake unit. The adjustable output will provide consistent and repeatable release for Warner Electric's 90 VDC permanent magnet electrically released brakes. The CBC-160 mounts as the cover on the standard module conduit box (part number: 5370-101-042).




#### CBC-160-1

The 160-1 accommodates 120 volts A.C. motors.

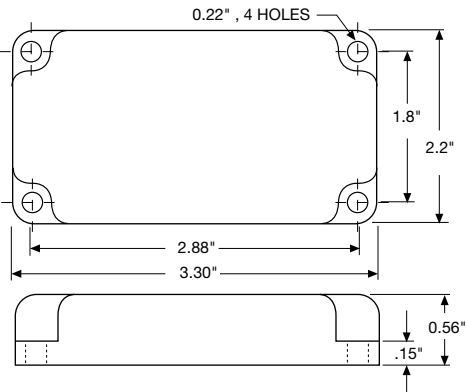
-  US
- Adjustable 30-100 VDC
- LED indicator
- 120 volt A.C. input

#### CBC-160-2

The power to the 160-2 control can come from either a 230 volt or 460 volt A.C. motor. Customer-provided switching is accomplished through the motor starter on the A.C. input. This allows convenient retrofit of spring-set style motor brakes and inexpensive installation of new applications.

-  US
- Adjustable 30-100 VDC
- Power from motor
- Easy retrofit
- 230/460 motors

### Dimensions

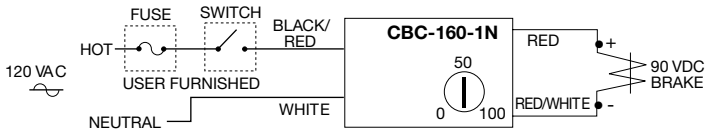


All dimensions nominal unless otherwise specified.

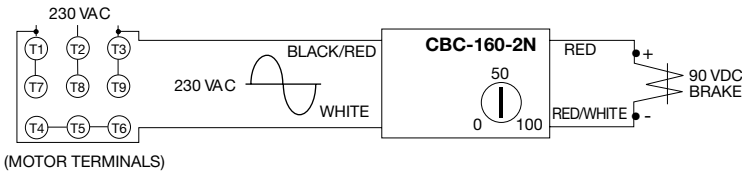
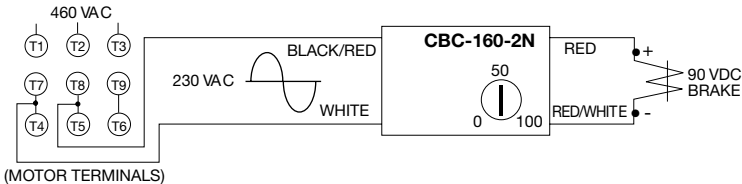
### Specifications

	CBC-160-1	CBC-160-2
Part No.	6013-448-001	6013-448-002
Input	120 VAC, 50/60 Hz	220/240 VAC, 60 Hz, 1 Phase, 100 VA max.
Status Indicator	Red LED indicates power to the brake	—
Output	Single Channel, 30-100 VDC half-wave rectified nominal, 0.8 Amps maximum	
Ambient Temperatures	0° to 122°F (-18° to 50°C)	
Switching	Accomplished through motor starter or on A.C. line using relay or triac	

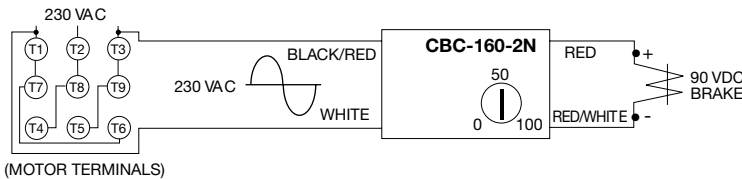
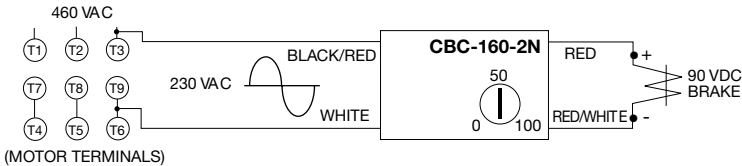
### Connection Diagrams



#### WYE Connected Motor



#### DELTA Connected Motor



# CBC-801 On-Off Controls

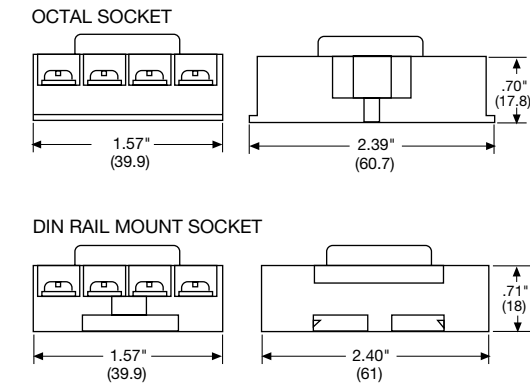
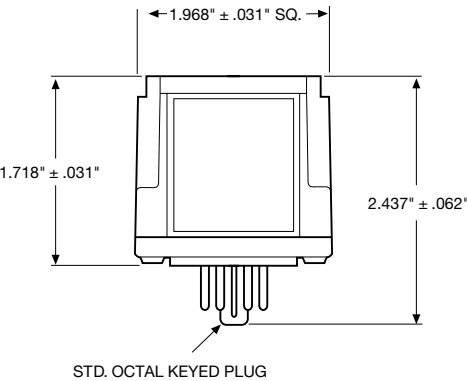
## Plug-in Octal Socket Power Supplies

The CBC-801 is a basic on-off power supply that provides full voltage to a 90 volt clutch or brake and is activated by an external switch. This type of power supply is sufficient for many clutch/brake applications.

### CBC-801 series Multi-unit capacity

The CBC-801 is a plug-in power supply which is used with an octal socket. The wiring connections are made at the socket. The CBC-801 will operate two units separately — or simultaneously. Octal socket is purchased separately.

### Dimensions



All dimensions nominal unless otherwise specified.

- US
- For basic on-off operation
- Wiring connections made at octal socket
- Arc suppression circuitry extends switch life
- Fused for overload protection
- LED output indicators
- DIN rail mountable

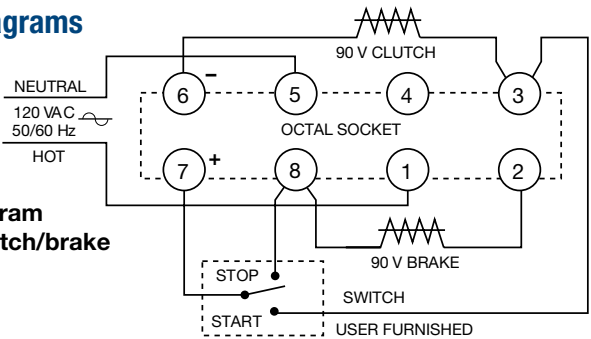


### Specifications

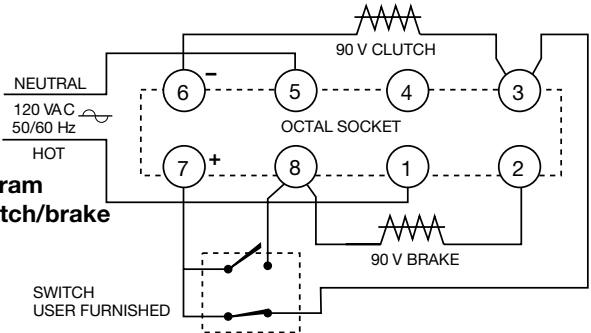
	CBC-801-1	CBC-801-2
Part No.	6001-448-004	6001-448-006
Input Voltage	120 VAC, 50/60 Hz	220/240 VAC, 50/60 Hz
Output	90 VDC, 1.25 A max.	
Circuit Protection	Fused 1.6 Amp, 250 V fast-blo	
Ambient Temperature	-23° to 116°F (-31° to 47°C)	
Max. Cycle Rate	Limited by the clutch or brake, variable with application	
Switching	Single pole, double throw Minimum contact rating: 10 Amp, 28 VDC resistive or 10 Amp, 120 VAC inductive	
Status Indicator	Red LED indicates brake is energized, Green LED indicates clutch is energized	
Mounting	Two versions of octal socket are available: 6001-101-001 foot mount 6001-101-002 DIN rail mount	

### Connection Diagrams

Connection diagram for operating clutch/brake separately.



Connection diagram for operating clutch/brake simultaneously.



# CBC-802 On-Off Controls

## Plug-in Octal Socket Power Supplies

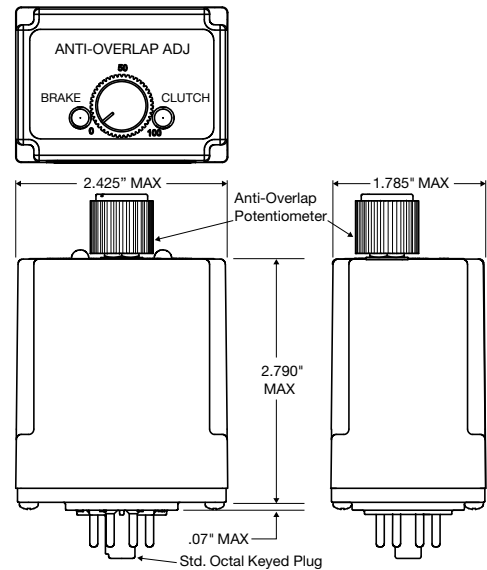


### CBC-802 PLC compatible

The CBC-802 is a power supply with solid state circuits for load switching. A brake and clutch may be operated separately — or, two brakes or two clutches, one unit on at a time. The CBC-802 mounts on an octal socket (purchased separately), and the wiring connections are made at the socket terminals. Octal socket sold separately, refer to mounting specifications for part number.

- Plug-in power supply with solid state switching circuits—increases switch service life
- Adjustable time delay for controlling clutch/brake overlap
- Internally fused for overload protection
- DIN rail mountable
- LED output indicators

### Dimensions

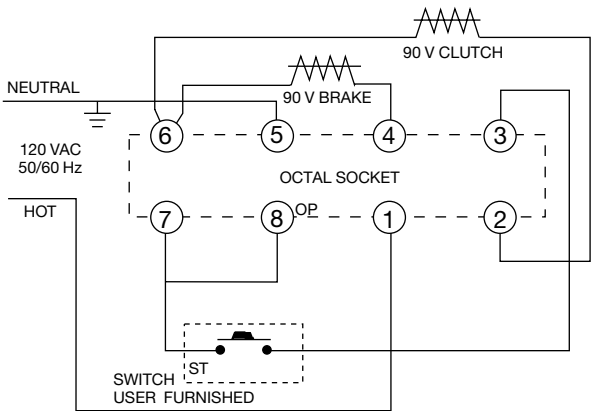


All dimensions nominal unless otherwise specified.

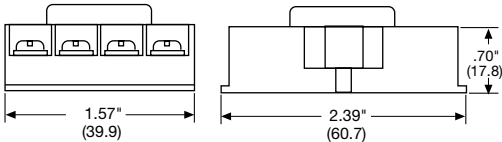
### Specifications

CBC-802	
Part No.	6002-448-002
Input	120 VAC, 50/60 Hz
Output	90 VDC, 0.5 A max.
Status Indicator	Red LED indicates brake energized. Green LED indicates clutch energized.
Circuit Protection	Fused 0.5 Amps, 250 V
Ambient Temperature	-20° to 113°F (-29° to 45°C)
Leakage Current	500 uA max. for solid state switches
Max. Cycle Rate	Limited by the clutch or brake, variable with application
Switching	Momentary contact, maintained contact, or solid state open collector logic Minimum contact rating 20 VDC resistive, 0.01 Amps Minimum input pulse—1 millisecond
Adjustments	Externally adjusted potentiometer sets overlap between clutch and brake from 0 to 130 MS.
Mounting:	Two versions of octal socket are available: 6001-101-001 foot mount 6001-101-002 DIN rail mount

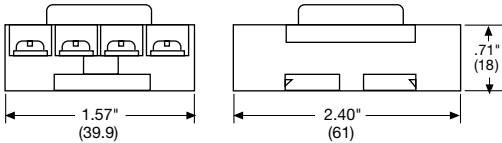
### Connection Diagram



OCTAL SOCKET




DIN RAIL MOUNT SOCKET



# MCS-103-1 Adjustable Torque Controls

## Adjustable Torque Control

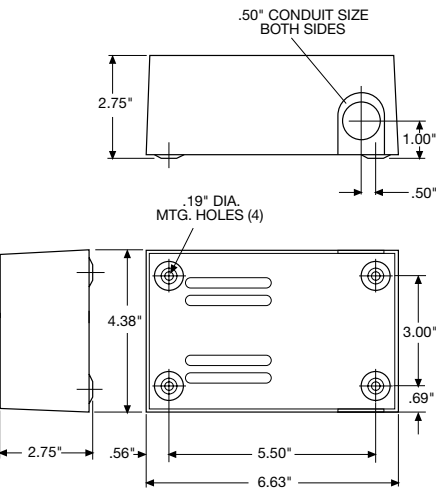
The MCS-103-1 is an enclosed control complete with a cover and mounting provisions. A brake and clutch may be operated separately with this control – or up to four units, two at a time. The external wiring is connected to the terminal strip located behind the cover.

-  **US**
- Can be used with electrically released brakes

- Torque control for one 90 VDC clutch or brake
- Operates up to four units, two on at a time
- Easy-to-install. Compact. 120 VAC input
- Convenient terminal strip behind an easy-to-remove cover



### Dimensions

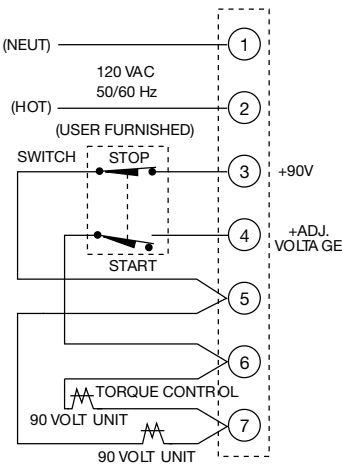


All dimensions nominal unless otherwise specified.

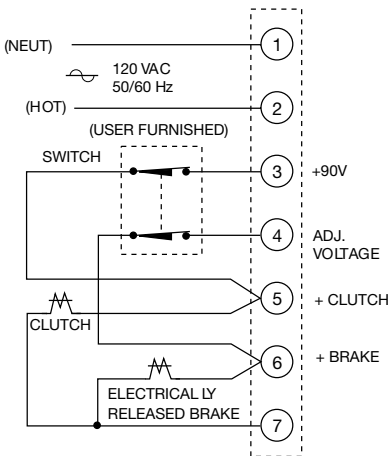
### Specifications

MCS-103-1	
Part No.	6010-448-002
Input	120 VAC, 50/60 Hz
Output	1.25 Amp 90 V full wave rectified for one unit and adjustable from 0-90 volts full wave rectified for second unit
Circuit Protection	Fused 1.5 Amp, 250 V
Ambient Temperature	-20° to 113°F (-29° to 45°C)
Maximum Cycle Rate	Limited by the clutch or brake and will vary with application.
Mounting	Mounting centers 5-1/2" wide, 3" high. Knockouts for 1/2" conduit
External Switches (User furnished)	Double pole, double throw maintained contact. Minimum contact rating: 10 Amp, 28 VDC resistive or 10 Amp, 120 VAC inductive. Contact ratings given will operate all Warner Electric brake and clutch units. However, switches with ratings less than those given may be used with fractional horsepower units provided the rating is equal to or greater than the coil current.

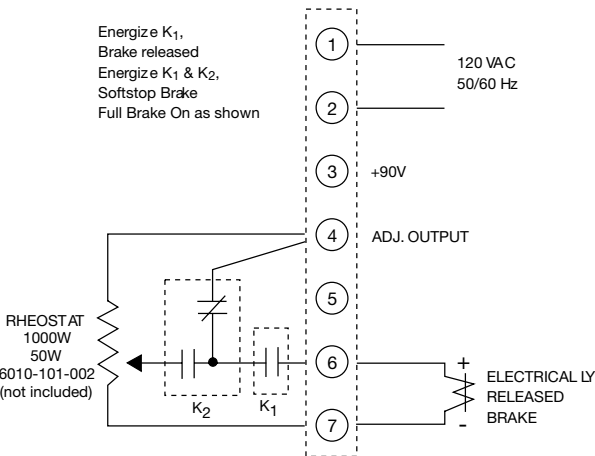
### Connection Diagrams



Normal Clutch/Brake Operation  
(One unit on at a time)



Clutch/Electrically Released  
Brake Operation  
(Both units on at a time)



Soft Stop for  
Electrically Released Brake

# MCS-805-1/MCS-805-2 Power Supply

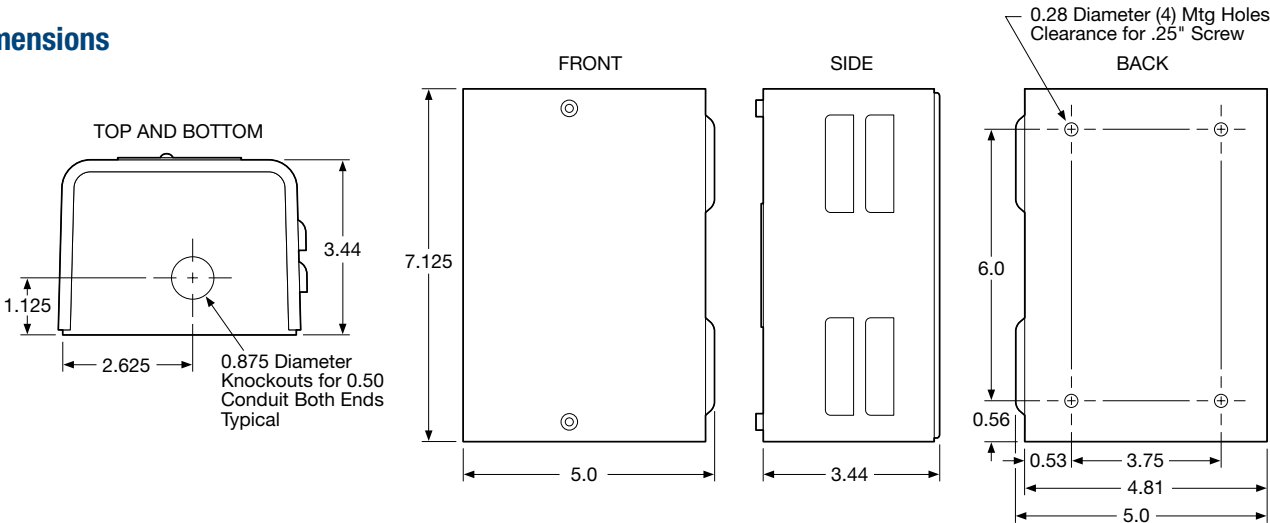
The DC voltage required to release the Warner Electric ER-1225 Brake is supplied by the MCS-805-1 or MCS-805-2 Power Supply. The correct brake release voltage—approximately 35-75 volts DC—is set by adjusting the power supply at the time of brake installation. Temperature compensating circuits provide proper operation over the entire operating range of 0°F to 150°F. Switching may be provided on either the AC or DC side of the power supply. The MCS-805-1 may be mounted on its back panel or on 1/2" conduit. The MCS-805-2 has a torque adjustment capability for soft stop applications. The MCS-805-2 requires two switching circuits when used for those applications requiring soft engagement.

## Specifications

	MCS-805-1	MCS-805-2
Part No.	6090-448-006	6090-448-007
Input	115/230 VAC, 50/60 Hz ±10%	115/230 VAC, 50/60 Hz ±10%
Output	0.4 Amp, 35/75 VDC	0.4 Amp, 35/75 VDC
Ambient Temperature	-20° to 150°F (-29° to 65°C)	-20° to 150°F (-29° to 65°C)
Maximum Cycle Rate	Limited by the clutch or brake and will vary with application. Consult factory for specifics.	
External Switches (User furnished)	For DC switching: single pole, single throw. Minimum contact rating 1 amp, 120 volts DC resistive. For AC switching: single pole, single throw. Minimum contact rating 1 amp, 120 volts AC.	
Circuit Protection	.75 Amp 250V Slow Blow 3 AG	



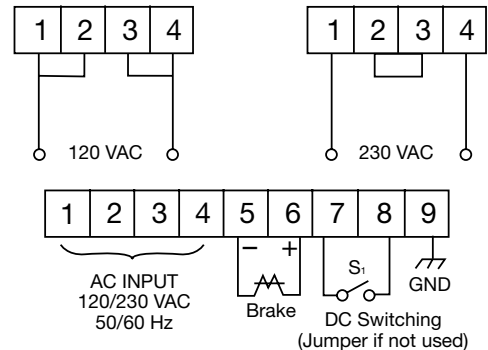
## Dimensions



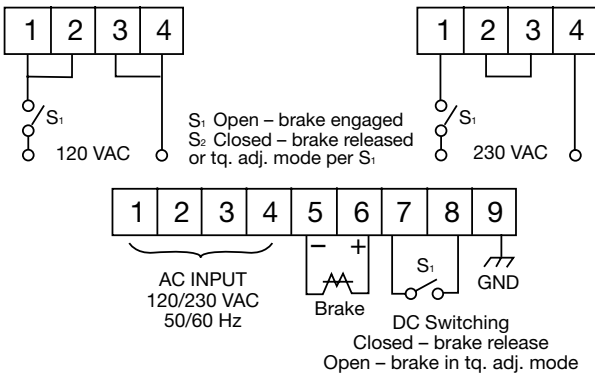
## Connection Diagrams

Connect the MCS-805-1 or MCS-805-2 Power Supply per the following diagram and instructions:

MCS 805-1




MCS 805-2



For AC switching, switch may be in series with input supply.  
For DC switching, use terminals 7 and 8 as shown.  
DO NOT put switch in series with load on terminals 5 and 6.

# CBC-300 Adjustable Torque Controls

The CBC-300 Series Controls provide dual torque controls when connected to any of Warner Electric's 90 volt clutches and brakes.

-  US
- Current monitored output maintains consistent torque regardless of variation in coil temperature.
- Switch selection tunes control to exactly match current requirements and operating characteristics of each clutch or brake.
- Individual torque adjust allows preset maximum torque tailored to application requirements.
- Short circuit protection, line to line.
- Torque limiting protects machine components from damage.
- Can be used with electrically released brakes.
- Internally Fuse Protected



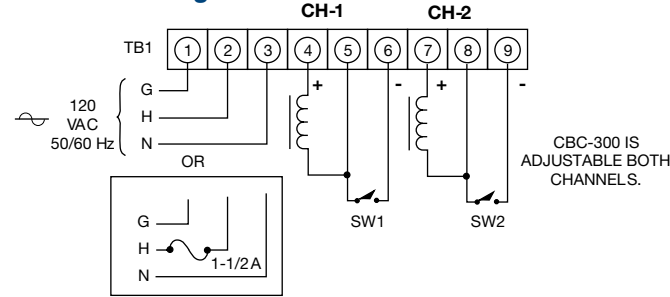
## CBC-300 Series Dual channel/Dual channel torque adjust

The CBC-300 has two adjustable current channels.

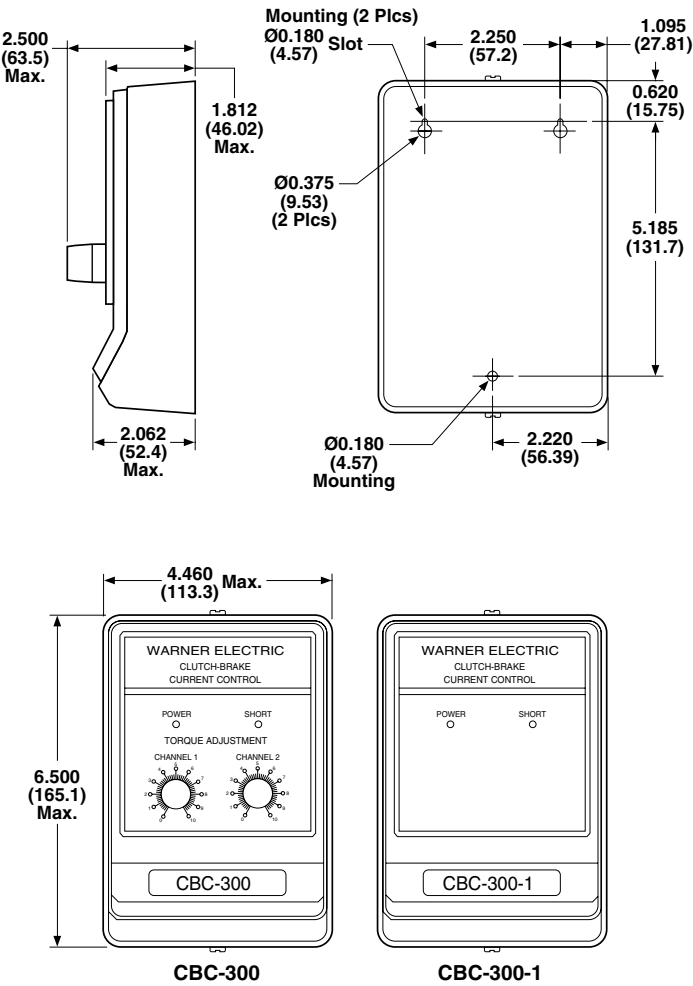
### Specifications

CBC-300						
Part No.	6021-448-009					
Input Power	120 VAC +10% -15%, 50/60 Hz, single phase, 215 VA max.					
Output	Pulse-width modulated full wave rectified D.C. Constant current, switch selectable ranges, 0-90 volt					
Ambient Temperature	+32°F to +113°F (0°C to 45°C) with plastic cover installed +32°F to +150°F (0°C to 66°C) with plastic cover removed					
Circuit Protection	Internal line to line short circuit protection Optional customer supplied fusing on A.C. line, 1.5 Amps, 250 VAC. Fast-acting fuse internal 300 (recommended 300-1)					
Current Adjust (via front panel potentiometers)	Dual adjustable channels					
Status indicators	“POWER”—green LED indicates A.C. power is applied to the control. “SHORT”—red LED indicates a short circuit condition exists on one or both outputs.					
Internal Adjustments	Set DIP switches SW1 and SW2 to suit the current draw of the connected clutch/brake coil:					
	Switch Range	1	2	3	4	5
	Max Current Draw (mA)	60	175	245	305	533
External Switching	Mechanical or electromechanical—customer supplied: 1 Amp, 125 V minimum rating Solid-state, NPN isolated transistor—customer supplied: 2 Amp, J250 V minimum rating. Maximum off state leakage current <1 mA					

### Connection Diagram



# CBC-300 Adjustable Torque Controls



Pots for remote current adjustment: 6011-101-001 single turn  
6011-101-002 ten turn

## Selection Guide

	CBC 300	CBC 300-1
	6021-448-009	6021-448-002
NEMA 1	Both channels adjustable	Both channels adjustable
Enclosure	Adjustable by knobs on unit	Adjustable by remote pots
	Max. output at 100%	Max. output at 100%

# CBC-500 Adjustable Torque Controls

## Panel Mounted



### Specifications

	CBC-500-90	CBC-500-24
Part No.	6024-448-003	6024-448-002
Input Voltage	120 VAC	24-30 VAC or VDC
Output Voltage	0-90 VDC	0-24 VDC
Output Current	1 Amp/Channel 2 Amps Total	5 Amps/Channel 5 Amps Total
Auxiliary Supply	12 VDC 250 mA	12 VDC 250 mA
Circuit Protection	Fused 2.5 Amp, 250 V Fast-blo	Fused 6.3 Amp, 250 V Fast-blo
Ambient Temperature	+32° to 122°F (0° to 50°C)	
Status Indicators	Red LED indicates channel is energized.	
Adjustments	Two potentiometers for voltage adjustment of channel 1 and channel 2 output from 0 to full rated voltage. Frequency adjustment from 60 to 400 Hz to reduce clutch/brake "Hum" associated with machine frequencies. Jumper for single or dual operation. See Appendix for explanation.	
Inputs:	3 Optically coupled, 10-30 VDC, 3-9 mA for Channel 1, Channel 2 and Channel 2 override (applies full voltage to channel 1 output)	

### CBC-500 series Dual torque adjustable power supplies

The CBC-500 series is a dual channel adjustable voltage control with optically isolated input switching for 24 and 90 volt electric clutches and brakes. These controls can be set up to energize the two outputs alternately (single) or simultaneously (dual). Refer to the Appendix for additional setup and switching information.

- Dual adjustable channels
- Optically isolated input switching
- Single or dual channel operation
- Auxiliary 12V supply
- Can be used with electrically released brakes

### Enclosure (Optional)

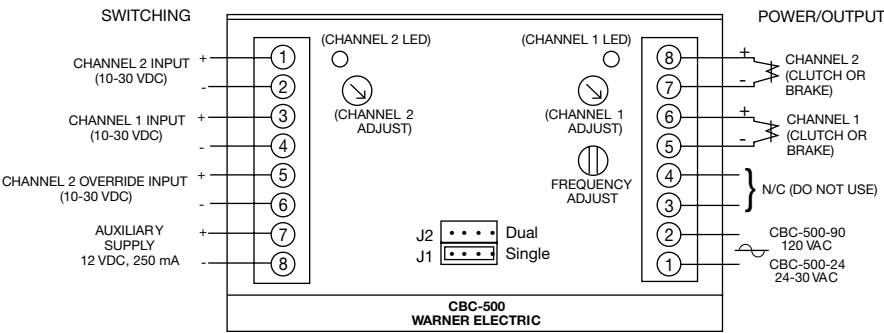


- Lift off hinge
- Quick-release latches
- Conforms to NEMA Type 13
- European Standard IEC 529, IP65

# CBC-500 Adjustable Torque Controls

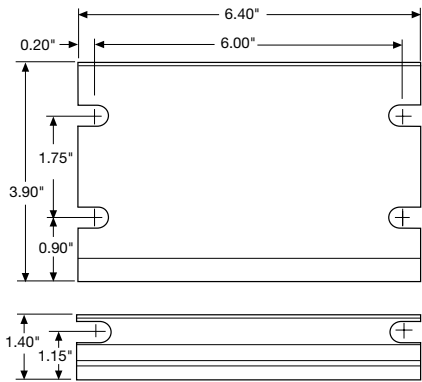
Panel Mounted

## Connection Diagram



All dimensions nominal unless otherwise specified.

## Dimensions



Part No.	6042-101-004
Size	8"H x 6"W x 4"D (203.2 x 152.4 x 101.6 mm)

# CBC-550 Adjustable Torque Controls

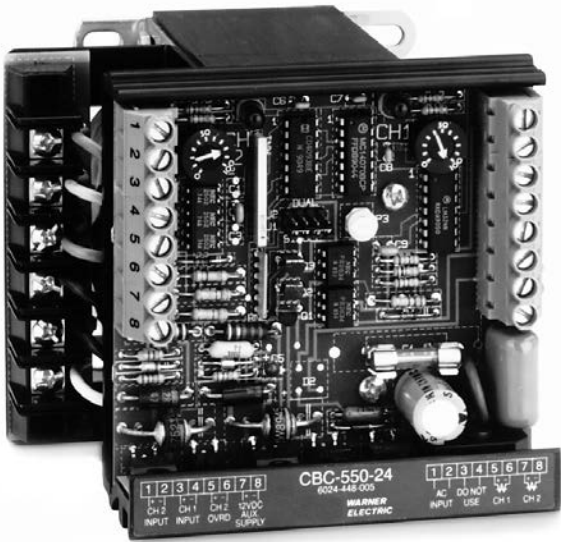
## Panel Mounted

### CBC-550 series Dual adjustable with power transformer

The CBC-550 series is a dual channel adjustable voltage control with optically coupled switching for 24 and 90 volt electric clutches and brakes. These controls can be set up to energize the two outputs alter-nately (single) or simultaneously (dual). Refer to the Appendix for additional setup and switching information.

The CBC-550 series has a power transformer which will operate with a 120, 220, 240, 380, or 480 VAC input.

- Dual adjustable channels
- Optically isolated input switching
- Single or dual channel operation
- Can be used with electrically released brakes



### Specifications

	CBC-550-90	CBC-550-24
Part No.	6024-448-006	6024-448-005
Input Voltage	120/220/240/380/480 VAC	
Output Voltage	0-90 VDC	0-24 VDC
Output Current	1 Amp/Channel 1.2 Amps Total	4 Amps/Channel 4 Amps Total
Auxiliary Supply	12 VDC 250 mA	12 VDC 250 mA
Circuit Protection	Fused 1.5 Amp, 250 V fast-blo	Fused 5 Amp, 250 V fast-blo
Ambient Temperature	+32° to 122°F (0° to 50°C)	
Status Indicators	Red LED indicates channel is energized.	
Adjustments	Two potentiometers for voltage adjustment of channel 1 and channel 2 output from 0 to full rated voltage. Frequency adjustment from 60 to 400 Hz to reduce clutch/brake "Hum" associated with machine frequencies. Jumper for single or dual operation. See Appendix for explanation.	
Inputs	3 Optically coupled, 10-30 VDC, 3-9 mA for Channel 1, Channel 2 and Channel 2 override (applies full voltage to channel 1 output)	

### Enclosure (Optional)



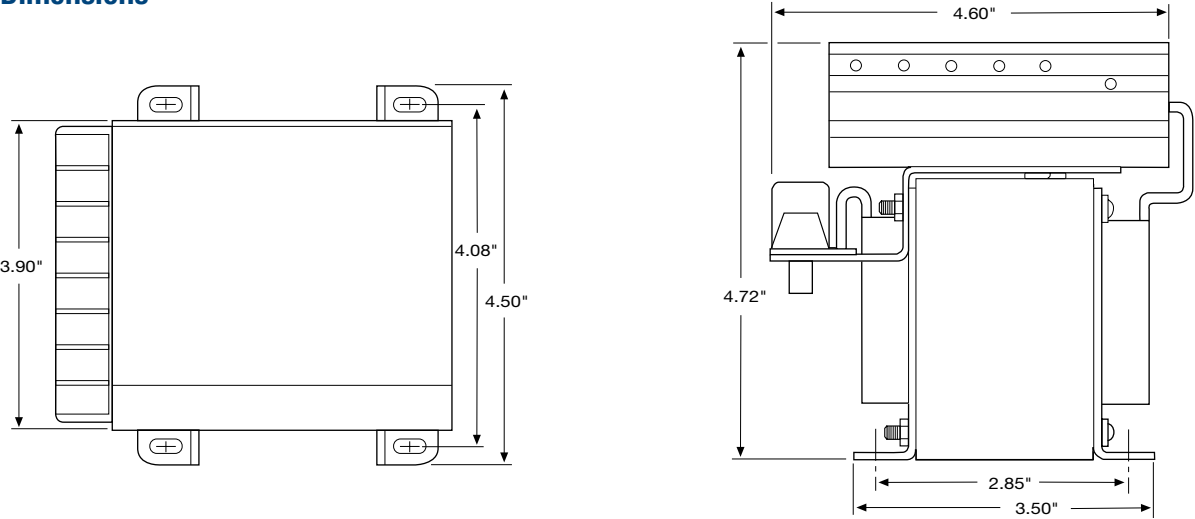
- Lift off hinge
- Quick-release latches
- Conforms to NEMA Type 13
- European Standard IEC 529, IP65

Part No.	6006-101-007
Size	6"H x 6"W x 6"D (152.4 x 152.4 x 152.4 mm)

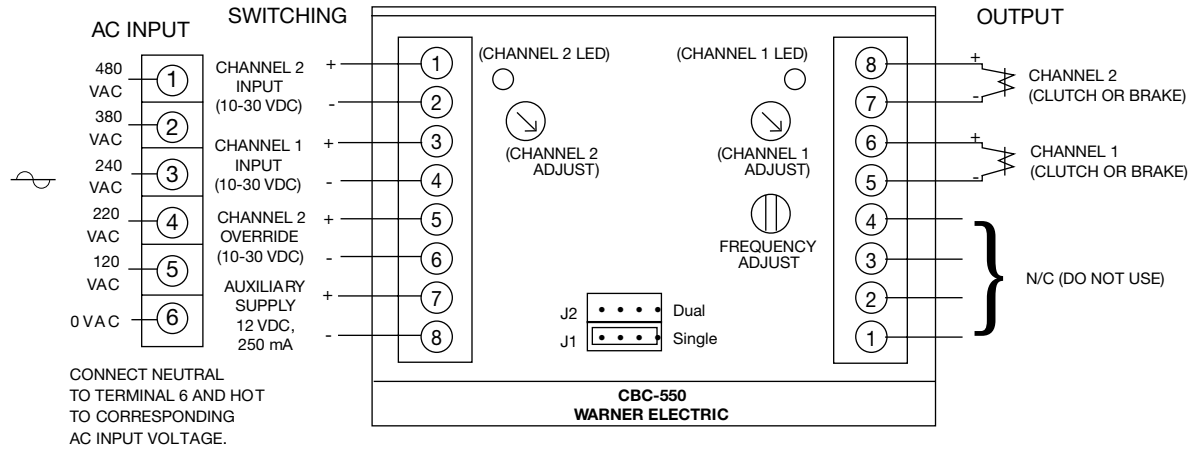
# CBC-550 Adjustable Torque Controls

Panel Mounted

## Dimensions



## Connection Diagram



All dimensions nominal unless otherwise specified.

# CBC-1825R Adjustable Torque Controls

## Panel Mounted

### CBC-1825R series

The CBC-1825R is designed to provide consistent and repeatable acceleration and deceleration when used with Warner Electric 90 VDC clutches and brakes. Current to each channel is introduced along an adjustable time ramp and monitored continuously. Adjustments include initial pull-in pulse, hold level, maximum torque, and ramp time. LEDs are provided on the circuit board to indicate power is applied to the clutch or brake unit.

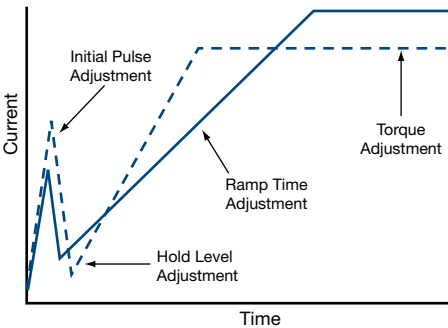
**Note:** It is recommended that the auto-gap springs be removed from the clutch and brake for successful accel-decel application.



### Specifications

CBC-1825R	
Part No.	1825-448-001
Input Voltage	120 VAC, 50/60 Hz, 100 VA maximum
Output Current	Current driven PWM, compatible with 90 VDC clutch/brake (switch selectable current output)
Auxiliary Supply	12 VDC 250 mA
Circuit Protection	Input Fused 1.5 Amp, 250 V fast-blo clutch and brake outputs are short circuit protected
Status Indicators	Clutch and brake LEDs indicate output is energized Short circuit LED indicates a fault
Ambient Temperature	0° to 122°F (-18° to 50°C)
Switching	Contact rating: 15 mA @ 15 V, open collector NPN 2mA maximum allowable leakage current and 2 V maximum saturation voltage

### Set-up

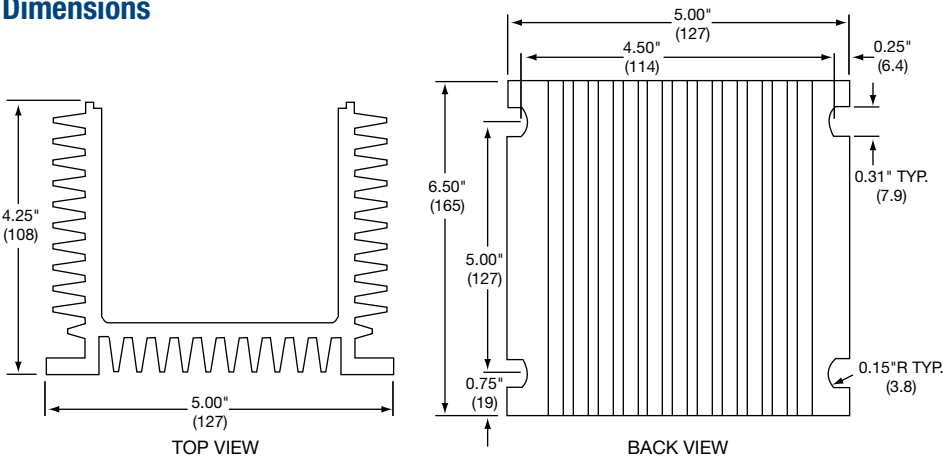


All dimensions nominal unless otherwise specified.

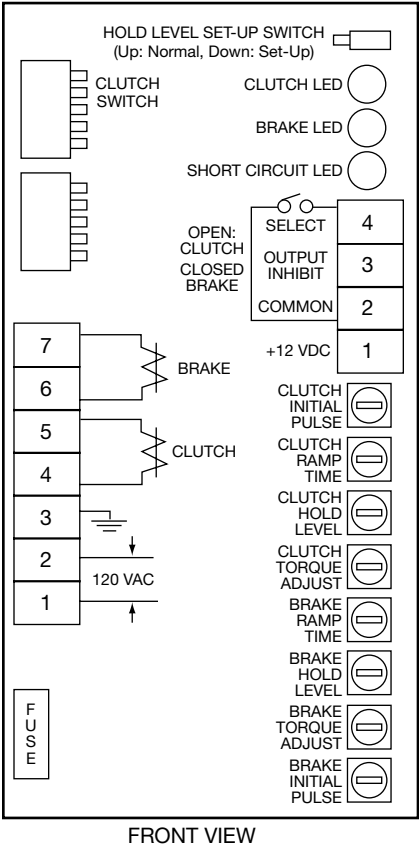
# CBC-1825R Adjustable Torque Controls

Panel Mounted

## Dimensions



## Connection Diagram



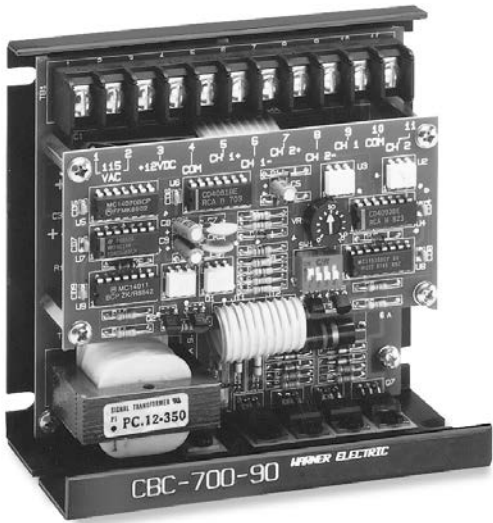
# CBC-700 Overexcitation Controls

## General Purpose OEX Control

### CBC-700 Series

Simple, compact, high performance OEX control for either 90 or 24 VDC clutches and brakes. OEX spike duration and anti-overlap times delay are adjustable. Two optically isolated inputs.

- High performance
- Switch selectable OEX duration
- Force decay suppression with adjustable anti-overlap time delay
- Compact, flexible mounting
- Models for 24 or 90 volt clutches and brakes
- Cycle rate limited by clutch/brake



### Specifications

	CBC-700-90	CBC-700-24
Part No.	6042-448-003	6042-448-002
Input	120 VAC, 50/60 Hz	24-28 VAC, 50/60 Hz
Output Voltages		
Steady State	90 VDC	24 VDC
Overexcitation	340 VDC	105 VDC
Output Current (Per channel alternately)	.5 Amps	3.5 Amps
OEX Pulse Duration	Adjustable through logic board dip switches (see service manual)	
Inputs	Two-optically isolated (10-30 VDC)	
Ambient Temperature Range	0°F to 140°F (-18°C to +60°C)	
Maximum Off State Leakage	<2 mA (inputs)	
Circuit Protection	1.6A Fast Act (5 x 20 mm)	5A Slo-Blo (5 x 20 mm)
Auxiliary Supply	12 VDC, 250 mA maximum	

### Enclosure (Optional)



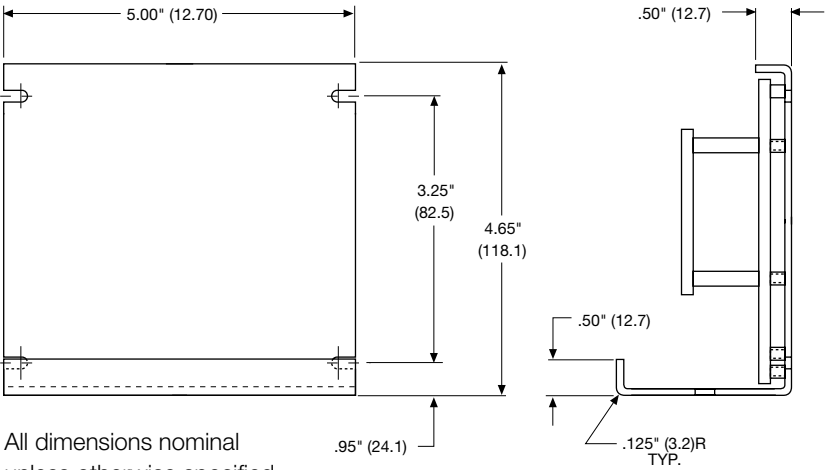
- Lift off hinge
- Quick-release latches
- Conforms to NEMA Type 13
- European Standard IEC 529, IP65

Part No.	6042-101-004
Size	8"H x 6"W x 4"D (203.2 x 152.4 x 101.6 mm)

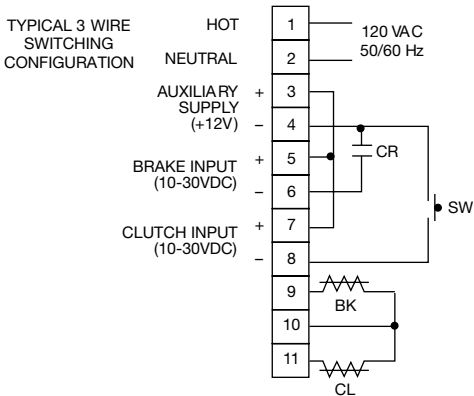
# CBC-700 Overexcitation Controls

## General Purpose OEX Control

### Dimensions



### Connection Diagram



# CBC-750 Overexcitation Control

## Rapid Acceleration/Deceleration

### CBC-750 Dual channel, current based OEX with switching logic

Warner Electric's CBC-750 Constant Current Overexcitation Clutch/Brake Control is a solid-state electronic control designed to increase the cycle rate capabilities and accuracies of electromagnetic clutches and brakes. The control accomplish this by sending a momentary high voltage overexcitation spike to the clutch and/or brake magnetic coil to build a high density magnetic flux field almost instantaneously. By using overexcitation, the response time is reduced as dramatically as performance is increased. For example, the current build up time of a 5 inch, 6 volt magnet is reduced from 84 milliseconds to 2 milliseconds.

The CBC-750 user selects either 120, 220 or 240 VAC operation at the time of installation, and is available for 6 volt clutches and brakes.

LED indicators on the faceplate of each control tell the user the status of input signals, output activation and any auxiliary inputs. A reset switch resets the output should a short be detected. Remote torque adjust potentiometer inputs are also provided. Appropriate current range for each size clutch or brake is selected by a dip switch. Constant current for each level is assured by the control's design.

- Maintains torque at preset levels regardless of temperature variations
- Automatically controls OEX pulse duration for optimum response without overheating coils
- Automatically prevents clutch and brake "overlap"
- Configurable as an analog follower control through remote top input
- Integral switching logic through auxiliary, inhibit and override inputs



Shown with optional cover, part number 6041-101-004

- High performance OEX control
- Constant current output capability
- Available for 6 volt clutches and brakes
- Outputs short circuit protected.
- AC/DC optically isolated inputs
- Transformer isolation Remote torque potentiometer capability
- Input/Output inhibit functions
- Switch selectable OEX function
- Automatic CH1/CH2 anit-overlap feature
- Heavy duty suppression circuits
- Selectable output current ranges
- Remote status indicators inputs and outputs

### Specifications

CBC-750-6	
Part No.	6041-448-001
Input Power	120/220/240 VAC, ±10%, 50/60 Hz, 350 VA (switch selectable)
Control Inputs	Opto-isolated 10-30 VDC @ 10-35 mA nominal sinking or sourcing, or 24 VAC (50/60Hz) @ 22 mA nominal, or 120 VAC (50/60 Hz) @ 20 mA nominal
Clutch/brake Output	
Steady State Output	
Current controlled	.910 to 4.34 A max.
Current Rise Time	Dependent on clutch/brake size
Current Fall Time	Depending on clutch/brake size
Overexcitation Voltage	75 VDC nom.
Overexcitation Time	Automatic adjustment by control feedback
Anti-overlap Time	Automatic adjustment by control feedback
Power Supply Output	12 VDC, ±0.6 VDC, 250 mA max.
Auxiliary Indicator	Opto-isolated NPN transistors
Outputs	24 VDC maximum, 20 mA max., reverse polarity protected
Circuit Protection	Internal short circuit protection on each output channel.
Fusing	
AC Input Line	2 Amp, 250 V Slo-Blo
OEX Supply	10 Amp, 32 V Slo-Blo

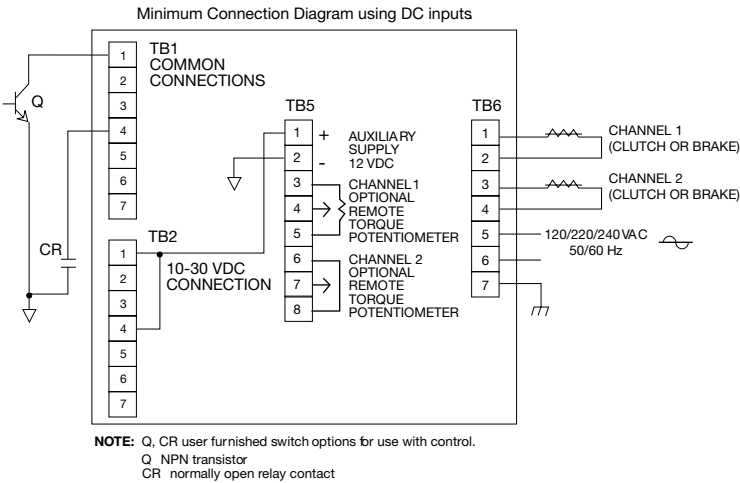
# CBC-750 Overexcitation Controls

## Rapid Acceleration/Deceleration

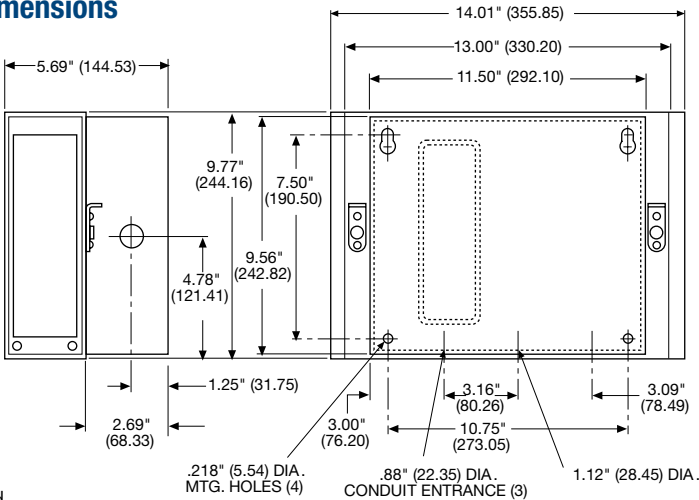
Seven optically isolated inputs accept 10-30V A.C./D.C. (TB2) or 120 VAC (TB3), configured through set-up switches

- 1. Channel 2 Input
- 2. Channel 2 Input Inhibit (disregards channel 2 input signal)
- 3. Auxiliary Input
- 4. Channel 1 Input
- 5. Channel 1 Input Inhibit (disregards channel 1 input signal)
- 6. Output Inhibit (deactivates both output channels)
- 7. Channel 2 Override (applies full voltage to channel 1 output)

### Connection Diagram



### Dimensions



All dimensions nominal unless otherwise specified.

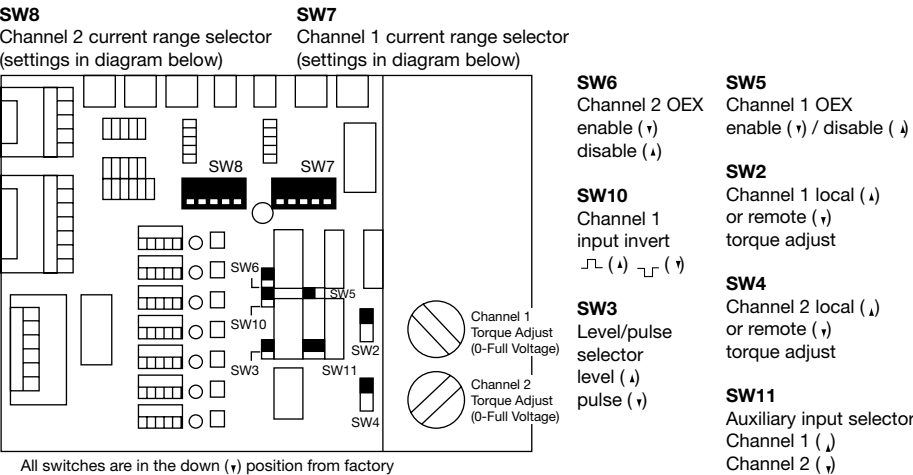
### Setup Switches

SW1: AC Voltage selection switch on terminal board inside control unit

### Max. Current Output

(SW7 & SW8 settings)

Nominal Voltage	1	2	3	4	5
6	0.910	2.35	3.183	3.760	4.340

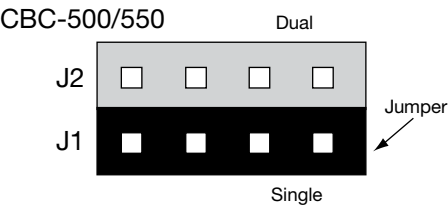


# Appendix

## CBC-500/550 Single vs. Dual Operation

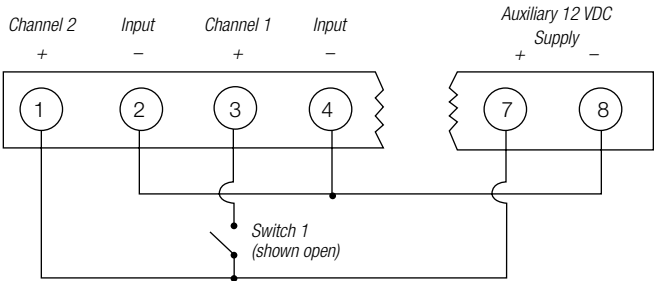
The CBC-500/550 series controls allow operation in either a single or dual mode. The mode of operation is determined via the position of a jumper on the main control board.

The controls are shipped with the jumper in the J1 or single mode position. A variety of output logic can be accomplished via the single/dual jumper position and whether the control is wired to one input switching device (2-wire mode) or two input switching devices (3-wire mode). The following diagrams show how each channel (output) of the control can be either alternately or simultaneously energized.



### 2-wire Switching Option

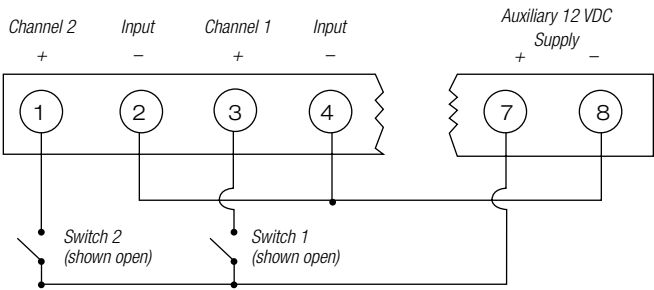
Control's switching terminal block



Jumper Mode	Switch 1	Channel 1	Channel 2
J1-Single	Open	Off	Powered
	Closed	Powered	Off
J2-Dual	Open	Powered	Powered
	Closed	Off	Off

### 3-wire Switching Option

Control's switching terminal block



Jumper Mode	Switch 1	Switch 2	Channel 1	Channel 2
J1-Single	Closed	Open	Latched On	Off
	Open	Closed	Off	Latched On
J2-Dual	Closed	Open	Off	Off
	Open	Closed	Latched On	Latched On

## Questions and Answers

### 1. What transformers can be used with controls requiring 24-30 VAC input?

Manufacturer	Part Number	Primary	Secondary
Abbott	6B 12-160	115 VAC	24V @ 6 amps
Quality	6-K-119VBR	115/230 VAC	24V @ 8 amps
Signal	24-6	115 VAC	24V @ 6 amps
Signal	DP24-6	115/230 VAC	24V @ 6 amps
Triad	F-260-U	115 VAC	24V @ 6 amps

### 2. What is the difference between a MCS-801 and a CBC-801-1 or between a MCS-103 and a MCS-103-1?

There is no performance difference between the MCS-103 and MCS-103-1. There is no performance difference between the MCS-801 and CBC-801-1. The CBC-801-1 is roughly 1/4" shorter than the MCS-801. The units wire and work exactly the same.

### 3. Which power supplies can be used with the SF 1525HT and SFC 1525HT (used in the EP-1525HT) coil?

90V:

The SF and SFC 1525 High Torque 90V clutch coils require .794 amps of current to produce full rated torque. The following power supplies and controls will provide the needed power.

CBC-100	.8 amps	MCS-103-1	1.25 amps
CBC-150	.8 amps	CBC-500	1 amp
CBC-801	1.25 amps	CBC-550	1 amp

24V:

The SF and SFC 1525 High Torque 24V clutch coils require 3.14 amps of current to produce full rated torque.

Any of our 24V controls (CBC-500, CBC-550, CBC-700) will provide this current.

### 4. Can I use a CBC-160 with a variable frequency drive and AC motor?

No. As the voltage to the drive is varied, the output to the electrically released brake would also vary. This would cause the brake to re-engage when it should be released.

### 5. Which power supplies offer a 12 VDC power source that could be used to power auxiliary switch inputs such as inductive or photoelectric sensors?

CBC-500, CBC-550, CBC-700, CBC-750

### 6. We plan to use a PLC in the application. Does that impact our choice of control or power supply?

The CBC-801s and MCS-103-1 are not very PLC friendly. Both require a 10 amp relay for switching which is not very common for PLCs. Alternatives would be CBC-150 or CBC-500/550 respectively which are more 'PLC-Friendly'.

### 7. Which of the controls would allow for the independent operation of two clutches or two brakes?

Four controls allow for completely independent operation of two clutches or brakes. That is, that a clutch and brake can both be on at once, both off at once, or one on and one off. These controls are:

CBC-801-1 and CBC-801-2, MCS-103-1, CBC-300

The CBC-500/550 allows for operation of both channels on at once, both channels off at once or cycling between channel one and two. However, in the both-on/both-off mode, you cannot also do independent single channel operation.

### 8. Our PLC can provide 24 or 90 volts output. Why do we need a separate power supply at all?

There are two reasons to use a Warner Electric control or power supply with clutches and brakes. First, the electric coil within clutches and brakes can create a significant back EMF spike when turned off. This can damage PLC circuits (some PLCs include a diode for protection). All Warner Electric controls and power supplies include a suppression network to protect upstream electrical components from the back EMF spike. Second, this same suppression network will speed the collapse of the magnetic field within a clutch or brake. Without the suppression circuit, a clutch and brake will often overlap each other in performance with resulting poor machine performance.

### 9. Which controls can be used with electrically released brakes?

The CBC-160-1 and CBC-160-2 are designed specifically to use with the conduit box of EM and EUM electrically released brake designs. The CBC-160-1 and CBC-160-2 can also be used with ER and FB brake designs.

The MCS-103-1, CBC-300 and CBC-500/550 can all be used with ER, FB as well as UM-FBC, EM and EUM-FBB and EM and EUM-MBFB designs.

The MCS 805-1 and MCS 805-2 are for use only with the ER 1225 brakes. The ERS series brakes can be used with the CBC-100 or CBC-801 power supplies.

## Ordering Information

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Model	Part Number	Page
CBC-100-1 .....	6003-448-101 .....	CTL-4
CBC-100-2 .....	6003-448-103 .....	CTL-4
MCS-103-1 .....	6010-448-002 .....	CTL-8
CBC-150-1 .....	6004-448-001 .....	CTL-4
CBC-150-2 .....	6004-448-002 .....	CTL-4
CBC-160-1 .....	6013-448-001 .....	CTL-5
CBC-160-2 .....	6013-448-002 .....	CTL-5
CBC-300 .....	6021-448-009 .....	CTL-10, CTL-11
CBC-300-1 .....	6021-448-002 .....	CTL-11
CBC-500-24 .....	6024-448-002 .....	CTL-12
CBC-500-90 .....	6024-448-003 .....	CTL-12
CBC-550-24 .....	6024-448-005 .....	CTL-14
CBC-550-90 .....	6024-448-006 .....	CTL-14
CBC-1825R .....	1825-448-001 .....	CTL-16
CBC-700-24 .....	6042-448-002 .....	CTL-18
CBC-700-90 .....	6042-448-003 .....	CTL-18
CBC-750-6 .....	6041-448-001 .....	CTL-20
CBC-801-1 .....	6001-448-004 .....	CTL-6
CBC-801-2 .....	6001-448-006 .....	CTL-6
Octal Socket, Foot Mount .....	6001-101-001 .....	CTL-6, CTL-7
Octal Socket, DIN Rail Mount .....	6001-101-002 .....	CTL-6, CTL-7
CBC-802 .....	6002-448-002 .....	CTL-7
Optional Enclosure: CBC-500, CBC-700 .....	6042-101-004 .....	CTL-12, CTL-18
Optional Enclosure: CBC-550 .....	6006-101-007 .....	CTL-14
MCS-805-1 .....	6090-448-006 .....	CTL-9
MCS-805-2 .....	6090-448-007 .....	CTL-9

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# Part Numbers Ordering Information



**PN**

# Part Numbers Ordering Information

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## Base Mounted Units

### Electro Pack - EP

Model	Part No.	Voltage	Pg. No.
EP-170	5633-273-002	6	A-3
	5633-273-003	24	
	5633-273-005	90	
EP-250	5130-273-031	6	A-3
	5130-273-032	24	
	5130-273-034	90	
EP-400	5131-273-009	6	A-3
	5131-273-010	24	
	5131-273-011	90	
EP-500	5230-273-003	6	A-3
	5230-273-011	24	
	5230-273-002	90	
EP-825	5231-273-003	6	A-3
	5231-273-004	24	
	5231-273-002	90	
EP-1000	5232-273-003	6	A-3
	5232-273-005	24	
	5232-273-002	90	
EP-1525	5234-273-003	6	A-3
	5234-273-002	90	
EP-1525HT	5234-273-017	24	A-3
	5234-273-012	90	

### Electro Pack – Ceramic Faced - EP-C

Model	Part No.	Voltage	Pg. No.
EP-170-C	5633-273-018	24	A-10
	5633-273-019	90	
EP-250-C	5130-273-053	24	A-10
	5130-273-054	90	

### Electro Pack – Washdown

Model	Part No.	Voltage	Pg. No.
EP-250-W	5130-273-060	24	A-12
	5130-273-061	90	
EP-400-W	5131-273-030	24	A-12
	5131-273-031	90	

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A-10	EP250C	5130-273-053	NA
A-10	EP250C	5130-273-054	NA
A-12	EP250W	5130-273-060	NA
A-12	EP250W	5130-273-061	NA
A-3	EP400	5131-273-009	SP-1
A-3	EP400	5131-273-010	SP-1
A-3	EP400	5131-273-011	SP-1
A-12	EP400W	5131-273-030	NA
A-12	EP400W	5131-273-031	NA
A-3	EP500	5230-273-002	SP-4
A-3	EP500	5230-273-003	SP-4
A-3	EP500	5230-273-011	SP-4
A-3	EP825	5231-273-002	SP-5
A-3	EP825	5231-273-003	SP-5
A-3	EP825	5231-273-004	SP-5
A-3	EP1000	5232-273-002	SP-7
A-3	EP1000	5232-273-003	SP-7
A-3	EP1000	5232-273-005	SP-7
A-3	EP1525	5234-273-002	SP-9
A-3	EP1525	5234-273-003	SP-9
A-3	EP1525 HT	5234-273-012	SP-9
A-3	EP1525 HT	5234-273-017	SP-9
A-3	EP170	5633-273-002	SP-1
A-3	EP170	5633-273-003	SP-1
A-3	EP170	5633-273-005	SP-1
A-10	EP 170C	5633-273-018	NA
A-10	EP 170C	5633-273-019	NA

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