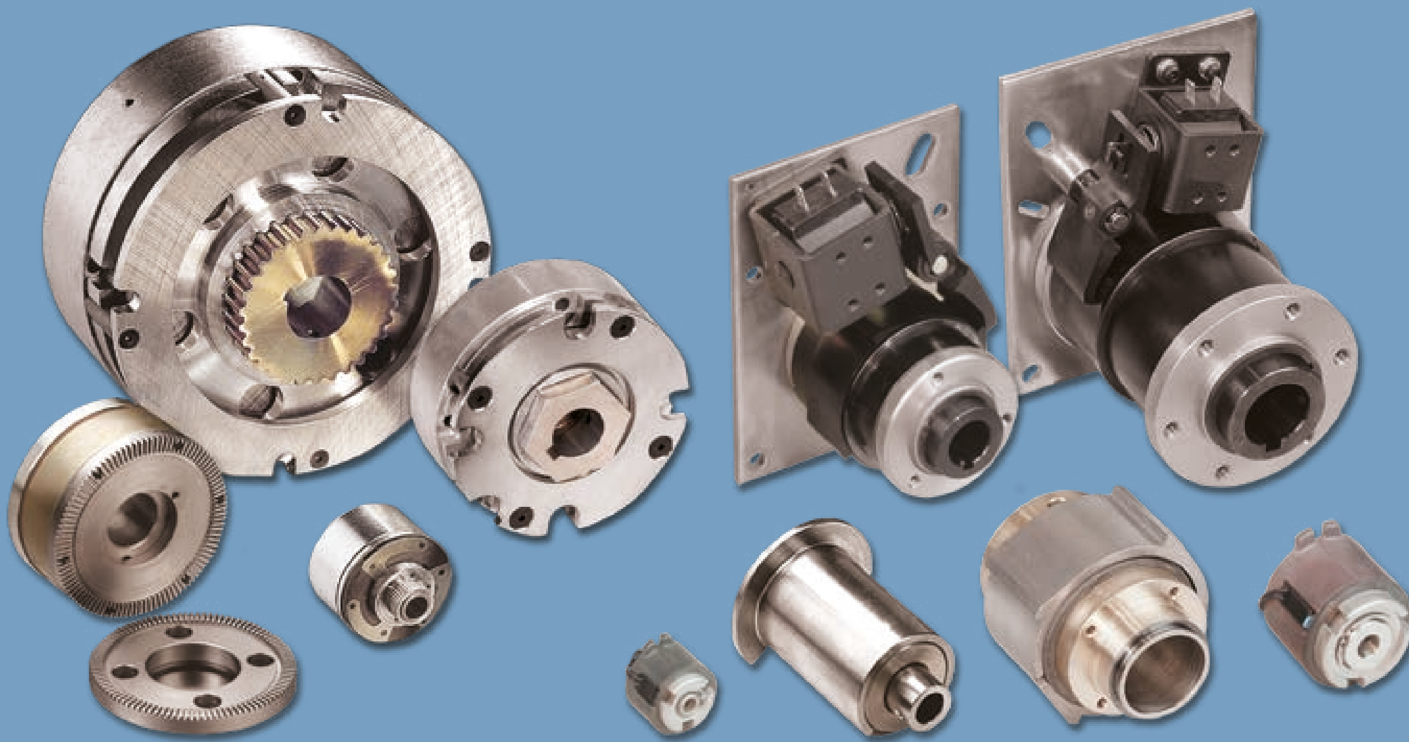


Clutches & Brakes

www.thomsonlinear.com

DELTRAN

Thomson - the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that makes us the supplier of choice for motion control technology.

- Thomson own the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to more than 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Fortive Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

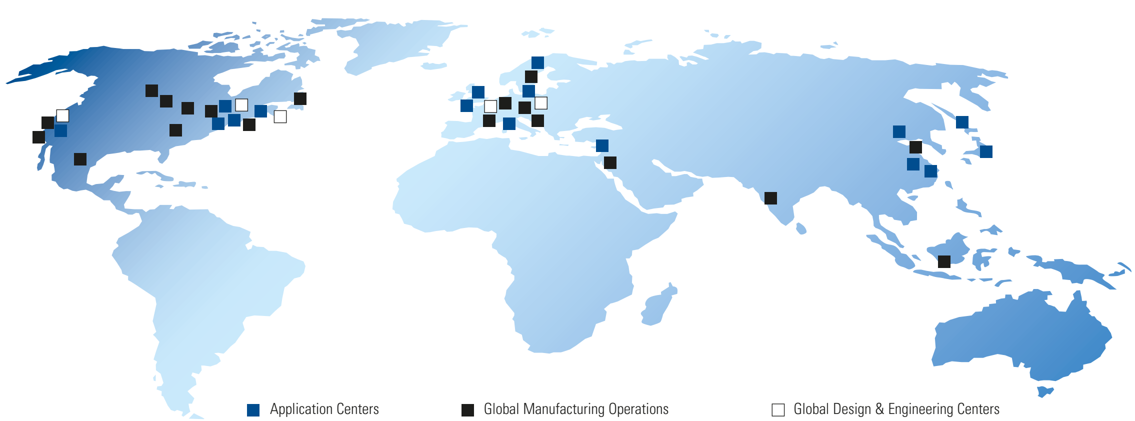
A Name You Can Trust

A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information are available at www.thomsonlinear.com. Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

The Fortive Business System

The Fortive Business System (FBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. FBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. FBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages, Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe



Deltran Clutches & Brakes

Introduction

Building Our Business On a Strong Foundation

Thomson has a long history of manufacturing quality clutches and brakes. Our roots are firmly planted in brand names such as Deltran, American Precision Industries (API) and Warner PSI, combining more than 100 years of combined manufacturing experience.

In 2000, the Genuine Wrap Spring™ and electromagnetic friction products were combined under the Deltran name within the Thomson family. As we merged the manufacturing of these product lines into one facility in Amherst, NY, we focused on keeping the engineering expertise at the forefront while practicing The Fortive Business System (FBS) of continuous improvement.

Today, our clutch and brake products are working in a wide range of applications specific to factory automation, material handling, automotive, aviation, defense, aerospace, medical, office machine, robotics and servo motor manufacturing industries. These products set the solid foundation for the broad range of standard and custom products currently available to our customers.

Our modern Amherst, NY, facility is ISO 9001:2008 and AS9100-D certified for its design, manufacturing and assembly of motion control devices. Our brake and clutch manufacturing experience, technological know-how and commitment to bring our customers a quality product, delivered on time, every time are some of the reasons why Thomson is the best choice for your next motion control product.

Quality Management
ISO 9001
www.dekra-seal.com
DEKRA certified

For customer service and application support, please call us at 1-540-633-3400. For other contact information, please see the back of this catalog.

Using Our Clutches and Brakes Catalog

Finding just the right clutch or brake product can be a daunting task. The selection process hinges on the application with many variables to take into consideration. Often times there are several brake or clutch options that might do the job—the key is finding the best solution for your application.

This catalog contains several aides to assist in the selection process.

- **CLUTCH AND BRAKE TECHNOLOGIES**—This catalog contains clutch and brake information for Wrap Spring and Electromagnetic Friction Clutches and Brakes. Pages 6-13 offer operation, design and application examples of both technologies. The printed tabs offer a quick way to find the technology and products you need. Engineering guidelines appear at the end of each section.

  THE GENUINE WRAP SPRING product section begins on page 15.
  THE FRICTION product section begins on page 87.

- **SELECTION BY MOTION TYPE**—The chart on pages 4 & 5 categorizes our clutches and brakes by type of motion. The basic motions are START, INDEX, SLIP, STOP and HOLD. Each of these motion types are noted by an icon on the left side of this chart. As you browse through this catalog, you will see these same motion icons in the top header of the product pages. If you know that your application requires a specific motion, this chart may be a helpful place to start your brake and clutch selection.

- **SELECTION BY CAPABILITY**—The chart on page 5 will help you to determine which technology may work best in your application: Wrap Spring or Friction. Your application may have specific requirements of a brake or clutch such as torque, speed, accuracy, etc. This chart may help you determine whether The Genuine Wrap Spring products or one of our Friction Clutches or Brakes will be best suited for your operation.

Clutches & Brakes

Table of Contents

Clutches & Brakes

Product Overview

Wrap Spring Products

THE GENUINE WRAP SPRING CLUTCH/BRAKE PACKAGES

CB Series combination clutch/brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 1800 RPM depending on size. Each unit is pre-engineered and pre-assembled for easy installation. Super CB clutch/brakes provide 3 to 5 times longer life.


THE GENUINE WRAP SPRING CLUTCHES

Two clutch series include the Solenoid Actuated SAC Series and the mechanically actuated, basic wrap spring PSI Series clutch.


THE GENUINE WRAP SPRING ACCESSORIES

Several accessories are offered for The Genuine Wrap Spring products, including dust cover enclosures; heavy duty actuator and controls. The heavy duty actuator is used with the PSI-6 Series clutches. A plug-in clutch/brake control designed for operation of D-frame, AC or DC wrap spring clutches and brakes is available.


THE GENUINE WRAP SPRING ENGINEERED PRODUCTS

Engineered products are specially designed to solve specific and unique application requirements. The products shown are the result of years of experience in providing innovative solutions for applications, including paper feed drives, agriculture equipment, copiers, robotics, etc. These solutions are now available as "engineered" products, which include the DL, MAC, SP and BDNB.


Friction Products

FRICTION CLUTCHES & CLUTCH COUPLINGS

Electromagnetic clutches and clutch couplings are available in six frame sizes and offered as shaft-mounted or flange -ounted models. The CS and CSC Series provide an efficient, electrically switchable link between a motor and a load. These models offer full corrosion resistant, rotating components designed for low inertia and minimal drag, zero backlash and integral long-life bearings.


FRICTION BRAKES

Electromagnetic power-on (BF) brakes provide an efficient, switchable means of stopping and/or holding a load. Spring-set electromagnetic power-off (SB, FSB, PMB & MBRP) brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power.


PERMANENT MAGNET POWER-OFF BRAKES

Permanent magnet power-off brakes (RAB) provide zero backlash stopping and/or holding of a load in the absence of power. While the field (electromagnet) is fixed and prevented from rotating, the output hub assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized, rotating components are disengaged, thus allowing the shaft to freely rotate.

FRICTION ENGINEERED PRODUCTS

Engineered products are specially designed to solve specific and unique application requirements. The products shown are the result of innovative solutions we provided for applications such as document handling, copiers, ATM machines, dispensing machines, robotics and military aerospace actuators. The solutions we provided are now available as "engineered" products in this section, including Tooth Power-on and Power-off (TC/TCR), Metric Clutches (MCS) and Metric Brakes (MBF).


Clutches & Brakes

Product Selection

CLUTCHES & BRAKES SELECTION CHART—BY MOTION TYPE							
Motion Type	**Type**	**Model/Sizes**	**Max Torque lb-in (Nm)**	**Bore Range**	**Max RPM**	**Actuation Method**	**Page**
Starting START	Wrap Spring Clutch	DL-33	30 (3.4)	English: 1/4 - 5/16" Metric: 6 - 8 mm	1200	DC	65
Motion icons are shown at the top of each product page to make selecting easier.	Wrap Spring Clutch	MAC-30, 45, 45 w/BC	150 (16)	English: 1/4 - 5/8" Metric: 6 - 16 mm	1200	DC	67
	Friction Clutch	CS-11, 15, 17, 22, 26 CSC-11, 15, 17, 22, 26	125 (14.2)	English: 1/4 - 1" Metric: 8 - 35 mm	5000	DC	92
	Friction Clutch	TC-19, TCR-19	250 (28.2)	English: 3/8 - 1/2"	5000	DC	121
	Friction Clutch	MCS	Custom Engineered Product - Consult Factory				95
	Friction Clutch	MDC	Custom Engineered Product - Consult Factory				122
Indexing INDEX	Wrap Spring Clutch	PSI-2, 4, 5, 6, 8	2500 (282.5)	English: 1/4 - 1 1/2" Metric: 6 - 40 mm	1800	Mechanical	56
	Wrap Spring Clutch	SAC-2, 4, 5, 6	500 (56.5)	English: 1/4 - 1" Metric: 6 - 25 mm	1800	AC or DC Solenoid; AIR	48
	Wrap Spring Clutch/Brake	Super CB CB-5, 6, 7, 8, 10	5,000 (565)	English: 1/2 - 1 3/4" Metric: 12 - 45 mm	750	AC or DC Solenoid; AIR	20
	Wrap Spring Clutch/Brake	Standard CB CB-2, 4, 5, 6, 7, 8, 10	5,000 (565)	English: 1/4 - 1 3/4" Metric: 6 - 45 mm	1800	AC or DC Solenoid; AIR	32
	Wrap Spring Clutch	SP-2, 4, 5, 6	500 (56.5)	English: 3/4 - 1" Metric: 20 - 25 mm	1500	AC or DC; AIR	70
Stopping STOP	Friction Brake	BF-11, 15, 17, 22, 26	125 (14.13)	English: 3/16 -1" Metric: 3 - 35 mm	5000	DC	99
	Friction Brake	MBF-26, 30, 40, 50, 60, 80, 100 (L & S)	3540 (400)	Metric: 12 - 60 mm	5000	DC	103
Holding HOLD	Wrap Spring Brake	BDNB	250 (28.23)	English: 1/2"	200	N/A	72
	Friction Brake	BF-11, 15, 17, 22, 26	125 (14.13)	English: 3/16 -1" Metric: 3 - 35 mm	5000	DC	99
	Friction Brake	SB-15, 17, 19, 23, 26, 28, 30, 40, 50, 70	1200 (135.6)	English: 1/4 - 2" Metric: 3 - 45 mm	5000	DC	107
	Friction Brake	FSB-15, 17	3 (0.34)	English: 3/16 - 3/8" Metric: 3 - 8 mm	5000	DC	111
	Friction Brake	RAB-11, 13, 15, 20, 25, 32, 40, 50, 60	1239 (140.0)	Metric: 6 - 40 mm	5000	DC	113
	Friction Brake	PMB-30, 40, 50, 60, 65, 75, 85, 100	4250 (480.0)	English: 3/8 - 1 5/8" Metric: 11 - 45 mm	3000	DC	115
	Friction Brake	MBRP-15, 19, 22, 26	4 (35, 40)	Metric: 5 - 45 mm	5000	DC	119
	Friction Brake	MBF-26, 30, 40, 50, 60, 80, 100 (L & S)	3540 (400)	Metric: 12 - 60 mm	5000	DC	103
	Friction Brake	MDB	Custom Engineered Product - Consult Factory				122
	**Consult factory for higher speeds*		***Intermittent/Continuous*				

Clutches & Brakes

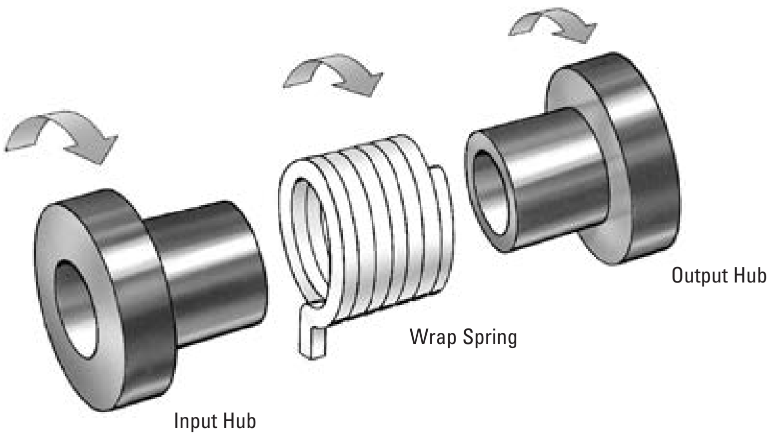
Product Selection

BRAKES & CLUTCHES SELECTION CHART—BY CAPABILITY This chart contains basic information to determine when to use a Wrap Spring or Friction product.*		
Capability	**The Genuine Wrap Spring™**	**Friction**
Torque Capacity Per Unit Size	✓	
Low Power Consumption	✓	
Single Revolution	✓	
Random Start/Stop		✓
Brake: Power-On		✓
Brake: Power-Off		✓
Soft Start/Soft Stop		✓
Positive Engagement	✓	
Stopping Accuracy	✓	
Speeds Up To 1750	✓	✓
Speeds Over 1750		✓
Bi-Directional Rotation		✓
Rapid Cycling	✓	✓
Actuation - Electric	✓	✓
Actuation - Pneumatic	✓	
Actuation - Mechanical	✓	
Manual Release		✓
Torque Adjustment Feature		✓

**Many applications require additional specifications not shown in the chart above.*
Always review your application requirements before choosing a brake or clutch product.

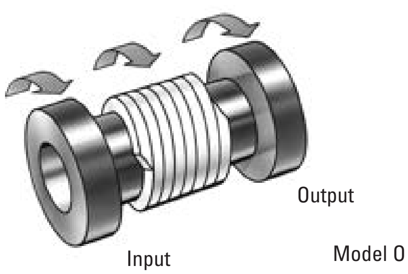
The Genuine Wrap Spring™ Clutches & Brakes

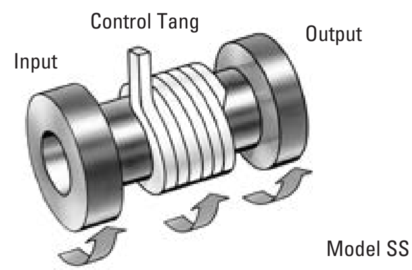
Operation Design Principles

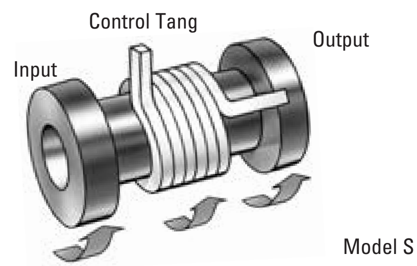


The basic wrap spring clutch consists of three elements: an input hub, an output hub and a spring whose inside diameter is slightly smaller than the outside diameter of the two hubs.
When the spring is forced over the two hubs, rotation in the direction of the arrow wraps it down tightly on the hubs, positively engaging them. The greater the force of rotation, the more tightly the spring grips the hubs.

Wrap Spring Design Configurations







Overrunning Clutch

In its basic form, the wrap spring clutch operates as an overrunning clutch. When the input hub is rotated as shown, the spring wraps down to engage the two hubs. If the input is stopped or reversed, the spring unwraps to release the output hub, allowing the load to overrun. PSI Series overrunning clutches can also perform one-way indexing and backstopping functions.

Start-Stop Clutch (Random Positioning)

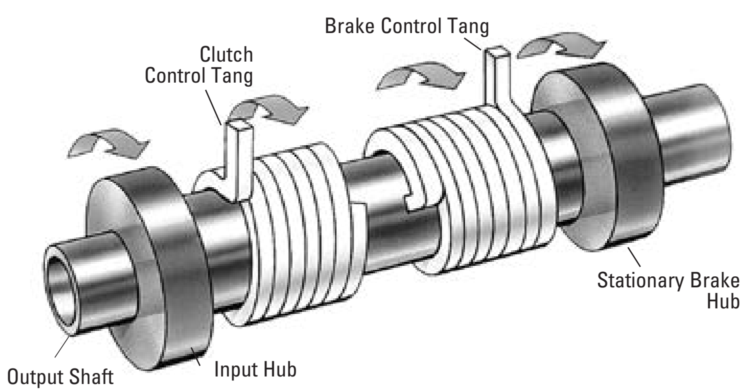
Modifying the basic PSI Series clutch with a control tang allows the clutch to engage and then disengage the load when the control tang is locked in position by the stop collar. Once disengaged, the load coasts freely from the continuously running input.

Single Revolution Clutch

A second tang, secured to the output hub, allows PSI Series clutches to perform single revolution functions. When the control tang is engaged, the output hub cannot overrun because it is secured to the spring. Single revolution PSI, SP and SAC Series clutches are capable of stopping only 10% of their starting load capacity. A CB Series unit is recommended where higher braking torque is required.

Combination Clutch/Brake

The wrap spring clutch/brake utilizes two control tangs to hold either the clutch or brake spring open. When the clutch and brake control tangs rotate with the input hub, the input hub and output shaft are positively engaged by the clutch spring. When the brake control tang is locked by the stop collar, the brake spring wraps down to engage the output shaft to the stationary brake hub. At the same time, the clutch spring unwraps slightly, allowing the input hub to rotate freely.



The Genuine Wrap Spring Clutches & Brakes

Applications

The Genuine Wrap Spring clutch/brakes provide hundreds of simple motion processes that can be controlled through the three basic wrap spring clutch functions: overrunning, start-stop and single revolution.

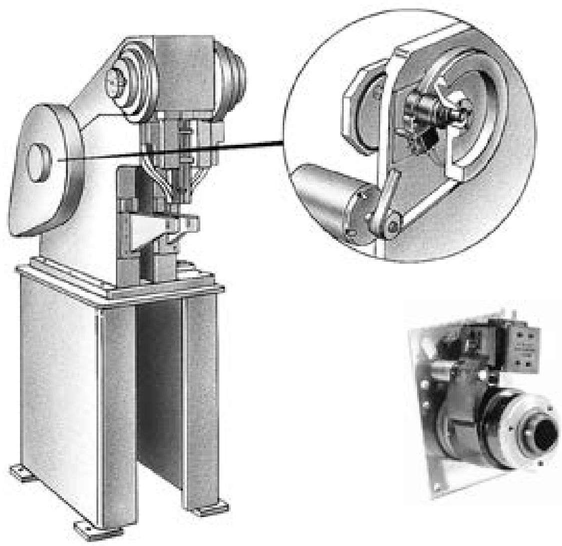
Important Facts

- The torque capacity of a spring clutch or brake is a direct function of the diameter of the hub and the tensile strength of the spring.
- A spring clutch or brake will not slip. It will attempt to supply the torque demanded, up to the mechanical limitations of the spring.
- When the spring is allowed to wrap down (or grip the hubs), the output hub will accelerate to the input RPM in .003 seconds, the output in .0015 seconds.
- The dynamic torque of acceleration or deceleration is proportional to the RPM multiplied by the load inertia and divided by the acceleration time. This fact indicates that spring clutches and brakes are inertia sensitive—the more inertia, the higher the dynamic torque.
- The torque demand of the spring clutch is equal to the system frictional torque of the load plus the dynamic torque of acceleration.
- When coming to the stop position of the cycle, there must be enough energy in the rotating mass of the load to allow the spring to release its grip on the input hub. This means that if there is a large frictional load or a torque demand such as coming up to the top of a cam, there must be sufficient energy in the rotating mass to open the spring. Failure to do so will result in possible input hub wear and/or noise.

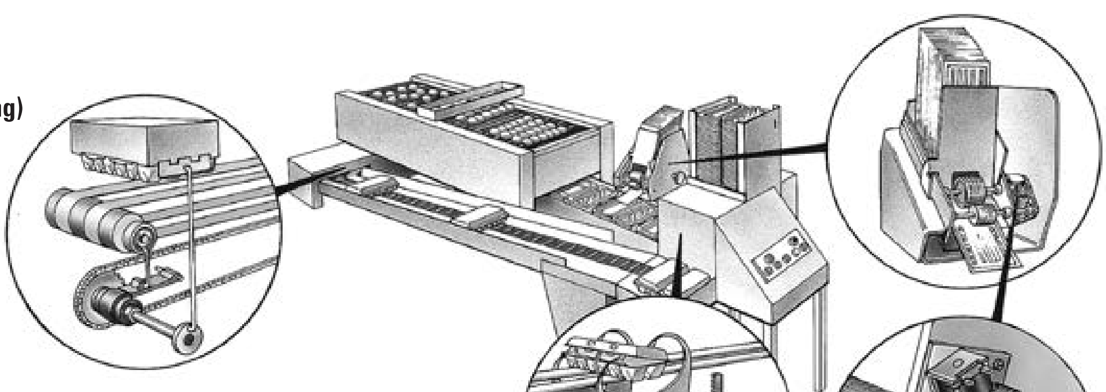
Single Revolution

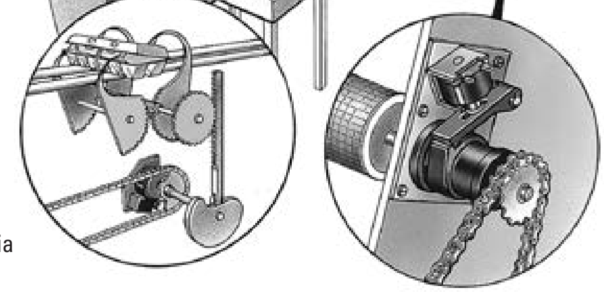
Riveter

Through a wrap spring clutch, the motor drives a large flywheel and a large eccentric mass connected to the piston-like riveting ram. The wrap spring clutch-brake always stops at just past top dead center position, ready for the next cycle.



Start-Stop (Accurate Positioning)





Egg Packaging

When cartons of eggs are detected on the conveyor, the carton is pushed off onto the pallet. A CB-6 clutch/ brake is fitted to a crank assembly. The crank profile is designed to accelerate slowly to gently move the eggs and accelerate rapidly back to be in position for the next carton. Thus the inertia at start and stop is only the inertia of the crank.

The Genuine Wrap Spring™ Clutches & Brakes

Start-Stop Applications

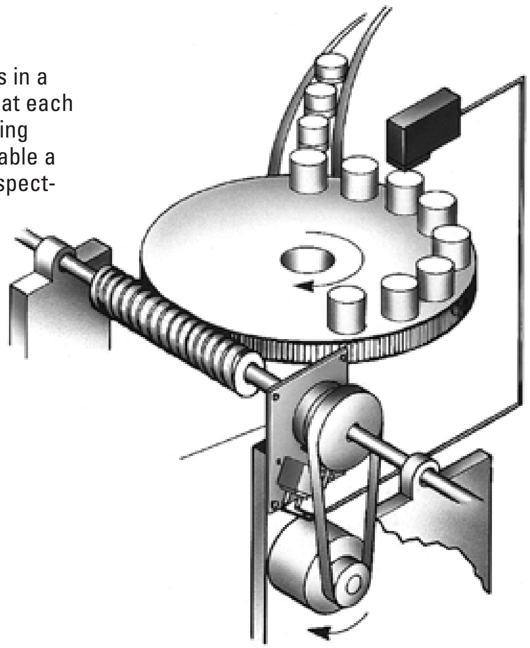
Literally hundreds of simple motion processes can be controlled through the three basic functions of wrap spring clutches and brakes—Overrunning, Start-Stop, and Single Revolution. Here are just a few examples:

- Mail openers and inserters, collators
- Bag making, paper feed
- Food processing
- Metal riveting, stapling and stitching
- Paper edge trimming
- Film advance
- Inclined conveyors
- Stackers
- Conveyor diverter gate
- Wire bending
- Money counter
- Paper printing and folding
- Newspaper vending machine door mechanism
- Wire windup machine/material cutoff
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

Single Revolution

Rotary Table

The worm drive in this application is in a 16:1 ratio to the indexing table so that each power supply pulse to the wrap spring clutch/brake solenoid indexes the table a single position for filling, sorting, inspecting, etc.



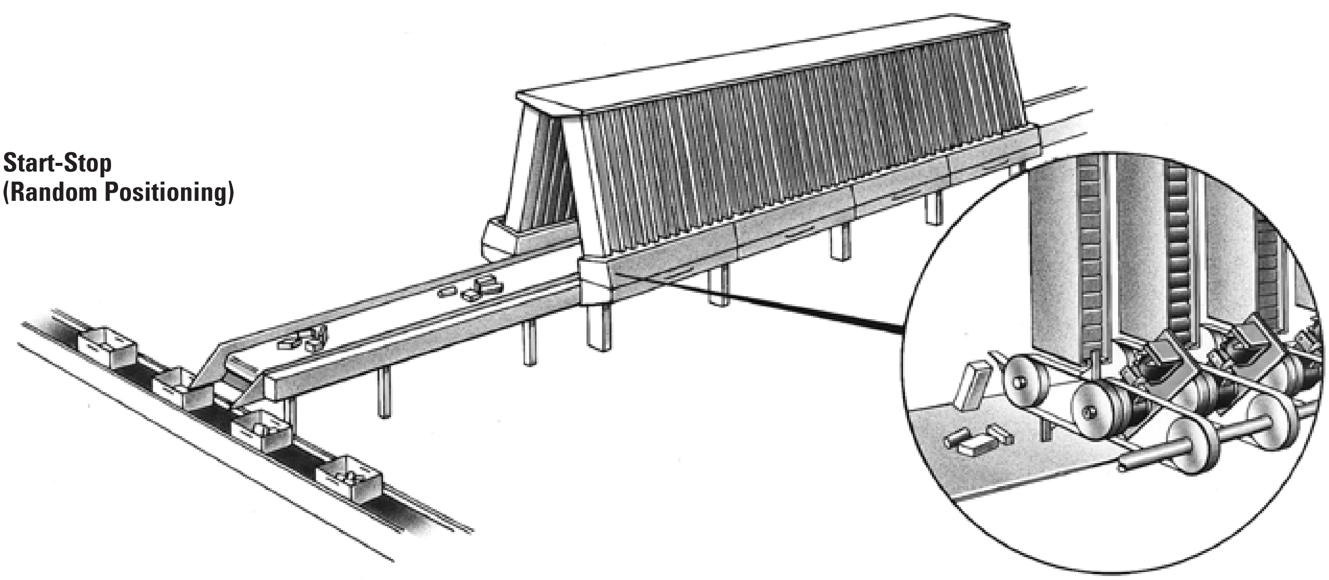
Product Selection

- Super CB
- Standard CB
- SAC
- PSI

Advantages

- Speed and accuracy increases productivity
- Excellent repeatability—no cumulative error
- Minimum system inertia

Start-Stop (Random Positioning)



Computerized Order Picker

800 wrap spring clutches, one at each station, dispense packages at the rate of three per second, onto a constantly moving belt to make up various customer orders. The computer-controlled system signals the appropriate clutch, which drives a paddle wheel-type belt system. This, in turn, ejects one package per computer signal.

Advantages

- Positioned control of paddle ejector made possible with positive, single revolution type clutch
- No cumulative error assures that orders are filled properly
- Simple control. One drive motor for the complete system. Low cost.

Product Selection

- SAC
- PSI

The Genuine Wrap Spring Clutches & Brakes

Overrunning Applications

Incline Conveyor

Anti-backup, anti-back driving

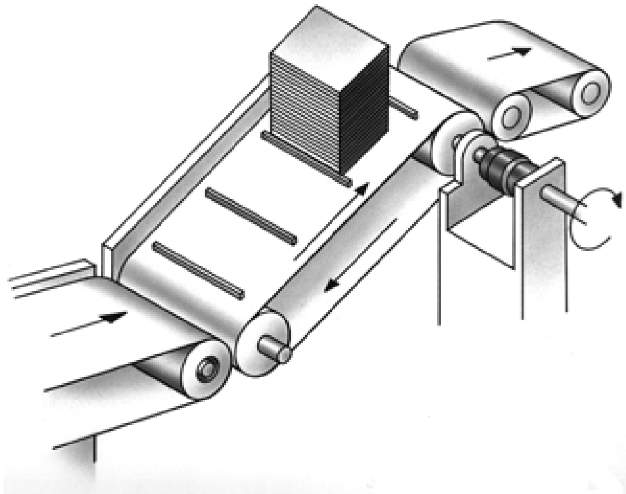
The PSI Series mechanical wrap spring clutch acts as an anti-backup device on this inclined conveyor. When the conveyor is running, the wrap spring is disengaged, allowing the clutch output to freewheel. When the conveyor drive is disengaged, the conveyor starts to reverse and engages the wrap spring, which then acts as an effective brake.

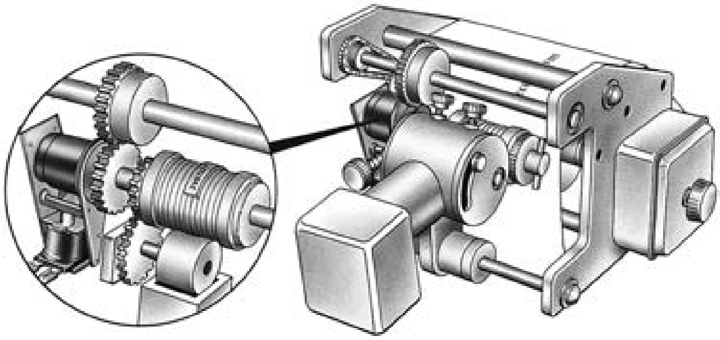
Advantages

- Uni-directional control facilitates low-cost design
- Maintenance free

Product Selection

- PSI





Product Selection

- SAC-5
- SP-5

Precise Registration

Print Wheel

In this high-speed code printing machine, a photo eye scans a mark on the web and signals a single-revolution wrap spring clutch to drive the print wheel in exact registration with the continuously moving web. Variations in printing positioning cannot be tolerated.

Advantages

- Fast/Accurate—the wrap spring clutch rapidly accelerates the print wheel and returns it to home position with no cumulative error. Long acceleration times would cause smearing and misregistration.
- Compact—high torque-to-size ratio makes it easy to fit into the small space, thus reducing overall machine size and cost.
- Control—electric actuation for simple interface with the photo eye signal.

Linear-to-Rotary Translation

Rack and Pinion Indexing Drive

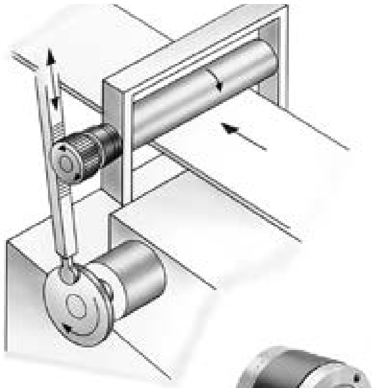
Since wrap spring clutches are inherently uni-directional, the PSI overrunning model "O" clutch in this application operates as a ratchet drive. When the rack is moved upward, the wrap spring clutch engages to translate torque to the feed conveyor. On the downward side of the stroke, the wrap spring clutch is disengaged.

Advantages

- Simple—requires no external controls or sensors
- Reliable
- Maintenance free

Product Selection

- PSI

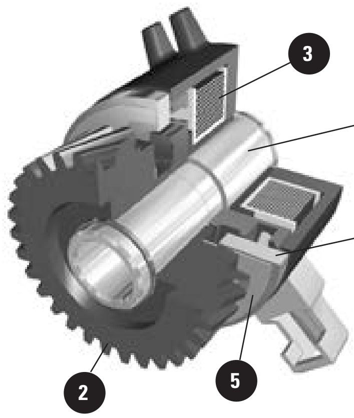


Friction Clutches & Brakes

Operation and Design Principles

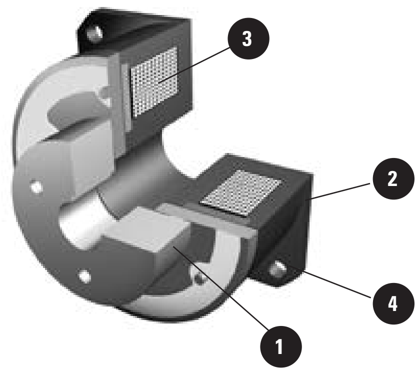
Electromagnetic Clutch (CS, MCS)

An electromagnetic clutch in its simplest form is a device used to connect a motor to a load. Generally the motor shaft is pinned or keyed to the clutch rotor-shaft assembly (1) bore (input), with the load connected to the armature (output) of the clutch (2) by a pulley or gear. Until the coil (3) is energized, this armature assembly is not coupled, thus not rotating with the input rotor-shaft. Upon coil energization, the rotor-shaft assembly becomes part of an electromagnet, attracting the armature plate (4), engaging this with the rotor assembly and thus driving the load. When the coil is de-energized, these two attracted elements are no longer attracted and are separated by a spring (5) within the armature assembly. The motor shaft and load are then no longer connected and, therefore, the load is not driven. The clutch enables the motor to remain on while the load is idle, benefiting in faster cycle time and better overall system efficiency.



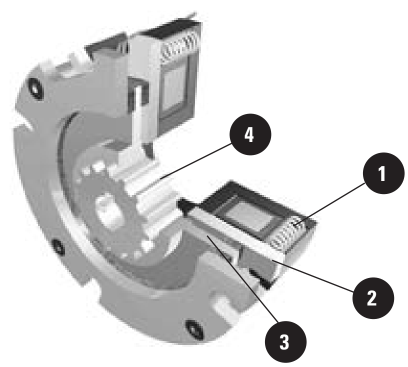
Power-On Electromagnetic Brake (BF, MBF)

A power-on electromagnetic brake operates using the same principle as the clutch but with only a single rotating component, the armature assembly (1). The brake is generally positioned on the load shaft with the armature assembly secured to the shaft while the field assembly (2) is mounted to a non-rotating component or bulkhead. Until the coil is (3) energized, the armature assembly will rotate freely. Upon energization, the field assembly becomes an electromagnet, attracting the armature plate (4), thus braking the load.



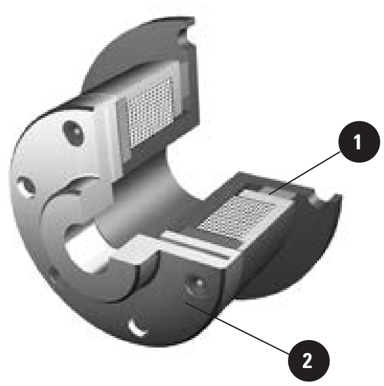
Power-Off Electromagnetic Spring-Set Brake (SB, FSB)

A power-off electromagnetic spring-set brake operates on a slightly different principle. The actual braking force is applied by the use of compression springs within the field assembly. In normal power-off mode, these springs (1) apply pressure to the fixed (non-rotating) armature plate (2), which, in turn, applies pressure to the rotor (3). This rotor has the ability to "float" back and forth under the applied pressure depending on the state of the coil. It is coupled to the load shaft by a spline or hex through a hub (4). Some rotors are suspended between two diaphragm-like springs to achieve the "floating" state.



Power-Off Electromagnetic Permanent Magnet Brake (RAB)

A power-off electromagnetic permanent magnet brake operates on the principle of the attractive force of a permanent magnet creating the braking action, while the electromagnet is used to negate this force, allowing load rotation. In normal power-off mode, the permanent magnet in the fixed field assembly (1) creates an attractive force on the armature assembly (2), which is attached to the load shaft by means of set screws or pins, hence stopping or holding the load. Upon coil energization, the electromagnet forms an opposing magnetic force to the permanent magnet, thus allowing the armature assembly free rotation (no brake).



Friction Clutches & Brakes

Applications

Electromagnetic Clutches & Clutch Couplings

Electromagnetic clutches provide an efficient, electrically switchable link between a motor and a load. Clutches are used to couple two parallel shafts by the use of pulleys, gears or sheaves. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are mounted on a single shaft with the rotor secured to the shaft. The armature is bearing mounted and free to rotate. When the coil is energized, the armature engages the friction surface of the rotor, thus driving the load.

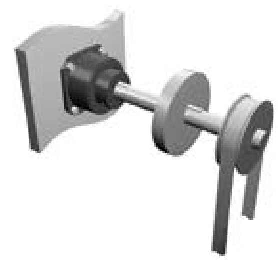
Electromagnetic clutch couplings provide this same efficient, electrically switchable link between a motor and a load for inline shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are securely mounted on opposing inline shafts. When the coil is energized, the armature engages the friction surface of the rotor, coupling the two inline shafts, thus driving the load.

Shafts must be fully bearing supported

Electromagnetic Brakes

Electromagnetic power-on brakes provide an efficient, switchable means of stopping and/or holding the load. While the field (electromagnet) assembly is fixed and prevented from rotating by a flange, the armature assembly is secured to the shaft. When the coil is energized, the armature engages the friction surface of the fixed field (electromagnet) assembly, thus stopping and/or holding the load.

Offered in spring-set or permanent magnet designs, electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. While the field (electromagnet) assembly is fixed and prevented from rotating, the rotor (spring-set design) or armature (permanent magnet design) assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized, rotating components are disengaged, thus allowing the shaft to freely rotate.

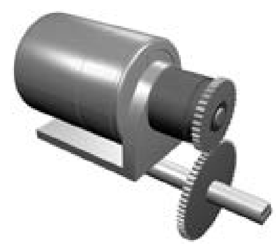


Shafts must be fully bearing supported

Tooth Brakes & Clutches

When used in either static or low-speed engagement applications, tooth clutches and clutch couplings provide an efficient, positive, switchable link between a motor and load on inline or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by a fixed flange, the rotor is generally attached to the input shaft. The armature assembly is securely mounted to either an inline load shaft or a parallel shaft by means of pulleys or gears. When the coil is energized, the tooth profile of the armature positively engages the tooth profile of the rotor, coupling the two inline or parallel shafts, thus driving the load.

Tooth brakes provide an efficient, positive, switchable means of either holding a load or decelerating a load from a slow speed, generally 20 RPM or less. Utilizing the same principle as the tooth clutch, these brakes can be used to effectively hold a load in position. Available in power-on or power-off models, tooth brakes are ideal for applications requiring high torque in tight places.

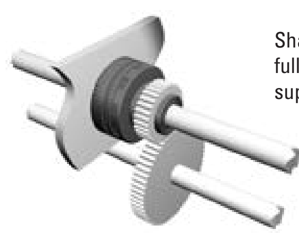


Shafts must be fully bearing supported

Multiple-Disc Brakes & Clutches

Multiple-Disc Clutches provide a smooth efficient, switchable link between a motor and a load on inline or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor is securely mounted on the drive shaft. The armature assembly is then mounted either directly on an opposing inline shaft or indirectly on a parallel shaft by means of gears or pulleys. When the coil is energized, the armature engages the friction surface of the rotor, further engaging the multiple discs within the assembly until full torque is achieved, thereby coupling the two inline or parallel shafts, thus driving the load.

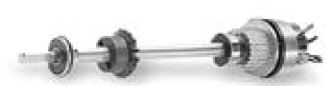
Multiple-Disc Brakes offer the same smooth, efficient operation as a braking device. By eliminating the rotor component and using the electromagnet to engage a static field assembly and a rotating armature assembly, braking can be achieved. These units provide high torque in a compact package size primarily for custom applications in the aerospace industries.



Shafts must be fully bearing supported

Custom Assemblies (Value-Added Designs)

Variations of any device shown in this catalog can be adapted specifically to meet the most demanding needs of your application. Custom gears, pulleys, sprockets, integrally mounted to the clutch can be combined with special shaft sizes, coil voltages, connector assemblies or any other type of design imaginable.



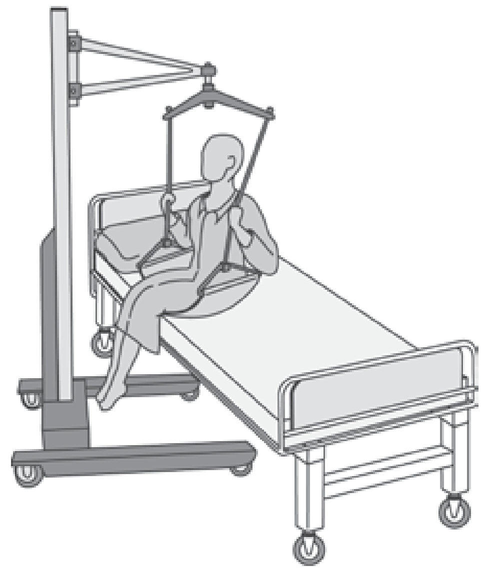
FRICTION

Friction Applications

Power-Off Brakes

Patient Lift

The SB can be used as a holding brake to consistently hold a load in position at a specific stopping point.

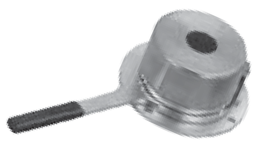


Advantages

- Uni-directional control
- Compact design
- Non-asbestos friction material
- Factory set air gaps (no need to adjust)
- Interchangeability with many existing brake designs

Product Selection

- SB
- LBRP



Floor Sweeper/Scrubber

SB are used as a parking brake to hold the vehicle on inclines, etc. The SB eliminates the need for manual brake linkage or expensive hydraulic brakes.

Advantages

- Uni-directional control
- Compact design
- Non-asbestos friction material
- Factory set air gaps (no need to adjust)
- Manual release options
- Interchangeability with many existing brake designs

Product Selection

- PMB
- SB

Transfer Case

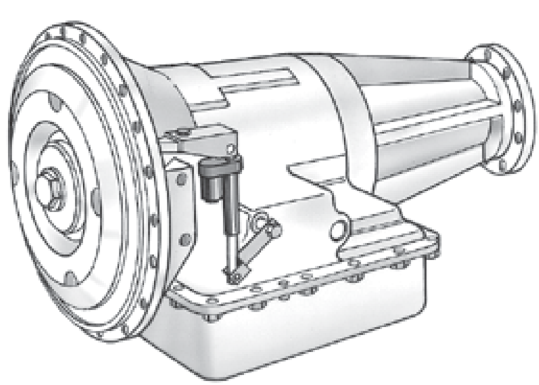
The BRP is used to hold a rotary gear train in place when the transfer case is in the static mode.

Advantages

- Uni-directional control
- Compact design
- Factory set air gap
- Non-asbestos friction material

Product Selection

- BRP
- SB

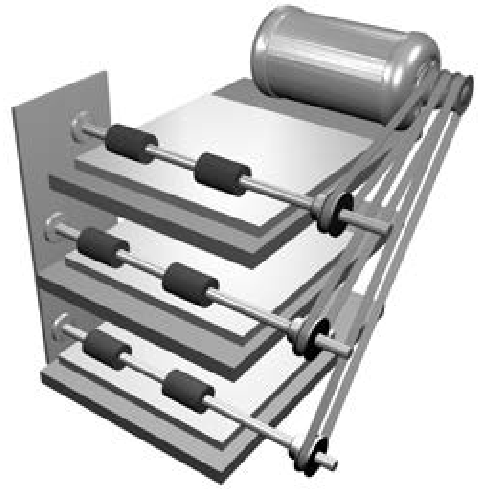


Friction Applications

Power-On Clutches & Brakes

Paper Feed

Power-On Clutch Application:
CS products are used on paper feed applications. There is a prime motor that drives a series of belts/pulleys that drive feed rollers. The CS are mounted on the feed roller shaft. When power is applied to the CS, the clutch engages and then drives the feed roller. The clutch will continue to drive until power is removed.



Advantages

- Low inertia and minimal drag
- Fast response, repeatable performance
- Energy efficient
- Simple installation
- Non-asbestos friction material

Product Selection

- CS
- CSC

Power Sliding Door

Power-On Tooth Clutch Application:
TC is a power-on tooth clutch used to drive a mechanical drive assembly in either direction

Advantages

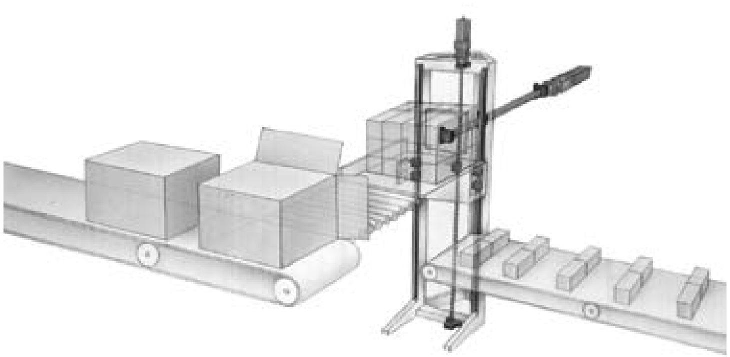
- Simple installation
- Energy efficient
- Torque to size ratio
- Positive engagement, indexing capability

Product Selection

- TC
- CS

Conveyor Drive System

Power-On Clutch and Brake Application:
CS power-on clutches are used to drive the conveyor belt. The BF power-on brake is used to stop the conveyor belt.



Advantages

- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Energy efficient
- Economic cost
- Non-asbestos friction material

Product Selection

- CS
- BF

Application Data Form

Worksheet

Application Data Form			
Customer	Contact	Dept	
Address		City	State
Phone	Fax		Zip
E-mail			
Project Information			
Project Type	Price Target	Avg Yearly Qty	
Initial Release Date	Initial Ship Qty	Current Source	
Product Type	Project Life		
Application			
Application Data			
Function	Unit Type		
Other			
Min. Torque Required	Type	Inertia	
Input	Rotation	Friction	
Shaft or Bore Size	Other		
Life (Hours)	TTS		
Cycle Life (M)	TTZ		
On Time	Input Speed		
Off Time	Output Speed		
Power Source			
Actuation	Suppression		
Other			
Volts	DC Type		
Other Volts	Min. Res.		
External Environment			
Vibration g (max)	→ at Hz		
Shock g (max)	Rel. humidity % max		
Operating Temperature minus ° C	plus ° C		
Protection			
Corrosion Protection			
Special Protection	Other IP		
Miscellaneous			
Safety Requirements			
Fire Resistance			
If possible insert drawing or sketch below, otherwise indicate drawing reference			
Drawing / Comments			

The Genuine Wrap Spring™

The Genuine Wrap Spring™

How To Select

Wrap spring clutches and brakes are pre-packaged, pre-assembled units that are as easy to select as they are to install. The simple three step selection process includes:

Step 1 Determine the clutch or brake function

Step 2 Determine the size

Step 3 Verify the design considerations

This selection process is based on the assumption that the diameter of the shaft at the clutch or clutch/brake location has been designed through good machine design practice. For most applications, this process will determine the right size product. When the performance requirements of a given application are marginally within the capabilities of a product, consider using the next larger size. In instances where required load/speed performance data is known and unit size is uncertain, use the technical selection process starting on page 74, which will help you review all necessary aspects of your application.

Step 1

Determine the clutch or brake function

Wrap spring clutches and brakes can perform three control functions—overrunning, start-stop and single revolution. Determine the function that will provide the best control for your application. The application ideas shown on pages 8–9 may be helpful. Select the series that best fits your application requirements from the chart below.

Step 2

Determine the size

To select the correct size unit, determine the maximum RPM at which the clutch or brake will operate and the shaft diameter on which the wrap spring unit will be mounted. A wrap spring clutch engages almost instantly and, since spring wrap increases with load, the unit must be sized carefully to ensure that it is correct for the application. If there is any uncertainty regarding the correct unit size, we recommend using the technical selection process starting on page 74.

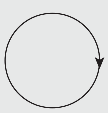
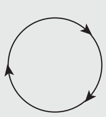
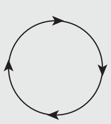
To select the correct wrap spring unit, locate the appropriate speed and shaft diameter points on the chart that correlates to the model that best suits your application. For applications requiring speed or diameter values higher than those illustrated, please contact your local Thomson distributor or your sales representative.

Step 3

Verify the design function considerations

Once the appropriate series and model size have been determined, review the design considerations. A complete checklist of these and other options are detailed in the “How to Order” section for each series.

Selection by Function

Function	Performance	Wrap Spring Product	Max Torque Starting lb-in (N-m)	Max Torque Stopping lb-in (N-m)	Max.* RPM	Max. Cycles/ Minute	Actuation Method
Overrunning 	An overrunning clutch will transmit torque in one direction only when the input hub is stopped or reversed. Consequently, the load is disengaged and free to rotate or overrun. *Engaged in one direction only*	PSI Series Model O	2500 (282.5)	N/A	1800	N/A	Reverse input rotation
		ACCM	1500 (169.5)	N/A	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical
Start-Stop 	A start-stop clutch will engage and disengage a load either by mechanical or electrical actuation. Start-stop clutches provide a random stop position for the load. *Random Positioning*	PSI Series Model SS	2500 (282.5)	0	1800	N/A	Mechanical
		SAC Series Model SS	500 (56.5)	0	1800	N/A	AC; DC Solenoid or AIR
		ACCE	1500 (169.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCE Heavy Duty	2500 (282.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCM	1500 (169.5)	0	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical
Single Revolution 	A single revolution clutch or clutch/brake will accurately position a load with no cumulative error for each single revolution cycle. Multiple stop collars with up to 24 stops (per revolution) provide fractional revolution capability. *Accurate positioning for single or multiple*	PSI Series Model S	2500 (282.5)	250 (28.25)	1800	1800	Mechanical
		SAC Series Model S	500 (56.5)	50 (5.65)	1800	1200	AC; DC Solenoid or AIR
		Super CB	5000 (565.0)	5000 (565.0)	1800	1200	AC; DC Solenoid or AIR
		Standard CB	5000 (565.0)	5000 (565.0)	1800	1200	AC; DC Solenoid or AIR
		ACCE	1500 (169.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCE Heavy Duty	2500 (282.5)	0	400	N/A	AC; DC Solenoid or AIR
		ACCM	1500 (169.5)	0	400	N/A	Mechanical
		ACCM Heavy Duty	2500 (282.5)	0	400	N/A	Mechanical

*For RPM ranges on specific models, see selection charts on page 17.

The Genuine Wrap Spring

Selection

Design Considerations

All Models

- CW or CCW rotation
- Single or multiple stop collar
- Bore size

Super CB and CB Series

- AC or DC solenoid and pneumatic
- CB-5, CB-6, CB-7, CB-8 and CB-10 sizes available in the long life, Super CB Series. See pages 18–29 for specific details.

SAC Series

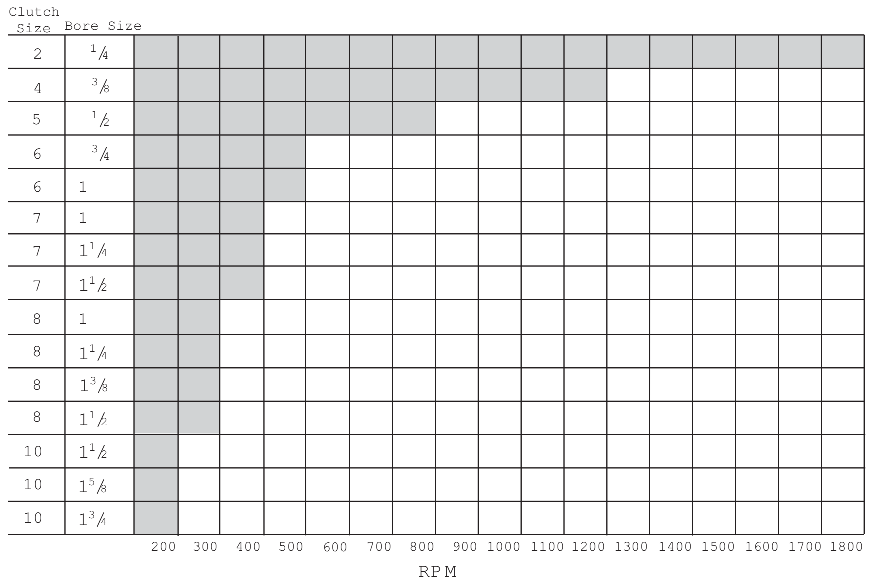
- AC or DC solenoid and pneumatic

PSI Series

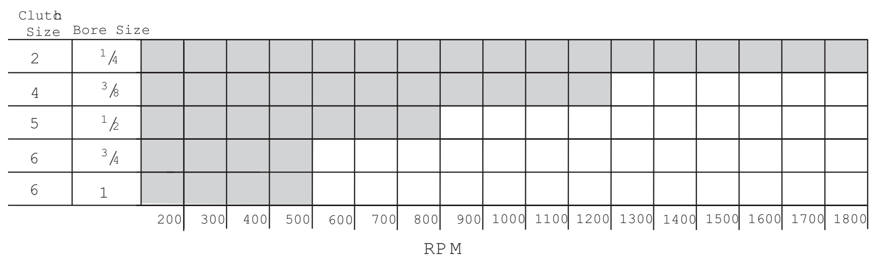
- Hub input/shaft output or shaft input/ hub output
- Overrunning Model O, start-stop Model SS or single revolution Model S

Selection Charts – RPM vs. Shaft Diameter

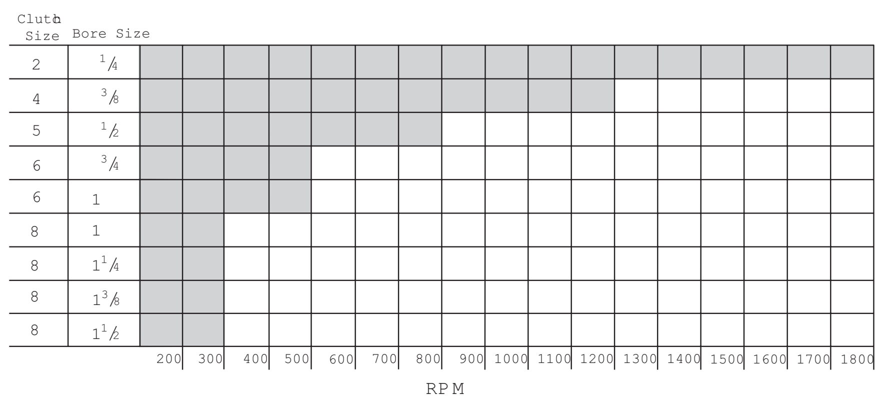
Super CB and Standard CB Series



SAC Series



PSI Series



Super CB Series

Longer Life, Extra Performance Clutch/Brake Packages

Super CB Series combination clutches and brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 750 RPM, depending on size. Each unit is pre-engineered and pre-assembled for easy installation.

Super CB clutches and brakes provide 3 to 5 times longer life. The five sizes of Super CB clutch/brake packages offer extraordinary performance and durability for those applications requiring long life under high load, high duty cycle conditions. Thomson will retrofit standard CB-5, CB-6, CB-7, CB-8, CB-10.

Features

- Available in five sizes
- Cost-effective design
- 3–5 times longer life than Standard CB
- Split cam design sizes CB-5, CB-6, CB-7, CB-8
- Adjustable control collars for easy and accurate output stop position setting
- RoHS compliant
- Load over-travel or backup is eliminated since Super CB units lock the load in both directions when the solenoid is off
- Anti-overrun feature prevents the output from running faster than the input
- ***Roller bearings never need adjustment for wear***
- Bring loads up to speed in 3 milliseconds and stop within 1.5 milliseconds
- AC or DC operated—other voltages available
- See page 62 for controls
- Direct retrofit for Standard CB-5, CB-6, CB-7, CB-8, CB-10
- 1-, 2- or 4-stop collar with steel insert standard
- Reinforced plastic stop collars also available for up to 24-stop maximum
- Heavy duty, industrial-grade coils
- High cycle rate capability
- High torque-to-size ratio
- Repeatable positioning within ±½°

Typical Applications

- Riveters
- Punch presses
- Packaging equipment
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

How to Order

Super CB - 6 - CW - 24V - 3/4” bore - 2

Super CB Series
Specify:
Imperial or Metric

Size
CB-5 = **5**
CB-6 = **6**
CB-7 = **7**
CB-8 = **8**
CB-10 = **10**

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise

Coil Voltage
12V = 12VDC
24V = **24VDC**
90V = 90VDC
115V = **115VAC**

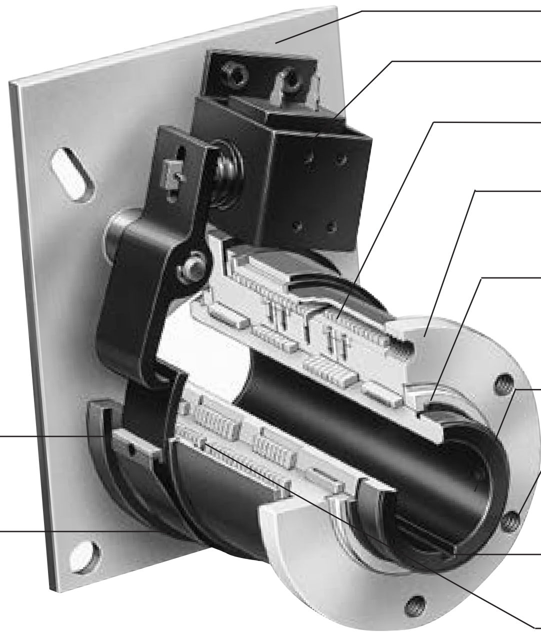
Bore Size
CB-5 = **½”**
CB-6 = **¾”, 1”**
CB-7 = **1”, 1¼”,1½”** *¾”
CB-8 = **1¼”, 1½”** *1”,*1 3/8”
CB-10 = **1½”** *1 5/8”,*1¾”
*Special order

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order.

OPTIONS	
Dust Covers	See page 60
Stop Collars	See page 61
Pneumatic Actuators	See page 62

Super CB Series

Solenoid-Operated Combination Clutch/Brake Packages



PERFORMANCE					
	CB-5	CB-6	CB-7	CB-8	CB-10
Static torque	250 lbs.-in. (28.25 Nm)	500 lbs.-in. (56.5 Nm)	1,500 lbs.-in. (169.5 Nm)	2,500 lbs.-in. (282.5 Nm)	5,000 lbs.-in. (565 Nm)
Maximum anti-overrun holding capability	45 lbs.-in. (5.085 Nm)	300 lbs.-in. (33.9 Nm)	600 lbs.-in. (67.8 Nm)	600 lbs.-in. (67.8 Nm)	1,200 lbs.-in. (135.6 Nm)
Maximum anti-back holding capability	160 lbs.-in. (18.08 Nm)	300 lbs.-in. (33.9 Nm)	600 lbs.-in. (67.8 Nm)	600 lbs.-in. (67.8 Nm)	1,200 lbs.-in. (135.6 Nm)
Inertia, rotating parts	.195 lbs.-in.^{2}	1.718 lbs.-in.^{2}	6.75 lbs.-in.^{2}	12.84 lbs.-in.^{2}	48.0 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	32 lbs.	63 lbs.	300 lbs.	300 lbs.	500 lbs.
Maximum operating speed	750 RPM	500 RPM	400 RPM	300 RPM	200 RPM
Response time, voltage on at full speed	27 MS	45 MS	50 MS	50 MS	70 MS
Weight	3 lbs.	7 lbs.	12 lbs.	15 lbs.	27 lbs.

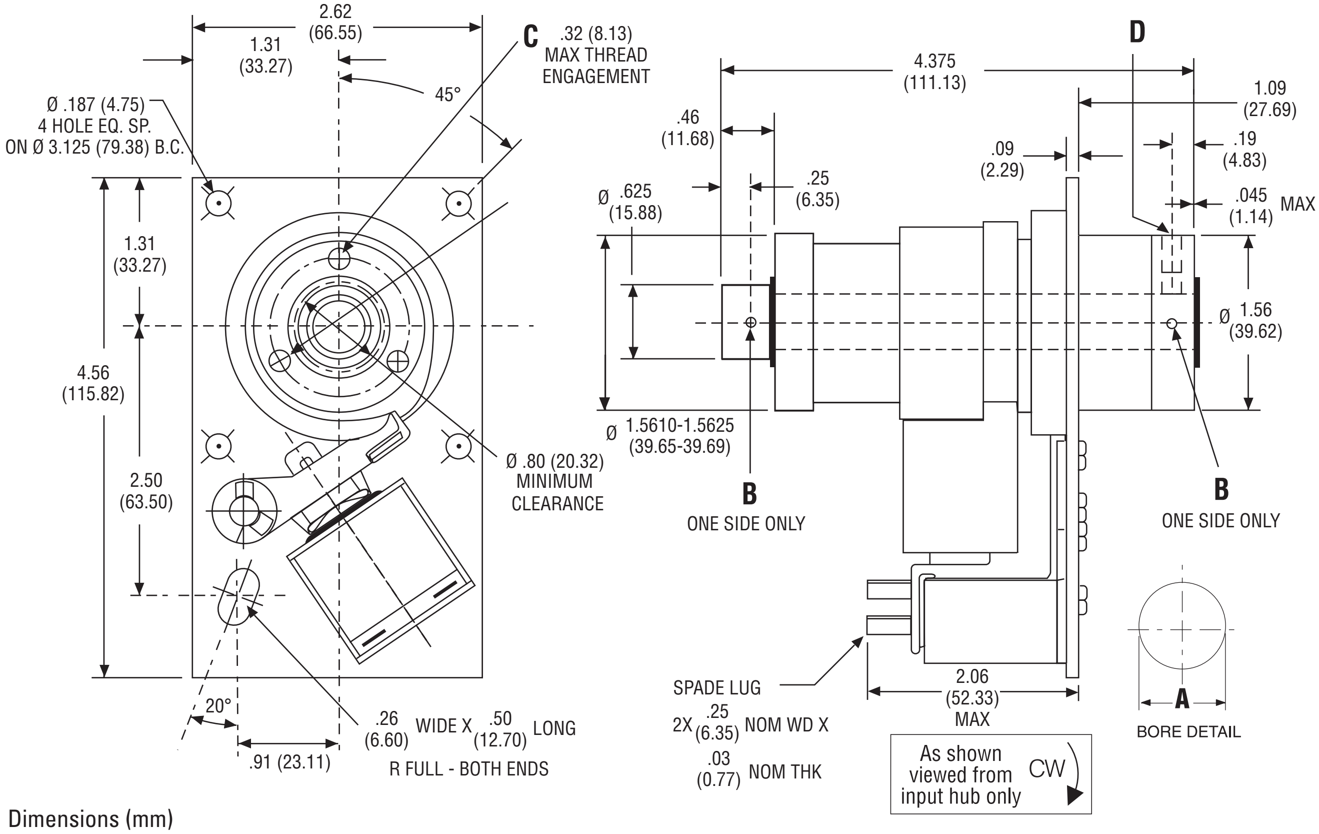
See page 74 for Minimum Inertia Requirements. See pages 81 & 82 for Mounting Requirements.

RPM vs. SHAFT BORE				
Size	**Max RPM**	**Shaft Bores Standard in. (mm)**	**Shaft Bores Special in. (mm)**	**Shaft Bores Metric in. (mm)**
CB–5	750	$^1/_2$” (12.7)	—	.4724-.4741 (12.0)
CB–6	500	$^3/_4$” or 1” (19.05 or 25.4)	—	.7874-.7894 (20.0) .9842-.9862 (25.0)
CB–7	400	1”, 1$^1/_4$” or 1$^1/_2$” (25.4, 31.75 or 38.10)	$^3/_4$” (19.05)	.9843-.9863 (25.0) 1.1811-1.8311 (30.0) 1.3780-1.3804 (35.0)
CB–8	300	1$^1/_4$” or 1$^1/_2$” (31.75 or 38.1)	1” or 1$^3/_8$” (25.4 or 34.925)	1.3780-1.3804 (35.0) 1.5784-1.5772 (40.0)
CB–10	200	1$^1/_2$” (38.1)	1$^5/_8$” or 1$^3/_4$” (41.275 or 44.45)	1.5749-1.5772 (40.0) 1.7717-1.7740 (45.0)

*Consult Factory

Super CB-5 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	250 lbs.-in.
Maximum anti-overrun holding capability	45 lbs.-in.
Maximum anti-back holding capability	160 lbs.-in.
Inertia, rotating parts	0.1950 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	32 lbs.
Maximum operating speed	750 RPM
Response time, voltage on at full speed	27 MS
Weight	3 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

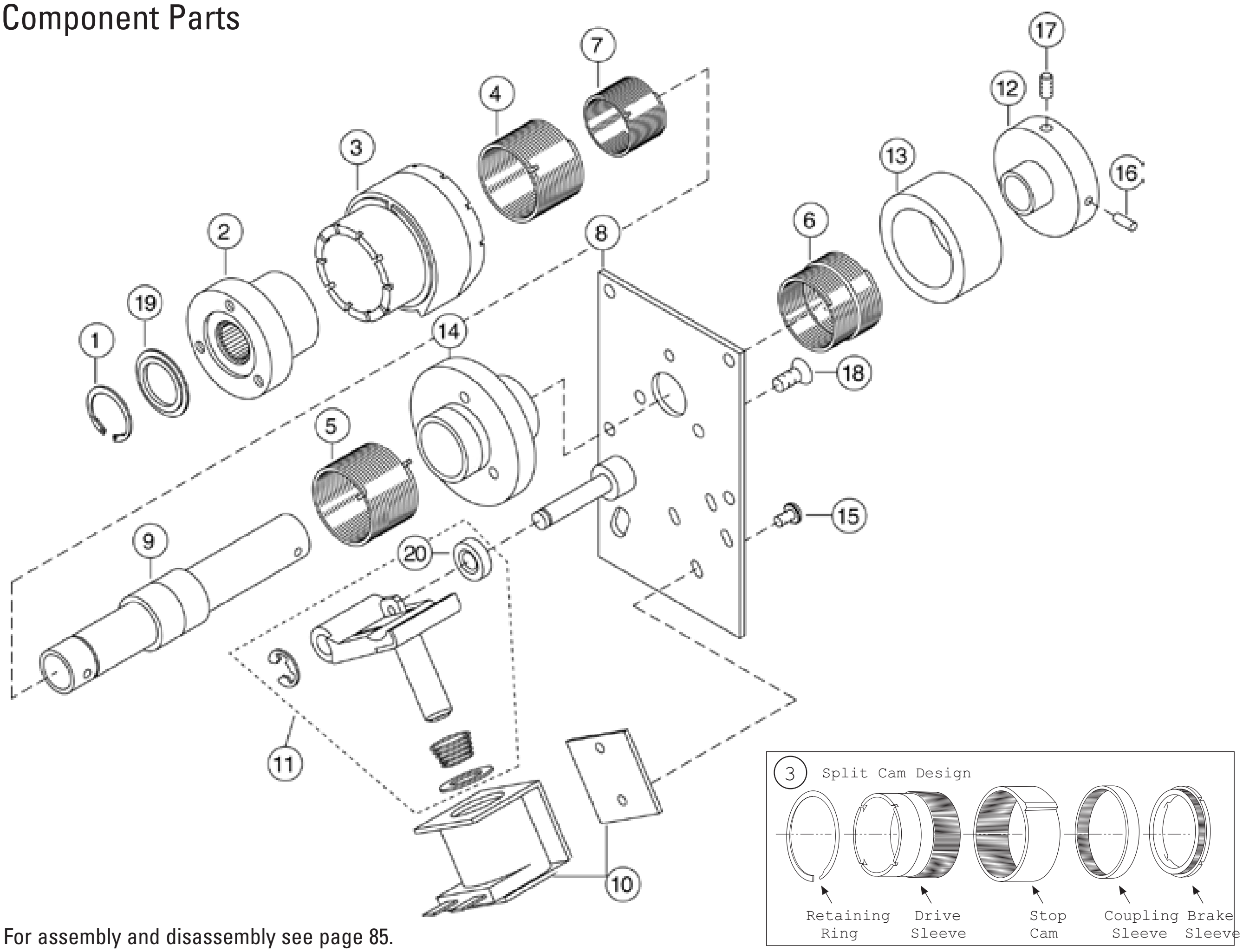
(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	**Pin Hole B**	**Mtg. Hole C**	**Set Screws D**
0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x #10-32 UNF-2B on 1.25 BC	#8-32 x 0.25 Lg. Hex Skt. Set Screw
METRIC BORES			
0.4724-4741 (12.0 H9)	0.117-0.121 (2.97-3.08)	3X M5 x 0.8 on 31.75 BC	M4 x 0.7 x 6.0 Lg. Hex Skt. Set Screw

Super CB-5 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

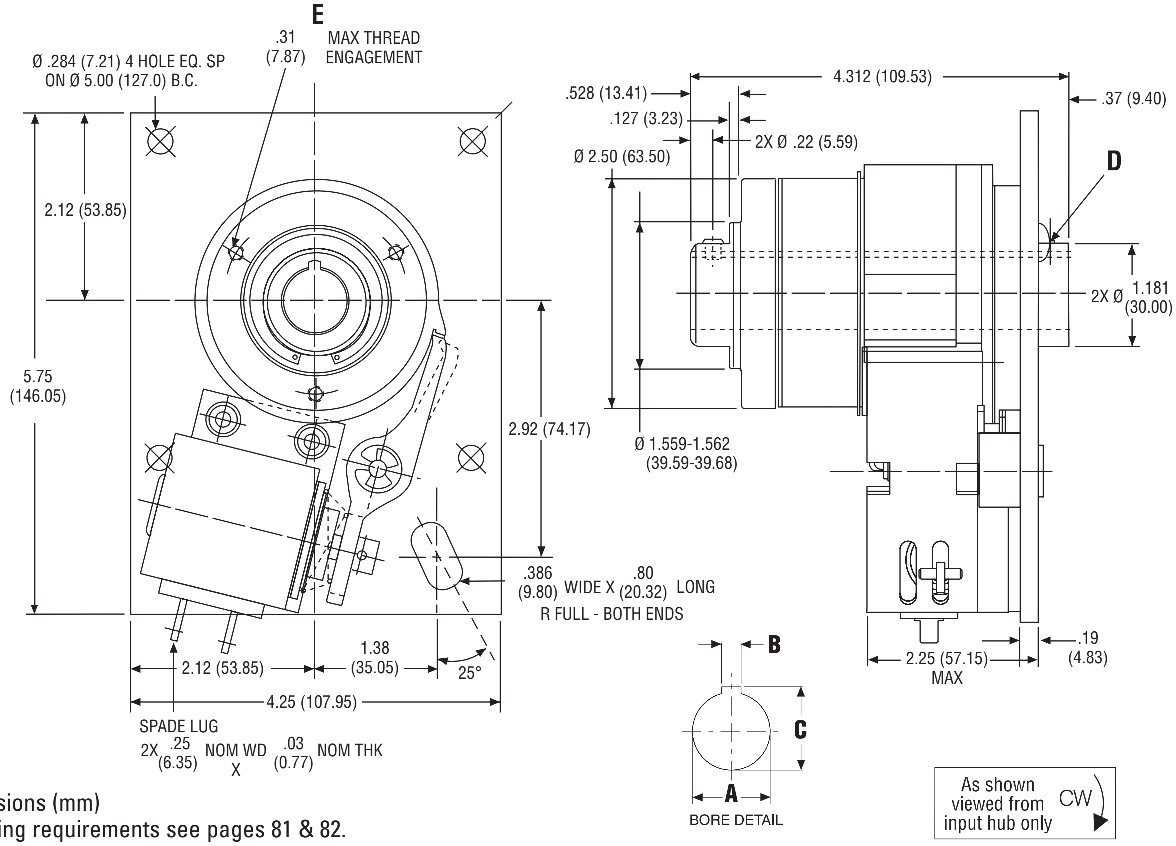
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.***
1	Retaining Ring		748-5-0006
2	Input Hub Anti-Overrun		541-5-0029 (541-5-0030)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-5-0801
4	Drive Spring	CW CCW	808-5-0001 808-5-0002
5	Brake Spring	CW CCW	808-5-0001 808-5-0002
6	Anti-Back Spring	CW CCW	808-5-0005 808-5-0006
7	Anti-Overrun Spring	CW CCW	808-5-0003 808-5-0004
8	Plate Assembly	CW CCW	686-5-0001 686-5-0002
9	Output Assembly 0.50 Bore (12.0 mm Bore)		 824-5-0469 (824-5-0470)

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.***
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		 101-5-0003 101-5-0006 101-5-0002 101-5-0005
11	Actuator Assembly	CW CCW	101-5-0060 101-5-0061
12	Anti-Back Hub		540-5-0006 (540-5-0047)
13	Dust Cover (AB Spring)		287-5-9002
14	Brake Hub		541-5-0024
15	Pan Head Machine Screw (Sems) (2)		797-1-0414
16	Spring Pin		679-1-0024
17	Headless Socket Set Screw		797-1-0153 (797-1-0769)
18	Flat Head Socket Cap Screw		797-1-0322
19	Thrust Washer		950-5-0006
20	Spacer		807-1-9002

* Part numbers in ( ) are metric

Super CB-6 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	500 lbs.-in.
Maximum anti-overrun holding capability	300 lbs.-in.
Maximum anti-back holding capability	300 lbs.-in.
Inertia, rotating parts	1.718 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	63 lbs.
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

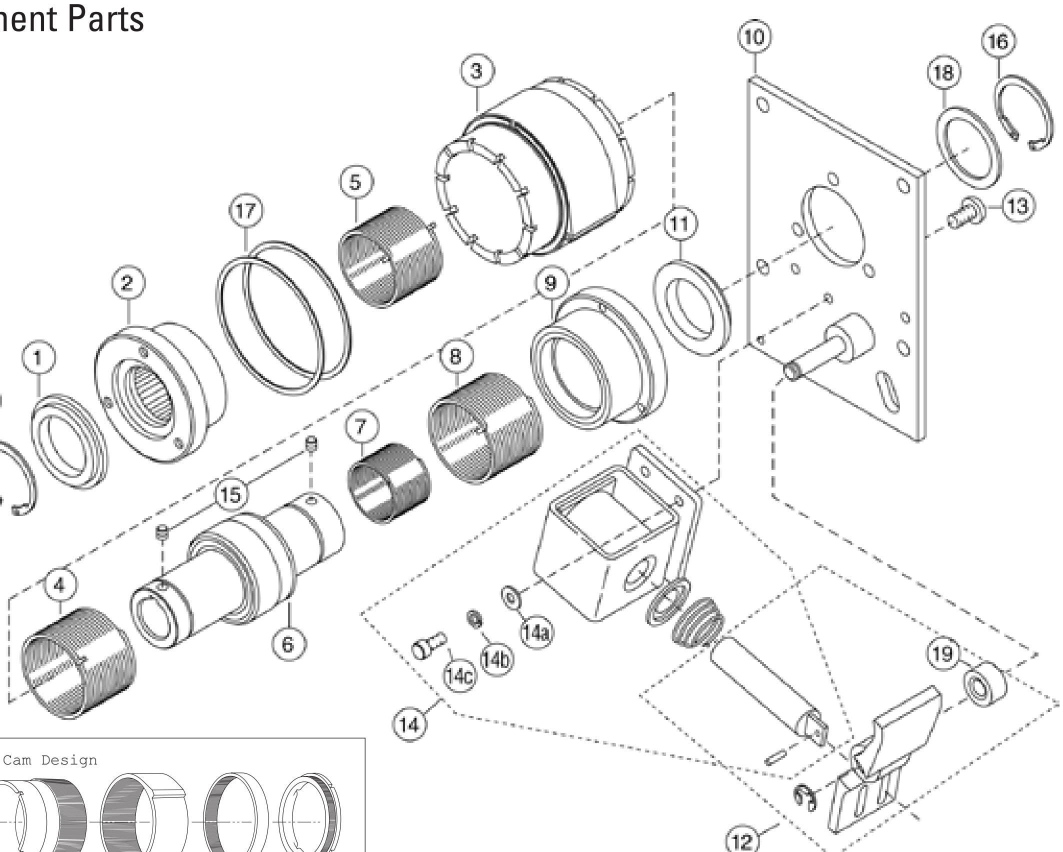
(Coils are rated for continuous duty)

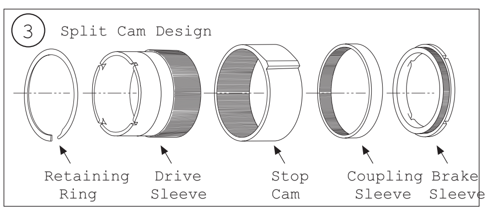
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	2x M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	2x 4.87-5.14 Hole (.191-.203)	3x M6 x 1.0 holes on 52.38 BC

Super CB-6 Clutch/Brake

Component Parts





For assembly and disassembly see page 85.

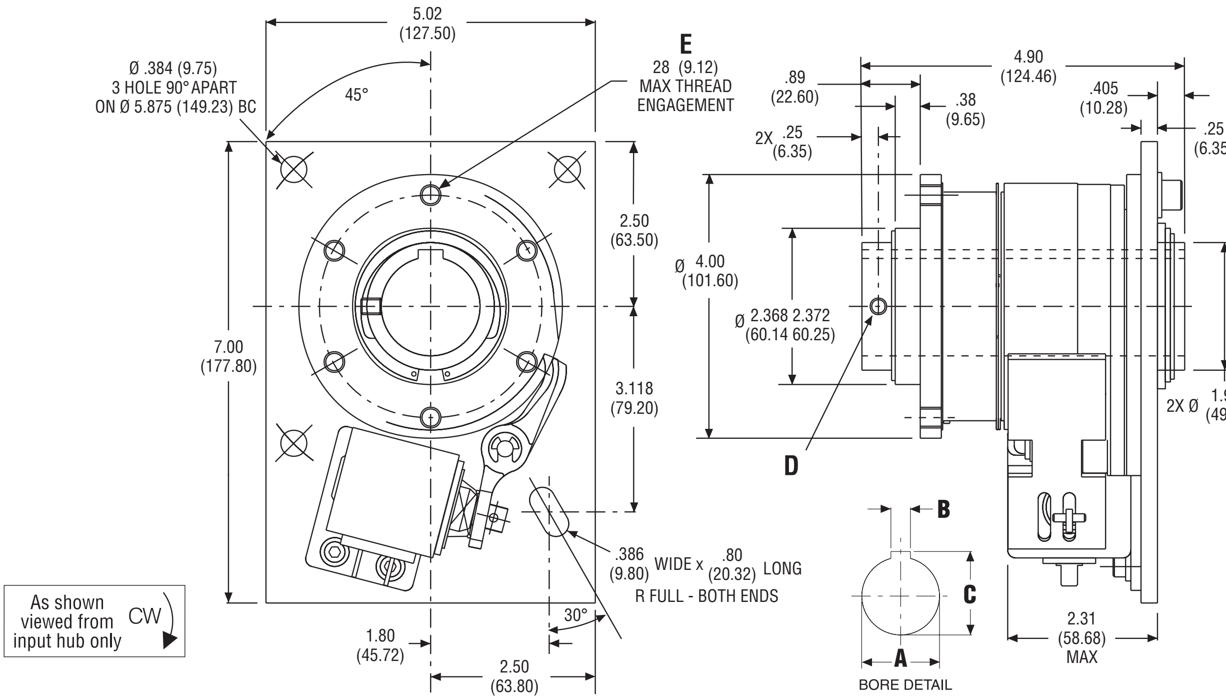
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.***
1	Thrust Washer (Input)		950-6-0003
2	Input Hub Assembly with Roller Bearing		541-6-0035 (541-6-0036)
3	Control Collar Special Steel Insert (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0750
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
6	Output Assembly SPCL 0.750 Bore Hard Shaft and Wear Rings 1.000 Bore (20.0 mm Bore) (25.0 mm Bore)		 824-6-0478 824-6-0481 (824-6-0482) (824-6-0483)
7	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004
8	Brake Spring	CW CCW	808-6-0001 808-6-0002
9	Brake Hub w/Roller Brg.		541-6-0045
10	Plate Assembly	CW CCW	686-6-0076 686-6-0077

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.***
11	Thrust Washer (Plate Hub)		950-6-0004
12	Actuator Assembly Special Actuator (includes plunger & spacer)	CW CCW	102-1-0032 102-1-0033
13	Button Head Cap Screw (3)		797-1-0243
14	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030
14a	Flatwasher (2)		950-1-0006
14b	Lockwasher - Split (2)		950-1-0020
14c	Skt. Head Cap Screw (2)		797-1-0044
15	Headless Skt. Set Screw (2) (0.75 bore only)		797-1-0162 (797-1-0774)
16	Retaining Ring (2)		748-1-0036
17	Shim (2)		807-1-0001
18	Shim .005		 807-1-0014
19	Spacer		807-1-9001

* Part numbers in ( ) are metric

Super CB-7 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	1,500 lbs.-in.
Maximum anti-overrun holding capability	600 lbs.-in.
Maximum anti-back holding capability	600 lbs.-in.
Inertia, rotating parts	6.75 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	300 lbs.
Maximum operating speed	400 RPM
Response time, voltage on at full speed	50 MS
Weight	12 lbs.

ELECTRICAL DATA

Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

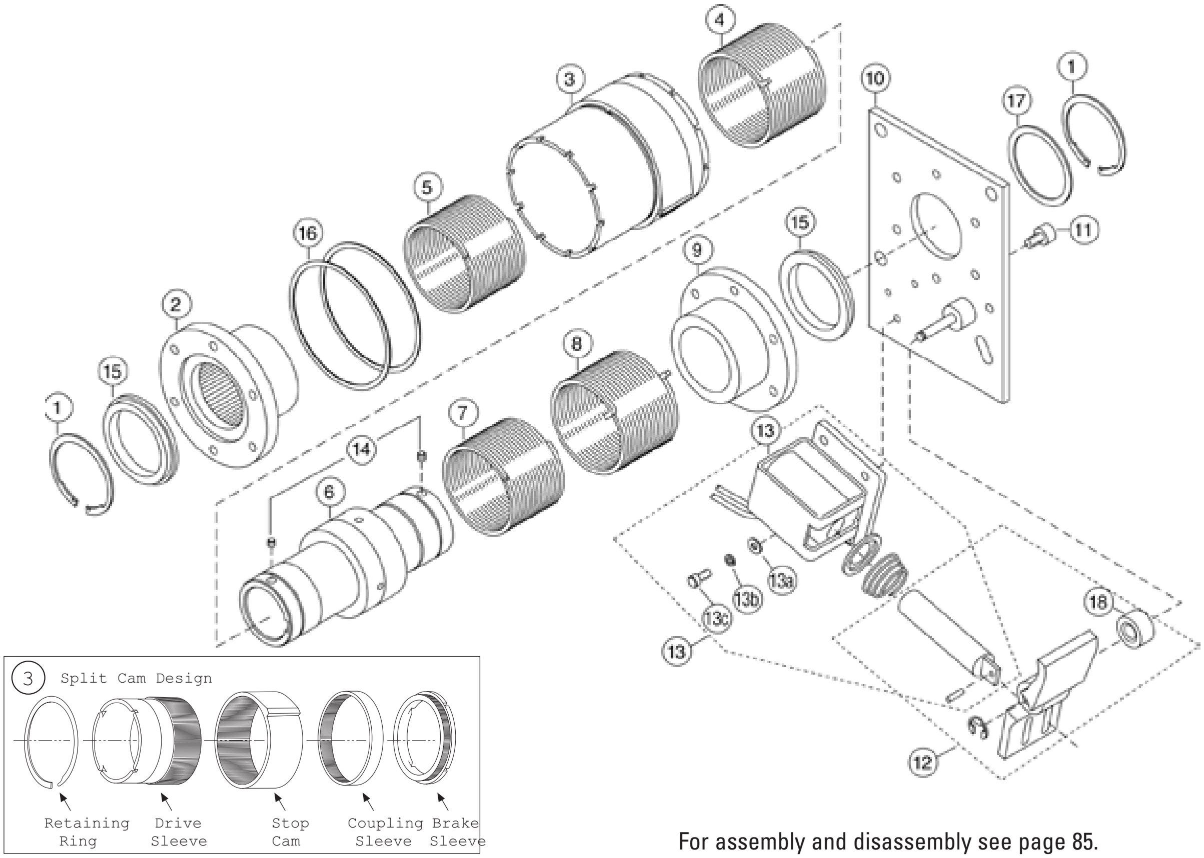
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA

Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
0.9843-0.9863 (25.0 H9)	0.3143-0.3156 (7.983-8.017)	1.1142-1.1241 (28.300-28.552)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.1811-1.1831 (30.0 H9)	0.3143-0.3156 (7.983-8.017)	1.3110-1.3209 (33.299-33.551)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

Super CB-7 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

COMPONENT PARTS

Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		541-7-0027 (541-7-0030)
3	Control Collar (Steel Insert) (Specify No. of Stops) Standard • 1.6° Adjustable	 CW/CCW	(541-7-8030) 266-1-0030
4	Drive Spring Standard	CW CCW	808-8-0007 808-8-0008
5	Anti-Overrun Spring	CW CCW	808-8-0009 808-8-0010
6	Output Assembly SPCL (25.0 mm Bore) (30.0 mm Bore) (35.0 mm Bore)		824-7-0143 (1.00) 824-7-0146 (1.50) (824-7-0144) (1.25) (824-7-0133) (824-7-0135) (824-7-0137)
7	Anti-Back Spring	CW CCW	808-1-0012 808-1-0013
8	Brake Spring	CW CCW	808-8-0005 808-8-0006
9	Brake Hub		541-7-0029

COMPONENT PARTS

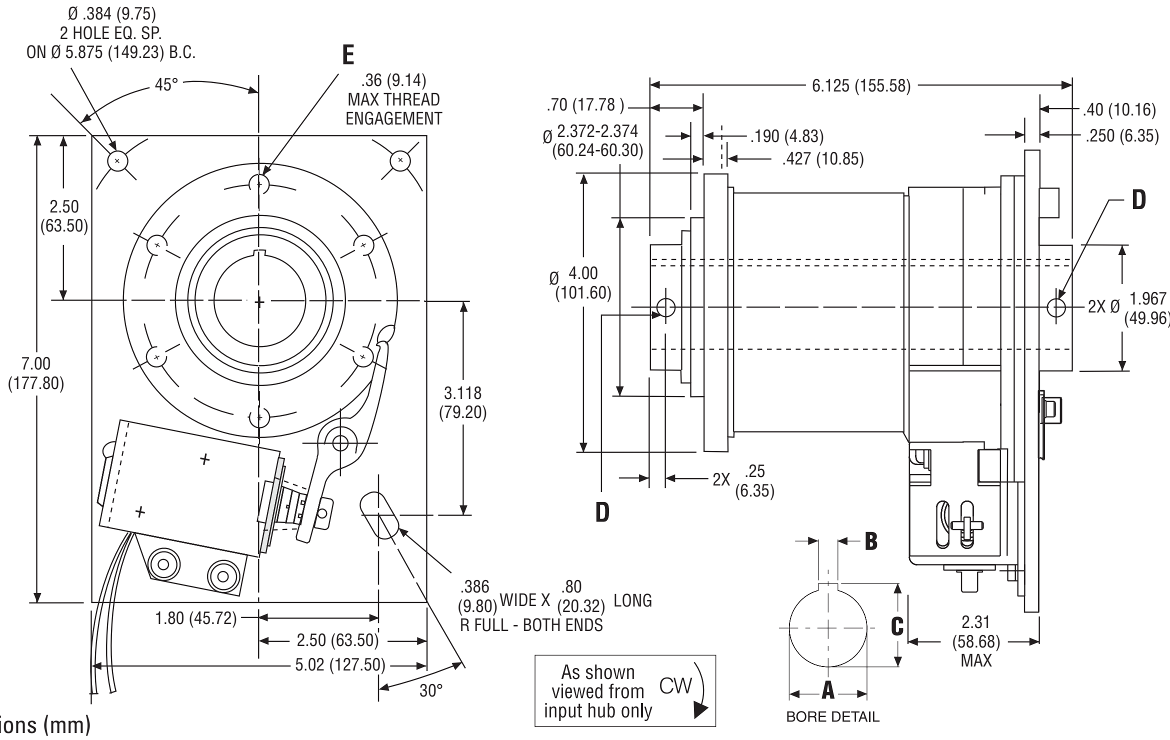
Item	Description	Rotation	Part No. *
10	Plate Assembly	CW CCW	686-7-0009 686-7-0010
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Skt. Set Screw (2)		797-1-0174
15	Thrust Washer (2)		950-8-0001
16	Shim		807-1-0002
17	Shim 0.005 0.010		 801-8-0001 801-8-0002
18	Spacer		807-1-9001

Shims used as required

* Part numbers in ( ) are metric

Super CB-8 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	2,500 lbs.-in.
Maximum anti-overrun holding capability	600 lbs.-in.
Maximum anti-back holding capability	600 lbs.-in.
Inertia, rotating parts	12.84 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	300 lbs.
Maximum operating speed	300 RPM
Response time, voltage on at full speed	50 MS
Weight	15 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.940	25.4	Standard
12 DC	1.860	6.43	Modification
90 DC	0.240	378.6	Modification

(Coils are rated for continuous duty)

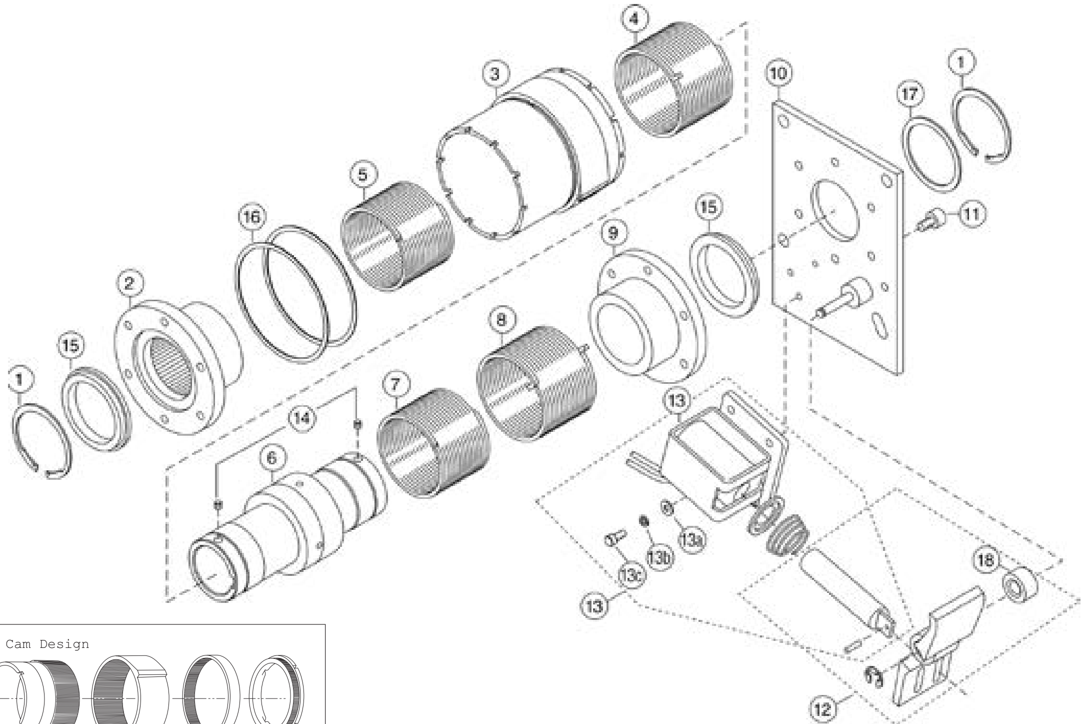
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

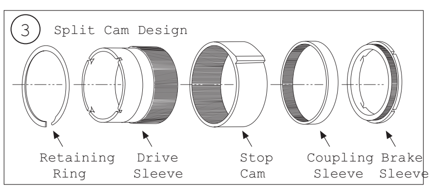
BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
1.0005-1.0025* (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.3755-1.3775* (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.5784-1.5772 (40.0 H9)	—	—	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

* Special Order

Super CB-8 Clutch/Brake

Component Parts





For assembly and disassembly see page 85.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		541-8-0009 (541-8-0012)
3	Control Collar (Steel Insert) (Specify No. of Stops) Standard • 1.6° Adjustable	CW/CCW	266-8-0275
4	Drive Spring Standard	CW CCW	808-8-0003 808-8-0004
5	Anti-Overrun Spring	CW CCW	808-8-0025 808-8-0026
6	Output Assembly SPCL (35.0 mm Bore) (40.0 mm Bore		824-8-0579 (1.00) 824-8-0576 (1.50) 824-8-0577 (1.38) (824-8-0578) (1.25) (824-8-0589) A/R
7	Anti-Back Spring	CW CCW	808-8-0025 808-8-0026
8	Brake Spring	CW CCW	808-8-0003 808-8-0004
9	Brake Hub		541-8-0010
10	Plate Assembly	CW CCW	686-8-0051 686-8-0052

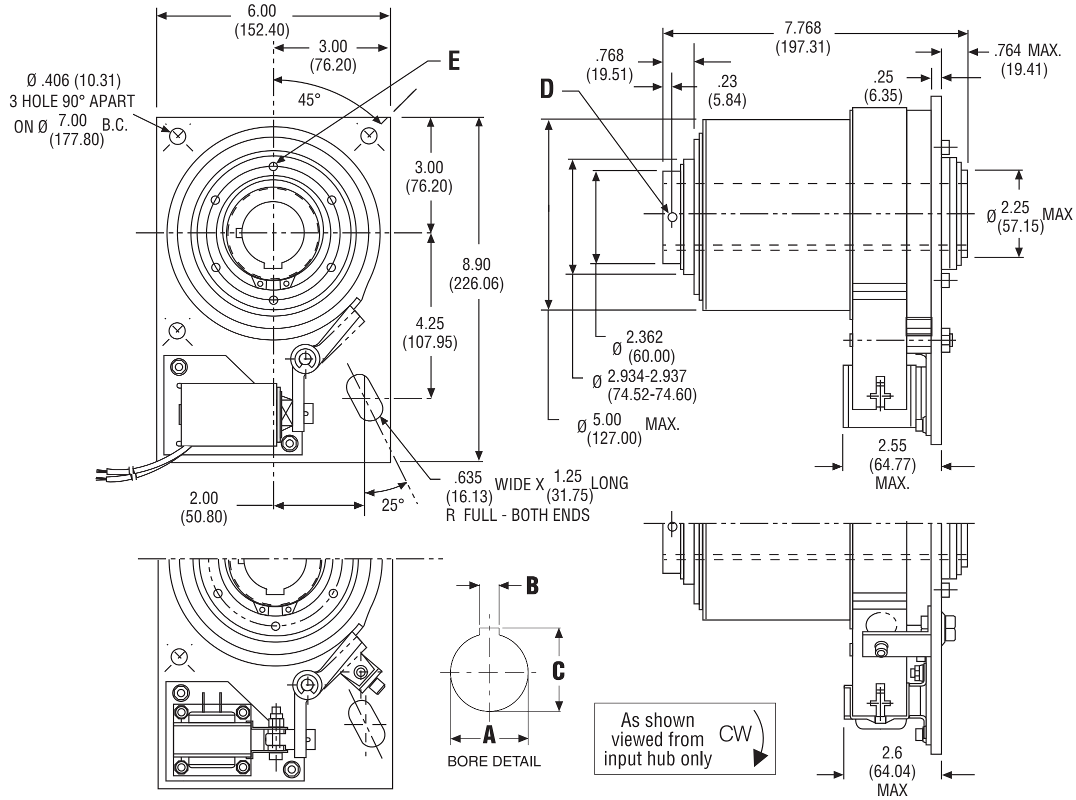
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger) AC AC DC DC	 CW CCW CW CCW	 102-1-0032 102-1-0033 102-1-0034 102-1-0035
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0053 101-1-0058 101-1-0052 101-1-0055
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Skt. Set Screw (2)		797-1-0174 (797-1-0783)
15	Thrust Washer (2)		950-8-0001
16	Shim (2)		807-1-0002
17	Shim 0.005 0.010		 801-8-0001 801-8-0002
18	Spacer		807-1-9001

Shims used as required

* Part numbers in ( ) are metric

Super CB-10 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)

Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	5,000 lbs.-in.
Maximum anti-overrun holding capability	1,200 lbs.-in.
Maximum anti-back holding capability	1,200 lbs.-in.
Inertia, rotating parts	48.0 lbs..-in.^{2}
Maximum radial bearing load at maximum speed	500 lbs.
Maximum operating speed	200 RPM
Response time, voltage on at full speed	70 MS
Weight	27 lbs.

ELECTRICAL DATA

Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.174*	14.5	Standard
24 DC	0.940	25.4	Standard
12 DC	1.860	6.43	Modification
90 DC	0.240	378.6	Modification

(Coils are rated for continuous duty)

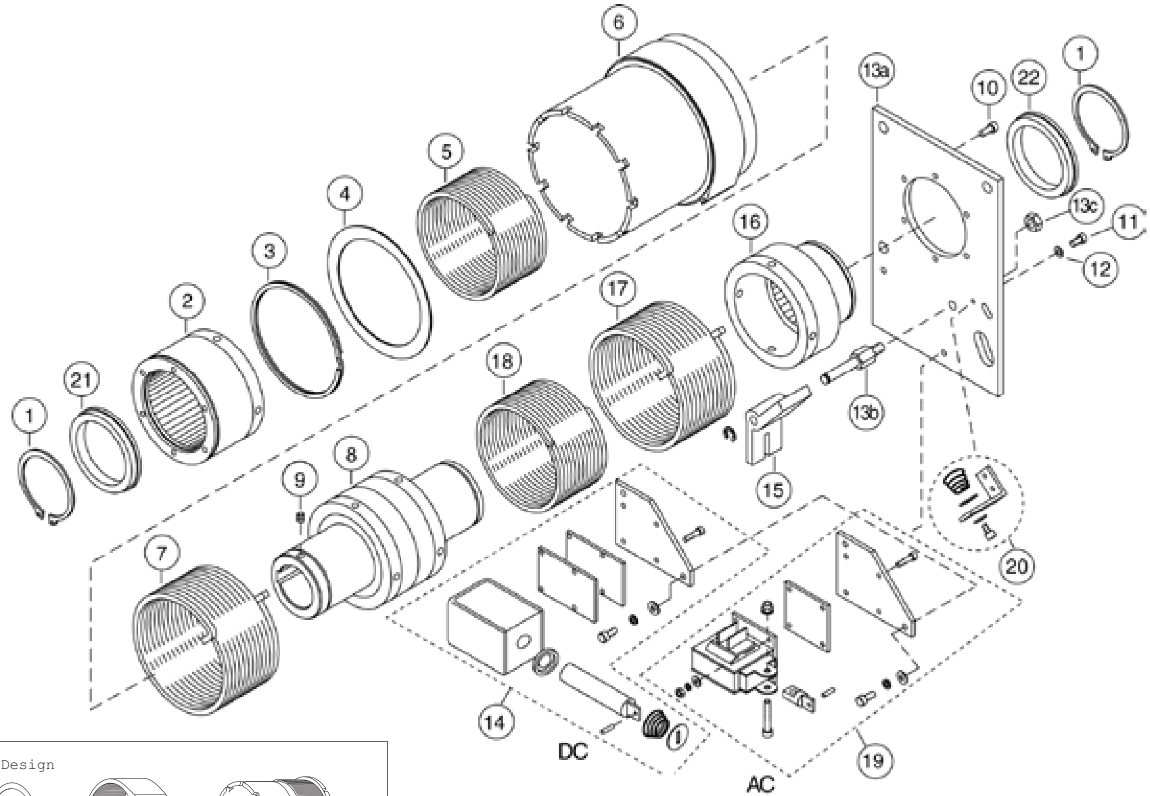
*115 AC - In rush current 2.9 amps / Holding current 0.1 amps

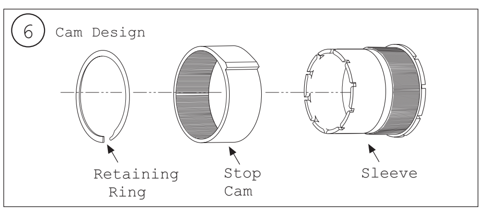
BORE & KEYWAY DATA

Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.669-1.679 (42.39-42.65)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.6255-1.6275 (41.287-41.339)	0.376-0.378 (9.55-9.61)	1.796-1.806 (45.61-45.88)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.7505-1.7525 (44.462-44.514)	0.376-0.378 (9.55-9.61)	1.922-1.932 (48.81-49.08)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
METRIC BORES				
1.5749-1.5772 (40.0 H9)	0.4717-0.4732 (11.979-12.021)	1.705-1.712 (43.300-43.491)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M6 x 1.25 12.70 DP on 86.79 BC
1.7717-1.7740 (45.0 H9)	0.5504-0.5520 (13.980-14.021)	1.922-1.929 (48.80-49.00)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M6 x 1.25 12.70 DP on 86.79 BC

Super CB-10 Clutch/Brake

Component Parts





For assembly and disassembly see pages 85 & 86.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring-Truarc		748-1-0020
2	Input Hub Anti-Overrun		541-0-0017 (541-0-0022)
3	Retaining Ring		748-1-0217
4	Spacer		807-0-0013
5	Anti-Overrun Spring	CW CCW	808-0-0001 808-0-0002
6	Control Collar Steel Insert Assembly (Specify No. of Stops) Standard 1.5° • Adjustable	CW CCW	266-0-0201 266-0-0211
7	Drive Spring	CW CCW	808-0-0009 808-0-0010
8	Shaft Assembly (Specify Bore) Anti-Overrun (40.00 mm Bore)	1.500 1.625 1.750	824-0-0097 824-0-0098 824-0-0099 (824-0-0100)
9	Headless Set Screw		797-1-0173 (797-1-0784)
10	Skt Head Cap Screw		797-1-0055
11	Head Cap Screw		797-1-0044
12	Lockwasher—Split		950-1-0020

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
13	Actuator Plate Assembly	CW CCW	101-0-0052 101-0-0053
13a	Plate		686-0-0001
13b	Pivot Pin		679-0-0001
13c	Lock Nut		661-1-0010
14	DC Coil Assembly 24 DC 12 DC 90 DC		 101-0-0003 101-0-0002 101-0-0004
15	Actuator Lever		102-0-9001
16	Brake Hub		541-0-0019
17	Brake Spring	CW CCW	808-0-0009 808-0-0010
18	Anti-Back Spring	CW CCW	808-0-0007 808-0-0008
19	AC Coil Assembly 115 AC	CW CCW	101-0-0005 101-0-0054
20	AC Actuator Return Assembly		101-0-0009
21	Thrust Washer (Input)		950-0-0002
22	Thrust Washer (Plate)		950-0-0003

* Part numbers in ( ) are metric

Standard CB Series

Solenoid-Activated, Combination Clutch/Brakes

CB Series combination clutches and brakes accurately start and stop loads driven by a continuously rotating power source. CB units operate from a single AC or DC pulse, stopping the load within ±½° noncumulative at speeds up to 1800 RPM, depending on size. Each unit is pre-engineered and pre-assembled for easy installation.

Features

- Available in seven sizes
- Adjustable control collars for easy and accurate output stop position setting
- Load over-travel or backup is eliminated since CB units lock the load in both directions when the solenoid is off
- RoHS compliant
- Cost-effective design
- Split cam design, Models CB-5, CB-6, CB-7, CB-8
- Anti-overrun feature prevents the output from running faster than the input
- Permanently lubricated—never needs adjustment for wear
- Brings load up to speed in 3 milliseconds and stops within 1.5 milliseconds
- Single, 2 and 4 stop collar standard, multi-stop collars with up to 24 stops available as specials
- AC or DC operated
- See page 62 for controls

Typical Applications

- Riveters
- Punch presses
- Packaging equipment
- Conveyor drives
- Heavy duty machinery
- Rapid cycling equipment

How to Order

CB - 6 - CW - 24V - 3/4" bore - 2

CB Series
Specify:
Imperial or Metric

Size
CB-2 = **2**
CB-4 = **4**
CB-5 = **5**
CB-6 = **6**
CB-7 = **7**
CB-8 = **8**
CB-10 = **10**

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise

Coil Voltage
12V = 12VDC
24V = **24VDC**
90V = 90VDC
115V = **115VAC**

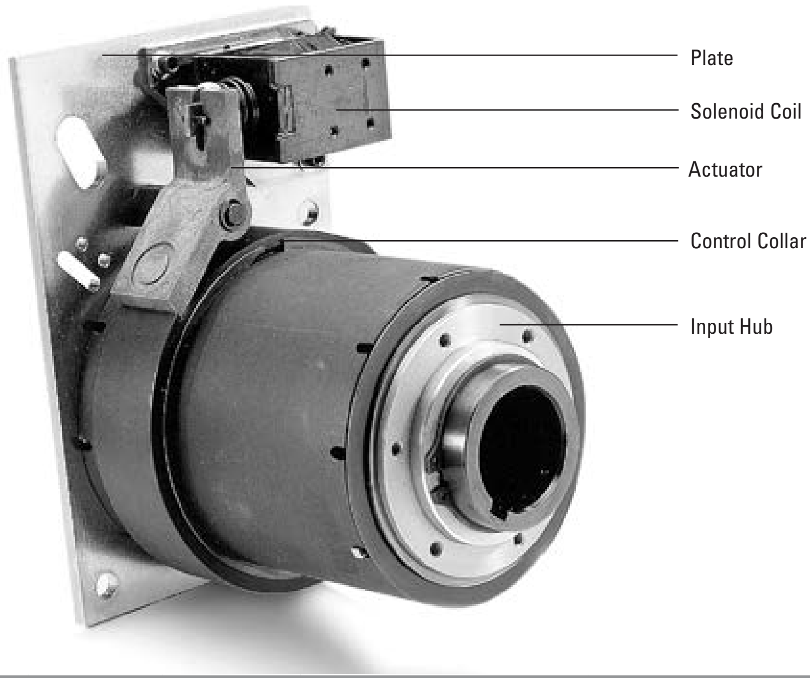
Bore Size
CB-2 = **¼"**
CB-4 = **3/8"**
CB-5 = **½"**
CB-6 = **¾", 1"**
CB-7 = **1",1¼",1½"** *¾"
CB-8 = **1¼",1½"** *1",*1 3/8"
CB-10 = **1½"** *1 5/8",*1¾"
*Special order

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order.

OPTIONS	
Dust Covers	See page 60
Stop Collars	See page 61
Pneumatic Actuators	See page 62

Standard CB Series

Combination Clutch/Brake Packages



PERFORMANCE							
	CB-2	CB-4	CB-5	CB-6	CB-7	CB-8	CB-10
Static torque	25 lbs.-in. (2.825 Nm)	120 lbs.-in. (13.56 Nm)	250 lbs.-in. (28.25 Nm)	500 lbs.-in. (56.5 Nm)	1,500 lbs.-in. (169.5 Nm)	2,500 lbs.-in. (282.5 Nm)	5,000 lbs.-in. (565 Nm)
Maximum anti-overrun holding capability	10 lbs.-in. (1.13 Nm)	25 lbs.-in. (2.825 Nm)	45 lbs.-in. (5.085 Nm)	300 lbs.-in. (33.9 Nm)	600 lbs.-in. (67.8 Nm)	600 lbs.-in. (67.8 Nm)	1,200 lbs.-in. (135.6 Nm)
Maximum anti-back holding	18 lbs.-in. (2.034 Nm)	80 lbs.-in. (9.04 Nm)	160 lbs.-in. (18.08 Nm)	300 lbs.-in. (33.9 Nm)	600 lbs.-in. (67.8 Nm)	600 lbs.-in. (67.8 Nm)	1,200 lbs.-in. (135.6 Nm)
Inertia, rotating parts	.0207 lbs.-in.^{2}	.0636 lbs.-in.^{2}	.1950 lbs.-in.^{2}	1.718 lbs.-in.^{2}	6.75 lbs.-in.^{2}	12.84 lbs.-in.^{2}	48.0 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	7.5 lbs..	14 lbs..	32 lbs..	63 lbs..	300 lbs..	300 lbs..	500 lbs..
Maximum operating speed	1,800 RPM	1,200 RPM	750 RPM	500 RPM	400 RPM	300 RPM	200 RPM
Response time, voltage on at full speed	20 MS	24 MS	27 MS	45 MS	50 MS	50 MS	70 MS
Weight	1 lbs.	2 lbs.	3 lbs.	7 lbs.	12 lbs.	15 lbs.	27 lbs.

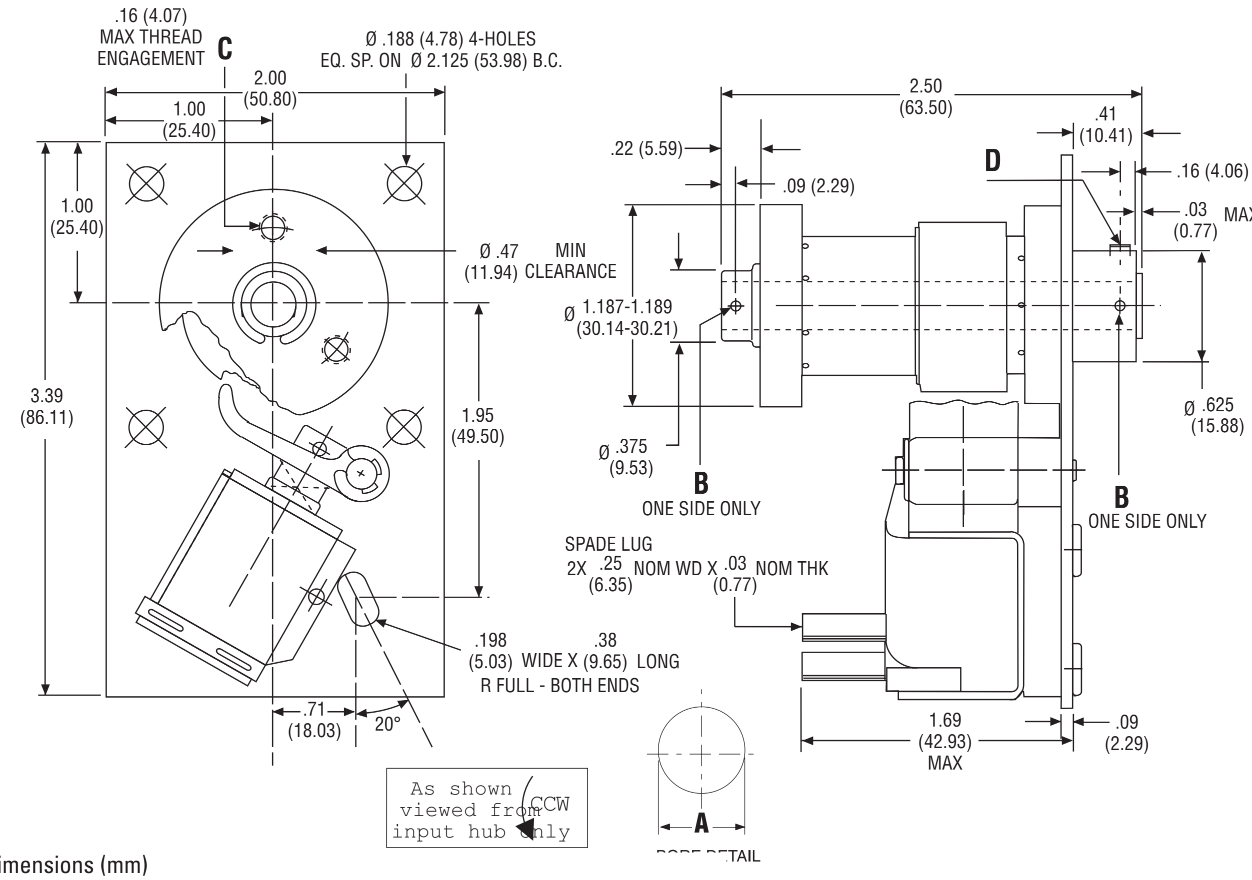
See page 74 for Minimum Inertia Requirements. See pages 81 & 82 for Mounting Requirements.

RPM vs. SHAFT BORE				
Size	Max RPM	Shaft Bores Standard in (mm)	Shaft Bores Special in (mm)	Shaft Bores Metric Standard in (mm)
CB–2	1,800	$^{1}/_{4}$″ (6.35)	—	.2362-.2374 (6.0)
CB–4	1,200	$^{3}/_{8}$″ (9.525)	—	.3937-.3951 (10.0)
CB–5	750	$^{1}/_{2}$″ (12.70)	—	.4724-.4741 (12.0)
CB-6	500	$^{3}/_{4}$″ or 1″ (19.05 or 25.0)	—	7874-.7894 (20.0) or .9842-.9862 (25.0)
CB-7	400	1″, 1$^{1}/_{4}$″ or 1$^{1}/_{2}$″ (25.4, 31.75 or 38.10)	$^{3}/_{4}$″ (19.05)	.9843-.9863 (25.0), 1.1811-1.1831 (30.0) or 1.3780-1.3804 (35.0)
CB-8	300	1$^{1}/_{4}$″ or 1$^{1}/_{2}$″ (31.75 or 38.1)	1″ or 1$^{3}/_{8}$″ (25.4 or 34.925)	1.3780-1.3804 (35.0) or 1.5784-1.5772 (40.0)
CB-10	200	1$^{1}/_{2}$″ (38.1)	1$^{5}/_{8}$″ or 1$^{3}/_{4}$″ (41.275 or 44.45)	1.5749-1.5722 (40.0) or 1.7717-1.7740 (45.0)

*Consult Factory

Standard CB-2 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	25 lbs.-in.
Maximum anti-overrun holding capability	10 lbs.-in.
Maximum anti-back holding capability	18 lbs.-in.
Inertia, rotating parts	0.0207 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	7.5 lbs.
Maximum operating speed	1800 RPM
Response time, voltage on at full speed	20 MS
Weight	1 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.104*	825	Standard
24 DC	0.230	104	Standard
12 DC	0.460	26	Modification
90 DC	0.059	1510	Modification

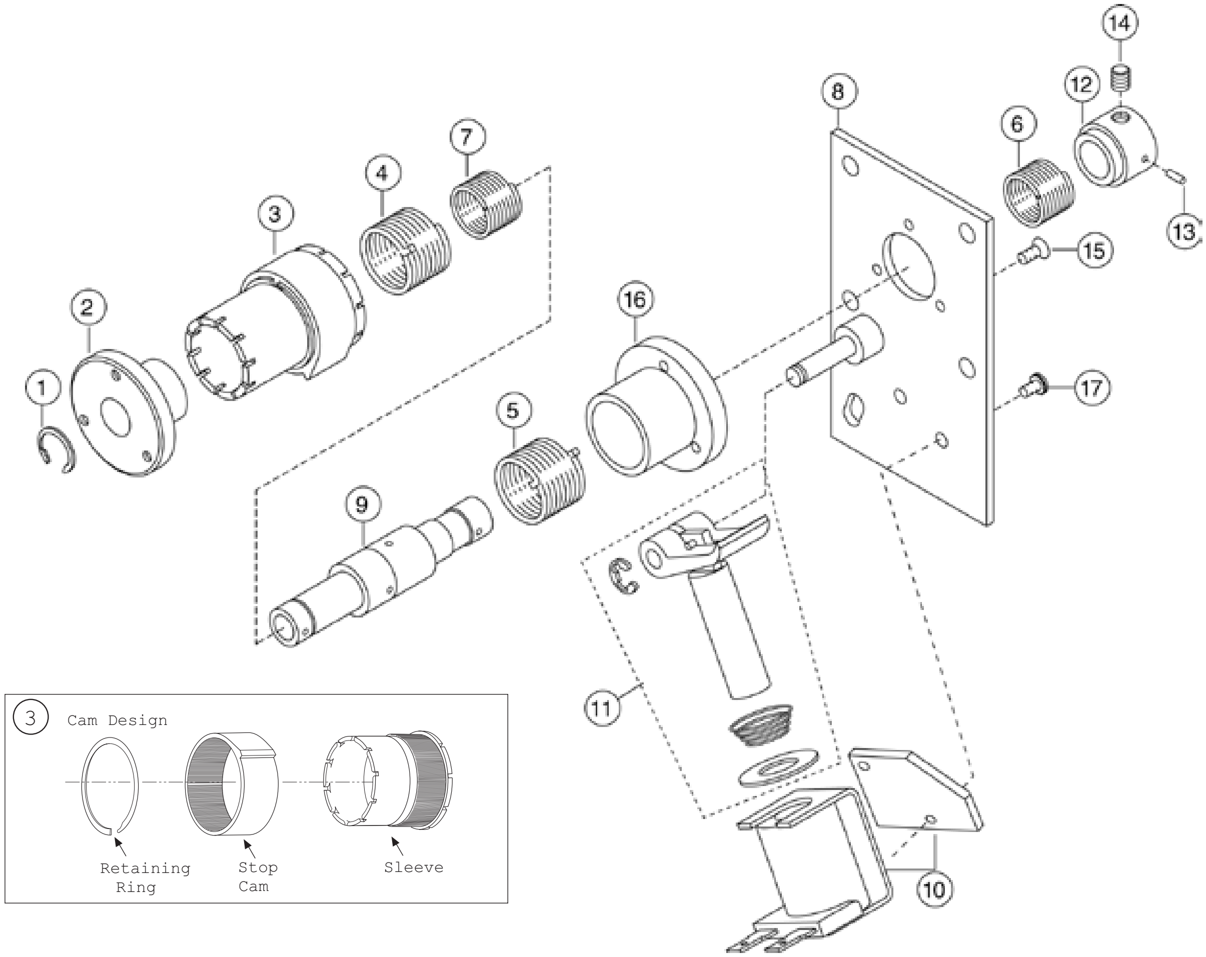
(Coils are rated for continuous duty)

*115 AC - In rush current .10 amps / Holding current .04 amps

BORE & KEYWAY DATA			
Bore A	**Pin Hole B**	**Mtg. Hole C**	**Set Screws D**
0.2505-0.2525 (6.362-6.414)	0.061-0.065 (1.54-1.66)	3x #6-32 UNC-2B on 0.938 BC	#8-32 x 0.190 Lg. Hex Skt. Set Screw
METRIC BORES			
0.2362-0.2374 (6.0 H9)	0.055-0.062 (1.4-1.57)	3X M4 x 0.7 on 23.83 BC	M4 x 0.7 x 5.0 Lg. Hex Skt. Set Screw

Standard CB-2 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

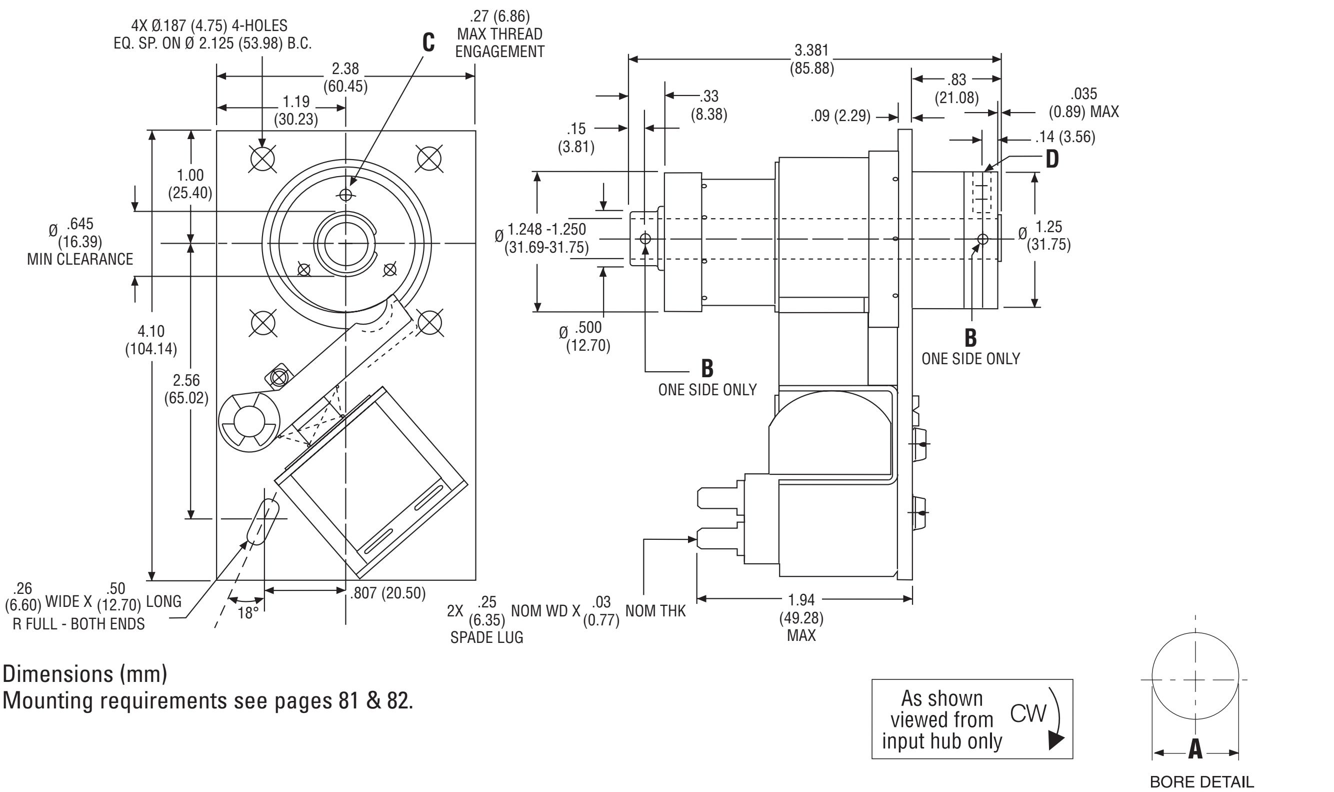
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0085
2	Input Hub Anti-Overrun		540-2-0004 (540-2-0107)
3	Control Collar (Specify No. of Stops) Standard - 2.8° Adjustable	CW CCW	266-2-0001 266-2-0031
4	Drive Spring	CW CCW	808-2-0108 808-2-0109
5	Brake Spring	CW CCW	808-2-0101 808-2-0100
6	Anti-Back Spring	CW CCW	808-2-0004 808-2-0003
7	Anti-Overrun Spring	CW CCW	808-2-0003 808-2-0004
8	Plate Assembly	CW CCW	686-2-0001 686-2-0002
9	Output Assembly with Anti-Overrun (0.25 Bore) (6.0 mm Bore)		824-2-0006 (824-2-0319)

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		 275-1-0003 275-1-0006 275-1-0002 275-1-0005
11	Actuator Assembly (kit w/ plunger)		101-2-0001
12	Anti-Back Hub		540-2-0003 (540-2-0109)
13	Spring Pin	CCW	679-1-0019
14	Headless Socket Set Screw		797-1-0152 (797-1-0768)
15	Flat Head Socket Cap Screw (3)		797-1-0311
16	Brake Hub		540-2-0006
17	Pan Head Machine Screw (Sems) (2)		797-1-0415

* Part numbers in ( ) are metric

Standard CB-4 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	120 lbs.-in.
Maximum anti-overrun holding capability	25 lbs.-in.
Maximum anti-back holding capability	80 lbs.-in.
Inertia, rotating parts	0.0636 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	14 lbs.
Maximum operating speed	1200 RPM
Response time, voltage on at full speed	24 MS
Weight	2 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

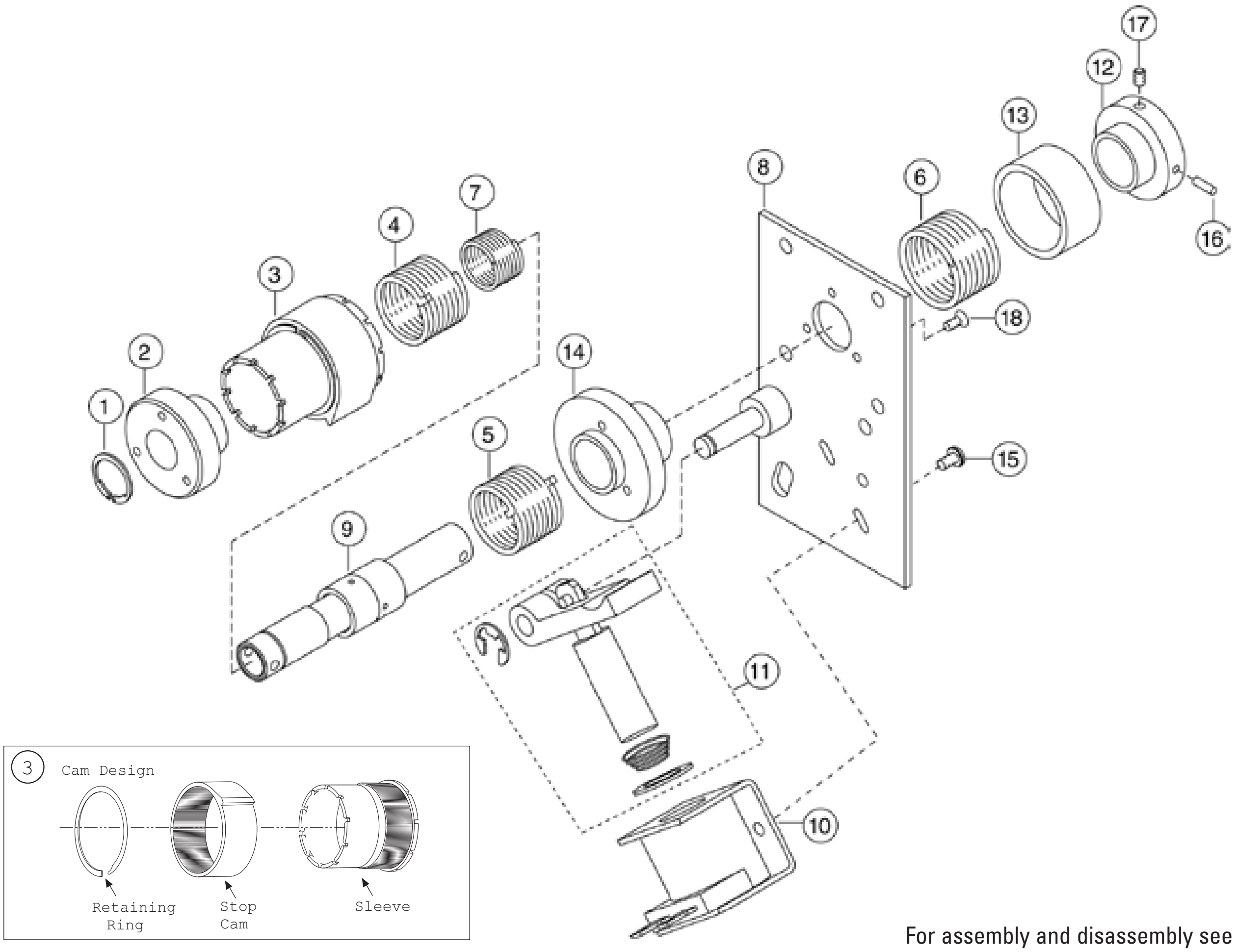
(Coils are rated for continuous duty)

*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	**Pin Hole B**	**Mtg. Hole C**	**Set Screws D**
0.376-0.378 (9.55-9.61)	0.115-0.135 (2.92-3.43)	3x #6-32 UNC-2B on .938 BC	#8-32 x 0.188 Lg. Hex Skt. Set Screw
METRIC BORES			
0.3937-0.3951 (10.0 H9)	0.117-0.121 (2.97-3.08)	3X M4 x 0.7 on 23.83 BC	M4 x 0.7 x 5.0 Lg. Hex Skt. Set Screw

Standard CB-4 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

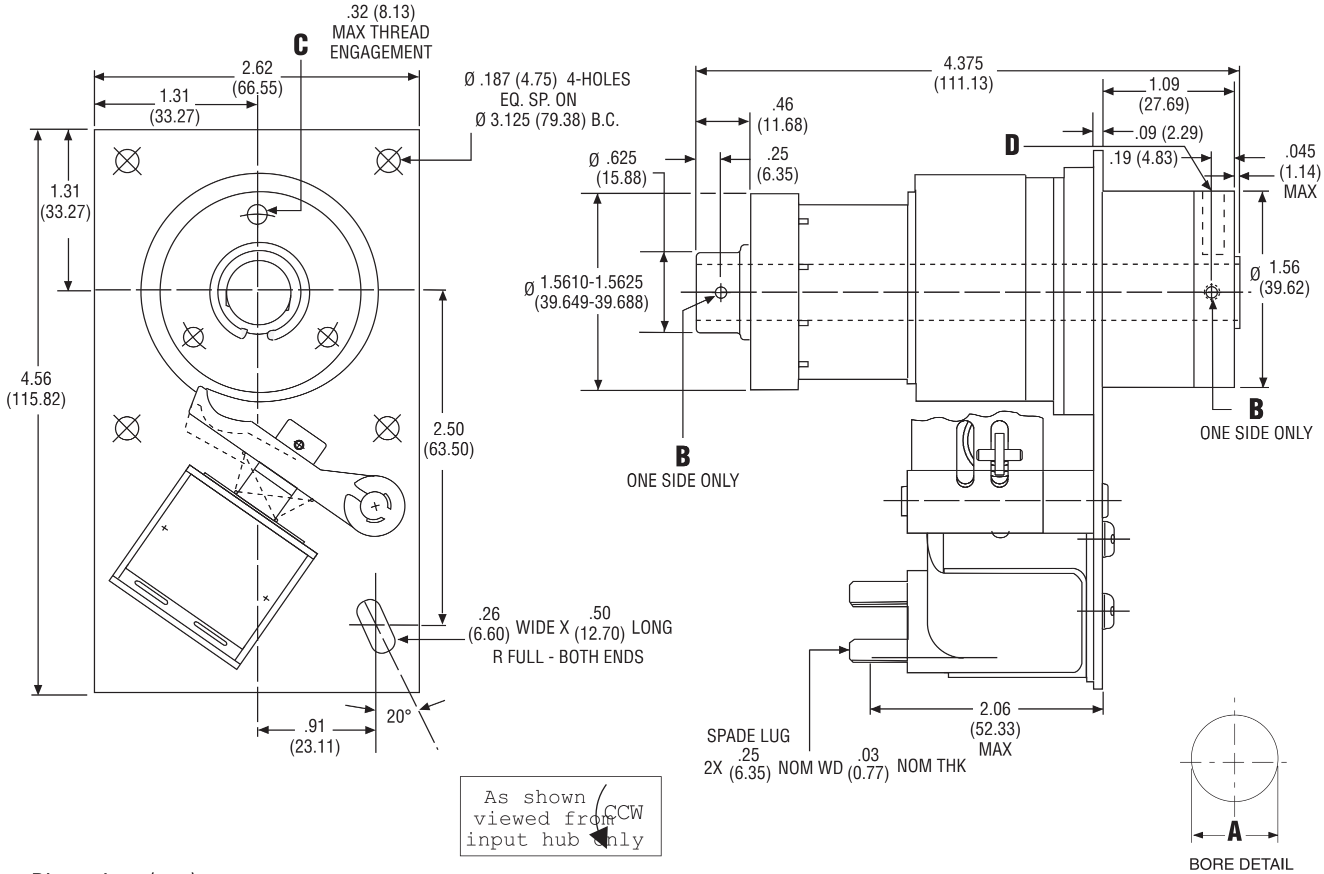
COMPONENT PARTS			
Item	Description	Rotation	Part No. *
1	Retaining Ring		748-1-0027
2	Input Hub Anti-Overrun		540-4-0021 (540-4-0077)
3	Control Collar (Specify No. of Stops) Standard - 2.4° Adjustable	CW CCW	266-4-0051 266-4-0081
4	Drive Spring	CW CCW	808-4-0066 808-4-0059
5	Brake Spring	CW CCW	808-4-0016 808-4-0017
6	Anti-Back Spring	CW CCW	808-4-0018 808-4-0019
7	Anti-Overrun Spring	CW CCW	808-4-0022 808-4-0023
8	Plate Assembly	CW CCW	686-4-0001 686-4-0002
9	Output Assembly with Anti-Overrun 0.38 Bore (10.0 mm Bore)		 824-4-0015 (824-4-0300)

COMPONENT PARTS			
Item	Description	Rotation	Part No. *
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		 275-1-0163 275-1-0166 275-1-0162 275-1-0165
11	Actuator Assembly		102-4-0005
12	Anti-Back Hub		540-4-0018 (540-4-0078)
13	Dust Cover (AB Spring)		287-4-9002
14	Brake Hub		540-4-0015
15	Pan Head Machine Screw (Sems) (2)		797-1-0412
16	Spring Pin		679-1-0022
17	Headless Socket Set Screw		797-1-0152 (797-1-0768)
18	Flat Head Socket Cap Screw (3)		797-1-0311

* Part numbers in ( ) are metric

Standard CB-5 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	250 lbs.-in.
Maximum anti-overrun holding capability	45 lbs.-in.
Maximum anti-back holding capability	160 lbs.-in.
Inertia, rotating parts	0.1950 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	32 lbs.
Maximum operating speed	750 RPM
Response time, voltage on at full speed	27 MS
Weight	3 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.103*	280.0	Standard
24 DC	0.325	74.0	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936.0	Modification

(Coils are rated for continuous duty)

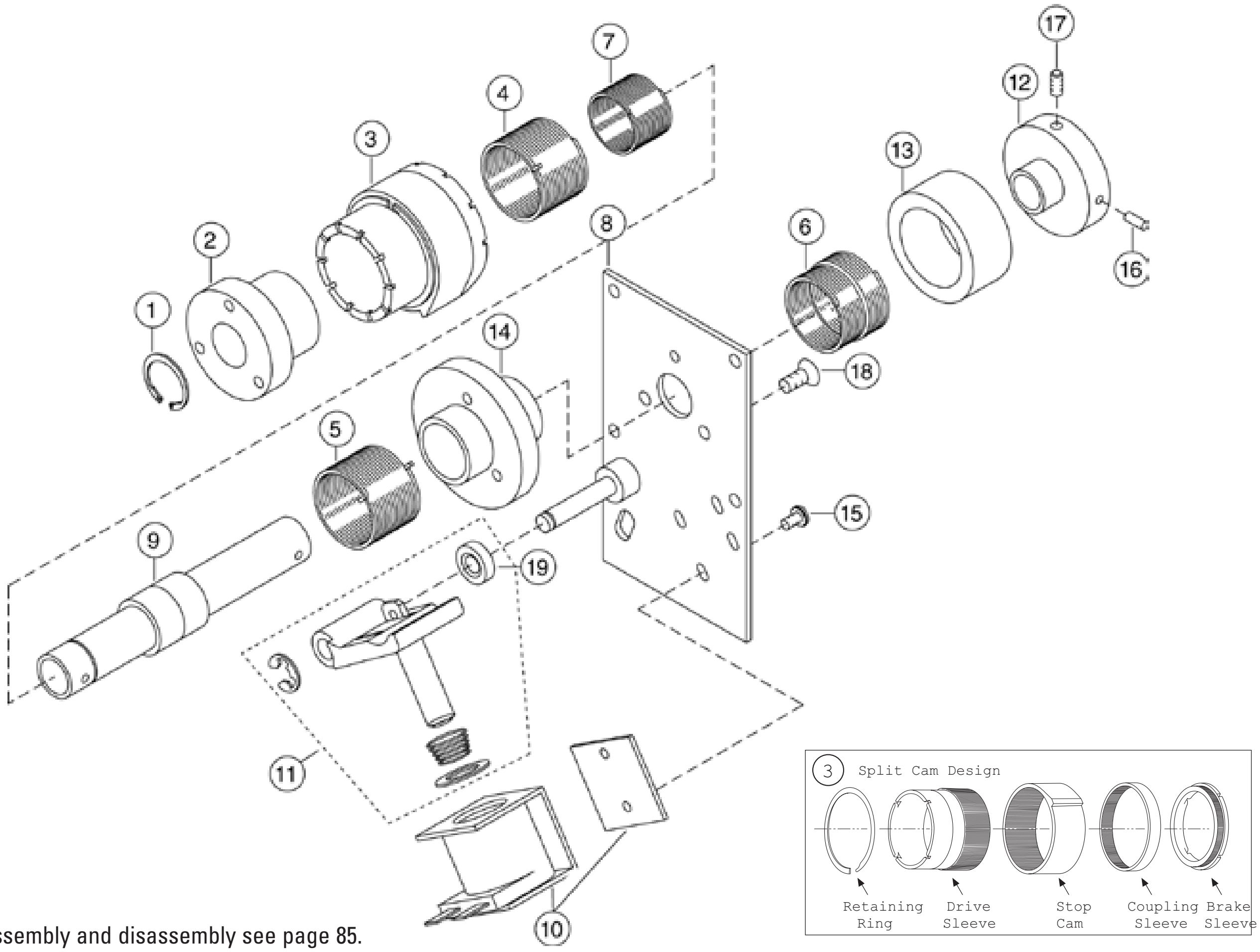
*115 AC - In rush current .232 amps / Holding current .098 amps

BORE & KEYWAY DATA			
Bore A	Pin Hole B	Mtg. Hole C	Set Screws D
0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x #10-32 UNF-2B on 1.25 BC	#8-32 x 0.25 Lg. Hex Skt. Set Screw
METRIC BORES			
0.4724-4741 (12.0 H9)	0.117-0.121 (2.97-3.08)	3X M5 x 0.8 on 31.75 BC	M4 x 0.7 x 6.0 Lg. Hex Skt. Set Screw

INDEX

Standard CB-5 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

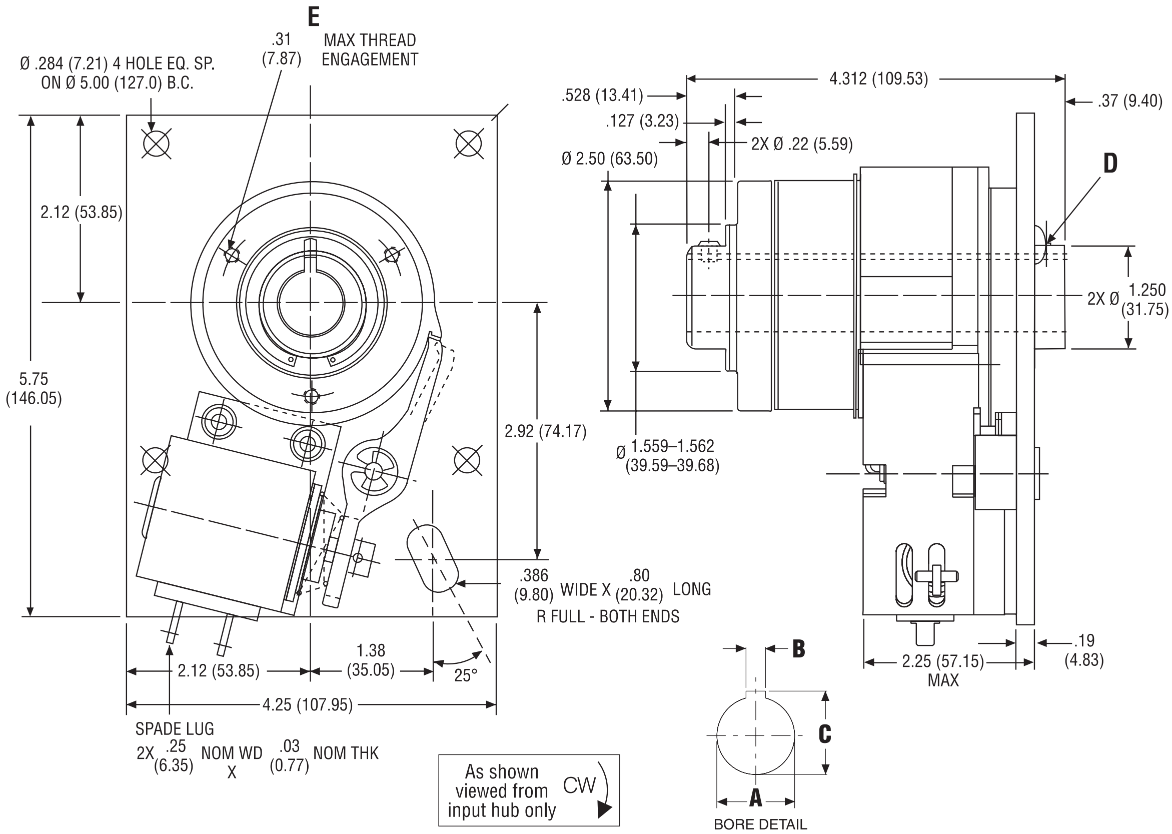
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0030
2	Input Hub Anti-Overrun		540-5-0007 (540-5-0018)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-5-0801
4	Drive Spring	CW CCW	808-5-0001 808-5-0002
5	Brake Spring	CW CCW	808-5-0001 808-5-0002
6	Anti-Back Spring	CW CCW	808-5-0005 808-5-0006
7	Anti-Overrun Spring	CW CCW	808-5-0003 808-5-0004
8	Plate Assembly	CW CCW	686-5-0001 686-5-0002
9	Output Assembly with Anti-Overrun (0.50 Bore) (12.0 mm Bore)		824-5-0002 (824-5-0107)

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
10	Coil Assembly 24 DC 115 AC 12 DC 90 DC		 101-5-0003 101-5-0006 101-5-0002 101-5-0005
11	Actuator Assembly	CW CCW	101-5-0058 101-5-0059
12	Anti-Back Hub		540-5-0006 (540-5-0047)
13	Dust Cover (AB Spring)		287-5-9002
14	Brake Hub		540-5-0004
15	Pan Head Machine Screw (Sems) (2)		797-1-0414
16	Spring Pin		679-1-0024
17	Headless Socket Set Screw		797-1-0153 (797-1-0769)
18	Flat Head Socket Cap Screw (3)		797-1-0322
19	Spacer		807-1-9002

* Part numbers in ( ) are metric

Standard CB-6 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	500 lbs.-in.
Maximum anti-overrun holding capability	300 lbs.-in.
Maximum anti-back holding capability	300 lbs.-in.
Inertia, rotating parts	1.718 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	63 lbs.
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

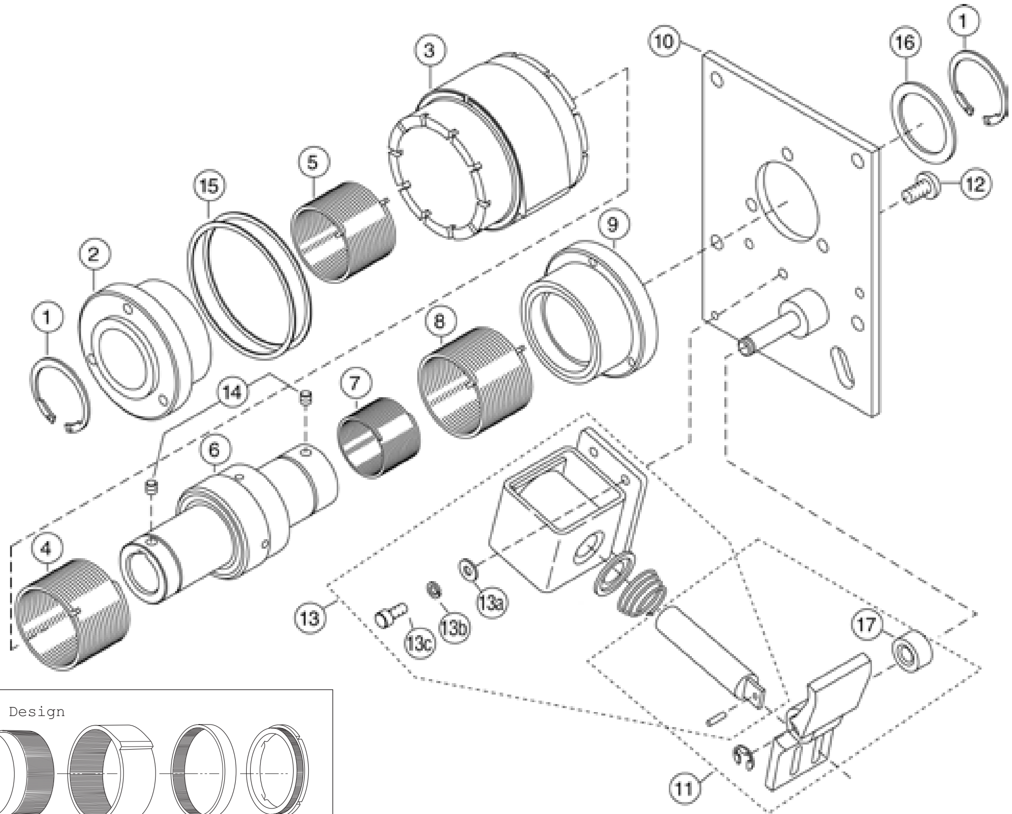
(Coils are rated for continuous duty)

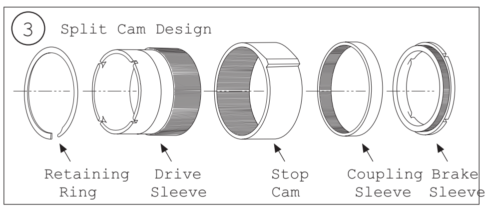
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	Keyway Width B	Keyway Depth C	Set Screws D	Mounting Holes E
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x 0.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	2x M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	2x 4.87-5.14 Hole (.191-.203)	3x M6 x 1.0 holes on 52.38 BC

Standard CB-6 Clutch/Brake

Component Parts





For assembly and disassembly see page 85.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0038
2	Input Hub Anti-Overrun		540-6-0003 (540-6-0059)
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0726
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
6	Output Assembly 0.750 Bore 1.000 Bore (20.0 mm Bore) (25.0 mm Bore)		 824-6-0002 824-6-0003 (824-6-0348) (824-6-0349)
7	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004
8	Brake Spring	CW CCW	808-6-0001 808-6-0002
9	Brake Hub		540-6-0001

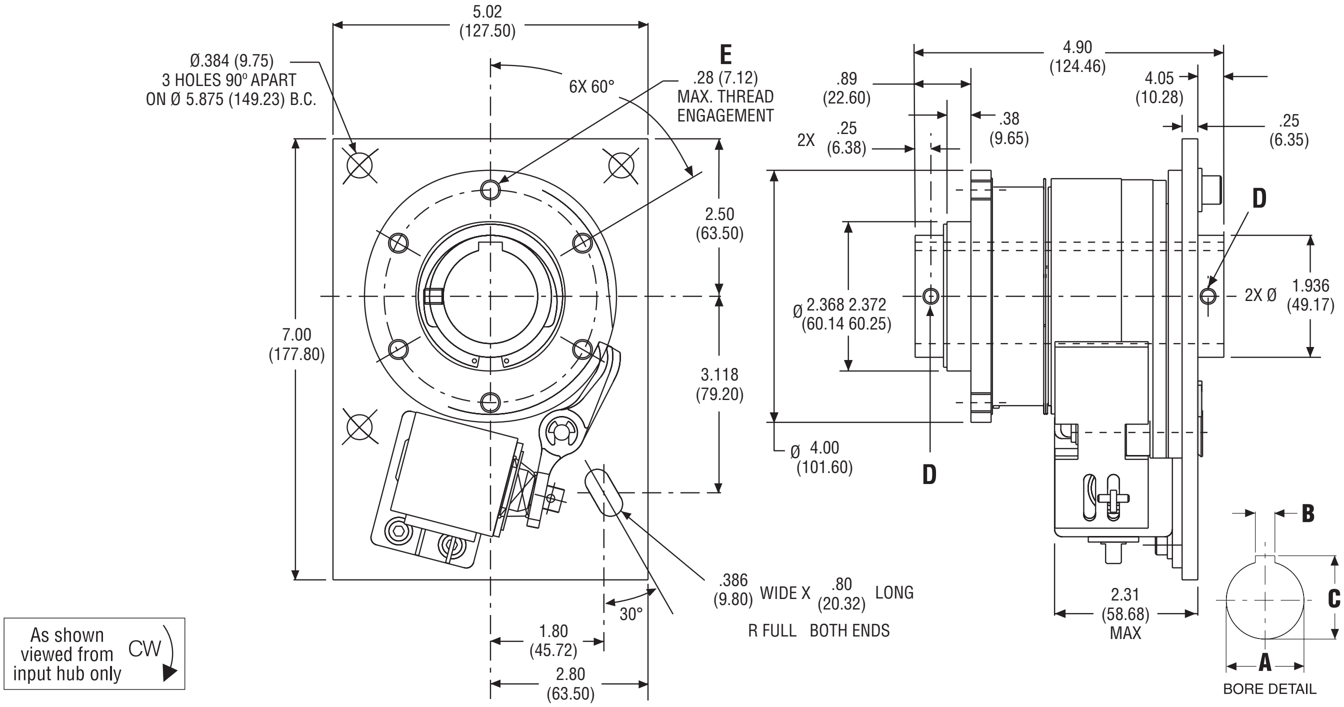
* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
10	Plate Assembly	CW CCW	686-6-0076 686-6-0077
11	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
12	Button Head Cap Screw (3)		797-1-0243
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher		950-1-0006
13b	Lockwasher—Split		950-1-0020
13c	Skt. Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2) (.75 Bore only) Set Screw (2) (20.0 mm Bore only)		 797-1-0162 (797-1-0774)
15	Shim (2)		807-1-0001
16	Shim .005 .010		 807-1-0014 807-1-0017
17	Spacer		807-1-9001

Shims used as required

Standard CB-7 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	1,500 lbs.-in.
Maximum anti-overrun holding capability	600 lbs.-in.
Maximum anti-back holding capability	600 lbs.-in.
Inertia, rotating parts	6.75 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	300 lbs.
Maximum operating speed	400 RPM
Response time, voltage on at full speed	50 MS
Weight	12 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

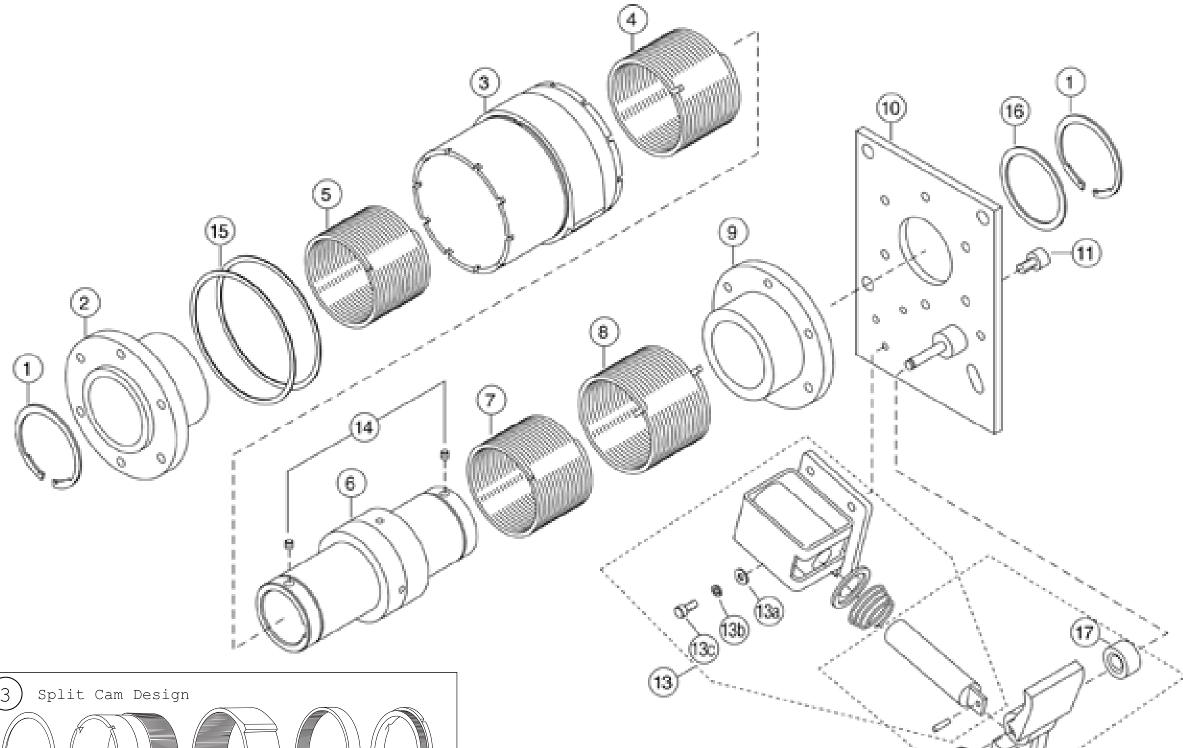
(Coils are rated for continuous duty)

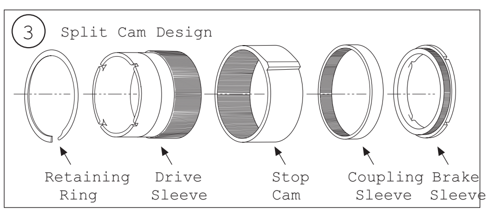
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
0.9843-0.9863 (25.0 H9)	0.3143-0.3156 (7.983-8.017)	1.1142-1.1241 (28.300-28.552)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.1811-1.1831 (30.0 H9)	0.3143-0.3156 (7.983-8.017)	1.3110-1.3209 (33.299-33.551)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

Standard CB-7 Clutch/Brake

Component Parts





For assembly and disassembly see page 85.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		540-8-0009 (540-7-0048)
3	Control Collar (Specify No. of Stops) Standard - 1.6° Adjustable	CW/CCW	266-1-0026
4	Drive Spring	CW CCW	808-8-0007 808-8-0008
5	Anti-Overrun Spring	CW CCW	808-8-0009 808-8-0010
6	Output Assembly 1.00 1.50 Anti-Overrun 1.25 (25.0 mm Bore) (30.0 mm Bore) (35.0 mm Bore)		 824-7-0114 824-7-0117 824-7-0115 (824-7-0123) (824-7-0125) (824-7-0127)
7	Anti-Back Spring	CW CCW	808-1-0012 808-1-0013
8	Brake Spring	CW CCW	808-8-0005 808-8-0006
9	Brake Hub		540-7-0030

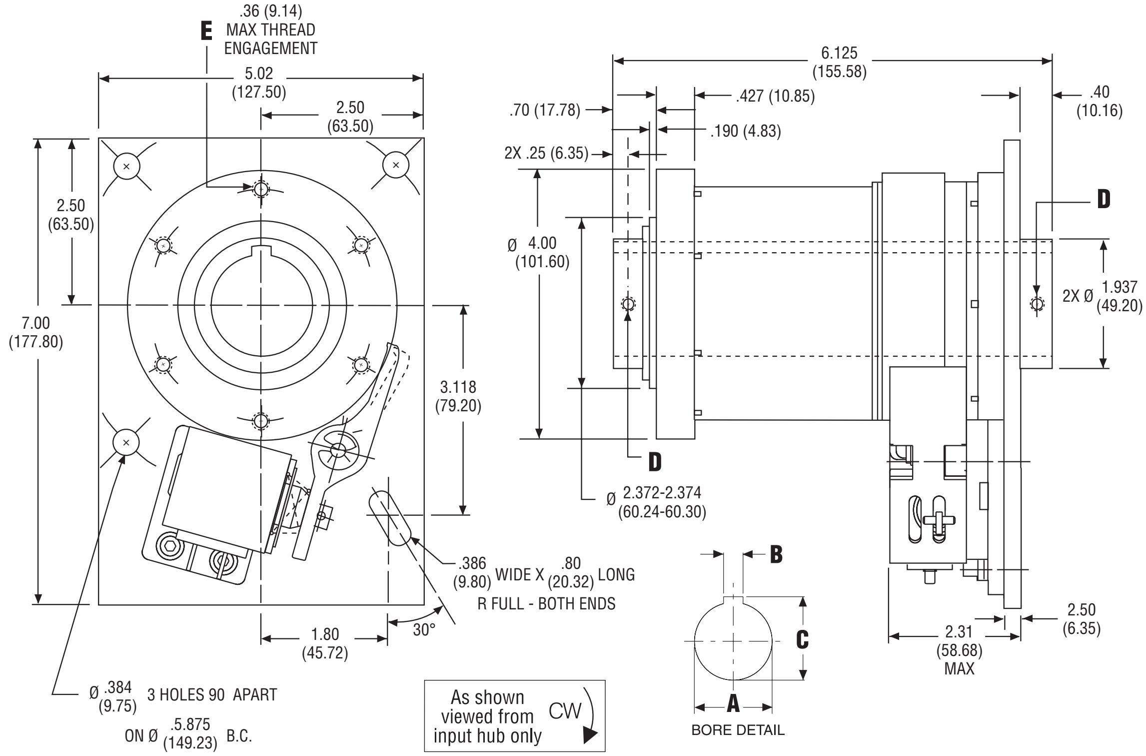
* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
10	Plate Assembly	CW CCW	686-8-0051 686-8-0052
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2)		797-1-0174
15	Shim		807-1-0002
16	Shim .005 .010		 807-8-0001 807-8-0004
17	Spacer		807-1-9001

Shims used as required

Standard CB-8 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)

Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	2,500 lbs.-in.
Maximum anti-overrun holding capability	600 lbs.-in.
Maximum anti-back holding capability	600 lbs.-in.
Inertia, rotating parts	12.84 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	300 lbs.
Maximum operating speed	300 RPM
Response time, voltage on at full speed	50 MS
Weight	15 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

(Coils are rated for continuous duty)

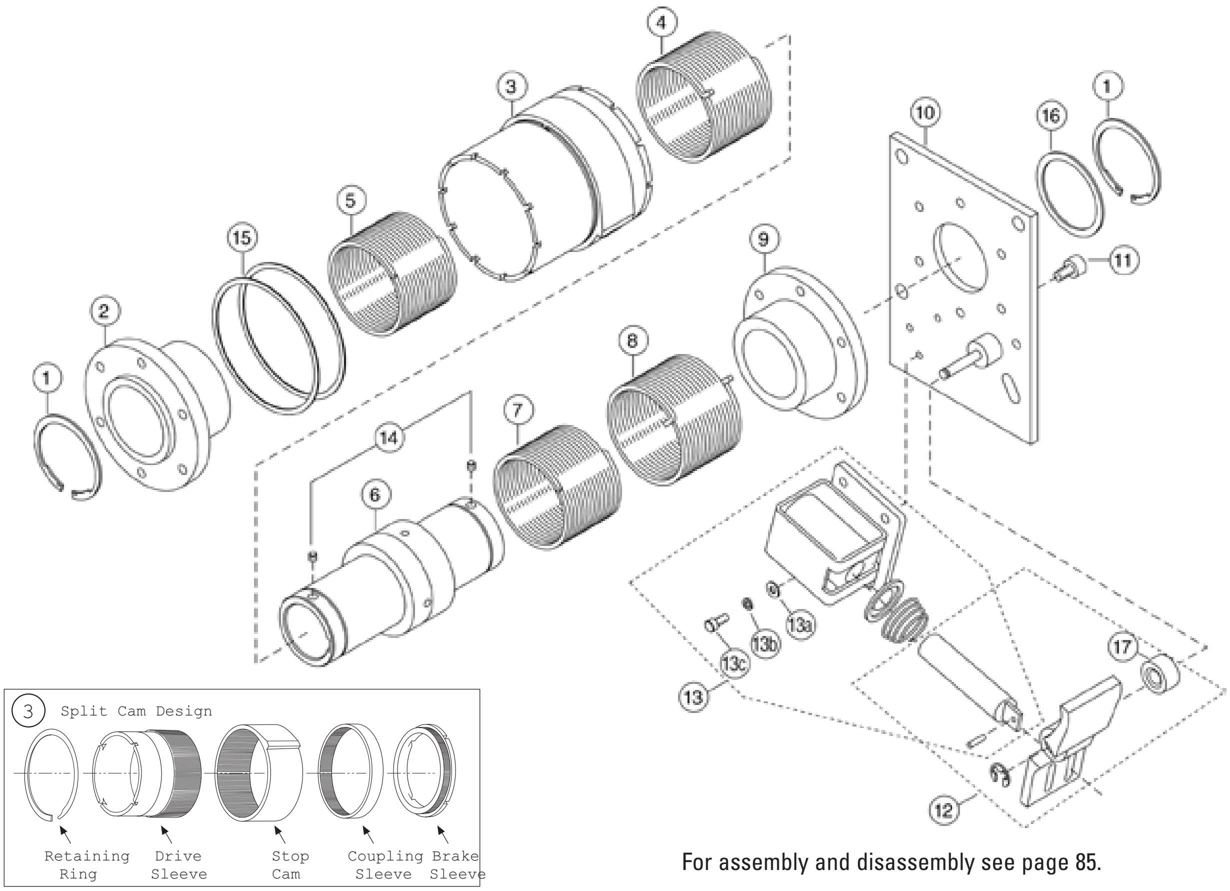
*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
1.0005-1.0025* (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.3755-1.3775* (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	2x #1/4-20 x 0.31 Lg. Hex Skt. Set Screw	6x #5/16-18 UNC-2B on 3.375 BC
METRIC BORES				
1.3780-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.5079-1.5182 (38.300-38.563)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC
1.5784-1.5772 (40.0 H9)	—	—	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 on 85.73 BC

* Special Order

Standard CB-8 Clutch/Brake

Component Parts



For assembly and disassembly see page 85.

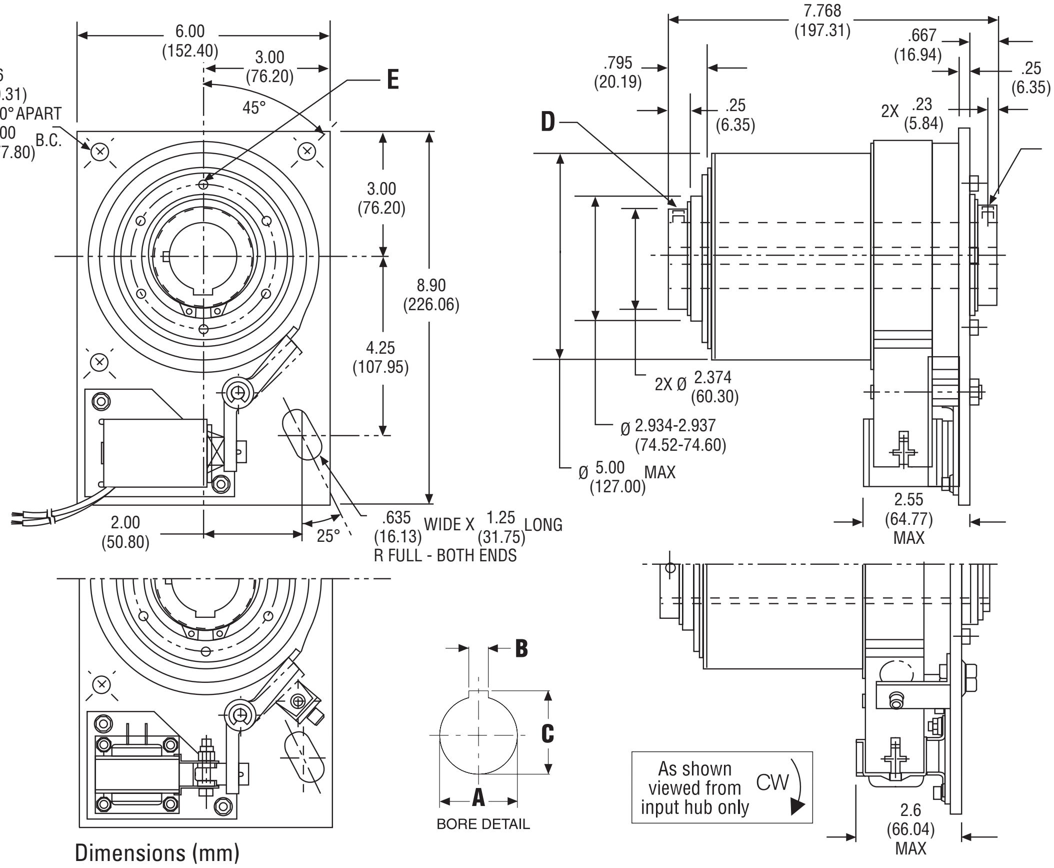
COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring		748-1-0039
2	Input Hub Anti-Overrun		540-8-0014 (540-8-0041)
3	Control Collar (Specify No. of Stops) Standard - 1.6° Adjustable	CW/CCW	266-8-0251
4	Drive Spring Standard	CW CCW	808-8-0003 808-8-0004
5	Anti-Overrun Spring	CW CCW	808-8-0025 808-8-0026
6	Output Assembly 1.00 1.50 Anti-Overrun 1.38 1.25 (35.0 mm Bore) (40.0 mm Bore)		 824-8-0329 824-8-0326 824-8-0327 824-8-0328 (824-8-0420) A/R
7	Anti-Back Spring	CW CCW	808-8-0025 808-8-0026
8	Brake Spring	CW CCW	808-8-0003 808-8-0004

* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
9	Brake Hub		540-8-0016
10	Plate Assembly	CW	686-8-0051
11	Button Head Cap Screw (6)		797-1-0064
12	Actuator Assembly (includes plunger)	CW CCW	102-1-0032 102-1-0033
13	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030
13a	Flatwasher (2)		950-1-0006
13b	Lockwasher—Split (2)		950-1-0020
13c	Head Cap Screw (2)		797-1-0044
14	Headless Socket Set Screw (2)		797-1-0174 (797-1-0784)
15	Shim (2)		807-1-0002
16	Shim .005 .010		 807-8-0001 807-8-0004
17	Spacer		807-1-9001

Standard CB-10 Clutch/Brake

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	5,000 lbs.-in.
Maximum anti-overrun holding capability	1,200 lbs.-in.
Maximum anti-back holding capability	1,200 lbs.-in.
Inertia, rotating parts	48.0 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	500 lbs.
Maximum operating speed	200 RPM
Response time, voltage on at full speed	70 MS
Weight	27 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	174*	14.5	Standard
24 DC	0.94	25.4	Standard
12 DC	1.86	6.43	Modification
90 DC	0.24	378.6	Modification

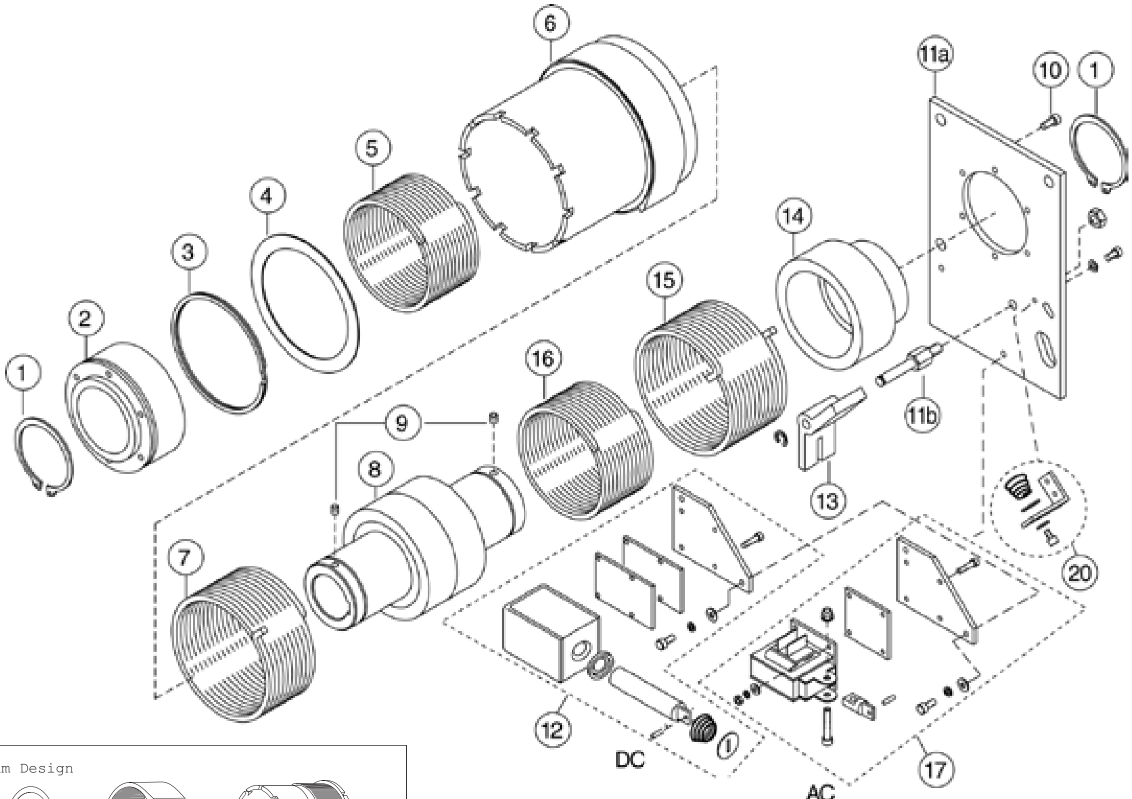
(Coils are rated for continuous duty)

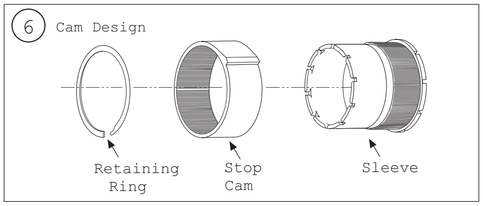
*115 AC - In rush current 2.9 amps / Holding current 0.1 amps

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.669-1.679 (42.39-42.65)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.6255-1.6275 (41.287-41.339)	0.376-0.378 (9.55-9.61)	1.796-1.806 (45.61-45.88)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
1.7505-1.7525 (44.462-44.514)	0.376-0.378 (9.55-9.61)	1.922-1.932 (48.81-49.08)	2x #1/4-20 x 0.25 Lg. Hex Skt. Set Screw	6x #1/4-20 UNC-2B 0.50 DP on 3.417 BC
METRIC BORES				
1.5749-1.5772 (40.0 H9)	0.4717-0.4732 (11.979-12.021)	1.705-1.712 (43.300-43.491)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 12.70 DP on 86.79 BC
1.7717-1.7740 (45.0 H9)	0.5504-0.5520 (13.980-14.021)	1.922-1.929 (48.80-49.00)	2x M6 x 1.0 x 10.0 Lg. Hex Skt. Set Screw	6x M8 x 1.25 12.70 DP on 86.79 BC

Standard CB-10 Clutch/Brake

Component Parts





For assembly and disassembly see page 85.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
1	Retaining Ring-Truarc		748-1-0020
2	Input Hub Anti-Overrun		541-0-0002 (541-0-0012)
3	Retaining Ring		748-1-0217
4	Spacer		807-0-0013
5	Anti-Overrun Spring	CW CCW	808-0-0001 808-0-0002
6	Control Collar (Specify No. of Stops) Standard - 1.5° Adjustable	CW CCW	266-0-0127 266-0-0151
7	Drive Spring Standard	CW CCW	808-0-0009 808-0-0010
8	Shaft Assembly 1.500 1.625 Anti-Overrun 1.750 (40.0 mm Bore) (45.0 mm Bore)		 824-0-0005 824-0-0006 824-0-0007 (824-0-0039) (824-0-0040)

* Part numbers in ( ) are metric

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No. ***
9	Headless Set Screw (2)		797-1-0173 (797-1-0784)
10	Skt. Head Cap Screw (6)		797-1-0055
11	Actuator Plate Assembly 11a Plate 11b Pivot Pin 11c Lock Nut	CW CCW	101-0-0052 101-0-0053 686-0-0001 679-0-0001 661-1-0010
12	DC Coil Assembly 24 DC 12 AC 90 DC		 101-0-0003 101-0-0002 101-0-0004
13	Actuator Lever		102-0-9001
14	Brake Hub		541-0-0013
15	Brake Spring	CW CCW	808-0-0009 808-0-0010
16	Anti-Back Spring	CW CCW	808-0-0007 808-0-0008
17	AC Coil Assembly 115 AC 115 AC	 CW CCW	 101-0-0005 101-0-0054
20	AC Actuator Return Assembly		101-0-0009
21	Head Cap Screw (2)		797-1-0044
22	Lockwasher—Split (2)		950-1-0020

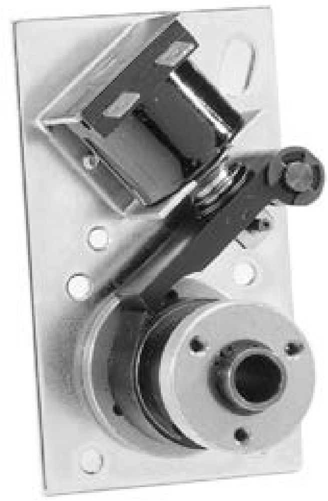
SAC Series

Solenoid-Actuated, Wrap Spring Clutches

The SAC Series features four models of pre-assembled, solenoid-actuated, wrap spring clutch packages. SAC units operate from a single AC or DC pulse to accurately start loads at speeds up to 1800 RPM, depending on size. Adjustable stop control collars provide easy and accurate output stop position settings. A typical SAC Series clutch will bring the load up to speed within 3 milliseconds. They are easy to interface with PCs and industrial control systems. SAC Series clutches are accurate, repeatable, fast acting, simple, maintenance free and low cost.

Features

- Available in four standard model sizes
- Solenoid-actuated, wrap spring clutch package
- Torque range from 25 lbs.-in. to 500 lbs.-in.
- 1, 2 and 4 stops standard—other stops available, up to 24 maximum
- Hub input (shaft input available, consult factory)
- RoHS compliant



Typical Applications

- Computer peripherals
- Business machines
- Packaging equipment
- Check cancellers
- Riveters

How to Order

SAC - 6 - CW - 24V - 3/4" bore - 2

SAC Series
Specify:
Imperial or Metric

Size
SAC-2 = **2**
SAC-4 = **4**
SAC-5 = **5**
SAC-6 = **6**

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise

Coil Voltage
12V = 12VDC
24V = 24VDC
90V = 90VDC
115V = 115VAC

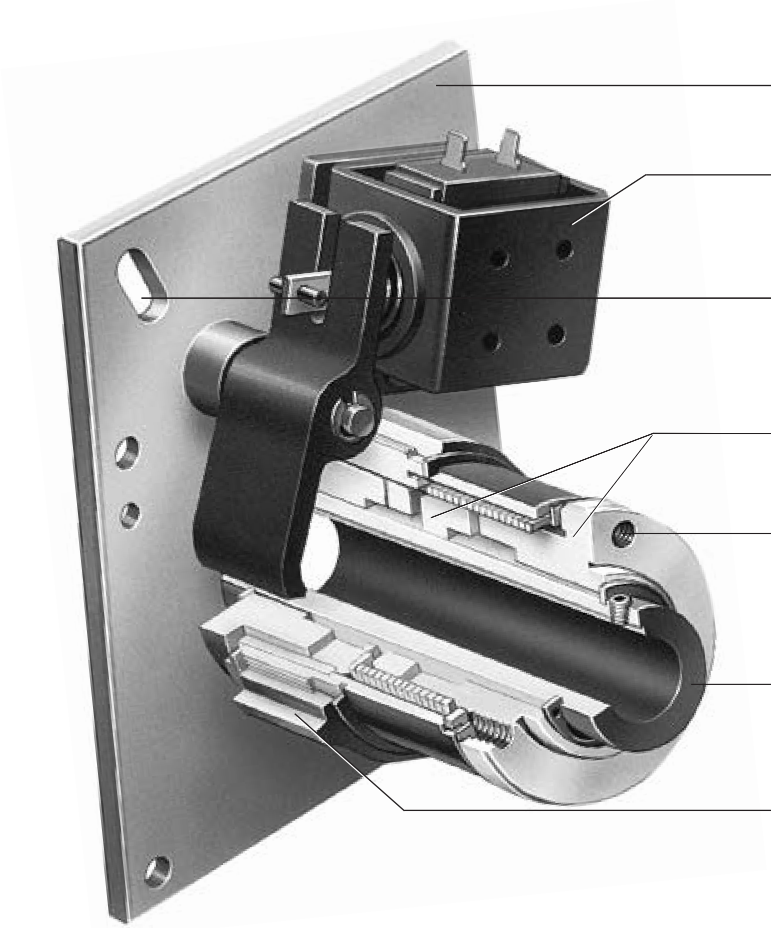
Bore Size
SAC-2 = **¼"**
SAC-4 = **⅜"**
SAC-5 = **½"**
SAC-6 = **¾", 1"**

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order.

OPTIONS	
Dust Covers	See page 60
Stop Collars	See page 61
Pneumatic Actuators	See page 62

SAC Series

Wrap Spring Clutches



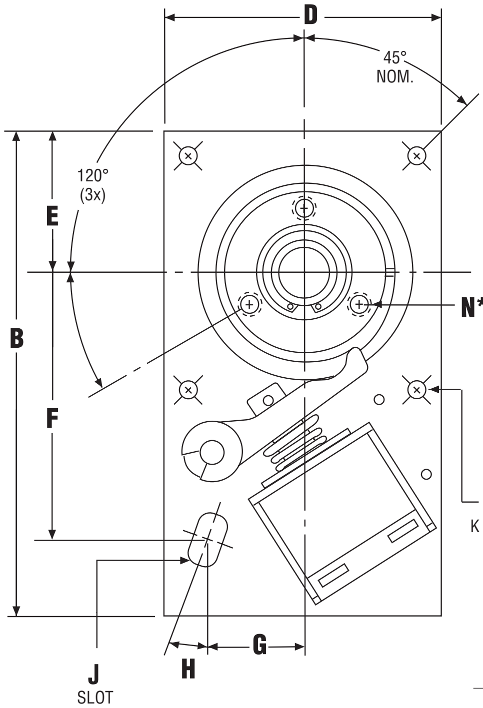
PERFORMANCE				
	SAC-2	**SAC-4**	**SAC-5**	**SAC-6**
Static torque	25 lbs.-in. (2.825 Nm)	120 lbs.-in. (13.56 Nm)	250 lbs.-in. (28.25 Nm)	500 lbs.-in. (56.5 Nm)
Shaft bores (standard)	0.250 (6.35 mm)	0.375 (9.525 mm)	0.500 (12.70 mm)	0.750 or 1.00 (19.05 mm or 25.40 mm)
RPM (maximum)	1,800 RPM	1,200 RPM	750 RPM	500 RPM
Inertia, rotating parts	0.0207 lbs.-in.^{2}	0.0636 lbs.-in.^{2}	0.1950 lbs.-in.^{2}	1.718 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	7.5 lbs.	14.0 lbs.	32.0 lbs.	63.0 lbs.
Response time, voltage on at full speed	20 MS	24 MS	27 MS	45 MS
Weight	1 lbs.	2 lbs.	3 lbs.	7 lbs.

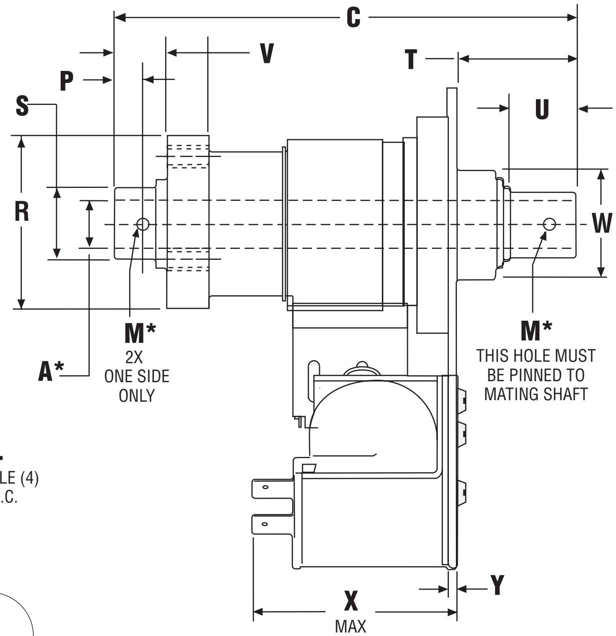
See page 74 for Minimum Inertia Requirements. See pages 81 & 82 for Mounting Requirements.

RPM vs. SHAFT BORE			
Size	**Max. RPM**	**Shaft Bores Standard in (mm)**	**Shaft Bores Metric in (mm)**
SAC-2	1,800	$^1/_4$" (6.35)	0.2362-0.2374 (6.0)
SAC-4	1,200	$^3/_8$" (9.525)	0.3937-0.3951 (10.0)
SAC-5	750	$^1/_2$" (12.70)	0.4724-0.4741 (12.0)
SAC-6	500	$^3/_4$" or 1" (19.05 or 25.40)	0.7874-0.7894 (20) or 0.9842-0.9862 (25)

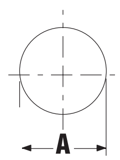
SAC-2, SAC-4 & SAC-5 Clutches

Dimensions





Dimensions (mm)
Mounting requirements see pages 81 & 82.



BORE DETAIL

As shown viewed from input hub only CW

DIMENSIONS											
Model	**Torque (lbs.-in.)**	**B Nom.**	**C Nom.**	**D Nom.**	**E Nom.**	**F Nom.**	**G Nom.**	**H Nom.**	**J Nom.**	**K Nom.**	**L Nom.**
SAC-2	25	3.39 (86.11)	2.50 (63.50)	2.00 (50.80)	1.00 (25.40)	1.95 (49.53)	0.71 (18.03)	20.0°	0.201 W x 0.375 L (5.10 x 9.53)	0.194 (4.93)	2.125 (53.98)
SAC-4	120	4.10 (104.14)	3.38 (85.85)	2.38 (50.45)	1.00 (25.40)	2.56 (65.02)	0.807 (20.50)	17.5°	.26 W x 50 L (6.60 x 12.70)	0.187 (4.75)	2.125 (53.98)
SAC-5	250	4.56 (115.82)	4.37 (111.00)	2.62 (66.55)	1.31 (33.27)	2.50 (63.50)	0.91 (23.11)	20.0°	.26 W x .50 L (6.60 x 12.70)	0.187 (4.75)	3.125 (79.38)

Model	Torque (lbs.-in.)	P Nom.	R Nom.	S Nom.	T Nom.	U Min.	V Nom.	W Max.	X Max.	Y Nom.
SAC-2	25	0.09 (2.29)	1.188 (30.17)	0.375 (9.525)	0.405 (10.29)	0.13 (3.30)	0.215 (5.46)	0.62 (15.75)	1.70 (43.18)	0.09 (2.29)
SAC-4	120	0.15 (3.81)	1.249 (31.72)	0.500 (12.70)	0.83 (21.08)	0.51 (12.95)	0.330 (8.38)	0.75 (19.05)	1.94 (49.28)	0.09 (2.29)
SAC-5	250	0.25 (6.35)	1.562 (39.67)	0.625 (15.87)	1.09 (27.69)	0.73 (18.54)	0.470 (11.94)	1.00 (25.40)	2.00 (50.80)	0.09 (2.29)

*See bore data on next page

SAC-2, SAC-4 & SAC-5 Clutches

Specifications

PERFORMANCE			
	SAC-2	SAC-4	SAC-5
Static torque	25 lbs.-in. (2.825 Nm)	120 lbs.-in. (13.56 Nm)	250 lbs.-in. (28.25 Nm)
Shaft bores (standard)	0.250 (6.35 mm)	0.375 (9.525 mm)	0.500 (12.70 mm)
RPM (maximum)	1,800 RPM	1,200 RPM	750 RPM
Inertia, rotating parts	0.0207 lbs.-in.^{2}	0.0636 lbs.-in.^{2}	0.1950 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	7.5 lbs.	14 lbs.	32 lbs.
Response time, voltage on at full speed	20 MS	24 MS	27 MS
Weight	1 lbs.	2 lbs.	3 lbs.

See page 74 for Minimum Inertia Requirements. See pages 81 & 82 for Mounting Requirements.

SAC-2 ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
120 AC 60 Hz	0.104*	825	Standard
24 DC	0.230	104	Standard
12 DC	0.460	26	Modification
90 DC	0.059	1510	Modification

(Coils are rated for continuous duty)

*120 AC - In rush current .10 amps / Holding current .04 amps

SAC-4 and 5 ELECTRICAL DATA			
Voltage	Current (amps)	Resistance (ohms)	Status
115 AC 60 Hz	0.103*	280	Standard
24 DC	0.325	74	Standard
12 DC	0.732	16.4	Modification
90 DC	0.096	936	Modification

(Coils are rated for continuous duty)

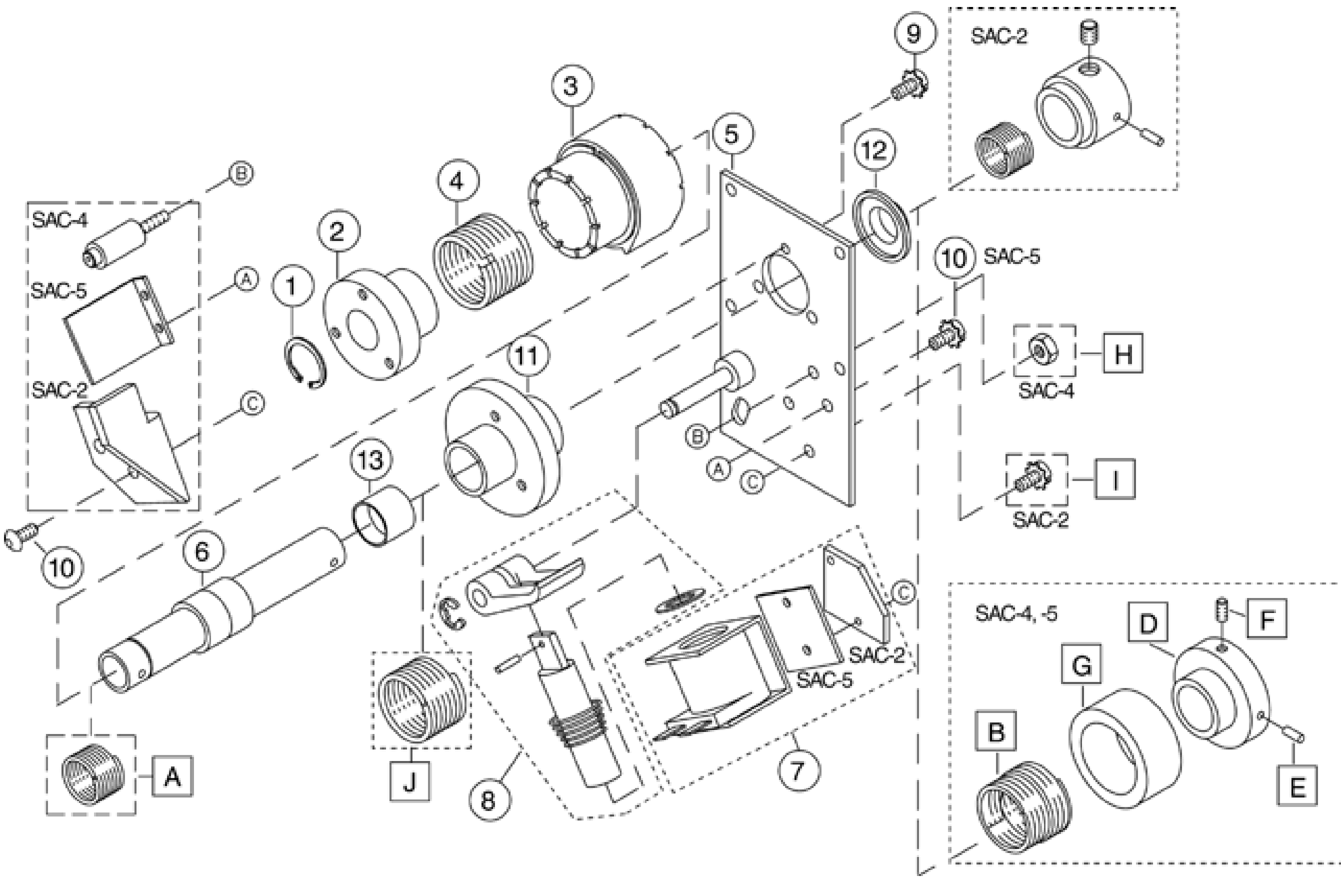
*115 AC - In rush current .232 amps / Holding current .098 amps

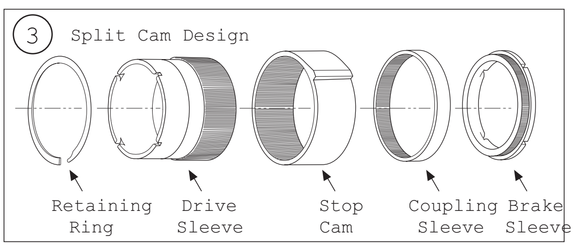
BORE & KEYWAY DATA			
Model	Bore A	M	Mtg. Holes N
SAC-2	0.2505-0.2525 (6.362-6.414)	0.061-0.065 (1.55-1.65)	3x 6-32 UNC-2B on .938 BC
SAC-4	0.376-0.378 (9.55-9.61)	0.124-0.129 (3.14-3.28)	3x 6-32 UNC-2B on .938 BC
SAC-5	0.5005-0.5025 (12.712-12.764)	0.124-0.129 (3.14-3.28)	3x 10-32 UNC-2B on 1.250 BC
METRIC BORES			
SAC-2	0.2362-0.2374 (6.0 H9)	2x 1.49-1.58 (2x 0.059-0.062)	3x M4 x 0.7 on 23.83 BC
SAC-4	0.3937-0.3951 (10.0 H9)	2x 2.97-3.08 (2x 0.117-0.121)	3x M4 x 0.7 on 23.83 BC
SAC-5	0.4724-0.4741 (12.0 H9)	2x 2.97-3.08 (2x 0.117-0.121)	3x M5 x 0.8 on 31.75 BC

*For assembly and disassembly see page 86

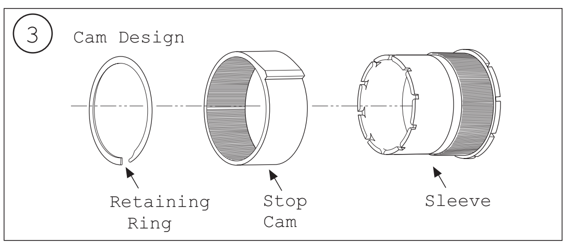
SAC-2, SAC-4 & SAC-5 Clutches

Component Parts





Sizes 5 and 6 only



Sizes 2 and 4 only

For assembly and disassembly see page 86.

SAC-2, SAC-4 & SAC-5 Clutches

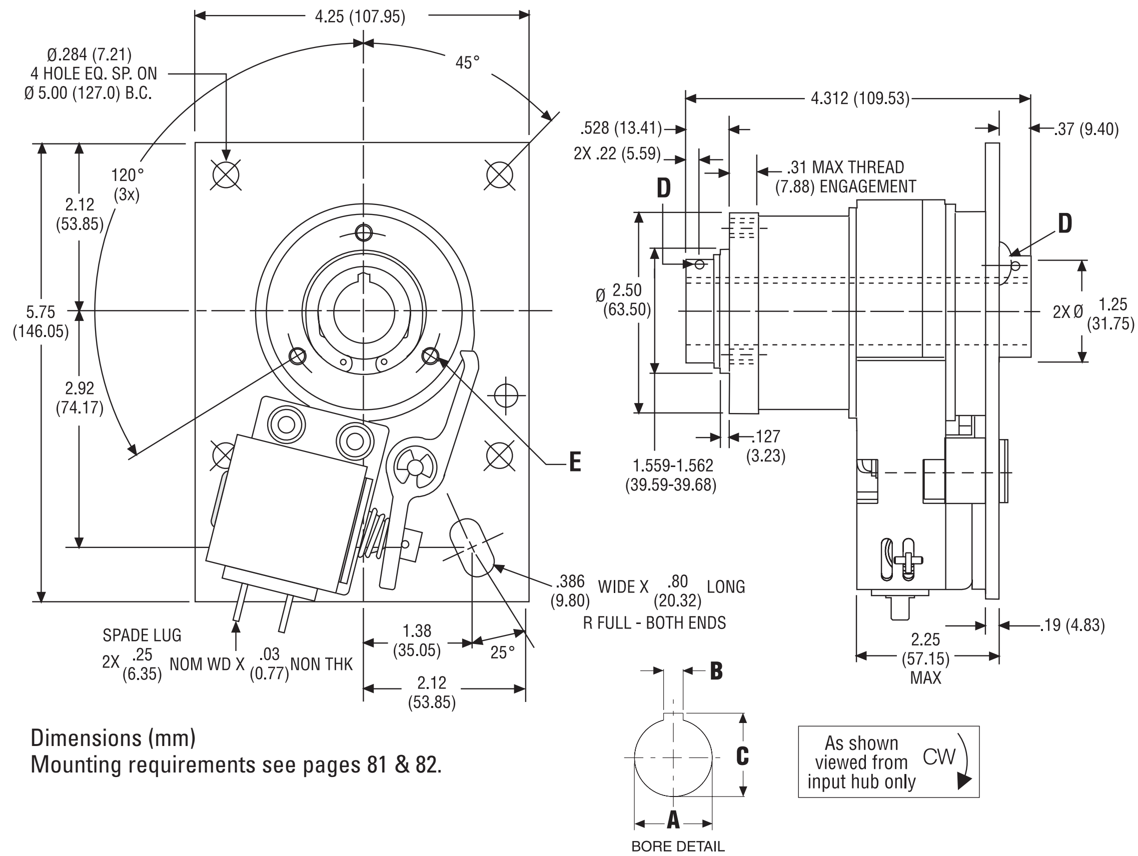
Component Parts

COMPONENTS				
Item	Description	SAC-2	SAC-4	SAC-5
1	Retaining Ring	748-1-0085	748-1-0027	748-1-0030
2	Input Hub	540-2-0004	540-4-0021	540-5-0007
3	Stop Collar (Specify no. of stops) Standard CW (1) Standard CCW (1)	 266-2-0001 266-2-0031	 266-4-0051 266-4-0081	 266-5-0801 266-5-0801
4	Drive Spring CW Drive Spring CCW	808-2-0108 808-2-0109	808-4-0066 808-4-0059	808-5-0001 808-5-0002
5	Plate Assembly CW Plate Assembly CCW	686-2-0001 686-2-0002	686-4-0001 686-4-0002	686-5-0001 686-5-0002
6	Output Assembly	824-2-0006	824-4-0015	824-5-0002
7	Coil Assembly (Specify voltage) 24 DC 115 AC *12 DC (optional) *90 DC (optional)	 275-1-0003 275-1-0006 275-1-0002 275-1-0005	 275-1-0163 275-1-0166 275-1-0162 275-1-0165	 101-5-0003 101-5-0006 101-5-0002 101-5-0005
8	Actuator Assembly (kit w/plunger)	101-2-0001	102-4-0005	101-5-0058 CW 101-5-0059 CCW
9	Flat Head Socket Cap Screw (3)	797-1-0311	797-1-0311	797-1-0322
10	Pan Head Machine Screw (Sems) (2)	797-1-0415	797-1-0412	797-1-0414
11	Plate Hub	540-2-0006	540-4-0015	540-5-0004
12	Grooveless Retaining Ring	748-1-0384	748-1-0377	748-1-0398
13	Sleeve	803-2-003	803-4-0010	803-5-0014

COMPONENTS				
Item	Description	SAC-2	SAC-4	SAC-5
A	Anti-Overrun Spring CW Anti-Overrun Spring CCW	808-2-0003 808-2-0004	808-4-0022 808-4-0023	808-5-0003 808-5-0004
B	Anti-Back Spring CW Anti-Back Spring CCW	808-2-0004 808-2-0003	808-4-0018 808-4-0019	808-5-0005 808-5-0006
C	Actuator Limit Stop Actuator Limit Stop	816-2-0001 CW 816-2-0002 CCW	816-1-0003 CW 816-1-0003 CCW	816-5-0013 CW 816-5-0013 CCW
D	Anti-Back Hub	540-2-0003	540-4-0018	540-5-0006
E	Spring Pin	679-1-0019	679-1-0022	679-1-0024
F	Headless Socket Set Screw	797-1-0152	797-1-0152	797-1-0153
G	Dust Cover (AB spring)	—	287-4-9002	287-5-9002
H	Hex Nut	—	661-1-0022	—
I	Pan Head Machine Screw (Sems)	—	797-1-0412	797-1-0414
J	Brake Spring	808-2-0101 CW 808-2-0100 CCW	808-4-0016 CW 808-4-0017 CCW	808-5-0001 CW 808-5-0002 CCW

SAC-6 Clutches

Dimensions



Dimensions (mm)
Mounting requirements see pages 81 & 82.

PERFORMANCE	
Static torque	500 lbs.-in. (58.5 Nm)
Inertia, rotating parts	1.718 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	63 lbs.
Maximum operating speed	500 RPM
Response time, voltage on at full speed	45 MS
Weight	7 lbs.

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
115 AC 60 Hz	0.334*	57.5	Standard
24 DC	0.586	41.0	Standard
12 DC	1.150	10.4	Modification
90 DC	0.151	598.0	Modification

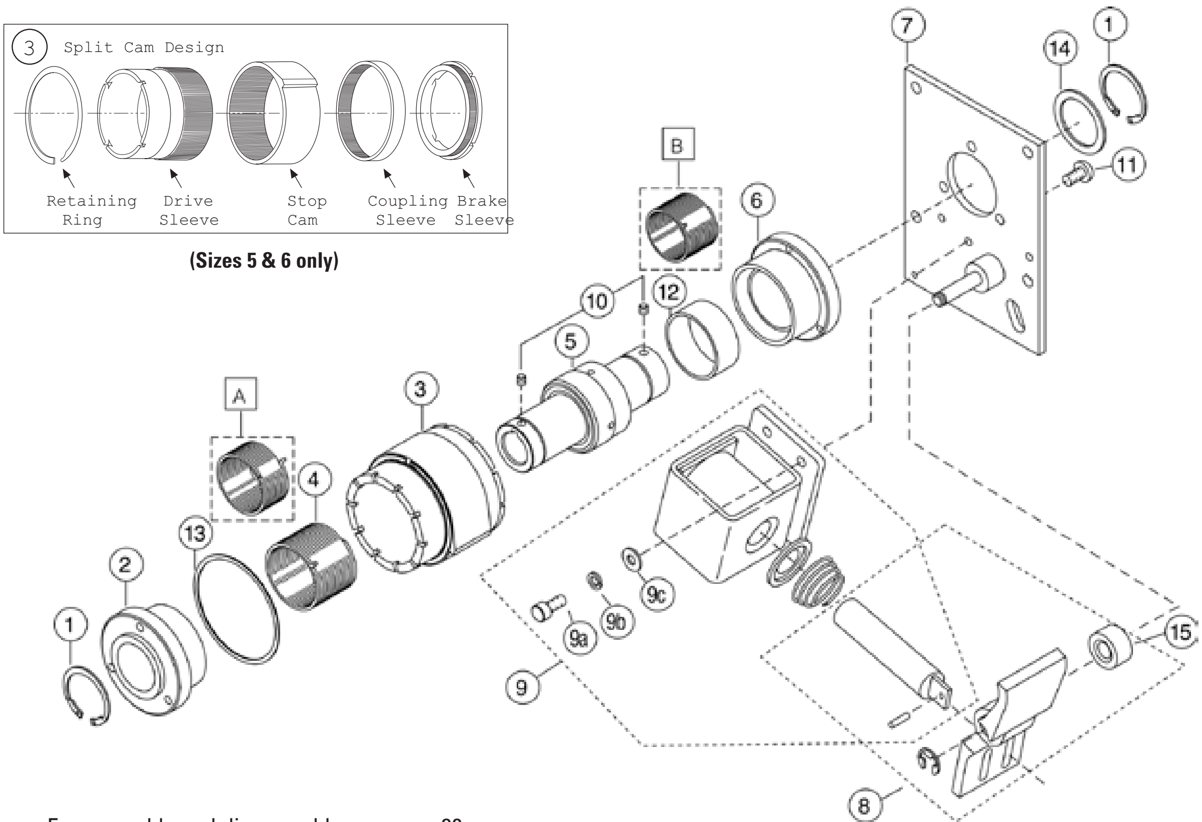
(Coils are rated for continuous duty)

*115 AC - In rush current 1.1 amps / Holding current 0.2 amps

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	2x #10-32 UNC-2B x 0.19 (4.83) Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B on 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	2x 0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B on 2.062 BC
METRIC BORES				
.7874-.7894 (20.0 H9)	.2356-.2368 (5.985-6.015)	.8976-.9015 (22.800-22.900)	2x M5 x 0.8 x 5.00 Nom. Lg. Hex Skt. Set Screw	3x M6 x 1.0 on 52.38 BC
.9842-.9862 (25.0 H9)	—	—	2x 4.87-5.14	3x M6 x 1.0 on 52.38 BC

SAC-6

Component Parts



(Sizes 5 & 6 only)

For assembly and disassembly see page 86.

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.**
1	Retaining Ring		748-1-0038
2	Input Hub Anti-Overrun		540-6-0003
3	Control Collar (Specify No. of Stops) Standard - 1.8° Adjustable	CW/CCW	266-6-0726
4	Drive Spring	CW CCW	808-6-0001 808-6-0002
5	Output Assembly 0.750 Bore 1.000 Bore		 824-6-0002 824-6-0003
6	Brake Hub		540-6-0001
7	Plate Assembly	CW CCW	686-6-0076 686-6-0077
8	Actuator Assembly Includes Plunger	CW CCW	102-1-0032 102-1-0033
9	Coil Assembly "D" Frame 24 DC 115 AC 12 DC 90 DC		 101-1-0028 101-1-0058 101-1-0027 101-1-0030

COMPONENT PARTS			
Item	**Description**	**Rotation**	**Part No.**
9a	Flatwasher (2)		950-1-0006
9b	Lockwasher – Split (2)		950-1-0020
9c	Skt. Head Cap Screw (2)		797-1-0044
10	Headless Skt. Set Screw (0.75 Bore only)		 797-1-0162
11	Button Head Cap Screw (3)		797-1-0243
12	Sleeve		803-6-0014
13	Shim (2)		807-1-0001
*14	Shim 0.005 0.010		 807-1-0014 807-1-0017
15	Spacer		807-1-9001
Options			
A	Anti-Overrun Spring	CW CCW	808-6-0005 808-6-0006
B	Anti-Back Spring	CW CCW	808-6-0003 808-6-0004

Shims used as required

PSI Series

Mechanically Actuated, Basic Wrap Spring Clutch Design

Ideal for Overrunning, Start-Stop and Single Revolution Applications.

PSI Series clutches represent the most fundamental wrap spring clutch design. As a start-stop or single revolution clutch, it is actuated simply by external blocking or releasing of the stop collar. As a simple overrunning clutch, it provides positive engagement of load to power source, but permits free overrunning when input power is slowed, stopped or reversed.

All units can be supplied with hub input/shaft output or vice versa. Designed for applications where direct mechanical control is desired, the PSI Series clutch is a reliable, easily applied, low-cost solution.

Features

- Single revolution models can stop 10% of rated drive torque capacity
- Mechanically actuated clutches
- Five models fit ¼" to 1½" shafts
- Torque ranges from 25 lbs.-in. to 2500 lbs.-in.
- Single revolution, start-stop or overrunning clutch functions
- RoHS compliant

Typical Applications

- Business machines
- Copying machines
- Material handling conveyors
- Packaging equipment
- Ribbon drives

How to Order

PSI - 2 - S - CW - SI - 1/4" bore - 2

PSI Series
Specify:
Imperial or Metric

Size
PSI-2 = **2**
PSI-4 = **4**
PSI-5 = **5**
PSI-6 = **6**
PSI-8 = **8**

Model
S = Single Revolution
SS = **Start-Stop**
O = Overrunning

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise
Look into the input end to determine the direction of rotation

Input
HI = Hub Input
SI = Shaft Input

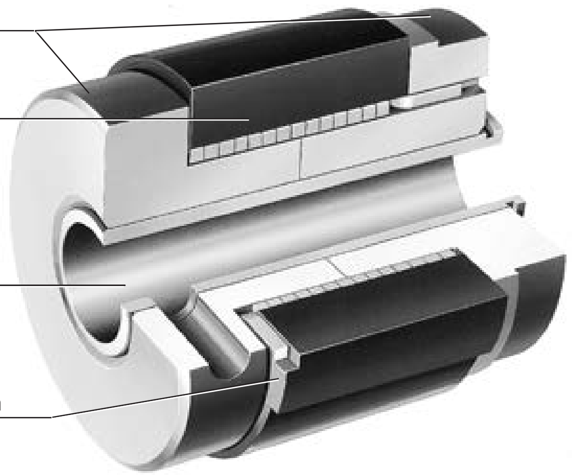
Bore Size
PSI-2 = **¼"**
PSI-4 = **3/8"**
PSI-5 = **½"**
PSI-6 = **¾, 1"**
PSI-8 = **1¼", 1½"** *1", *1 3/8"
*Special order

Stop Collar
1 = 1 stop
2 = 2 stop
4 = 4 stop
Other stop collars are special order

OPTIONS	
Stop Collars	See page 61

PSI Series

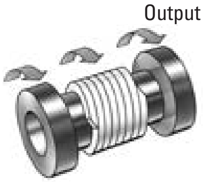
Wrap Spring Clutch Specifications & Capabilities



PERFORMANCE						
		PSI-2	PSI-4	PSI-5	PSI-6	PSI-8
Static torque		25 lbs.-in. (2.825 Nm)	120 lbs.-in. (13.56 Nm)	250 lbs.-in. (28.25 Nm)	500 lbs.-in. (56.5 Nm)	2500 lbs.-in. (282.5 Nm)
Inertia, rotating parts	SI HI	0.006 lbs.-in.^{2} 0.008 lbs.-in.^{2}	0.015 lbs.-in.^{2} 0.023 lbs.-in.^{2}	0.059 lbs.-in.^{2} 0.069 lbs.-in.^{2}	0.570 lbs.-in.^{2} 0.73 lbs.-in.^{2} (0.75 bore) 0.68 lbs.-in.^{2} (1.00 bore)	4.990 lbs.-in.^{2} 11.91 lbs.-in.^{2} (1.25 bore) 11.60 lbs.-in.^{2} (1.50 bore)
Weight		0.132 lbs.	0.22 lbs.	0.62 lbs.	2.60 lbs.	8.25 lbs.
Maximum radial bearing load at max. speed		6.75 lbs.	13.50 lbs.	31.50 lbs.	63.0 lbs.	300.0 lbs.
Maximum operating speed		1,800 RPM	1,200 RPM	750 RPM	500 RPM	300 RPM

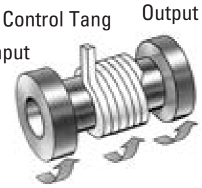
Operation Capabilities

Overrunning Model O



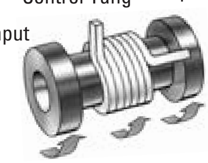
The overrunning clutch (Model O) transmits torque up to the rated value in the positive direction; when disengaged it only transmits some drag torque in the reverse direction. Major applications for this unit are anti-overrun protection and anti-backup devices.

Start-Stop (random positioning) Model SS



The start-stop clutch (Model SS) accelerates the load just after the control collar has been released, thus the collar is free to rotate, allowing the spring to grip both hubs together. To disconnect the clutch, the collar must be restrained, stopping the collar from rotating via the stop face. The spring will then be opened and the clutch will be disengaged. The output is free to rotate and will be stopped by system friction and clutch drag torque.

Single Revolution Model S



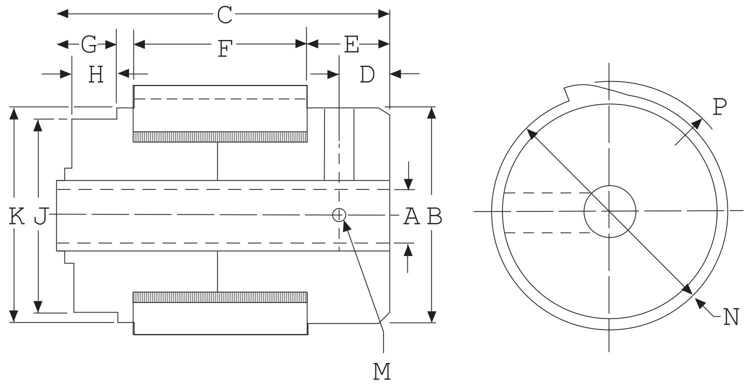
The single revolution clutch (Model S) accelerates in the same manner as the model SS. The deceleration starts when the collar is restrained, and the spring is opened, disengaging the clutch.

For Model S, the brake torque capability is limited to 10% of the rated torque.

All PSI Series clutches are easy to install. The shaft can be pinned or, on larger units, delivered with keyways.

PSI-2, PSI-4 & PSI-5 Clutches

Dimensions & Specifications



DIMENSIONS (mm)												
Model	Torque lbs.-in.	B	C	D	E	F	G	H	J Dia	K Dia.	N	P Rad.
PSI-2	25	0.94 (23.90)	1.25 (31.75)	0.16 (4.10)	0.34 (8.60)	0.49 (12.4)	0.33 (8.40)	0.25 (6.35)	0.8765-0.8775 (22.263-22.289)	0.94 (23.9)	1.00 (25.4)	0.57 (14.76)
PSI-4	120	1.25 (31.75)	1.38 (35.05)	0.16 (4.05)	0.28 (7.10)	0.68 (17.27)	0.34 (8.64)	0.25 (6.35)	1.1265-1.1275 (28.639-28.613)	1.25 (31.75)	1.31 (33.27)	0.72 (18.29)
PSI-5	250	1.56 (39.60)	1.88 (47.75)	0.22 (5.56)	0.38 (9.70)	1.00 (25.4)	0.34 (8.64)	0.25 (6.35)	1.502-1.503 (38.15-38.18)	1.56 (39.60)	1.69 (42.93)	0.96 (24.38)

BORE DATA		
Model	Bore A	M
PSI-2	0.2515-0.2525 (6.36-6.39)	#8-32
PSI-4	0.376-0.378 (9.55-9.61)	0.125 Dia. (3.175 Dia.)
PSI-5	0.501-0.503 (12.725-12.776)	0.188 Dia. (4.775 Dia.)
METRIC BORES		
PSI-2	0.2362-0.2374 (6.0 H9)	M3 x 0.5, 5.0 Lg. Set Screw (2@120)°
PSI-4	0.3937-0.3951 (10.0 H9)	M4 x 0.7, 5.0 Lg. Set Screw (2@120)°
PSI-5	0.4724-0.4741 (12.0 H9)	0.197 Dia. (5.0 Dia.)

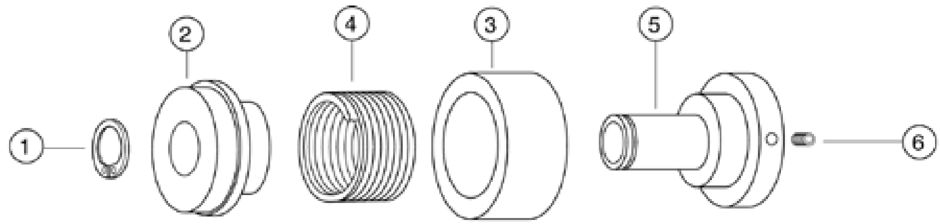
*For assembly and disassembly see page 86.

INDEX

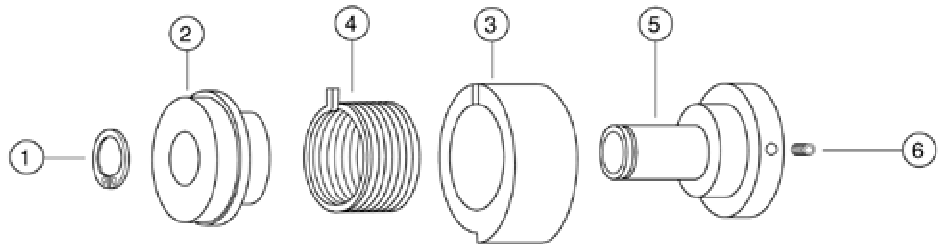
PSI-2, PSI-4 & PSI-5 Clutches

Component Parts

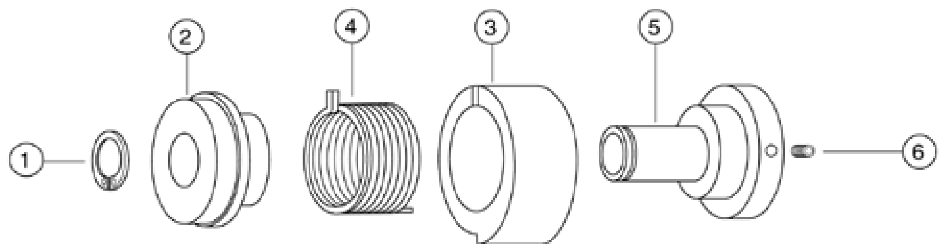
Model “O”



Model “SS”



Model “S”

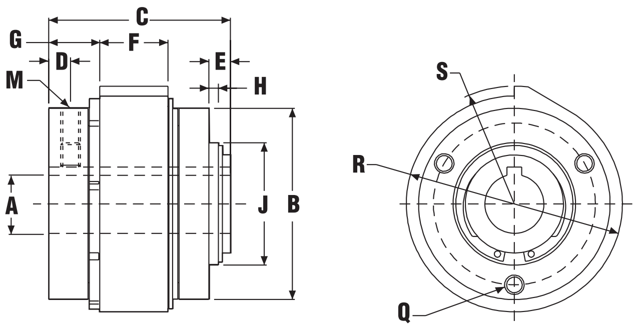


COMPONENT PARTS					
Item	**Description**	**Rotation**	**PSI-2 Part No.**	**PSI-4 Part No.**	**PSI-5 Part No.**
1	Retaining Ring		748-1-0005	748-1-0087	748-1-0090
2	Free Hub		540-2-0047	540-4-0027	540-5-0113
3	Control Collar	CW	266-2-9046	266-4-9005	266-5-9010
		CCW	266-2-9046	266-4-9005	266-5-9010
		Model 0	287-2-0003	287-4-0001	287-5-0015
4	Drive Spring	Model S CW	808-2-0036	808-4-0024	808-5-0030
		Model S CCW	808-2-0037	808-4-0030	808-5-0034
		Model SS CW	808-2-0051	808-4-0026	808-5-0031
		Model SS CCW	808-2-0052	808-4-0033	808-5-0035
		Model 0 CW	808-2-0040	808-4-0042	808-5-0033
		Model 0 CCW	808-2-0041	808-4-0043	808-5-0037
5	Shaft Assembly		824-2-0048	824-4-0037	824-5-0110
6	Headless Skt. Set Screw		797-1-0152	0.125 dia. hole	0.188 dia. hole

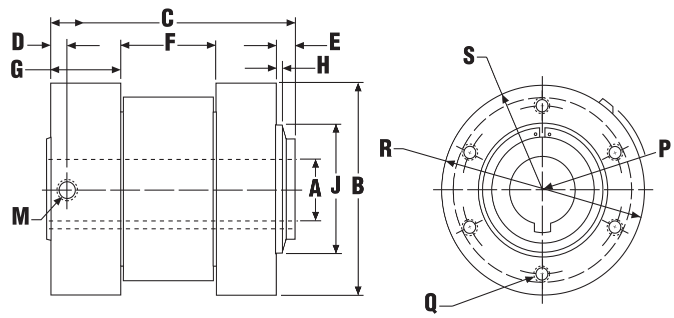
PSI-6 & PSI-8 Clutches

Dimensions & Specifications

PSI-6



PSI-8



Dimensions (mm)
For assembly and disassembly see page 86.

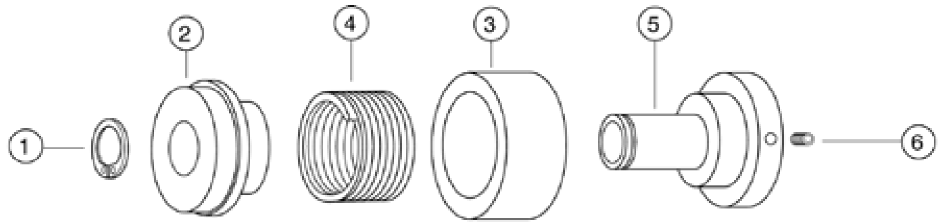
DIMENSIONS (mm)										
Model	Torque lbs.-in.	B Dia.	C	D	E	F	G	H	J Dia	R Dia.	S Rad.
PSI-6	500	Ø 2.437 Ø (61.90)	2.312 (58.72)	0.28 (7.10)	0.27 (6.86)	0.87 (22.1)	0.63 (16.00)	0.12 (3.05)	1.559-1.562 (39.60-39.67)	2.75 (69.85)	1.50 (38.1)
PSI-8	2500	Ø 4.00 Ø (101.6)	4.25 (107.95)	0.62 (15.75)	0.35 (8.89)	2.20 (55.9)	1.27 (32.26)	0.188 (4.78)	2.372-2.374 (60.25-60.30)	4.00 (101.6)	2.00 (50.8)

BORE & KEYWAY DATA					
Model	Bore A	Keyway Width B	Keyway Height C	M	Q
PSI-6	0.7505-0.7525 (19.063-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.52	#1/4-20 Tap	#1/4-20 x 1/2 DP 3 on 2.062 BC Max. Thread Engage Free Hub 0.312
PSI-6	1.0005-1.0025 (25.412-25.464)	—	—	0.25 Dia. (6.35)	#1/4-20 x 1/2 DP 3 on 2.062 BC Max. Thread Engage Free Hub 0.312
PSI-8	1.0005-1.0025 (25.412-25.464)	0.251-0.253 (6.37-6.43)	1.114-1.124 (28.29-28.55)	3/8-16 Tap 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.2505-1.2525 (31.762-31.814)	0.3135-0.3155 (7.962-8.014)	1.389-1.399 (35.28-35.54)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.3755-1.3775 (34.937-34.989)	0.3135-0.3155 (7.962-8.014)	1.518-1.528 (38.55-38.82)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
PSI-8	1.5005-1.5025 (38.112-38.164)	0.376-0.378 (9.55-9.61)	1.605-1.615 (40.76-41.02)	3/8-16 2 @ 90°	5/16-18 6 on 3.375 BC Max. Thread Engage Free Hub 0.375
METRIC BORES					
PSI-6	0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.80-22.90)	M5 x 0.8 Tap	M6 x 1.0 THD 3 Holes on a 52.37 BC
PSI-6	0.9842-0.9862 (25.0 H9)	—	—	5.0 Dia. (1.97 Dia.)	M6 x 1.0 THD 3 Holes on a 52.37 BC
PSI-8	1.378-1.3804 (35.0 H9)	0.3930-0.3944 (9.982-10.018)	1.508-1.516 (38.30-38.50)	M10 x 1.5, 25.0 Lg. Set Screw 2 @ 120°	M8 x 1.25 THD 6 Holes on a 85.73 BC
PSI-8	1.5748-1.5772 (40.0 H9)	—	—	M10 x 1.5, 25.0 Lg. Set Screw 2 @ 120°	M8 x 1.25 THD 6 Holes on a 85.73 BC

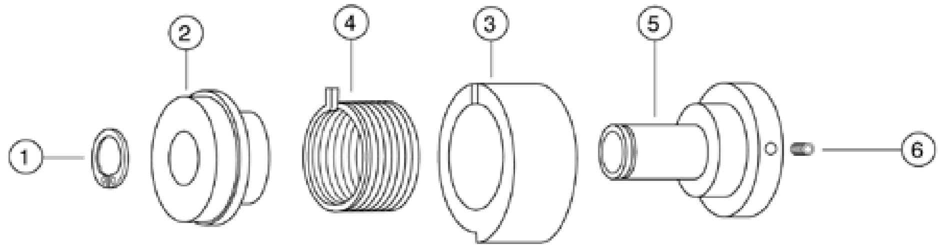
PSI-6 & PSI-8 Clutches

Component Parts

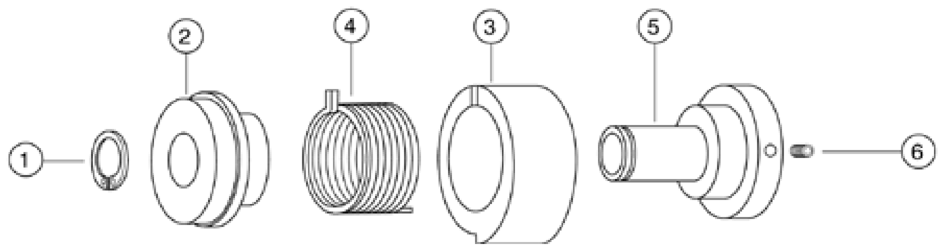
Model “O”



Model “SS”



Model “S”



COMPONENT PARTS				
Item	**Description**	**Rotation**	**PSI-6 Part No.**	**PSI-8 Part No.**
1	Retaining Ring		748-1-0038	748-1-0039
2	Free Hub		540-6-0009	540-8-0014
3	Control Collar	CW	266-6-0301	266-8-0127
		CCW	266-6-0401	266-8-0127
		Model O	287-6-0001	287-8-0002
4	Drive Spring	Model S CW	808-6-0001	808-8-0011
		Model S CCW	808-6-0002	808-8-0012
		Model SS CW	808-6-0007	808-8-0013
		Model SS CCW	808-6-0008	808-8-0014
		Model O CW	808-6-0009	808-8-0015
		Model O CCW	808-6-0010	808-8-0016
5	Shaft Assembly		0.75” 824-6-0052	1.000” 824-8-0213
			1.00” 824-6-0056	1.250” 824-8-0212
				1.375” 824-8-0211
				1.500” 824-8-0210
6	Headless Skt. Set Screw		797-1-0174	797-1-0199 (2)

Dust Cover Clutch Enclosures

Provide protection from contaminants for Super CB, CB and SAC Series Models

Plastic Clutch Cover

We offer plastic enclosures designed to complement the following clutches: Super CB-6, -8, -10; CB-2, -4, -5, -6, -8, -10 and SAC-2, -4, -5, -6.

Plastic Cover

- Protect units from dirt, contaminants and moisture
- Help to assure longer life
- Flexible soft plastic construction is durable
- Simple to remove and reinstall
- Low cost

Plastic

Model	Part No.
Super CB-6	287-6-0007
Super CB-8	287-8-0003
Super CB-10	287-0-0002
CB-2	287-2-0007
CB-4	287-4-0002
CB-5	287-5-0007
CB-6	287-6-0007
CB-8	287-8-0003
CB-10	287-0-0002
SAC-2	287-2-0007
SAC-4	287-4-0002
SAC-5	287-5-0007
SAC-6	287-6-0007

Aluminum Clutch Cover Kits

The environmentally designed cast aluminum enclosure will protect a CB-6, Super CB-6 or SAC-6 clutch from indoor and outdoor hazards such as falling dirt, non-corrosive liquids, dust, rain, sleet and snow.

- Sturdy cast aluminum construction
- Offers NEMA 3 & 12 protection
- Can be installed at any time
- Quieter clutch operation
- USDA-approved black powder coat paint finish

Benefits

- Prevents premature failure of clutches caused by moisture, dust and debris
- Extends clutch life
- Seals and protects bearings
- Reduces clutch operating temperature

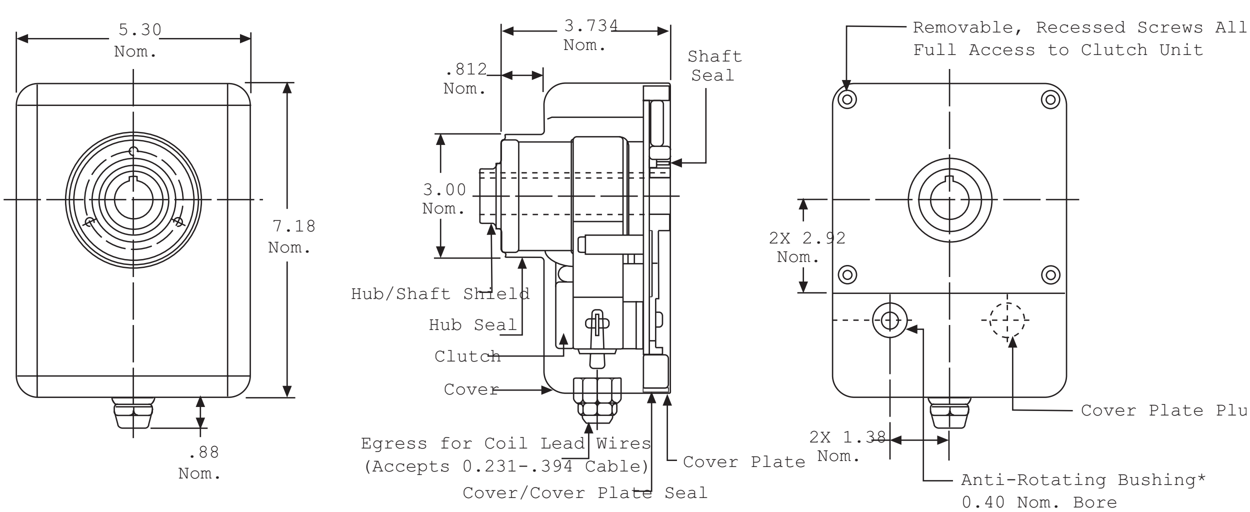
Typical Applications

- Food processing
- Packaging
- Material handling
- Medical equipment
- Agriculture

Aluminum
(Size 6 only)

Model	Part No.
Super CB-6	101-6-0096
CB-6 (Std.)	101-6-0095
SAC-6	101-6-0095

Note: A kit contains all components and hardware necessary to enclose a Super CB-6, CB-6 and SAC-6 clutch.



Dimensions (Aluminum)

Stop Collars

Specifications and Adjustments

Stop Collars

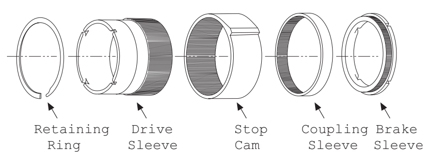
Stop Collars			
Model	**Collar Type**	**Stops**	**Status**
Super CB	Reinforced Plastic with steel insert Reinforced Plastic	1, 2 or 4 3, 5 through 24 stops	Standard Optional
Standard CB	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
PSI	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
SAC	Reinforced Plastic	1, 2 or 4 up to 24 max*	Standard Optional
ACCM	Powder Metal	4	Standard
ACCE	Powder Metal	4	Standard

* Consult factory for complete information

Stop Collar Adjustments

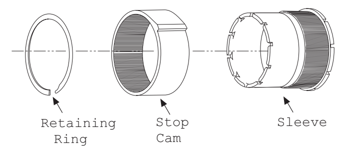
Unique splined stop collars are a standard feature of Super and Standard CB, as well as the PSI and SAC model clutches. These stop collars can be adjusted radially in fine increments. This feature allows the user to reposition the output to comply with specified shaft and keyway placements. Standard stop collar positioning increments are shown at right.

Split Cam Design



The Split Cam stop collar design is a standard feature on Super CB Sizes 5, 6, 7, 8; Standard CB Sizes 5, 6, 7, 8 and SAC Sizes 5, 6.

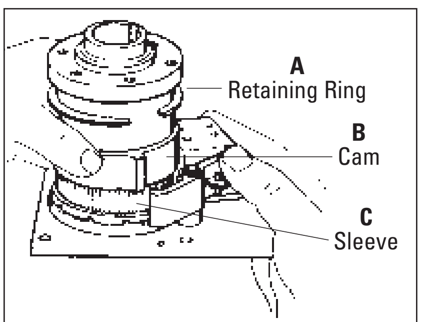
Traditional Cam Design



The Cam stop collar design is a standard feature on Super CB Size 10; Standard CB Sizes 2, 4, 10 and SAC Sizes 2, 4.

Stop Collar Removal and Adjustment

To adjust the stop collar, remove retaining ring A, slide cam B off sleeve C, rotate the cam to the desired position, slide it onto the sleeve again, and replace the retaining ring.



Note: While adjusting the stop collar on split cam units, the coupling sleeve must be held secure so that it does not move.

Standard Stop Collar Adjustments			
Series	**Size**	**Collar Design**	**Adjustment**
Super CB	CB-5	Split Cam	1.8°
Super CB	CB-6	Split Cam	1.8°
Super CB	CB-7	Split Cam	1.6°
Super CB	CB-8	Split Cam	1.6°
Super CB	CB-10	Cam	1.5°
Standard CB	CB-2	Cam	2.8°
Standard CB	CB-4	Cam	2.4°
Standard CB	CB-5	Split Cam	1.8°
Standard CB	CB-6	Split Cam	1.8°
Standard CB	CB-7	Split Cam	1.6°
Standard CB	CB-8	Split Cam	1.6°
Standard CB	CB-10	Cam	1.5°
SAC	SAC-2	Cam	2.8°
SAC	SAC-4	Cam	2.4°
SAC	SAC-5	Split Cam	1.8°
SAC	SAC-6	Split Cam	1.8°

Consult factory for complete information on non-standard stop collars.

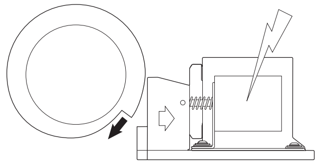
Heavy Duty Actuator

For use with PSI-6 and PSI-8 Clutches

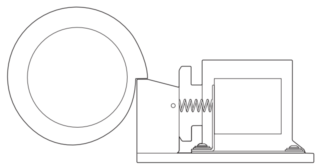
The Heavy Duty Actuator is offered as a simple laminated AC solenoid-actuated mechanical device to operate in conjunction with the PSI-6 and PSI-8 clutches. Mounted in the proper proximity to the clutches, it will control single, multiple, or partial revolution. It is designed as a no power, no revolution device. Ruggedly constructed from steel and nylon for maximum strength and long life.

Operation

When voltage is applied to the coil, the stop block is pulled back from the clutch stop collar, allowing the clutch to engage. It is not necessary to hold power on the coil for the entire revolution. A pulse to the coil will allow the clutch to start, the return spring pressure on the collar will not disengage the clutch and the stop block will be in position to disengage the clutch after one revolution. No "On" timing is necessary.



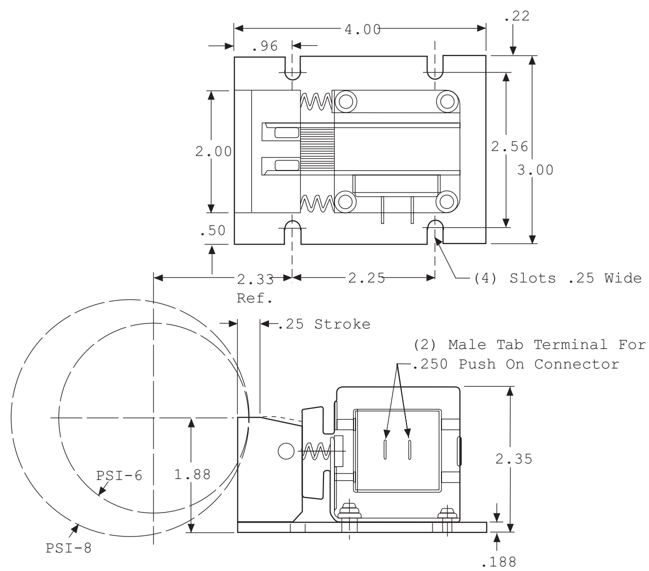
Energized



De-Energized

PN 901-00-002

SPECIFICATIONS	
Input	Line power 120 AC, 60 Hz
DC Resistance	14.5 ohms
Load current	In rush current 2.9 amps
Holding current	0.1 amps
Terminals	1/4" spade lug connections



Dimensions

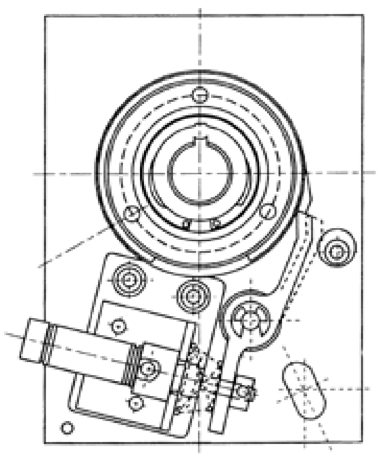
Pneumatic Actuation

Pneumatic actuation is available on the Standard CB-4, -5, -6, -7, -8 and -10 as well as the respective Super CB models; SAC-4, -5, -6, -8.

- No electrical sparks
- Not subject to power line voltage fluctuations
- Longer life of control members

Air pressure required: 4,5 - 16,5 bar

Retrofit kits available.



Notes

DL Series

DuraLIFE™ Clutches

DuraLIFE Series clutches (DL) are electromechanical wrap spring clutches that combine high torque, reliability and rapid acceleration into one small package at a competitive cost. It is offered in two configurations: headed coil or flying leads.

Wrap spring technology provides very fast response to bring loads up to speed in less than 3 ms (after spring wrap-down and depending on rpm).

The DL-33 is a drop-in alternative for high-cost clutches used in office automation applications such as printers and copiers. The long life and reliable performance make the DL-33 an ideal clutch for many packaging and automotive applications.

Features

- Wrap spring technology
- High torque, small package
- Rapid acceleration
- Consistent performance
- Low wattage required
- RoHS compliant

Applications

The DL-33 is suitable for high-load, tight-fitting applications requiring quick response, rapid acceleration and high torque. These requirements are common in office automation, packaging and automotive markets.

Application Considerations

Single Direction
Wrap spring clutches provide torque only in the direction in which they wrap down. This allows for overrunning.

Relative High Shock
Due to the rapid acceleration of the DL-33, system inertia effects can be significant. In some applications, an inline slip device may be used for shock absorption.

Engagement Relative to Speed
The DL-33 relies on relative motion between the input and output for engagement. Thus the slower the speed, the longer the time until engagement.

Typical Applications

Office Automation
- Copiers & printers
- Paper feed systems
- Collators & sorters
- Mailing equipment
- Ticket & receipt dispensers

Packaging
- Labeller
- Dispensing machines
- Conveyors

Automotive
- Cruise control
- Power lift gate
- Trunk cinch actuator systems
- Trunk power door closer

How to Order

DL - 33 - HI - CW - 24 - MC - 1/4” - P

Series
DL = DuraLIFE Clutch Imperial Metric

Size
33 = 33 mm

Input
HI = Hub Input
SI = Shaft Input

Direction of Rotation
CW = Clockwise
CCW = Counterclockwise
Look into the 3-lug drive end to determine the direction of rotation

Coil Voltage
12 = 12DC
24 = 24DC
90 = 90DC

Electrical Connection
MC = Molded Connector
FL = Flying Leads

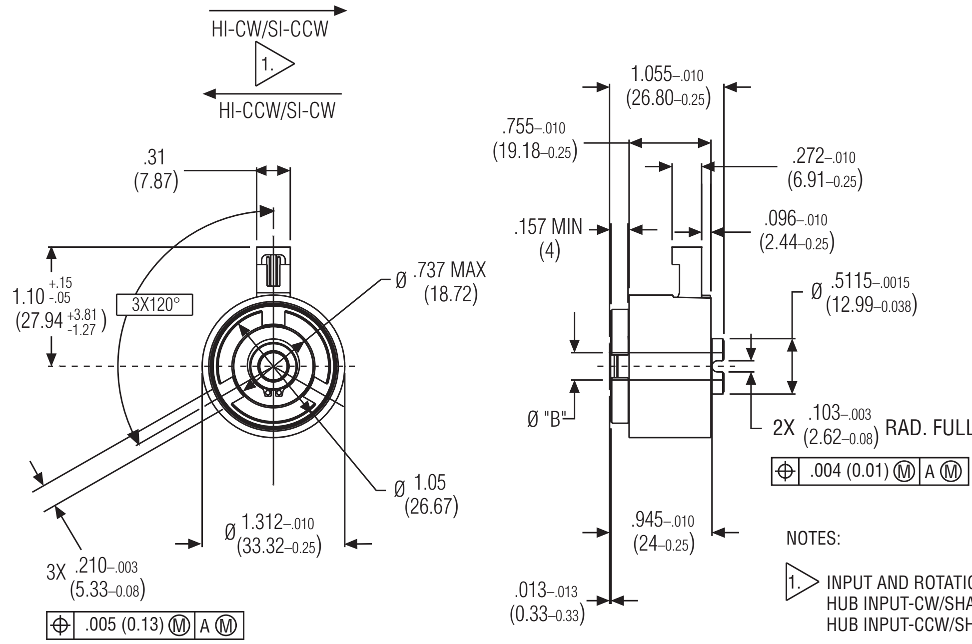
Bore Size
1/4”
5/16”
6mm
8mm

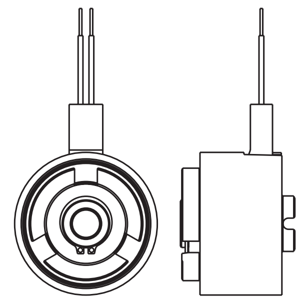
Drive Type
P = Pin
D = “D” Bore

OPTIONS
3-Dog Drive Adapter
Flexible Coupling

DL-33 Clutches

Dimensions & Specifications





FLYING LEADS
12 in LENGTH (300 mm)
#24 AWG
UL1213 Teflon 7x32

Dimensions (mm)
For more information see page 77.

NOTES:

1. INPUT AND ROTATION (VIEWED THIS END):
HUB INPUT-CW/SHAFT INPUT-CCW OR
HUB INPUT-CCW/SHAFT INPUT-CW

RECOMMENDED MATING CONNECTORS:
TERMINAL - POLARIZED LATCHING CRIMP ON CONTACTS
HOUSING: AMP NO 104257-1
CONTACTS:
LOOSE: AMP NO 1-530151-0
STRIP: AMP NO 530151-9
ALTERNATE TERMINAL-
INSUL. DISPLACEMENT CONTACTS
ASSEMBLY - AMP NO 103956-1
ASSEMBLY - MOLEX NO 70400-0141

PERFORMANCE	
Static torque	30 lbs.-in. (3.4 Nm)
Inertia, rotating parts	0.016 lbs.-in.^{2}
Maximum operating speed	1,200 RPM
Temperature	32°-140° F (0-60° C)
Cycle Life	1 x 10^6 @ 30 lbs.-in. Total Load
Weight	0.22 lbs.

ELECTRICAL DATA			
Voltage*	**Current (amps)**	**Resistance (ohms ±10%)**	**Status**
24 DC	0.130	185.0	Standard
12 DC	0.267	45.0	Standard
90 DC	0.034	2670.0	Standard

*Custom voltages available

(Coils are rated for continuous duty; 3.5 watts nominal)

Molded connector or 12” flying leads

BORE DATA	
Bore Sizes	**Bore B Ø**
1/4 inch	0.2505-0.2530 (6.362-6.427)
5/16 inch	0.3130-0.3181 (7.950-8.090)
METRIC BORES	
6 mm	0.237-0.239 (6.01-6.09)
8 mm	0.315-0.318 (8.01-8.09)

Cross Pin or Standard “D” Bores available, consult factory.

ENGINEERED PRODUCTS

START

MAC Series

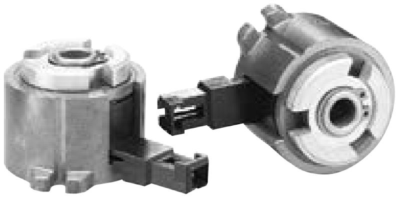
High-Performance Clutches at a Low Cost

Years of experience in developing magnetically actuated clutches for paper transport drives are all wrapped up in the MAC 30 & 45. These units meet the highest industry performance standards at an outstanding price, using state-of-the-art engineering, materials and processes.

- Wrap spring technology allows for fast response to bring loads up to speed within 50 ms (less depending on RPM)
- Exceeds industry life requirements with little cycle-to-cycle variation
- Enclosed construction effectively eliminates contaminants
- Electrical actuation for simple control interface
- Drag- and friction-free operation results in less wear
- Unidirectional input
- Output freewheels when disengaged
- RoHS compliant

Design Advantages

- Optional connector head plugs directly into wire harnesses
- Eliminate the need to custom fit lead lengths with connector head
- No leads to get tangled or damaged with connector head
- Rapid engagement time
- High torque-to-size ratio
- Simple construction – only three main assemblies
- High performance at low cost



Typical Applications

- Paper transport drives
- Forms handling equipment
- Sheet feeders
- Conveyors
- Film processing machines
- Copiers
- Printers
- Collators

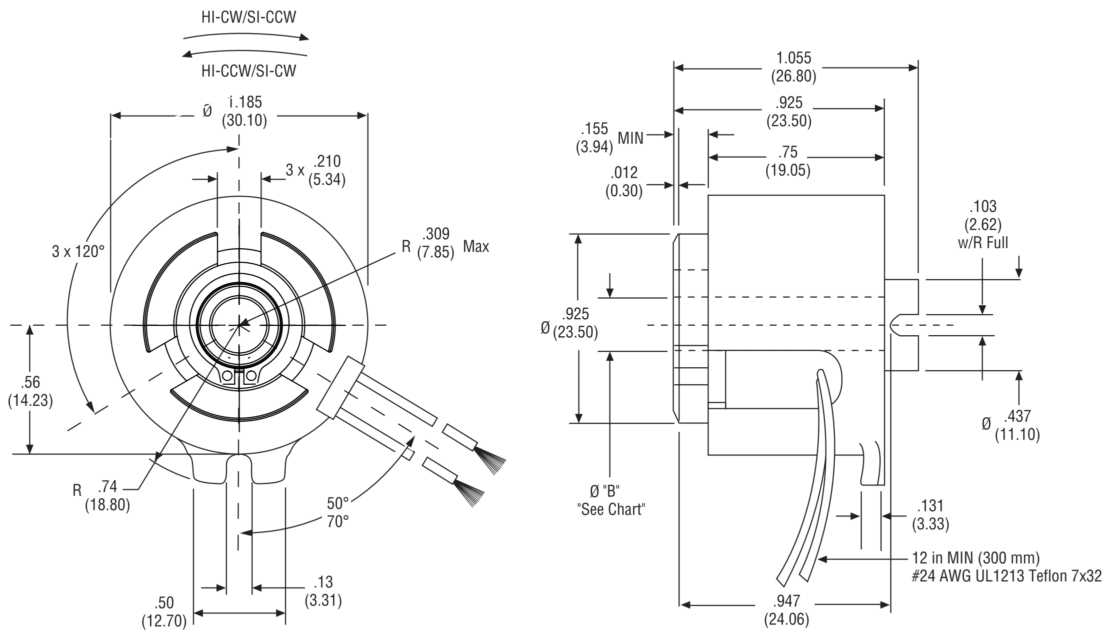
PERFORMANCE		
	MAC-30	MAC-45
Static torque	25 lbs.-in. (2.83 Nm)	150 lbs.-in. (16 Nm)
Maximum radial bearing load	15 lbs.	30 lbs.
Maximum operating speed	1,200 RPM	1,000 RPM
Response time, voltage on at full speed	50 MS Max. 20 MS Nom.	150 MS Max. 40 MS Nom.
Input configuration	Hub input or shaft input	
Bearing	Reinforced polyetherimide with internal lubricant	
Weight	0.22 lbs.	1.00 lbs.

For more information see page 77.

START

MAC-30 Clutch

Dimensions & Specifications



Dimensions (mm)
For more information see page 77.

BORE DATA	
Bore B	**Status**
0.2505-0.2530 (6.362-6.427)	Standard
0.3130-0.3155 (7.950-8.014)	Optional
METRIC BORES	
0.2366-0.2394 (6.009-6.081)	Standard
0.3153-0.3190 (8.008-8.103)	Standard

OPTIONS
Lug Drive Adapter
Connector Head
Consult Factory

ELECTRICAL DATA

MAC-30			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
24 DC	0.110	227 ±21	Standard

Leads: 12.0 inches (300 mm) long standard
Ends stripped: .19/.31 inches (4.9/7.8 mm) (Optional: terminated with a connector of your choice)

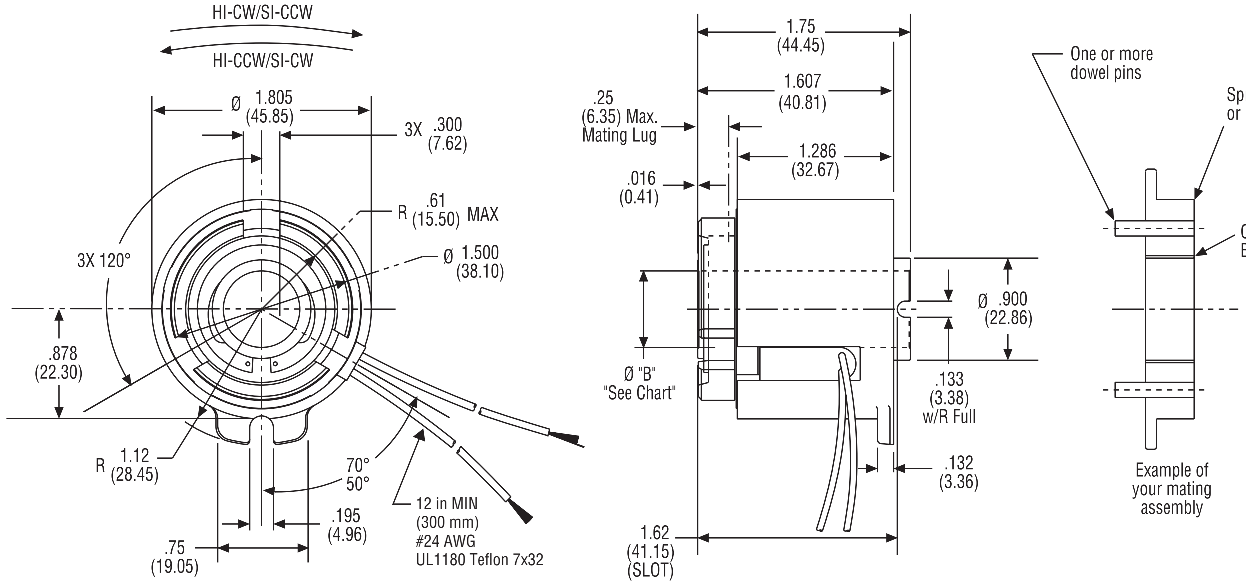
MAC-30 with Connector Head			
Voltage	**Current (amps)**	**Resistance (ohms)**	**Status**
24 DC	0.110	227	Standard
12 DC	0.243	49	Modification
90 DC			Available

Termination: 2 x .023 - .027 x .24 (0.58 - 0.69 x (6.09) square pin, pre-tinned alloy (Molex #08-52-0601)
Leadsets: Teflon insulated lead wires per UL1213 are available to suit any wire harness

START

MAC-45 Clutch

Dimensions & Specifications



Dimensions (mm)
For more information see page 77.

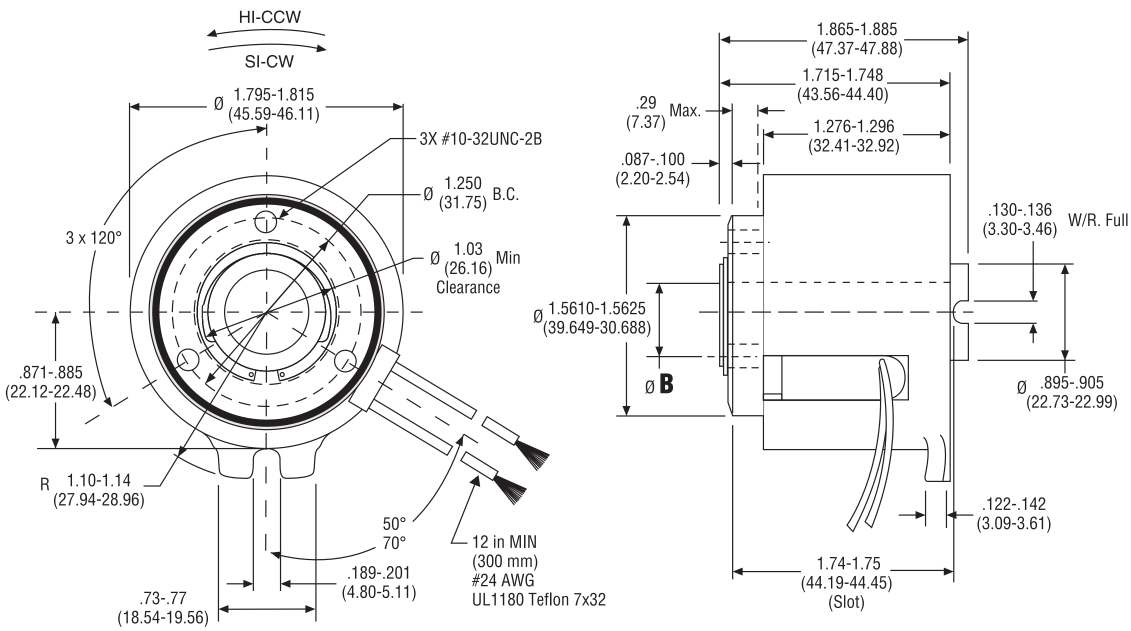
BORE DATA	
Bore B	**Status**
0.3755-0.3780 (9.537-9.602)	Optional
0.5010-0.5035 (12.725-12.789)	Optional
0.6260-0.6295 (15.900-15.990)	Standard
METRIC BORES	
0.3941-0.3968 (10.010-10.079)	Optional
0.4729-0.4755 (12.011-12.078)	Optional
0.5516-0.5555 (14.010-14.110)	Optional
0.6304-0.6346 (16.012-16.119)	Optional

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms +/-10%)**	**Status**
24 DC	0.257	93	Standard
12 DC	0.526	23	Modification
90 DC	0.054	1680	Modification
Leads:	12.0 in. (300 mm) long standard		
Ends stripped:	0.19/0.31 in. (4.9/7.8 mm) (Optional: terminated with a connector of your choice)		

PERFORMANCE
Bolt Circle Attachment
Ball Bearing Design
Lug Drive Adapter
Integral Connector Block (future option)
Consult factory

MAC-45 Clutch with Bolt Circle Attachment

Dimensions & Specifications



Dimensions (mm)
For more information see page 77.

BORE DATA	
Bore B	**Status**
0.3755-0.3780 (9.537-9.602)	Optional
0.5010-0.5035 (12.725-12.789)	Optional
0.6260-0.6295 (15.900-15.990)	Standard
METRIC BORES	
0.3941-0.3968 (10.010-10.079)	Optional
0.4729-0.4755 (12.011-12.078)	Optional
0.5516-0.5555 (14.010-14.110)	Optional
0.6304-0.6346 (16.012-16.119)	Optional

ELECTRICAL DATA			
Voltage	**Current (amps)**	**Resistance (ohms +/-10%)**	**Status**
24 DC	0.257	93	Standard
12 DC	0.526	23	Modification
90 DC	0.054	1680	Modification
Leads:	12.0 in. (300 mm) long standard		
Ends stripped:	0.19/0.31 in. (4.9/7.8 mm) (Optional: terminated with a connector of your choice)		

PERFORMANCE
Ball Bearing Design
Lug Drive Adapter
Integral Connector Block (future option)
Consult factory

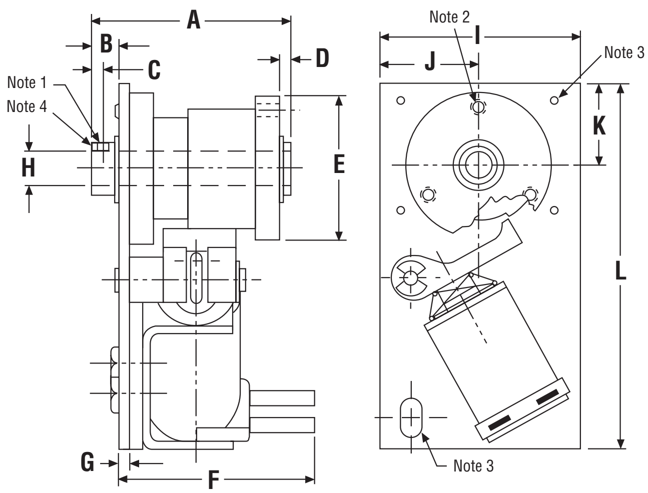
INDEX

SP-2, 4, 5 Clutches

Dimensions & Specifications

Designed specifically for computer peripheral and business machine applications, these clutches and brakes are suitable for indexing, rapid cycling and positive displacement clutching drives.

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque
- Standard hub input; shaft input special
- RoHS compliant



Dimensions (mm)

Notes

1. Output connection
   SP-2: .062 dia. hole
   SP-4: .125 dia. hole
   SP-5: .125 dia hole
2. Tapped holes on input hub:
   SP-2: 3 holes, #6-32 on .938 B.C.
   SP-4: 3 holes, #6-32 on .938 B.C.
   SP-5: 3 holes, #10-32 on 1.250 B.C.
3. Mounting holes:
   SP-2: .187 x .312 slot
   SP-4: 4 holes, .187 dia. on 2.125 B.C.
   SP-5: 4 holes, .187 dia. on 3.125 B.C.

Options

- Anti-overrun
- Anti-back (HI only)
- Overtravel stop

Typical Applications

- Paper drives
- Card readers and sorters
- Copying machines
- Ribbon drives
- Material handling conveyors

DIMENSIONS (mm)												
Model	A	B	C	D	E	F	G	H	I	J	K	L
SP-2	1.670	0.250	0.125	0.080	1.188 1.187	1.620	0.090	0.2515 0.2505	1.620	0.810	0.690	3.00
SP-4	2.000	0.430	0.160	0.080	1.250 1.249	1.910	0.090	0.376 0.378	2.380	1.190	1.00	4.10
SP-5	2.375	0.340	0.150	0.090	1.5625 1.5615	2.180	0.090	0.5015 0.5005	2.620	1.310	1.310	4.56

PERFORMANCE				
		SP-2	SP-4	SP-5
Static torque	lbs.-in. (Nm)	25 (2.825)	120 (13.56)	250 (28.25)
Maximum anti-overrun holding capability	lbs.-in. (Nm)	10 (1.13)	25 (2.825)	60 (6.78)
Inertia, rotating parts	lbs.-in.^{2}	0.0086	0.0522	0.09774
Maximum radial bearing load at maximum speed	lbs.	7.5	13	31
Maximum operating speed	RPM	1500	1200	750
Response time, voltage on at full speed	MS	25	30	30
Optional – Anti-overrun operation				
Weight	lb	0.55	0.88	1.32

Note: By adding an optional over travel stop (OTS), the braking torque is increased from 10% to 20% of the rated clutch torque.

ELECTRICAL DATA				
Voltage	Current (amps)	Current (amps)	Resistance (ohms)	Resistance (ohms)
	SP-2	SP-4, SP-5	SP-2	SP-4, SP-5
115 AC 60 Hz	0.104	0.103	825	280
24 DC	0.230	0.325	104	74.0
12 DC*	0.460	0.732	26	16.4
90 DC*	0.059	0.096	1510	936

*Modifications

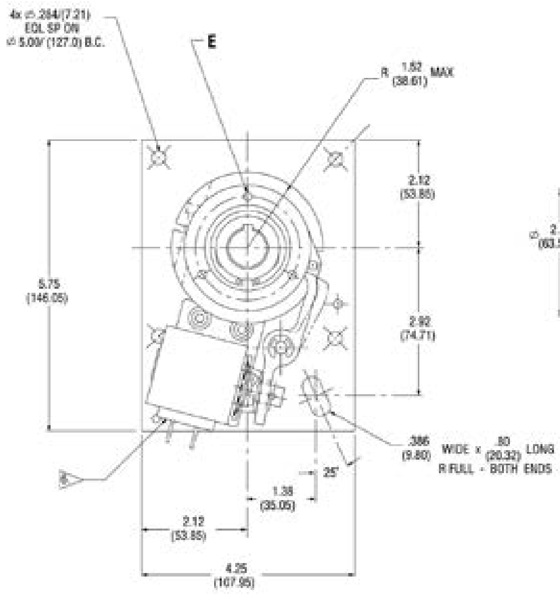
INDEX

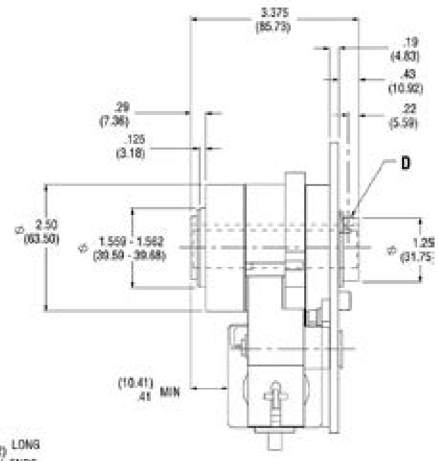
SP-6 Clutch

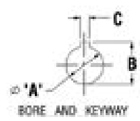
Dimensions & Specifications

Designed specifically for computer peripheral and business machine applications, these clutches and brakes are suitable for indexing, rapid cycling and positive displacement clutching drives.

- Low cost
- Trouble-free design for long life
- Complete package for immediate installation
- High torque
- Standard hub input; Shaft input special
- RoHS compliant







Dimensions (mm)

Options

- Anti-overrun
- Anti-back (HI only)
- Overtravel stop

Typical Applications

- Paper drives
- Card readers and sorters
- Copying machines
- Ribbon drives
- Material handling conveyors

BORE & KEYWAY DATA				
Bore A	**Keyway Width B**	**Keyway Depth C**	**Set Screws D**	**Mounting Holes E**
0.7505-0.7525 (19.062-19.114)	0.1885-0.1905 (4.787-4.839)	0.837-0.842 (21.25-21.39)	#10-32 UNC-2B x0.19 Lg. Hex Skt. Set Screw	3x #1/4-20 UNC-2B 0.48 MIN DP 2.062 BC
1.0005-1.0025 (25.412-25.464)	—	—	0.187-0.192 Hole (4.74-4.88)	3x #1/4-20 UNC-2B 0.48 MIN DP 2.062 BC
METRIC BORES				
0.7874-0.7894 (20.0 H9)	0.2356-0.2368 (5.985-6.015)	0.8976-0.9015 (22.800-22.900)	M5 x 0.8 x 5.0 Lg. Hex Skt. Set Screw	3x M6 x 1.0 holes on 52.38 BC
0.9842-0.9862 (25.0 H9)	—	—	4.87-5.14 Hole (0.191-0.203)	3x M6 x 1.0 holes on 52.38 BC

PERFORMANCE	
Static torque	500 lbs.-in. (56.5 Nm)
Maximum anti-overrun holding capability	300 lbs.-in. (33.9 Nm)
Inertia, rotating parts	2.0 lbs.-in.^{2}
Maximum radial bearing load at maximum speed	63 lbs.
Maximum operating speed	500 RPM
Response time, voltage on at full speed	60 MS
Optional – Anti-overrun operation	Hub input or Shaft input
Weight	5.29 lbs.

Note: By adding an optional over travel stop (OTS), the braking torque is increased from 10% to 20% of the rated clutch torque

ELECTRICAL DATA		
Voltage	**Current (amps)**	**Resistance (ohms)**
115 AC 60 Hz	0.334	57.5
24 DC	0.586	41.0
12 DC*	1.150	10.4
90 DC*	0.151	598

*Modifications

HOLD

BDNB Series

Bi-Directional, No-Back Design Clutches

The Bi-Directional No-Back offers an extraordinary combination of functions at low cost. The basic function of this unit may be easily adapted to a large range of applications requiring automatic position holding with rotary driven capability.

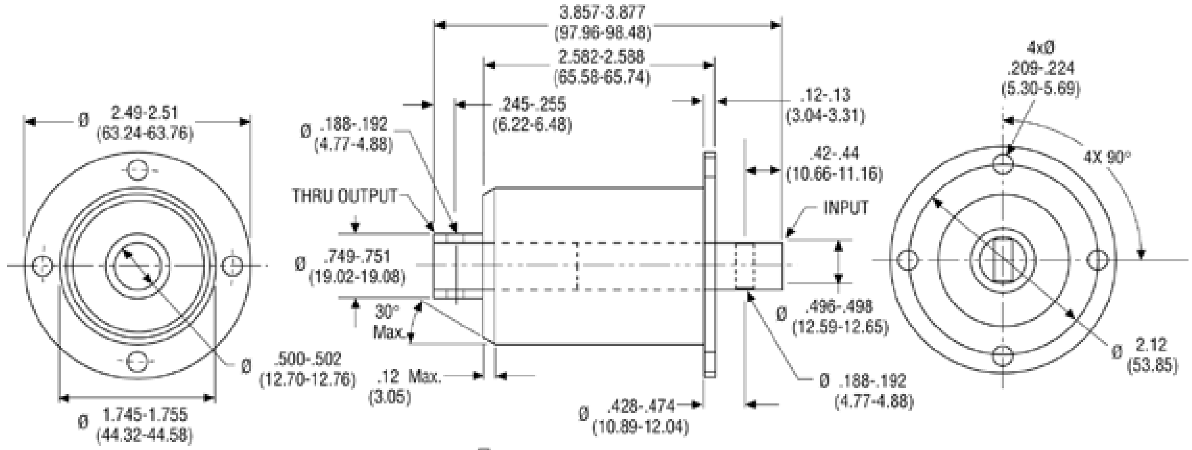
The BDNB can be turned only when torque is applied to the input shaft. The input shaft may be driven in either direction with torque being transmitted directly to the output shaft.

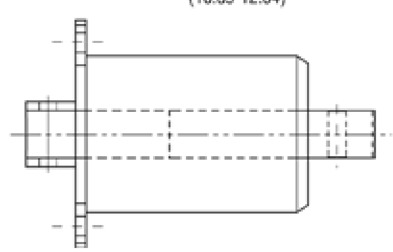
When there is no torque on the input, the output shaft is "locked" and cannot be rotated in either direction. Any torque applied to the output shaft is transmitted directly to the clutch body, and will not be reflected to the input.

- Input operates in CW and CCW direction; output will hold loads within specified torque ranges
- Modifications and special design variations available
- Maximum operating speed 200 RPM
- Flange can be oriented on the bi-side or the brake side, depending on the application
- RoHS compliant

Typical Applications

- Tank turret drives
- Boat or aircraft trim tabs
- Robotics
- Rudderlocks
- Hoists
- Manlifts
- Actuator holdbacks





Bi-Directional No Back offers two Flange options:
- Mounted on bi-side (shown above)
- Mounted on brake side (shown at left)

Dimensions (mm)

PERFORMANCE	
Torque ratings	250 lbs.-in. (28.23)
Clutch holding torque, both directions	250 lbs.-in. (28.23)
Output to housing lost motion	6°†
Input to output lost motion	25°
Maximum additional input torque	10*
Weight	2 lbs.

†Angular movement is determined with 25 lbs.-in. of torque applied to output.
*Or less than 1.15 times the output shaft load, whichever is greater

Notes

Selection Considerations

Inertia and Torque Values

Application Analysis

1. Function
The process for establishing the clutch or brake function is illustrated in Step 1 on page 16. In review, the three functions and the appropriate series selections are noted below.

Overrunning
Unidirectional torque transmission with free wheeling in opposite direction.
Selection
PSI (Model O)

Start-Stop
Engage/disengage with random stop position.
Selection
SAC (Model SS)
PSI (Model SS)

Single Revolution
Accurate stop position in single or fraction revolution cycles.
Selection
CB Model S
SAC Model S
PSI Model S

2. Calculate load inertia (WR2)
Use the inertia chart on page 75 to determine the inertia of the application components. To determine WR^2 of a given shaft or disc, multiply the WR^2 from the chart by the length of shaft or thickness of disc in inches.
Note: For hollow shafts, subtract WR^2 of the I.D. from the WR^2 of the O.D. and multiply by length.

In order to calculate the inertias of components which are made of material other than steel, use the multipliers found in the conversion chart (right) to establish the inertias of these components.

Inertia Conversion Chart

In order to determine the inertia of a rotating member (shaft, disc, etc.) of a material other than steel, multiply the inertia of the appropriate steel diameter from the chart on page 75 by:

Material	Multiplier
Bronze	1.05
Steel	1.00
Iron	.92
Powdered Metal Bronze	.79
Powdered Metal Iron	.88
Aluminum	.35
Nylon	.17

3. Determine clutch or brake torque value
With the inertia value calculated in Step 2, determine the torque requirement for the function determined in Step 1.

A) For Overrunning and Start-Stop (random start-stop) (SAC and PSI Models SS and O)

$$T = \frac{WR^2 \times RPM}{3700 \times t} + \text{friction torque*}$$

Where—
T = Torque required from wrap spring
WR^2 = load inertia (Step 2)
RPM = shaft speed at clutch location
t = time to engagement (.003 for clutch)

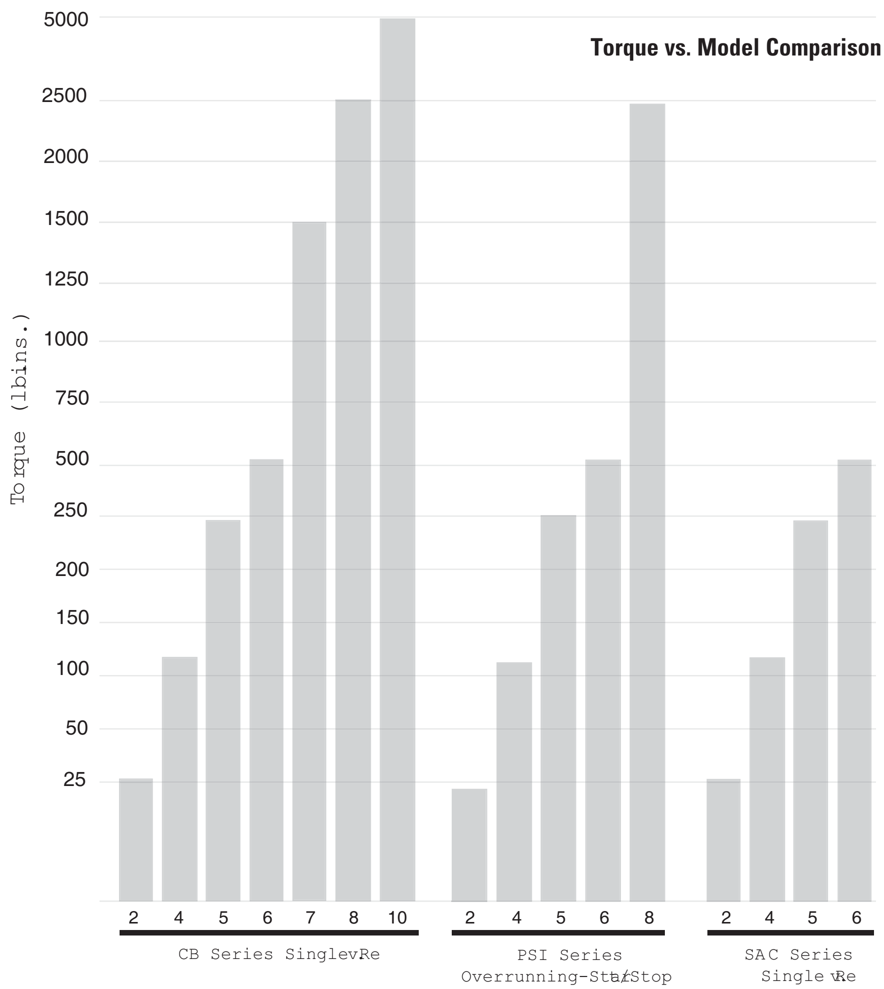
B) For single revolution applications (CB, SAC and PSI Models S)

$$T = \frac{WR^2 \times RPM}{3700 \times t} - \text{friction torque*}$$

Where—
T = torque required from wrap spring
WR^2 = Load inertia (Step 2)
RPM = Shaft speed at clutch or brake location
t = time to disengagement (.0015 for brake)

Find the value of T on the Torque vs. Model Comparison Chart below.

*Frictional (drag) torque is the torque necessary to overcome static friction. It may be measured by a spring-scale or by dead-weights, applied to a known moment arm so gradually as to make inertia negligible. It is that torque found just sufficient to induce motion.



Selection Considerations

Inertia and Torque Values

4. Verify selection with unit inertia

From the individual product specifications, find the unit inertia of the model selected in Step 3. Add this to the load inertia previously determined to arrive at the total torque requirement.

A) For Overrunning and On-Off (PSI Models SS and O)

$$A)\ T_t = \frac{(WR^2_{LOAD} + WR^2_{UNIT})RPM}{3700 \times t} + \text{friction torque}$$

B) For Single Revolution Start-Stop (CB, SAC-S and PSI Models S)

$$A)\ T_t = \frac{(WR^2_{LOAD} + WR^2_{UNIT})RPM}{3700 \times t} - \text{friction torque}$$

Where–T_t = total system torque
(WR^2_{LOAD}) = load inertia
(WR^2_{UNIT}) = clutch inertia

Find this torque value on the Torque vs. Model Comparison Chart on page 74 to verify the model selected in Step 3.

Minimum Load Inertia—Super CB and CB Clutch/Brakes

In order to achieve the CB accuracy capability of ±1/2°, a minimum load inertia is required to fully engage the brake spring and disengage the clutch spring. This minimum inertia (I) can be calculated from the accompanying formula and chart:

$$I = \frac{(t)\ (T_c + T_o)\ (3700)}{RPM} - I_c$$

I = Minimum inertia required to fully activate the clutch/brake—lb-in^2
t = Time—Seconds
T_c = Torque required to fully activate the clutch/brake—lb-in
T_o = Drag torque—lb-in

RPM = Revolutions per minute

I_c = Inertia at the output side of the clutch—lb-in^2

EXAMPLE:

CB-6 in a system running at 200 RPM with 3/4" bore and 20 lb-in drag. What inertia is required to fully activate the clutch/brake?

$$I = \frac{(0.005)\ (8.75 + 20)\ (3700)}{(200)} - 1.221 = 1.438 \text{ lb-in}^2$$

NOTE: When calculated inertia is zero or negative, no further action is required. If the calculation result is positive, additional inertia equal to or exceeding the result should be added.

INERTIA OF STEEL SHAFTING (Per Inch of Length or Thickness)

Dia. (in.)	WR^2 (lbs.-in.^{2})	Dia. (in.)	WR^2 (lbs.-in.^{2})	Dia. (in.)	WR^2 (lbs.-in.^{2})
1/4	.00011	7	66.816	13	803.52
3/8	.00055	7 1/4	77.04	13 1/4	858.24
1/2	.00173	7 1/2	87.984	13 1/2	924.48
3/4	.00864	7 3/4	100.656	13 3/4	995.04
1	.0288	8	113.904	14	1068.48
1 1/4	.072	8 1/4	128.88	14 1/4	1147.68
1 1/2	.144	8 1/2	144	14 1/2	1229.75
1 3/4	.288	8 3/4	162.72	14 3/4	1317.6
2	.432	9	182.88	15	1404
2 1/4	.72	9 1/4	203.04	16	1815.84
2 1/2	1.152	9 1/2	223.2	17	2314.08
2 3/4	1.584	9 3/4	252	18	2910.24
3	2.304	10	277.92	19	3611.52
3 1/2	4.176	10 1/4	306.72	20	4433.76
3 3/4	5.472	10 1/2	338.4	21	5389.92
4	7.056	10 3/4	371.52	22	6492.96
4 1/4	9.072	11	407.52	23	7757.28
4 1/2	11.376	11 1/4	444.96	24	9195.84
5	17.28	11 1/2	486.72	25	10827.36
5 1/2	25.488	11 3/4	529.92	26	12666.24
6	36	12	576	27	14731.2
6 1/4	42.624	12 1/4	626.4	28	17036.64
6 1/2	49.68	12 1/2	679.68	29	19604.16
6 3/4	57.888	12 3/4	735.84	30	22452.48

TORQUE & INERTIA VALUES

Model	T_C	t	I_C
CB-2	1.65	0.003	0.0116
CB-4	6.60	0.004	0.0450
CB-5	6.88	0.004	0.1663
CB-6	8.75	0.005	1.221 (0.75 in. bore) 1.138 (1.0 in. bore)
CB-7	17.0	0.005	9.43 (0.75 in. bore) 7.72 (1.0 in. bore) 6.70 (1.25 in. bore) 6.55 (1.50 in. bore)
CB-8	20.0	0.005	9.32 (1.0 in. bore)
			8.15 (1.5 in. bore)
CB-10	50.0	0.006	30 (1.5 in. bore)

How to determine maximum inertia load of CBs

$$\frac{T \times 3700 \times t}{RPM} = WR^2$$

T = Clutch Torque
t = .0015

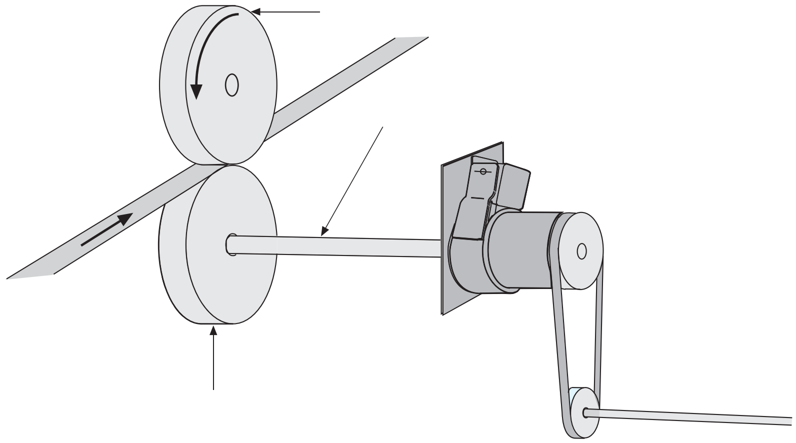
ENGINEERING GUIDELINES

Selection Considerations

Example

Nip Feed for Ribbon (Tape) Cut-Off—
Indexes 180° for 5½" Length

Determine Correct Size
Clutch/Brake



Nip Feed for Ribbon (Tape) Cut-Off—
Indexes 180° for 5½" Lengths

1. Determine function: Application requires accurate 180° start and stop positioning, therefore a CB or PSI Model S is chosen.

2. Calculate Load Inertia (WR^2)
   WR^2 NIPS (2) = 4.176 lbs.-in.^{2} each
   (ref. inertia chart, pg. 85)
   x 2 = 8.352 lbs.-in.^{2}

WR^2_{SHAFT} = .0288 x 6 = .1728 lbs.-in.^{2}

WR^2_{LOAD} = 8.5248 lbs.-in.^{2}
TOTAL

3. Apply results to Step 3 formulas to determine torque required for start/stop.

   T = 8.5248 x 200/5.55 – 20 = 287.2 lbs.-in.

   Estimate friction torque
   (about 20 lbs.-in. for this example).

   Make initial unit selection from Torque vs. Model Comparison Chart (pg. 84) based on load torque requirements:

   i.e., 287.2 in.lbs. Size CB-6

4. After making initial unit selection, add unit inertia (ref. Torque and Inertia Values, pg. 85) to load inertia (rotating components).

i.e.: 8.525 lbs.-in.^{2} (Load WR^2)
<u>+1.718 lbs.-in.</u>^{2}*
10.268 lbs.-in.^{2} (Total System WR^2)

Double-check size by computing new data with torque formula.

* (CB-6 WR^2—Pg. 25)

$$T = \frac{WR^2 \times RPM}{5.55 \text{ (for brake)}}$$

$$T = \frac{10.268 \times 200}{5.55} = 370 \text{ lbs.-in.}$$

CB-6 is correct size.

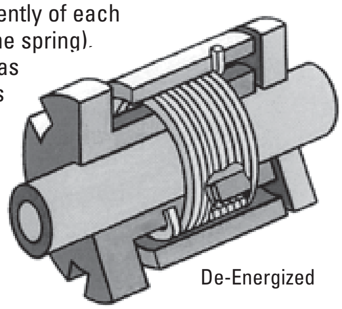
Note: All calculations shown assume zero compliance in driven, as well as driving, components. Compliance in the system reduces the torque required to accelerate the total inertial load to full RPM.

Magnetically Actuated Clutch Operation Principles & Performance

DL & MAC Series

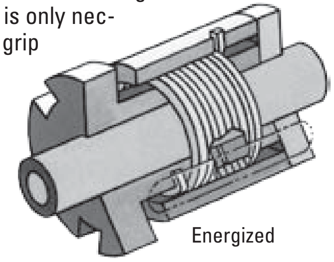
Clutch Operation

The inside diameter of the spring is larger than the outside diameter of the shaft hub. One end of the spring (control tang) is fastened to the control collar (or armature). When the coil is de-energized, the hubs rotate independently of each other. The free hub (affixed to the spring), the spring and the collar rotate as a unit. The opposing shaft hub is not fastened to the spring and rotates as another unit. The coil housing is stationary and piloted on the shaft bearing. A ground pin placed in the retaining tab secures the coil housing from rotating.



De-Energized

When the coil is energized, the control collar is pulled and held against the shaft flange. The momentary relative motion between spring and hubs "wraps" the spring, coupling the two hubs positively. All torque is transmitted through the wrapped spring. Magnetic force is only necessary to maintain a tight spring grip for total torque transfer.



Energized

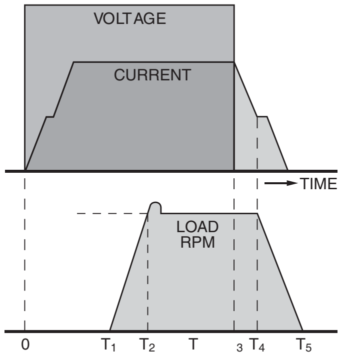
Operational Performance

The time-to-speed of the DL and MAC Series clutches is defined as the time required to accelerate the load to 100% of the input speed from the initial voltage pulse. The spring wrap down time is the only portion dependent on the input speed. Variation in time-to-speed is caused by:

1. Clutch to Clutch — statistical variation due to piece part tolerance
2. Cycle to Cycle — comprised of speed, voltage and temperature changes
3. Lifetime — enlargement of the normal band due to component wear.

If dictated by the application, cycle-to-cycle variation can be minimized by careful selection of system hardware and software. Statistical variation may also be reduced through tighter part tolerance but would result in a higher cost.

Performance Profile



Current and speed response profile

T_1 = Time to engage (TTE) (Electrical build up and collar movement and spring wrap time).

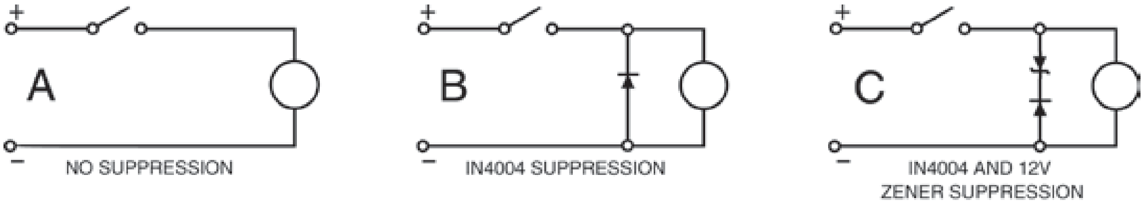
T_2 = Time to speed (TTS).

T_3 - T_4 = Armature disengagement time (ADT).

T_5 - T_3 = Time to zero (TTZ) (Load and speed dependent).

Characteristics of Disengagement

Control collar release time (ADT) is affected somewhat by speed, load and the above three variables. The electrical circuit, however, has a major impact on the MAC-45's disengagement performance. Voltage transients and bleed down time should be minimized. The optimum suppression network for an application using the MAC-45 is represented by circuit C, which incorporates a 1N4004 series diode and a zener diode with two times the coil voltage. Omitting the zener (circuit B) would result in a less expensive circuit but at the expense of minor decrease in performance. Circuit A represents the quickest disengagement time but provides no protection for voltage transients.



Questions & Answers

Relating to Standard Genuine Wrap Spring Products

1. **Question:** What changes are necessary to convert a CB series clutch from CW to CCW and vice versa?

   Answer: For all CB units, the following parts must be changed; the drive spring, brake spring, anti-overrun spring, anti-back spring and plate subassembly. The cams must also be reversed. Additional requirements: on CB-5, -6 and -8 units, the actuator subassembly must be changed. On CB-6, -8 and -10 (DC only) the coil subassembly must be changed. On CB-10 (AC only), the coil subassembly would require a new coil kit. All other components can be reused. The differential must also be reset after the unit has been reassembled.

2. **Question:** How is the spring differential set on a CB Series clutch? Why is this important?

   Answer: This setting is important because it establishes the relationship of the clutch spring to the brake spring. If the setting is incorrect, the unit may fail due to excessive wear or may not operate at all. The differential setting has been preset by the factory for “out-of-the-box” CB Series clutches. See page 80 for a detailed explanation of spring differential adjustment.

3. **Question:** Can the input or output of a CB Series clutch/brake be reversed?

   Answer: The standard CB Series clutch, which includes the anti-overrun clutch feature, cannot readily be reversed. However, if input reversal is required, please contact your local Thomson representative for additional information.

   One of the standard features of the CB Series clutch/brake is the anti-back spring. While this spring is required to achieve stopping accuracy, it also prevents the output from being reversed. Therefore, like the input of a standard CB Series clutch/brake (incorporating the AO feature), the output cannot and should not be reversed.

4. **Question:** How often should a Deltran wrap spring clutch be lubricated?

   Answer: Under normal operating conditions, lubrication is not necessary because the bearing surface components are manufactured from oil-impregnated, powdered metal materials.

5. **Question:** Can a single-stop CB Series clutch readily be changed to a multiple-stop unit and vice versa?

   Answer: The serrated control of the CB collar design facilitates easy changeover to a multiple-stop collar. Please refer to the assembly/disassembly instructions for the appropriate CB model. See Stop Collars, page 61.

6. **Question:** Can the output of the CB Series clutch be adjusted after installation?

   Answer: Certainly. The serrated design of the control collar assembly allows repositioning the cam after the unit has been installed. See page 61.

7. **Question:** How is rotation determined?

   Answer: For the CB, SAC & SP Series, determine the proper rotation by viewing the unit from the input hub end. For sizes 2 through 6, the input hub has three holes, while sizes 8 and 10 input hubs each have six holes. For the PSI Series, determine the proper rotation by viewing the clutch from the input end. For HUB input units, look at the free hub when determining rotation. For SHAFT input units, look at the shaft hub when determining rotation. Also, see the appropriate pages of this catalog or contact your local Thomson representative.

8. **Question:** What is necessary to assure that a CB model wrap spring clutch/brake stops consistently and accurately?

   Answer: In most cases when a CB does not position accurately, there is insufficient inertia to fully wrap down the brake spring. This situation can easily be resolved by either adding mass to the output or increasing machine speed.

   Remember, the CB Series clutch is an RPM-inertia-sensitive device. The specified minimum inertia must be met for the CB Series clutch/brake to operate properly.

9. **Question:** What are the possible causes of CB Series clutch slippage?

   Answer: Any slippage in a CB is usually caused by an incorrect differential setting. See the adjustment and repair section of this catalog on page 80.

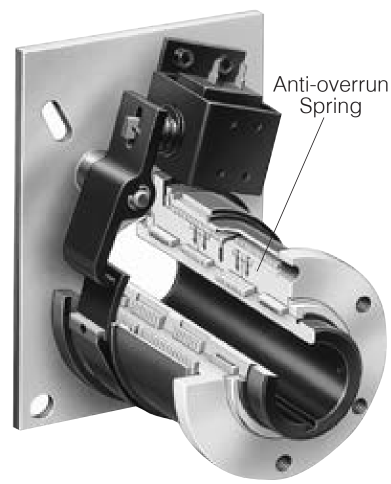
10. **Question:** What does the anti-overrun spring do?

    Answer: The anti-overrun spring feature prevents overhauling loads from over-running the input. The anti-overrun is an internal spring with an interference fit that slips in one direction but transmits torque in the other.

11. **Question:** Can the anti-overrun feature easily be incorporated into a non-anti-overrun CB Series clutch?

    Answer: This is easily accomplished on the CB-5, 6, 7 and 8 units, which only require a new input hub and anti-overrun spring. All other CB models must be completely disassembled to replace the output shaft assembly and input hub and add the anti-overrun spring.

    The “standard” CB Series clutch has the anti-overrun spring included. We recommend all CB Series clutches be purchased with the AO spring, if possible.



12. **Question:** How much torque can a Genuine Wrap Spring unit brake?

    Answer: The PSI, SAC & SP model S units are capable of braking 10% of their static torque rating. By incorporating the over-travel stop feature into the PSI and SP series model S units, brake torque increases to 20% of static torque rating.

    In general, the CB Series clutch is capable of stopping 50% of the unit’s static torque rating.

Questions & Answers

Relating to Standard Genuine Wrap Spring Products

13. Question: What should be checked when a CB Series unit doesn't actuate on each revolution?

Answer:
a) Check for coil input voltage.

b) Check actuator cam clearance. With the collar biased towards the actuator, there should be a .010" to .030" air gap between the bottom of the actuator and tip of the cam.

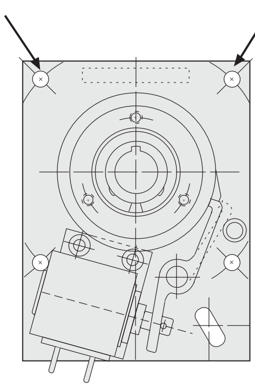
c) Check the setting. See Question 21 to reset or replace the solenoid.

14. Question: Can I use any coil with a one-shot power supply?

Answer: Yes, the one-shot power supply can be used with either AC or DC coils. However, when selecting a coil, remember that higher resistance results in slower response and conversely, lower resistance increases response speed.

15. Question: What is the purpose of the holes in the CB, SAC & SP Series plate assembly?

Answer: There are either three or four holes plus an anti-rotation slot on the CB, SAC & SP Series plate assemblies.



These holes are intended for mounting convenience. These clutch/brake units are shaft mounted, so the plate should simply be restricted from rotating. These units must have some axial compliance to operate properly.

16. Question: How can coil voltage of a wrap spring clutch coil be determined?

Answer: Models CB-6, 7, 8 and 10 have voltage markings near the terminal tabs. CB-2, 4 and 5, as well as SAC models, show the voltage on the back of the coil bracket.

17. Question: What is the meaning of the numbers stamped on The Genuine Wrap Spring clutches?

Answer: The Genuine Wrap Spring clutches are given an eight-digit number. This number translates into a description of your product. Example: 123-45-678

#1 identifies the product series.

#2 identifies whether the unit is domestic or metric.

#3 identifies the size of the unit.

#4 identifies hub input and rotation.

#5 identifies special features.

#6, #7, #8—this three-digit number is serial number assigned to identify specific features of each unit.

18. Question: Why doesn't a model CB-6 with 1" bore include a keyway?

Answer: There is not enough material in the shaft of a 1" bore CB-6 to accommodate a keyway. If a keyway is necessary for a specific application requiring a CB-6, the ¾" bore size should be chosen.

19. Question: How do I know if my clutch was made with the old style, one piece collar or the split cam design?

Answer: Currently, all new Genuine Wrap Spring Standard and Super CB-5, -6, -7, -8, and SAC-5, and SAC-6 units are manufactured with the split cam design. The easiest way to identify the split cam design is by looking at the pivot pin and actuator. If the unit is configured with the split cam design, there will be a small plastic spacer between the pivot pin and the actuator. The actuator will also have two slots for the plunger. The older design had no spacer, and there was only one slot for the plunger and actuator interface.

20. Question: How can I convert my existing one-piece collar to the split cam design?

Answer: To upgrade an older style (single-piece) collar to the split cam design, the sleeve must be replaced. (For CB-5, 6, 7 and 8 models only). The single-piece unit is replaced by a brake sleeve, coupling sleeve and a drive sleeve. In addition to changing the sleeve, the actuator must also be replaced. The position of the actuator on the cam is slightly different, and the new actuator compensates for this change. Refer to the appropriate pages of this catalog for replacement part numbers.

21. Question: How can the solenoid be reset or replaced?

Answer: The following instructions are to be used when resetting or replacing the solenoid.

Collar-Actuator Clearance

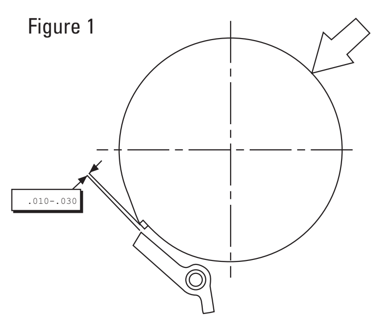
1. Loosen the solenoid adapter plate such that the solenoid can be easily repositioned.
2. If the clutch is equipped with an actuator limit stop, loosen it and move it out of the way.
3. Energize the solenoid.
4. Align the cam face and actuator tip as shown in Figure 1.
5. Push the collar as indicated by the arrow in Figure 1 to take up the free collar play.
6. Check to ensure that the plunger is properly seated.
7. Using a shim between the actuator tip and cam face, set the collar actuator clearance between .010 and .030 by repositioning the solenoid assembly.
8. Tighten the solenoid adapter plate screws.
9. De-energize the solenoid and repeat steps 2 through 5.
10. Re-check the clearance.
11. If equipped with an actuator limit stop, re-energize the coil and set the limit stop as follows:

DC Coils – Set the limit stop so it just contacts the actuator.

AC Coils – Set the actuator-limit stop clearance of .005-.020 at the closest point.

NOTE: It may not be possible to completely eliminate solenoid buzzing on AC solenoids.

Figure 1

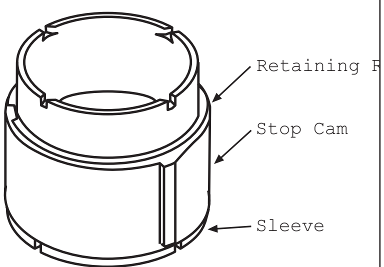


CB Spring Differential Adjustments

Non-Split and Split Cam Units

All Super CB and all CB series clutch/brakes are factory preset to the proper spring differential overtravel. Should a component require replacement and the springs are affected, it is advisable to mark the two spring tang slots to ensure correct reassembly. If this is not possible, use the following procedure to reset the springs.

Non-Split Cam Units



(Sizes 2, 4 and 10)

Spring Differential Adjustments for Non-Split Cam Units Super CB and CB Series (Sizes 2, 4 and 10 Only)

1. Remove the retaining ring from the input hub.
2. Rotate the clutch so the brake spring is fully wrapped down.
   Note: Merely rotating the unit until the actuator hits the cam will not fully engage the brake spring. The output shaft must be rotated in the driving direction until the brake spring fully wraps down.
3. With the brake fully engaged (per step 2), pull the clutch spring out of its slot and allow it to jump to wherever it comes to rest.
4. The clutch spring should be between two slots. Unwrap the spring and push it back into the nearest slot.
5. Push the input hub back into place, release the actuator.
6. Rotate the clutch until the brake spring fully wraps down again.
7. With the brake fully engaged, hold the shaft with one hand and release the actuator.
8. The collar will jump forward as the brake is released and the clutch engages.

The amount of overtravel varies with the unit.

Model	Overtravel
CB-2	.09 to .19”
CB-4	.19 to .31”
CB-10	.62 to .75”

Note: Non-Split Cam design units

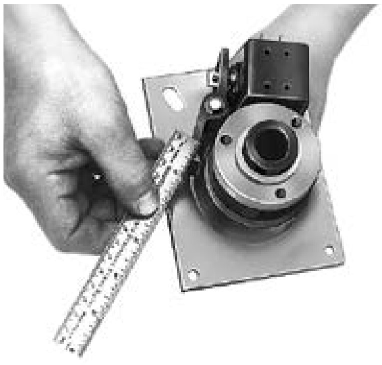
9. To obtain the overtravel, use a scale to measure the distance between the tip of the actuator and the tip of the cam. (See picture below)
10. If the overtravel is within specified limits, reinstall the retaining ring, the unit is set.
11. If the overtravel exceeds the specified amount, move the brake spring back one slot against the direction of rotation and repeat steps 2-9.
12. If the overtravel is less than the specified amount, move the brake spring forward one slot in the direction of rotation.

Note: If the unit is disassembled and the drive and/or brake springs do not need to be replaced, proceed as follows:

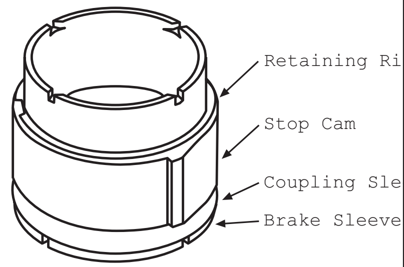
— Reposition the drive and brake springs to their original positions onto the output shaft assembly.

— Reassemble the clutch and position the spring tangs of the drive and brake springs in the factory marked locations on the control collar assembly (on the control collar, there are designated slots marked with a recessed punch mark).

— After the unit is completely assembled, the differential setting should be back to its original setting.



Split Cam Units



(Sizes 5, 6, 7 and 8)

Spring Differential Adjustments For Split Cam Units (5, 6, 7, and 8)

To adjust the differential on split cam units (Sizes 5, 6, 7 and 8), use the following procedure:

1. Slide the retaining ring, stop cam and coupling towards the free hub (input), separating the two split sleeves.
2. Move the brake sleeve spline in the opposite direction of the drive to wrap down the brake spring.
3. Hold the brake spring sleeve spline in place and slide the coupling onto the splines to secure the two sleeves.
4. Slide the stop cam onto the splined section and re-insert the retaining ring into the groove.
5. Rotate the clutch until the brake spring fully wraps down again.
6. With the brake fully engaged, hold the shaft with one hand and release the actuator.
7. The collar will jump forward as the brake is released and the clutch engages.
8. To obtain the overtravel, use a scale to measure the distance between the tip of the actuator and the tip of the cam. (See picture at left)

If the overtravel is too small or large, repeat steps 1-8 above.

The amount of overtravel varies with the unit.

Model	Overtravel
CB-5	.15 to .25”
CB-6	.19 to .37”
CB-7	.37 to .50”
CB-8	.37 to .50”

Note: Split cam design units

Mounting Requirements

Super CB, Standard CB, SAC and SP Units

(All plated mounted wrap spring products)

Horizontal & Vertical Mounting

The Genuine Wrap Spring™ clutches are self-contained packaged products that are easy to mount. A few simple precautions should be taken to ensure maximum life.

All Genuine Wrap Spring clutch products are designed for parallel shaft applications where they are fully supported by the shaft on which they are mounted. In the case of wrap spring clutch/brakes (CB), the through shaft is always the output. Connecting the parallel shaft to the CB input can be accomplished by use of a belt, chain or gear drive. CB models must be mounted with the shaft(s) in a horizontal position (Figure 1). If vertical mounting is required, see Figure 2.

Preferred horizontal mounting

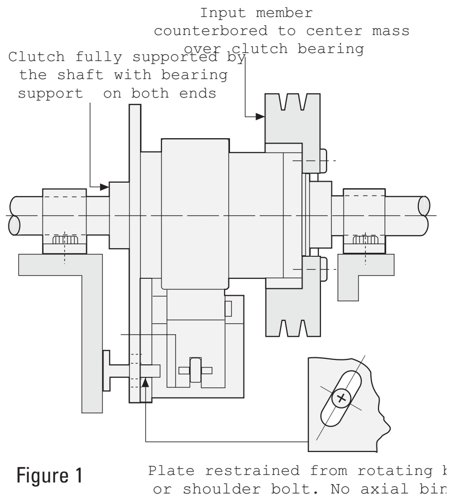


Figure 1

Optional vertical mounting

See Figure 2 note.

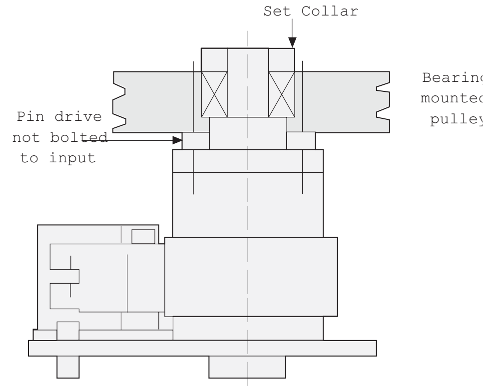


Figure 2

Preferred Horizontal Mounting

Figure 1 - Shows an ideal CB mounting. The unit is locked to the output shaft with a key and set screws. The mounting plate is restrained from rotating with a pin but is not restrained axially, reducing the load on the CB's internal plate bearing.

The anti-rotation device employed must be able to withstand the braking torque required by the load.

It may be desirable to have easy access to the input for changing belts, etc. In this case, the clutch/brake can be mounted on a stub shaft. If so, the unit must still be fully supported. Overhung loads on the input member must be avoided to secure long radial bearing life.

Optional Vertical Mounting

Figure 2 - When applying a wrap spring vertically, the mating drive member (pulley, sprocket or sheave must be bearing-supported as shown in Figure 2. This is necessary to eliminate the axial loading that will occur from the weight of the mating drive member (pulley, sprocket or sheave).

ENGINEERING GUIDELINES

Optional Mounting Configurations

Figures 3 and 4

Illustrate how proper support can be provided. Input members are generally face mounted to the input hub of the unit as shown in Figure 1. This is facilitated by drilled and tapped holes provided in the free hub flange.

Preferred pulley mounting

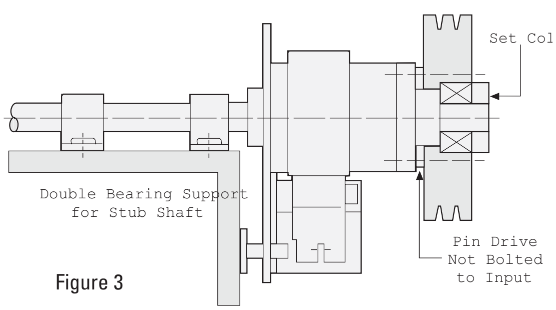


Figure 3

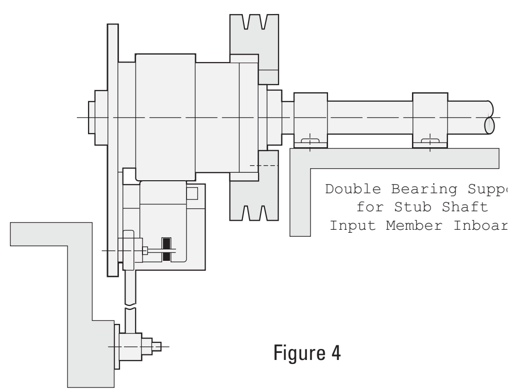


Figure 4

The setup shown in Figure 3 is possible if the radial load to the input hub of the clutch is small compared to the specified load. With a substantial load, arrange the pulley over the centerline of clutch free hub as shown in Figure 4.

The solution presented here is better than that in Figure 3. Place one support bearing as close to the pulley as possible. Use a torque arm for anti-rotation.

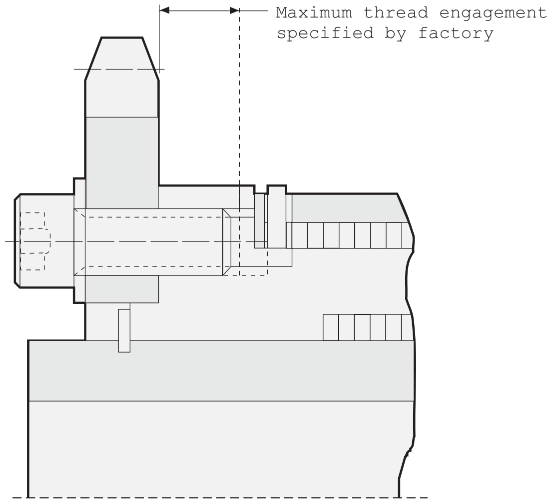
Small units (sizes 2, 4, and 5) are provided with pilot holes in the output shaft and guide drilling through the machine shaft for attachment of the unit, accomplished by a pin.

Mounting Requirements

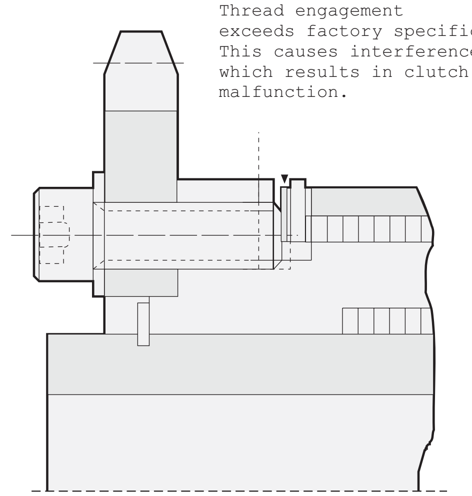
Mounting Thread Engagement

Thread Engagement Requirements

Just a reminder . . . while mounting a sprocket or pulley to the input hub of your CB-2, -4, -5, -6, -7, -8 or -10 or SAC-2, -4, -5 or -6, the screws/ bolts used must not protrude through the flange or hub. This will interfere or jam the control collar assembly, therefore causing the clutch to malfunction by failing to “drive” or causing the clutch to “slip.” Please refer to the following chart for maximum thread engagement:



Correct Mounting



Incorrect Mounting

CB/SAC-2 = .150
CB/SAC-4 = .280
CB/SAC-5 = .350
CB/SAC-6 = .312

CB-7 = .280
CB-8 = .360
CB-10 = .500

Application Analysis

1. Function to Be Performed

1.1 What work is to be done?

Give a basic description of the type of machine and what the clutch/brake is to do. This is important for the application engineers since they may have had experience with this type of application previously.

Example: The application is on a new design for a riveting machine. The clutch will control an eccentric, which will drive home the rivet.

Example: A new automatic bank teller will require a clutch or clutch/brake to deliver the money to the customer after transaction.

1.2 Is it bi-directional?

There are certain applications that require torque to be transmitted in both directions of rotation with one clutch. When this is the case, a friction clutch is generally considered, NOT a wrap spring clutch. There are applications, however, where special wrap spring clutches can be designed for bi-directional applications.

Example: A clutch coupling is required to transmit torque in both CW and CCW rotation and to decouple the load from the drive upon command. PSI engineers designed a wrap spring clutch that can drive in both directions of rotation and, when commanded, will completely decouple the load from the drive, all with a single spring.

1.3 Will it require torque modulation?

Certain applications require "soft" starts or stops. A friction clutch or brake can accomplish this by reduced voltage to the coil. A wrap spring clutch or brake CANNOT be torque modulated, BUT the effects can be minimized by use of a flexible coupling or a properly shaped cam.

Example: A conveyor that contains high but small bottles may require soft starts so that the bottles do not fall over.

Example: A reversing drive for a moving platen copying machine may require a soft start so as not to put vibrations into the machine during the copying cycle, but, during the return, these vibrations may be of no consequence. Thus a friction clutch could be used for the copy cycle and a spring clutch (MSC) for the return.

Example: To minimize the shock and vibration during braking when using a CB or SP S style clutch, compliance can be introduced into the plate retention method.

1.4 Start, Stop, or Start/Stop?

1.4.1 START.

Some applications require starting the load periodically but are not critical in the final stopping position when the clutch is released.

Example: Application is feeding wire or paper into a set of rollers which then continue to draw the wire or paper off the larger spool, independent of the clutch. A PSI or SAC style model SS could be used. The SS style clutch would allow the output of the clutch to overrun the input, allowing the continued motion of the wire when the clutch is no longer engaged. An MSC or MAC may also be suitable.

Example: Application is to use clutches for a two-speed drive. This would not require an accurate stopping position. The PSI model SS or SAC could be used.

1.4.2 STOP.

Certain applications require only stopping or holding. In the wrap spring section of the catalog, there would not be a unit specifically designated as a brake; however, a PSI style clutch could be used as a brake by tying one of the hubs to mechanical ground. MAC or MSC can be configured for limited braking.

Example: The vertical axis of robot is controlled by a ball screw. A brake can be used to hold that position in the event of power failure.

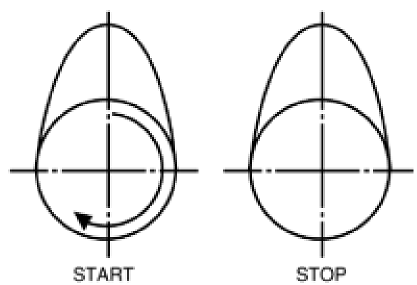
1.4.3 START/STOP.

Single-revolution applications require a start/stop function. This ensures that the load is in a known position at all times. The PSI, SP and SAC style model S clutches plus the CB style clutch/brake are used for these types of requirements.

Example: Most any cam controlling application will require accurate positional control of the start of the cycle. At the end of the cycle the brake stops the motion where the cam is again in its known starting position for the next cycle.

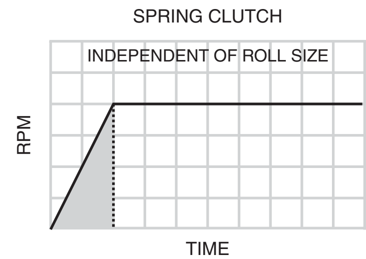
2. Load

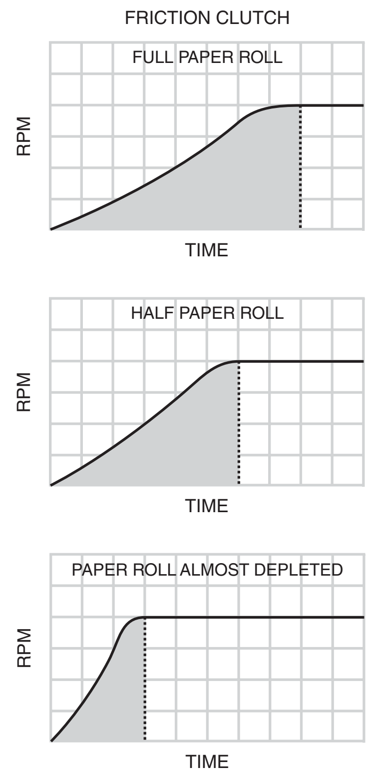
2.1 Inertia—does it vary?



An important factor to consider is that a friction clutch's starting time is inertial and frictional load dependent while that of the wrap spring clutch is not. The time to speed of a wrap spring is, for all practical purposes, constant irrespective of load, within its torque capacity.

Example: A printer will use rolls of paper and it will require a clutch to provide accurate positioning. A spring clutch may be the better choice for this situation since it is not affected by the changing inertia of the roll as the paper is used.





2.1 Friction—does it vary? How?

Load friction varies with bearing wear and over time will increase the friction seen by the clutch. More important, the load may vary through the cycle and be both positive and negative as with most cam-type applications. The importance of knowing how this varies and to what extent should be known for proper clutch application.

3. RPM

3.1 Is the RPM constant?

Many complaints come from users of CBs because of inaccurate stopping position. Upon investigation, it is found that one RPM is used to initially set up the machine and then a faster RPM used for operation. This inaccuracy happens because at lower RPM, there is less energy contained in the load and the brake spring does not fully wrap down; when the RPM is increased to the run speed, the brake spring fully wraps down and the stop position changes.

ENGINEERING GUIDELINES

Application Analysis

It also is common that, to increase production of a machine, the RPM has been increased, and the clutch no longer functions the same. As the RPM goes up, the dynamic torque increases proportionately and can cause an over-torque condition.

It is important to know the RPM and if it changes during setup.

3.2 Is the rotation always in the same direction?

There can be situations when the input rotation direction changes during manual setup operations or normal operation of the machine. If the wrap spring clutch has the anti-overrun (AO) feature, this cannot be done. Without anti-overrun, the input can be rotated in the opposite direction of rotation. The spring will tend to open and slip on the input hub.

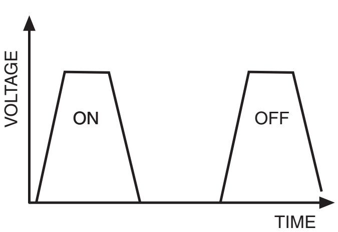
4. Timing Requirements

The time of initiating motion or stopping motion is always important in any mechanical system.

4.1 TTS — Time To Speed

This is the time from initially applying voltage to the coil or solenoid of the clutch until the load has reached full RPM.

The machine synchronization and permissible cycle rate can depend on this parameter. Spring clutches are very consistent in TTS since they are not dependent on the load; thus they will allow certain variations in load and still have consistency in timing.



$$\text{Duty Cycle} = \frac{t_{ON}}{t_{ON} + t_{OFF}} \times 100 = \_\_\_\%$$

4.2 Duty Cycle

Duty cycle is most often used as a means to determine heat buildup of an electrical device.

For single-revolution spring clutches, the cycle duration is dependent on the number of stops on the control collar and the RPM. Cycle rate is the number of cycles per minute. Both are important to know.

5. Stopping Position

5.1 Cycle-to-cycle accuracy requirements

Cycle-to-cycle accuracy is usually given as angular accuracy for single revolution, indexing style clutches; PSI, SP, SAC and CBs.

Example: The application is that a clutch is to control a cut-off knife and will require stopping position accuracy of 5 degrees cycle to cycle.

Stopping position depends on system conditions at the time of stopping. This means that if system conditions, such as RPM or friction, change from one stop to the next, the stopping position may also change. For stopping accuracy, the brake must come to a positive, known position. For the PSI or SP style models with overtravel stop, this would mean that the pin comes all the way to the limit stop. For the CBs it would mean that the brake spring wraps fully down on the brake hub. Once the actuator contacts the control collar to disconnect the clutch, the stop point is dependent on the system inertia to carry the load forward to this brake position. If the system friction is high, there may not be enough inertia; or if the RPM decreases, the energy of the inertia also decreases and may no longer be enough to reach full brake.

Example: A CB with a 2-stop collar is not realizing 180 degrees between stops. This could be because system friction is different at each stop.

Example: A system runs at low RPM for initial setup of the machine, then increases to a normal run speed. The stopping position is no longer the same. The energy of inertia is now higher, and the stopping position will advance since at the lower RPM the brake spring might not have been fully wrapped down on the brake hub.

6. Life Requirements

6.1 Cycles

Cycle life is the required number of times the clutch is engaged and disengaged during its desired operating life. Based on the application data given, an estimate can often be made on the number of cycles that can be expected. This is a common request, but each application is somewhat different, and life testing in the machine is the best way to give an accurate value.

6.2 Time

In certain applications this may be of greater concern than the number of cycles.

Example: A clutch is to be used to control a fire damper door as a safety device, which must be able to function over a minimum life of 10 years. Hopefully the clutch will never have to be used, but this information will determine, perhaps, surface treatment and/or materials.

Example: The main drive clutch of a machine will be engaged 10-20 times per day, 200 days, over five years. Life of the machine is to be 10,000 hours minimum. This may dictate the type of bearings required in the clutch.

7. Environment

7.1 Business or office equipment

This is usually a well-known type of environment but can sometimes differ from the norm.

Example: The clutch in a copier will be located adjacent to the heat lamp and can have a local temperature of 130 degrees C. This situation would require careful consideration for the clutch to properly perform over the expected life, such as special bearing oil.

7.2 Industrial

Most industrial environments can be assumed, but there may be unusual conditions that must be considered.

Example: The clutch will operate a wrapping mechanism on a textile machine. There will be cotton fiber in the air. This cotton fiber can collect on the actuator and not allow proper function, but it will also collect on the oil of the powdered metal bearings. This will act as a wick to draw the oil out and cause premature bearing failure if not adequately protected from the cotton fiber. The solution in this case could be an enclosure/ cover.

7.3 Agricultural or outdoor

This type of application will require the clutch to be constructed with materials to meet harsh conditions of weather and contamination.

Example: The clutch will control a grain drill. The PSI-5 and PSI-6 farm clutches are constructed using special control collars with dirt seals and shaft materials that will stand up to this operating environment.

8. Special Requirements

8.1 Input and direction of rotation

With the exception of the CBs, spring clutches can be operated either as a shaft or hub input. The CBs can only be operated as hub input.

The direction of rotation can be either clockwise or counter clockwise. The direction of rotation is determined by looking from the free hub end.

8.2 Bore size

Always try to use the catalog standard sizes for best economy and delivery. If this is not possible, special bore sizes can be obtained.

8.3 Voltage of coil

Always try to use the catalog standard coil voltages. The most popular is 24 VDC; however, special voltages can be supplied if required.

8.4 Gears, pulleys or special free hub configuration

If the anticipated volume in the application will allow, it may be more economical for the factory to supply the clutch directly with the requested gear, pulley, sprocket or other special feature. It should be noted that Thomson has an in-house powdered metal facility so that the input hub and the special feature could be molded as an integral part. Consult with the factory to determine the best method of manufacture.

Disassembly & Assembly Instructions

CB-2 and -4

Disassembly

1. Important—Ensure that the spring tang location is marked before the unit is taken apart.
2. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
3. Remove the retaining ring from the input hub end.
4. Remove input hub – turn in direction of rotation only.
5. Release the actuator so that the brake is disengaged.
6. Remove the collar assembly – extract the collar toward the clutch spring end.

Assembly

1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the input hub – turn in direction of rotation only.
4. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 80.)
5. Install the retaining ring with smooth surface facing input hub.

Note: Anti-back springs and hubs should not be disassembled because of the difficulty in maintaining endplay setting between hubs. The unit should be returned to the factory for service.

CB-5 and Super CB-5

Disassembly

1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove thrust washer (Super CB-5 only).
4. Remove input hub – turn in direction of rotation only.
5. Release the actuator so that the brake is disengaged.
6. Remove the collar assembly (see split cam design) by extracting the collar toward the clutch spring end.

Assembly

1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the input hub – turn in direction of rotation only.
4. Install thrust washer (Super CB-5 only).
5. Install the retaining ring with smooth surface facing input hub.
6. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 80.)

Note: Anti-back springs and hubs should not be disassembled because of the difficulty in maintaining endplay setting between hubs. The unit should be returned to the factory for service.

CB-6, -7 and -8

Disassembly

1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove input hub – turn in direction of rotation only.
4. Remove the retaining ring from the mounting plate end.
5. Remove the output shaft and collar assembly (see split cam design) from the mounting plate – turn in direction of rotation only. **Do not remove brake hub from mounting plate.**
6. Remove the collar assembly (see split cam design) from the output shaft by extracting the collar toward the brake side of the output shaft.

Assembly

1. Replace parts as needed.
2. Install the collar assembly (see split cam design) over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install retaining ring on the mounting plate end with its smooth surface facing brake hub.
5. Install the input hub.
6. Install the retaining ring on the input hub with smooth surface facing the hub.
7. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 80.)

Super CB-6, -7 and -8

Disassembly

1. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
2. Remove the retaining ring from the input hub end.
3. Remove the input hub with thrust washer — turn in direction of rotation only. (Super CB-7 and 8 note the orientation of the flange for assembly.)
4. Remove the retaining ring from the mounting plate end.
5. Remove the output shaft and collar assembly (see split cam design) from the mounting plate – turn in direction of rotation only. Do not remove brake hub from mounting plate.
6. Remove the collar assembly (see split cam design) from the output shaft by extracting the collar toward the brake side of the output shaft.

Assembly

1. Replace parts as needed.
2. Install the collar assembly (see split cam design) over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring on the mounting plate end with its smooth surface facing the brake hub.
5. Install the input hub with thrust washer (flange oriented correctly on Super CB-7 and 8).
6. Install the retaining ring on the input hub with its smooth surface facing the hub.
7. Reset spring differential as needed. (See "CB Spring Differential Adjustments" on page 80.)

CB-10 and Super CB-10

Disassembly

1. Important—Ensure that the spring tang location is marked before the unit is taken apart.
2. Rotate the input hub until the actuator hits the stop cam. Continue to apply torque in the direction of rotation to the output shaft until the brake spring is fully wrapped down.
3. Remove the retaining ring from the input hub end.
4. Remove the input hub – turn in direction of rotation only (CB-10). (Super CB-10 remove the input hub with the thrust washer – turn in direction of rotation only and note the orientation of the flange for assembly.
5. Remove the retaining ring from the mounting plate end.
6. Remove the output shaft and collar assembly from the mounting plate – turn in direction of rotation only. Do not remove brake hub from mounting plate.
7. Remove the collar assembly from the output shaft by extracting the collar toward the brake side of the output shaft.

Disassembly & Assembly Instructions

Assembly
1. Replace parts as needed.
2. Install the collar assembly over the output shaft and spring assembly. (Pull the brake spring through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install the output shaft and collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring on the mounting plate end with its smooth surface facing the brake hub.
5. Install the input hub and reset spring differential as needed (CB-10). Install the input hub with thrust washer flange oriented correctly and reset the spring differential as needed (Super CB-10). (See "CB Spring Differential Adjustments"on page 80.)
6. Install the retaining ring with smooth surface facing the hub.

SAC-2, -4 and -5

Disassembly
1. Remove the retaining ring from the input hub end.
2. Remove input hub – turn in direction of rotation only.
3. Remove the stop collar by extracting the collar toward the clutch spring end.

Assembly
1. Replace parts as needed.
2. Install the stop collar over the output shaft and spring assembly. (Pull the clutch spring tang through the collar with needle-nosed pliers, taking care not to distort the spring.)
3. Install input hub – turn in direction of rotation only.
4. Install retaining ring.

SAC-6

Disassembly
1. Remove the retaining ring from the input hub end.
2. Remove input hub – turn in direction of rotation only.
3. Remove the retaining ring from the mounting plate end.
4. Remove the output shaft and stop collar assembly from the mounting plate – turn in the direction of rotation only. Do not remove plate hub from mounting plate.
5. Remove the control stop from the output shaft by extracting the collar towards plate side of the output shaft.

Assembly
1. Replace parts as needed.
2. Install the stop collar over the output shaft and spring assembly.
3. Install the output shaft and stop collar assembly on the mounting plate – turn in direction of rotation only.
4. Install the retaining ring to output shaft.
5. Install the input hub.
6. Install the retaining ring on the shaft input end.

PSI

Disassembly
1. Remove retaining ring from shaft.
2. Remove hub end by rotating opposite to drive direction.
3. For Model S, remove stop collar and spring by rotating opposite to drive direction and pulling to remove output tang from hub.

Assembly Model S
1. Assemble spring to output hub by rotating opposite to direction of rotation. Output tang must be inserted completely into hole in hub during this assembly.
2. Assemble stop collar over spring by deflecting input tang with long-nose pliers. (Reach through collar with pliers.)
3. Assemble input hub by rotating opposite to direction of rotation.
4. Assemble retaining ring to shaft.

Assembly Model O & SS
1. Assemble spring and stop collar (or sleeve) with control tang located in slot in collar.
2. Assemble spring and collar to output hub by rotating opposite to direction of rotation.
3. Assemble input hub by rotating opposite to direction of rotation.
4. Assemble retaining ring to shaft.

Friction Clutches & Brakes

How to Select

Brake Selection

Step 1

Determine if the application requires a *static* (holding) or *dynamic* (stopping) brake.

Step 2

For *static brake applications*, determine the required static torque to hold the load under worst case conditions, considering system drag. Skip to Step 5.

Step 3

For *dynamic braking applications* with a specific stopping time requirement, first calculate the dynamic torque necessary to decelerate the load, using the ***inertia-time*** equation:

$$T_D = (0.1047\ (I \times \omega) / t) - D$$

where I = total system inertia lbs.-in.-sec^2, ω = shaft speed in RPM, t = time to zero and D = load drag. Next multiply by 1.25 to convert to static torque. Skip to Step 5.

Step 4

For those *dynamic braking applications* requiring only an ability to stall a load, calculate the appropriate static torque using the ***horsepower-RPM*** equation:

$$T_S = 1.25 \times 63000 \times (HP \times K) / \omega$$

where HP = horsepower, K = service factor and ω = RPM ***OR*** refer to the charts found on page 89.

Step 5

Select a brake model from the catalog with a static torque rating greater than the required torque (service factor dependent). Verify that the selected brake fits into the available application envelope and mounting configuration.

Note: When braking dynamically, careful consideration must be given to proper energy dissipation. Calculate the total kinetic energy dissipation per cycle (E_k), and compare this to the allowable braking energy (E_b) based on the frequency of engagement (N) given in the Energy Dissipation Chart on page 127. If the total kinetic energy dissipation **per cycle** is more than allowable, given the frequency of engagement, then consider using a larger series brake.

Clutch Selection

Step 1

For clutch applications with a *specific acceleration time* requirement, first calculate the dynamic torque (T_D) required to accelerate the load using the ***inertia-time*** equation:

$$T_D = 0.1047\ (I \times \omega) / t + D$$

where I = rotational load inertia in lbs.-in.-sec^2 units, ω = differential slip speed in RPM, t = time to speed, and D = load drag torque reflected to the clutch. Next convert to static torque by multiplying by 1.25. Skip to Step 3.

Step 2

For clutch applications requiring only an *ability* to *accelerate a load*, calculate the appropriate static torque using the ***horsepower-RPM*** equation:

$$T_S = 1.25 \times 63000 \times (HP \times K) / \omega$$

where HP = horsepower, K = service factor, and ω = differential slip speed in RPM ***OR*** refer to the charts in the engineering guidelines section.

Step 3

Select a clutch model from the catalog with a static torque rating greater than the required torque (service factor dependent). Verify that the selected clutch fits into the available application envelope and mounting configuration.

Note: When engaging a clutch dynamically (under load at speed), careful consideration must be given to proper energy dissipation. Calculate the total energy dissipated per minute:

$$E = (E_k + E_s) \times N$$

where E_k = kinetic energy, E_s = slip energy, and N = cycle rate. If the total energy dissipation is more than allowable (see performance data tables), then consider using a larger series clutch.

General Notes

In some applications it may be necessary to consider clutch or brake inertia and engagement time in calculating load acceleration. If the inertia or engagement time of the clutch or brake selected represents more than 10% of the load inertia or acceleration time, use the above referenced ***Inertia-time*** equation to solve for acceleration time **(t)**, using an inertia equivalent to the sum of the load inertia and the clutch or brake inertia (see performance data tables). Then verify that the sum of the acceleration and clutch or brake engagement times is still within the required acceleration time for the application.

For more information on other key factors that greatly affect clutch or brake life, such as ambient temperature, slip-speed and load energy, please contact us at 1-540-633-3400.

Selecting a Clutch or Brake

Torque, Horsepower & Speed

Disregarding frictional losses in a pulley, gear or sprocket system incorporating a clutch and running at a constant speed, the HP delivered by the clutch equals the HP of the prime mover. However, the torque imposed on the clutch may be greater or less than the torque on the prime mover depending on the ratio of the speed of the shafts. Generally, the faster the clutch shaft speed, the lower the torque required to drive the load.

The application charts below can be used as a quick and easy reference to determine the proper sizing of a clutch or brake based on motor horsepower and speed. However, when precise control and life expectancy are critical, all design considerations should be evaluated.

Light to Medium Duty Applications (K = 1.5)

	Clutch or Brake Shaft Speed in RPM																				
HORSEPOWER	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4600	5000
1/50																					
1/20								Series 17													
1/12																					
1/8																					
1/6								Series 19													
1/4																					
1/3										Series 22/23											
1/2																					
3/4											Series 26/28										
1																					
1 1/2													Series 30								
2																					
3																					
5															Series 40						
7 1/2																					

Heavy Duty Applications (K = 3.0)

	Clutch or Brake Shaft Speed in RPM																				
HORSEPOWER	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4600	5000
1/50							Series 17														
1/20																					
1/12								Series 19													
1/8																					
1/6										Series 22/23											
1/4																					
1/3												Series 26/28									
1/2																					
3/4														Series 30							
1																					
1 1/2																					
2															Series 40						
3																					
5																					
7 1/2																					

FRICTION

START

CS/CSC Series

Shaft-Mounted Clutches and Clutch Couplings

Electromagnetic clutches provide an efficient, electrically switchable link between a motor and a load. Clutches are used to couple two parallel shafts by the use of pulleys, gears or sheaves. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor and armature assembly are mounted on a single shaft, with the rotor secured to the shaft. The armature is bearing mounted and free to rotate. When the coil is energized, the armature engages the friction surface of the rotor, thus driving the load.

Electromagnetic clutch couplings provide this same efficient, electrically switchable link between a motor and a load for inline shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab, the rotor and armature assembly are securely mounted on opposing inline shafts. When the coil is energized, the armature engages the friction surface of the rotor, coupling the two inline shafts, thus driving the load.

- Torque: 2.5 to 80 lbs.-in. (0.28 to 9.04 Nm)
- Diameters: 1.25 to 2.26 in. (31.8 to 66.8 mm)
- Efficient means of cycling load
- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Economic cost
- Energy efficient

How to Order

CS – 11 B 24* – E04 – E04

Series
- **CS** = Shaft Mounted Clutch
- **CSC** = Shaft Mounted Clutch Coupling

Frame Size
- **11** = 1.25 (31.8)
- **15** = 1.53 (38.9)
- **17** = 1.78 (45.2)
- **22** = 2.26 (57.4)
- **26** = 2.63 (66.8)

- **B** = Burnished
- **U** = Unburnished

Coil Voltage
- **12** = 12VDC
- **24** = **24VDC**
- **90** = **90VDC**

Rotor Bore / **Armature Bore**

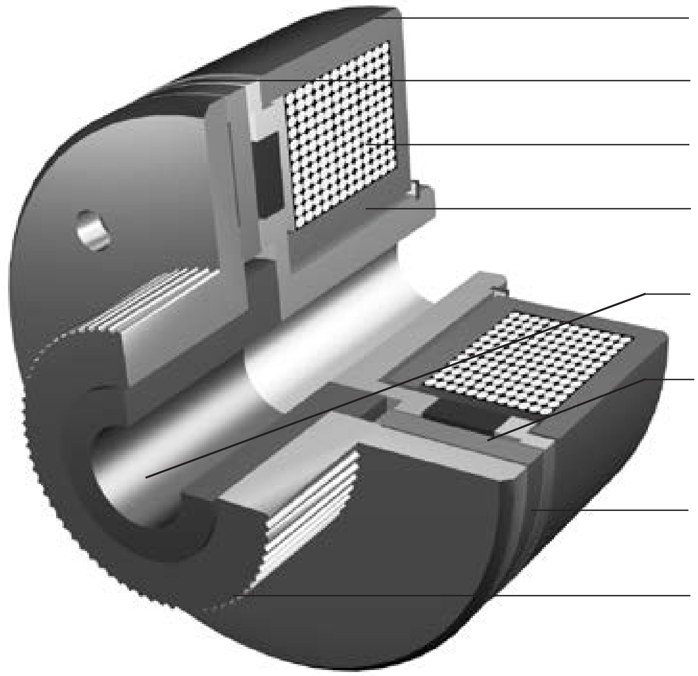
English		Metric	
E03	= .1875	**M06**	= 6mm
E04	= .2500	**M08**	= 8mm
E05	= .3125	**M10**	= 10mm
E06	= .3750	**M12**	= 12mm
E08	= .5000	**M20**	= 20mm
E10	= .6250	**M25**	= 25mm

* Other voltages available upon request

General Notes

- The air gap should be checked periodically to ensure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Consult factory for additional options.
- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Flying leads are provided as standard, terminal style connection available upon request.
- Armature and rotor bore dimensions are minimums, with tolerance generally .001/.002 larger to accommodate varying environmental conditions.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

Clutches and Clutch Couplings

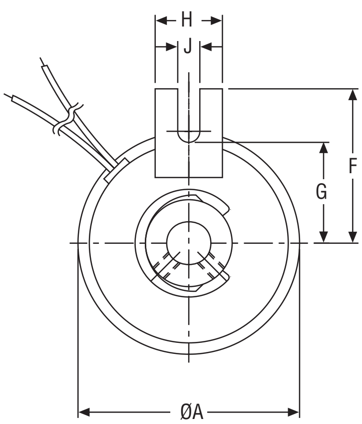


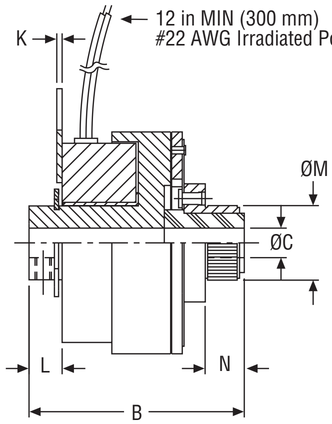
Typical Applications

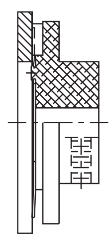
- Document handling
- Copiers
- Printers
- Collators
- Sorters
- Finishers
- ATM machines
- Currency counters
- Vending machines
- Postal handling equipment
- Ticket & receipt dispensing
- Packaging
- Material handling
- Office automation

CS-11 Clutches & CSC-11 Clutch Couplings

Dimensions & Specifications







Dimensions (mm)
Mounting requirements see page 128.

CS Model

CSC Model

CS Model Shown

DIMENSIONS											
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: OAL in. (mm)	C: Bore Ø in. (mm)	F: Tab Height in. (mm)	G: Slot Height in. (mm)	H: Tab Width in. (mm)	J: Slot Width in. (mm)	K: Tab Thickness in. (mm)	L: Length in. (mm)	M: Mtg Ø x N: Length in. (mm)
CS-11B24-E04-E04	5.0 (0.56)	1.25 (31.8)	1.38 (35.1)	.250 (6.4)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	.507 x 0.33 (12.9 x 8.4)
CS-11B24-E05-E05	5.0 (0.56)	1.25 (31.8)	1.38 (35.1)	.312 (7.9)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	.507 x 0.33 (12.9 x 8.4)
CSC-11B24-E04-E04	5.0 (0.56)	1.25 (31.8)	1.28 (32.5)	.250 (6.4)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	NA
CSC-11B24-E05-E05	5.0 (0.56)	1.25 (31.8)	1.28 (32.5)	.312 (7.9)	0.87 (22.1)	0.56 (14.2)	0.38 (9.7)	0.13 (3.3)	0.03 (0.8)	0.22 (5.6)	NA

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Armature Engage. msec	Armature Disengage. msec	Armature Inertia lbs.-in.-sec²	Rotor Inertia lbs.-in.-sec²	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
CS-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.5×10^{-5}	2.6×10^{-5}	0.2 (0.1)	175
CSC-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.4×10^{-5}	2.6×10^{-5}	0.2 (0.1)	175

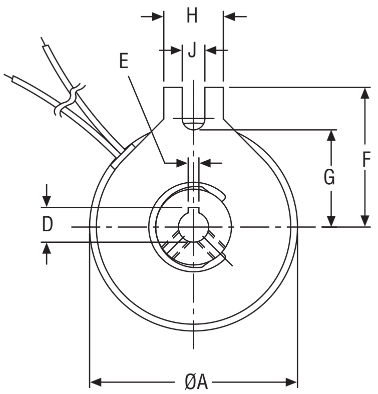
*See "How to order" model numbering system on page 90 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

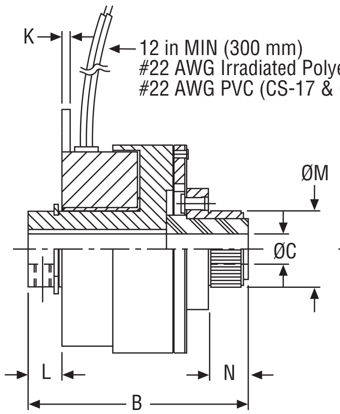
General Notes

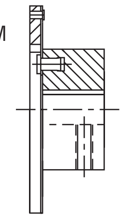
- Customer shall maintain concentricity between armature assembly and rotor shaft within .003 T.I.R.
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Other voltages available upon request.
- Initial working air gap at installation shall be .004/.009.
- Customer supplied gear/pulley/sprocket is press-fit on the clutch armature assembly knurl.
- Rotor is secured to shaft by set screw or roll pin.
- Clutch coupling armature assembly is secured to shaft by set screws and key.
- Metric bores available
- Static torque values above are burnished

CS-15, 17 Clutches & CSC-15, 17 Clutch Couplings

Dimensions & Specifications







Dimensions (mm)
Mounting requirements see page 128.

CS Model

CSC Model

CS Model Shown

DIMENSIONS

Model*	Static Torque in. (mm)	A: OD in. (mm)	B: OAL in. (mm)	C: Bore Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Tab Height in. (mm)	G: Slot Height in. (mm)	H: Tab Width in. (mm)	J: Slot Width in. (mm)	K: Tab Thick. in. (mm)	L:Lngth in. (mm)	M: Mtg Ø x N: Lg in. (mm)
CS-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.83 (46.5)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CS-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.83 (46.5)	. 312 (7.9)	.364 (9.2)	.094 (2.4)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CS-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.83 (46.5)	. 375 (9.5)	NA	NA	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	.631 x 0.33 (16.0 x 8.4)
CSC-15B24-E04-E04	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CSC-15B24-E05-E05	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 312 (7.9)	.364 (9.2)	.094 (2.4)	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CSC-15B24-E06-E06	10 (1.13)	1.53 (38.9)	1.68 (42.7)	. 375 (9.5)	NA	NA	1.10 (27.9)	0.75 (19.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.38 (9.7)	NA
CS-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.85 (47.0)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CS-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.85 (47.0)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CS-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.85 (47.0)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	.631 x 0.33 (16.0 x 8.4)
CSC-17B24-E04-E04	15 (1.69)	1.78 (45.2)	1.55 (39.4)	. 250 (6.4)	.286 (7.3)	.062 (1.6)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA
CSC-17B24-E05-E05	15 (1.69)	1.78 (45.2)	1.55 (39.4)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA
CSC-17B24-E06-E06	15 (1.69)	1.78 (45.2)	1.55 (39.4)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.32 (33.5)	0.91 (23.1)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.30 (7.6)	NA

PERFORMANCE

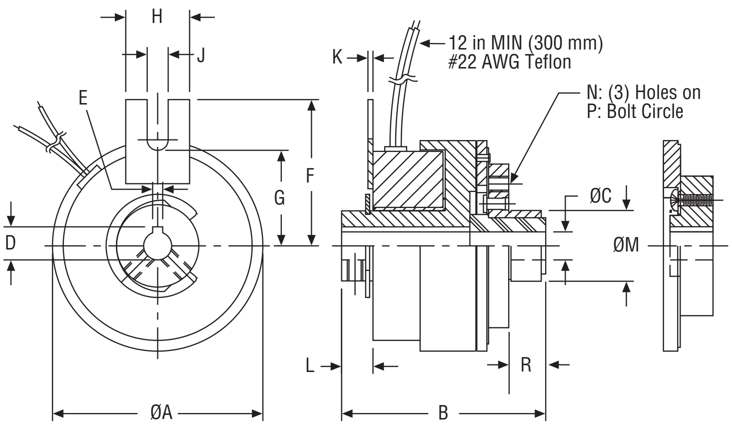
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engage. msec	Armature Diseng. msec	Armature Inertia lbs.-in.-sec²	Rotor Inertia lbs.-in.-sec²	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
CS-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	5.9×10^{-5}	5.2×10^{-5}	0.4 (0.2)	295
CSC-15	10 (1.13)	24/90	130/1800	5.0	8.0	22.0	6.6×10^{-5}	5.2×10^{-5}	0.4 (0.2)	295
CS-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	7.3×10^{-5}	11.4×10^{-5}	0.6 (0.3)	420
CSC-17	15 (1.69)	24/90	108/1500	6.0	10.0	27.0	8.1×10^{-5}	11.4×10^{-5}	0.6 (0.3)	420

General Notes

- Initial working air gap at installation shall be .004/.009.
- Static torque values above are burnished.
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Metric bores available
- Other voltages available upon request.

CS-22, 26 Clutches & CSC-22, 26 Clutch Couplings

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see page 128.

CS Model

CSC Model

CSC Model Shown

DIMENSIONS														
Model*	Static Torque in. (mm)	A: OD in. (mm)	B: OAL in. (mm)	C: Bore Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Tab Height in. (mm)	G: Slot Height in. (mm)	H: Tab Width in. (mm)	J: Slot Width in. (mm)	K: Tab Thick. in. (mm)	L: Lngth in. (mm)	M: Mtg Ø x R: Lngth in. (mm)	N: (3) Mtg. Holes	P: Mtg. Hole BC Ø in. (mm)
CS-22B24-E05-E05	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CS-22B24-E06-E06	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CS-22B24-E08-E08	40 (4.52)	2.26 (57.4)	2.20 (55.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	.756 x .37 (19.2 x 9.4)	NA	NA
CSC-22B24-E05-E05	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CSC-22B24-E06-E06	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CSC-22B24-E08-E08	40 (4.52)	2.26 (57.4)	2.06 (52.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.52 (38.6)	1.16 (29.5)	0.44 (11.2)	0.19 (4.8)	0.06 (1.5)	0.36 (9.1)	NA	NA	NA
CS-26B24-E06-E06	80 (9.04)	2.63 (66.8)	2.47 (62.7)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	.999 x 0.47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CS-26B24-E08-E08	80 (9.04)	2.63 (66.8)	2.47 (62.7)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	.999 x 0.47 (25.4 x 11.9)	#8-32	1.375 (34.9)
CSC-26B24-E06-E06	80 (9.04)	2.63 (66.8)	2.10 (53.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	NA	NA	NA
CSC-26B24-E08-E08	80 (9.04)	2.63 (66.8)	2.10 (53.3)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.75 (44.5)	1.34 (34.0)	0.50 (12.7)	0.19 (4.8)	0.06 (1.5)	0.34 (8.6)	NA	NA	NA

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
CS-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.4 x 10^{-5}	32.3 x 10^{-5}	1.1 (0.5)	1400
CSC-22	40 (4.52)	24/90	75/1059	8.5	12.0	32.0	33.1 x 10^{-5}	32.3 x 10^{-5}	1.1 (0.5)	1400
CS-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	80.0 x 10^{-5}	62.0 x 10^{-5}	1.4 (0.6)	2600
CSC-26	80 (9.04)	24/90	65/893	9.5	15.0	35.0	81.0 x 10^{-5}	62.0 x 10^{-5}	1.4 (0.6)	2600

*See "How to order" model numbering system on page 90 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Initial working air gap at installation shall be .006/.013.
- Static torque values above are burnished
- Customer shall maintain a loose pin fit through the anti-rotation tab to prevent pre-loading of bearings.
- Metric bores available
- Other voltages available upon request.

START HOLD STOP

MCS Series

Metric Shaft-Mounted Clutches

Our metric line of clutches and brakes are designed to be used in true metric applications (dimensional). The MCS Series offers a wide selection of metric bores and metric standard keyways. The Form Fit and Function matches popular metric lines globally available and are drop-in replacements in most cases.

The MCS Series has superior performance at a fraction of the cost of our competition. These units are available for low, medium and high volumes.

- Torque: 5.5 to 500 Nm (49 to 4,425 lbs.-in.)
- Diameters: 63 to 280 mm (2.48 to 11.02 in.)
- Zero backlash design
- Static or dynamic engagement
- Simple installation
- Energy efficient
- Economic cost
- Available "as is" or custom
- RoHS compliant

Typical Applications

- Factory automation
- Robotics
- Material handling
- Automotive
- Office automation
- Aviation
- Mail sorters
- Servo systems
- Medical

CLUTCH & CLUTCH COUPLINGS

How to Order

MCS - 26 - U - 24 - M12

Series
MCS = Metric Clutches

Frame Size
26 = 67.5 (2.657)
30 = 85 (3.346)
40 = 106 (4.173)
50 = 133 (5.236)
60 = 169 (6.654)
80 = 220 (8.661)
100 = 280 (11.024)

B = Burnished
U = Unburnished

Coil Voltage
24 = 24VDC

Rotor Bore
M12 = 12mm
M15 = 15mm
M20 = 20mm
M25 = 25mm
M30 = 30mm
M40 = 40mm
M50 = 50mm
M60 = 60mm

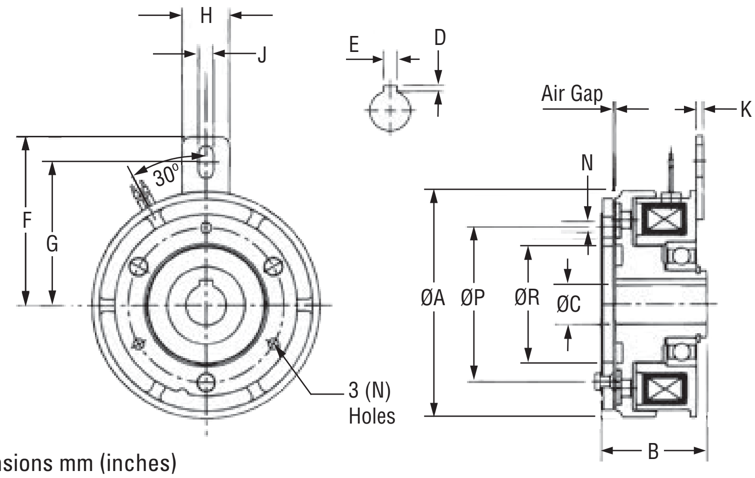
General Notes

- The air gap should be checked periodically to ensure proper operation.
- All friction faces must be kept free of grease and oil for proper operation.
- Consult factory for additional options.
- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Flying leads are provided as standard, terminal style connection available upon request.
- Armature and rotor bore dimensions are minimums, with tolerance generally .001/.002 larger to accommodate varying environmental conditions.
- Coil of 24 volts are provided as standard, other coil voltages are available upon request.

SLIP START

MCS-26, 30, 40, 50, 60, 80 & 100 Metric Clutches

Dimensions & Specifications



Dimensions mm (inches)

MCS Model Shown

DIMENSIONS														
												Mounting Holes		
Model	Static Torque Nm (lbs.-in.)	A: OD mm (in.)	B: OAL mm (in.)	C: Bore mm (in.)	D: K'way Height mm (in.)	E: K'way Width mm (in.)	F: Tab Height mm (in.)	G: Slot mm (in.)	H: Tab Width mm (in.)	J: Slot Width mm (in.)	K: Tab Thickness mm (in.)	N:Dia Holes (3) mm (in.)	P: BC mm (in.)	R: Dia mm (in.)
MCS-26U24-M12	5.5 (48.68)	67.5 (2.657)	31.1 (1.224)	12 (0.472)	1.8 (0.071)	4 (0.157)	49.5 (1.949)	42.75 (1.683)	12 (0.472)	4.5 (0.177)	2 (0.079)	3.1 (0.122)	46 (1.811)	34.5 (1.358)
MCS-26U24-M15	5.5 (48.68)	67.5 (2.657)	31.1 (1.224)	15 (0.591)	2.3 (0.091)	5 (0.197)	49.5 (1.949)	42.75 (1.683)	12 (0.472)	4.5 (0.177)	2 (0.079)	3.1 (0.122)	46 (1.811)	34.5 (1.358)
MCS-30U24-M15	11 (97.35)	85 (3.346)	34.2 (1.346)	15 (0.591)	2.3 (0.091)	5 (0.197)	63.5 (2.500)	55 (2.165)	14 (0.551)	5.5 (0.217)	2 (0.079)	4.1 (0.161)	60 (2.362)	41.5 (1.634)
MCS-40U24-M20	22 (194.70)	106 (4.173)	40 (1.575)	20 (0.787)	2.3 (0.091)	5 (0.197)	72.5 (2.854)	61.75 (2.431)	16 (0.630)	6.5 (0.256)	2 (0.079)	5.1 (0.201)	76 (2.992)	52 (2.047)
MCS-50U24-M25	45 (398.25)	133 (5.236)	45 (1.772)	25 (0.984)	3.3 (0.130)	7 (0.276)	85 (3.346)	76.3 (3.004)	16 (0.630)	6.5 (0.256)	2 (0.079)	6.1 (0.240)	95 (3.740)	62 (2.441)
MCS-60U24-M30	90 (796.50)	169 (6.654)	52.7 (2.075)	30 (1.181)	3.3 (0.130)	7 (0.276)	112 (4.409)	98.4 (3.874)	25 (0.984)	8.5 (0.335)	3 (0.118)	8.1 (0.319)	120 (4.724)	80 (3.150)
MCS-80U24-M40	200 (1770)	220 (8.661)	78 (3.071)	40 (1.575)	3.5 (0.138)	10 (0.394)	128 (5.039)	129 (5.079)	25 (0.984)	10 (0.394)	3 (0.118)	3.0 (0.118)	158 (6.220)	99.5 (3.917)
MCS-100U24-M50	400 (3540)	280 (11.024)	93 (3.661)	50 (1.969)	3.5 (0.138)	12 (0.472)	172.5 (6.791)	162 (6.378)	30 (1.181)	10 (0.394)	3 (0.118)	6.0 (0.236)	120 (4.724)	100 (3.937)

PERFORMANCE											
Model	Static Torque* Nm (lbs.-in.)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Armature Engagement msec	Armature Disengage msec	Armature Inertia kgcm^2 (lbs.-in.-sec^2)	Rotor Inertia kgcm^2 (lbs.-in.-sec^2)	Weight kg (lbs.)	Energy Dissipation ft.-lbs./min	Recomm. Air Gap at Install mm (in.)
MCS-26U24-M15	5.5 (48.68)	24	53	11	10	12	0.346 (3.06 x 10^{-4})	0.834 (7.38 x 10^{-4})	1 (2.205)	2600	0.2 (0.008)
MCS-30U24-M15	11 (97.35)	24	38.4	15	9	20	1.098 (9.72 x 10^{-4})	2.215 (1.96 x 10^{-3})	1.5 (3.307)	2900	0.2 (0.008)
MCS-40U24-M20	22 (194.7)	24	28.9	20	14	60	3.22 (2.85 x 10^{-3})	6.739 (5.96 x 10^{-3})	2.5 (5.512)	5800	0.2 (0.008)
MCS-50U24-M25	45 (398.25)	24	25	25	20	68	10.445 (9.24 x 10^{-3})	19.149 (1.69 x 10^{-2})	4 (8.818)	9000	0.3 (0.012)
MCS-60U24-M30	90 (796.5)	24	16.46	35	18	148	38.109 (3.37 x 10^{-2})	56.765 (5.02 x 10^{-2})	7 (15.432)	10000	0.3 (0.012)
MCS-80U24-M40	200 (1770)	24	12.8	45	27	142	120.827 (1.07 x 10^{-1})	145.953 (1.29 x 10^{-1})	12 (26.455)	50000	0.4 (0.016)
MCS-100U24-M50	400 (3540)	24	9.6	60	90	120	357.462 (3.16 x 10^{-1})	539.803 (4.78 x 10^{-1})	20 (44.092)	70000	0.4 (0.016)

(-) denotes English equivalents. Specifications subject to change without notice.
*Unburnished
**Consult factory

STOP HOLD

BF Series

Power-on Brakes

Electromagnetic power-on brakes provide an efficient, switchable means of stopping and/or holding the load. While the field (electromagnet) assembly is fixed and prevented from rotating by a flange, the armature assembly is secured to the shaft. When the coil is energized, the armature engages the friction surface of the fixed field (electromagnet) assembly, thus stopping and/or holding the load.

- Torque: 5 lb-in to 80 lbs.-in. (0.56 to 9.04 Nm)
- Diameter: 1.25 to 2.26 in. (31.8 to 66.8 mm)
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

Typical Applications

- Robotics
- Medical equipment
- Actuators
- Motor brakes
- Postal handling equipment
- Packaging

How to Order

BF - 26 B 24* - E08

Series
BF = Power-on Brake

Frame Size

11	=	1.25 (31.8)
15	=	1.53 (38.9)
17	=	1.78 (45.2)
22	=	2.26 (57.4)
26	=	2.63 (66.8)

U = Unburnished
B = Burnished

Coil Voltage

12	=	12VDC
24	=	**24VDC**
90	=	**90VDC**

Hub Bore

English			Metric		
E03	=	.1870	**M03**	=	3mm
E04	=	.2500	**M04**	=	4mm
E05	=	.3125	**M05**	=	5mm
E06	=	.3750	**M06**	=	6mm
E08	=	.5000	**M08**	=	8mm
E10	=	.6250	**M10**	=	10mm
			M12	=	12mm
			M16	=	16mm

Insulation Class:
BF: Class B (130°C)

* Other voltages available upon request

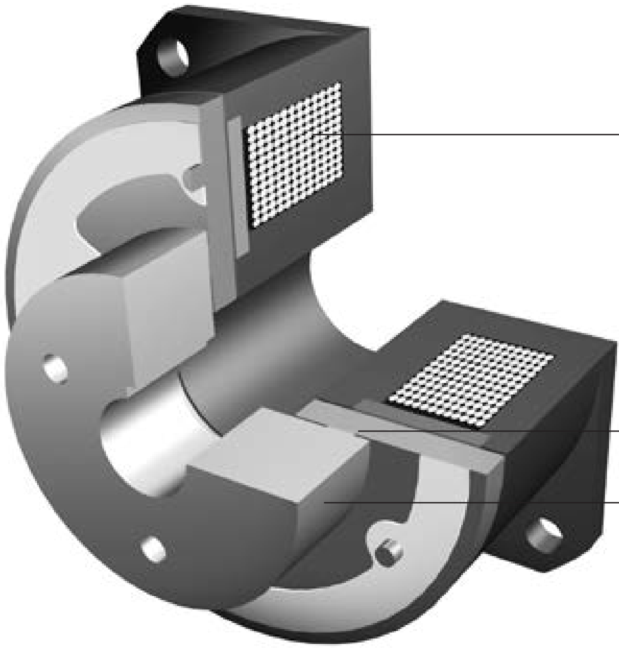
General Notes

- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.
- Working air gap should be checked periodically to ensure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

STOP HOLD

BF Series

Power-on Brakes



Efficient low-power consumption coil, UL Class B insulation system

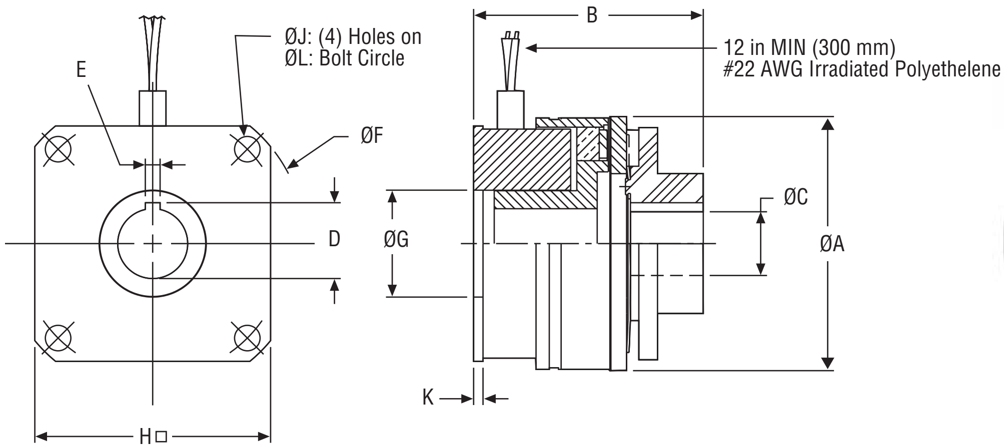
Zero backlash accurate system positioning

Fully plated components, maximum corrosion protection

STOP HOLD

BF-11 Brakes

Dimensions & Specifications



BF Model Shown

Dimensions (mm)
Mounting requirements see page 128.

DIMENSIONS												
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: OAL in. (mm)	C: Hub ID Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Mtg Pilot Ø in. (mm)	G: Case IDØ in. (mm)	H: Mtg Width in. (mm)	J: (4) Mtg Holes Ø in. (mm)	K: Mtg Plt Thickness in. (mm)	L: Mtg Hole BC Ø in. (mm)
BF-11B24-E04	5.0 (0.56)	1.25 (31.8)	1.14 (29.0)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.498 (38.0)	0.53 (1.35)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)
BF-11B24-E05	5.0 (0.56)	1.25 (31.8)	1.14 (29.0)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.498 (38.0)	0.53 (1.35)	1.17 (29.7)	.125 (3.2)	0.05 (1.3)	1.31 (33.3)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
BF-11	5.0 (0.56)	24/90	128/1800	5.0	5.0	18.0	3.4×10^{-5}	NA	0.2 (0.1)	175

*See "How to order" model numbering system on page 97 for BF power-on brakes.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

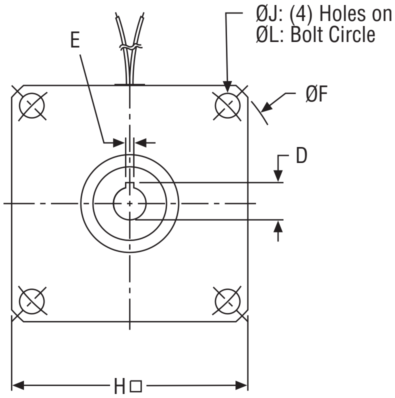
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .004/.009.
- Other voltages available upon request.
- Brake coupling armature assembly is secured to shaft by (1) set screw and key.
- Metric bores available

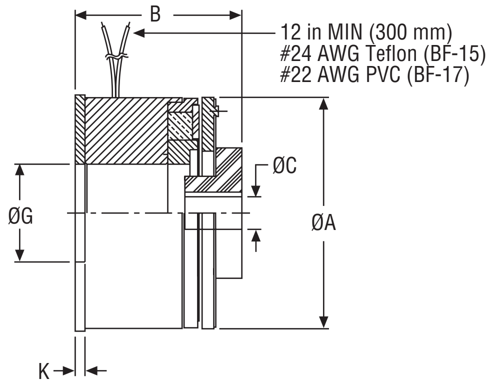
BRAKES

STOP HOLD

BF-15, 17 Brakes

Dimensions & Specifications





Dimensions (mm)
Mounting requirements see page 128.

BF Model Shown

DIMENSIONS												
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: OAL in. (mm)	C: Hub ID Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Mtg Pilot Ø in. (mm)	G: Case ID Ø in. (mm)	H□: Mtg Width in. (mm)	J: (4) Mtg Holes Ø in. (mm)	K: Mtg Plt Thick. in. (mm)	L: Mtg Hole BC Ø in. (mm)
BF-15B24-E04	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.250 (6.4)	.286 (7.3)	.062 (1.6)	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-15B24-E05	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.312 (7.9)	.364 (9.2)	.094 (2.4)	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-15B24-E06	10 (1.13)	1.53 (38.9)	1.38 (35.1)	.375 (9.5)	NA	NA	1.999 (50.8)	0.68 (17.3)	1.56 (39.6)	.156 (4.0)	0.06 (1.5)	1.75 (44.5)
BF-17B24-E04	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.250 (6.4)	.286 (7.3)	.062 (1.6)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)
BF-17B24-E05	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)
BF-17B24-E06	15 (1.69)	1.78 (45.2)	1.27 (32.3)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.436 (61.9)	0.75 (19.1)	1.82 (46.2)	.187 (4.7)	0.06 (1.5)	2.13 (54.1)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
BF-15	10.0 (1.13)	24/90	130/1800	5.0	8.0	22.0	6.6×10^{-5}	NA	0.4 (0.2)	295
BF-17	15.0 (1.69)	24/90	108/1518	6.0	10.0	27.0	8.1×10^{-5}	NA	0.5 (0.3)	420

*See "How to order" model numbering system on page 90 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

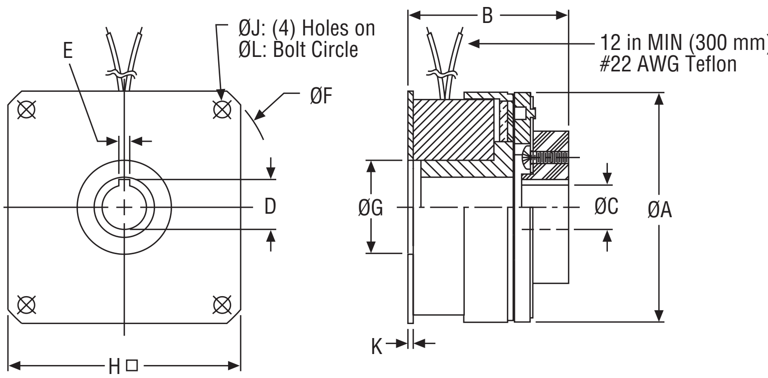
General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .006/.013.
- Other voltages available upon request.
- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

STOP HOLD

BF-22 & 26 Brakes

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see page 128.

BF Model Shown

DIMENSIONS											
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: OAL in. (mm)	C: Hub ID Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Mtg Pilot Ø in. (mm)	G: Case ID Ø in. (mm)	H□Mtg Width in. (mm)	J: (4) Mtg Holes Ø in. (mm)	K: Mtg Plt Thick. in. (mm)	L: Mtg Hole BC Ø in. (mm)
BF-22B24-E05	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.312 (7.9)	.364 (9.2)	.094 (2.4)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-22B24-E06	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.375 (9.5)	.425 (10.8)	.094 (2.4)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-22B24-E08	40 (4.52)	2.26 (57.4)	1.74 (44.2)	.500 (12.7)	.564 (14.3)	.125 (3.2)	2.873 (73.0)	0.88 (22.4)	2.33 (52.9)	.166 (4.2)	0.06 (1.5)	2.50 (63.5)
BF-26B24-E06	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.375 (9.5)	.425 (10.8)	.094 (2.4)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)
BF-26B24-E08	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.500 (12.7)	.564 (14.3)	.125 (3.2)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)
BF-26B24-E10	80 (9.04)	2.63 (66.8)	1.84 (46.7)	.625 (15.9)	.709 (18.0)	.188 (4.8)	3.499 (88.9)	1.06 (27.0)	2.63 (66.8)	.187 (4.7)	0.06 (1.5)	3.13 (79.5)

PERFORMANCE									
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
BF-22	40.0 (4.52)	24/90	75/1048	8.5	12.0	32.0	33.1×10^{-5}	NA	0.9 (0.4)	1400
BF-26	80.0 (9.04)	24/90	66/937	9.5	15.0	35.0	81.0×10^{-5}	NA	1.2 (0.5)	2600

*See "How to order" model numbering system on page 90 for clutches & clutch couplings.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .003 T.I.R. at the diameter of the bolt circle.
- Static torque values above are burnished.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .003 T.I.R.
- Initial working air gap at installation shall be .008/.018.
- Other voltages available upon request.
- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

MBF Series

Metric Power-on Brakes

Our metric line of clutches and brakes are designed to be used in true metric applications (dimensional). The MBF Series offers a wide selection of metric bores and metric standard keyways. The Form Fit and Function matches popular metric lines globally available and are drop-in replacements in most cases.

The MBF Series has superior performance at a fraction of the cost of our competition. These units are available for low, medium and high volumes.

- Torque: 5.5 to 500 Nm (49 to 4,425 lbs.-in.)
- Diameters: 63 to 280 mm (2.48 to 11.02 in.)
- Zero backlash design
- Static or dynamic engagement
- Simple installation
- Energy efficient
- Economic cost
- Available "as is" or custom
- RoHS compliant

Typical Applications

- Factory automation
- Robotics
- Material handling
- Automotive
- Office automation
- Aviation
- Mail sorters
- Servo systems
- Medical

MBF-S (Short Hub)

MBF-L (Long Hub)

How to Order

MBF - 26 - U - 24 - M12 - L**

Series
MBF = Metric Brakes

Frame Size
26 = 67.5 (2.657)
30 = 85 (3.346)
40 = 106 (4.173)
50 = 133 (5.236)
60 = 169 (6.654)
80 = 220 (8.661)
100 = 280 (11.024)

B = Burnished
U = Unburnished

Coil Voltage
24 = 24VDC

Armature Bore
M12 = 12mm
M15 = 15mm
M20 = 20mm
M25 = 25mm
M30 = 30mm
M40 = 40mm
M50 = 50mm
M60 = 60mm

Hub Length**
L = **Long Hub**
S = **Short Hub**

** Long or Short Hub Length available only on MBF Series Brakes

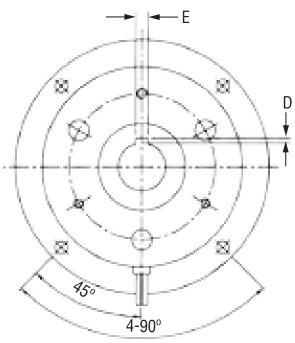
General Notes

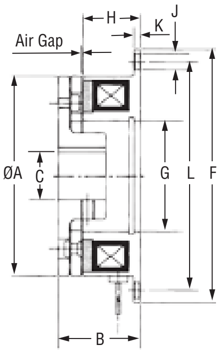
- The air gap should be checked periodically to ensure proper operation.
- All friction faces must be kept free of grease and oil for proper operation.
- Consult factory for additional options.
- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Flying leads are provided as standard, terminal style connection available upon request.
- Armature and rotor bore dimensions are minimums, with tolerance generally .001/.002 larger to accommodate varying environmental conditions.
- Coil of 24 volts are provided as standard, other coil voltages are available upon request.

STOP HOLD

MBF-26, 30, 40, 50, 60, 80 & 100-S (Short) Metric Brakes

Dimensions & Specifications





MBF-S Model Shown

Dimensions mm (inches)

DIMENSIONS												
Model	**Static Torque** Nm (lbs.-in.)	**A: OD** mm (in.)	**B: OAL** mm (in.)	**C: Bore** mm (in.)	**D: K'way Height** mm (in.)	**E: K'way Width** mm (in.)	**F: Flange OD** mm (in.)	**G: Case ID** mm (in.)	**H: Case Height** mm (in.)	**J: Mtg Holes (4)** mm (in.)	**K: Mtg Pla Thickness** mm (in.)	**L:Mtg Hole BC** mm (in)
MBF-26U24-M12-S	5.5 (48.68)	63 (2.48)	25.55 (1.01)	12 (0.47)	1.8 (0.07)	4 (0.16)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2 (0.08)	72 (2.83)
MBF-26U24-M15-S	5.5 (48.68)	63 (2.48)	25.55 (1.01)	15 (0.59)	2.3 (0.09)	5 (0.20)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2 (0.08)	72 (2.83)
MBF-30U24-M15-S	11 (97.35)	80 (3.15)	28.8 (1.13)	15 (0.59)	2.3 (0.09)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.5 (0.10)	90 (3.54)
MBF-30U24-M20-S	11 (97.35)	80 (3.15)	28.8 (1.13)	20 (0.79)	2.3 (0.09)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.5 (0.10)	90 (3.54)
MBF-40U24-M20-S	22 (194.70)	100 (3.94)	32.9 (1.30)	20 (0.79)	2.3 (0.09)	5 (0.20)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3 (0.12)	112 (4.41)
MBF-40U24-M25-S	22 (194.70)	100 (3.94)	32.9 (1.30)	25 (0.98)	3.3 (0.13)	7 (0.28)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3 (0.12)	112 (4.41)
MBF-50U24-M25-S	45 (398.25)	125 (4.92)	37.3 (1.47)	25 (0.98)	3.3 (0.13)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.5 (0.14)	137 (5.39)
MBF-50U24-M30-S	45 (398.25)	125 (4.92)	37.3 (1.47)	30 (1.18)	3.3 (0.13)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.5 (0.14)	137 (5.39)
MBF-60U24-M30-S	90 (796.50)	160 (6.30)	42.5 (1.67)	30 (1.18)	3.3 (0.13)	7 (0.28)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4 (0.16)	175 (6.89)
MBF-60U24-M40-S	90 (796.50)	160 (6.30)	42.5 (1.67)	40 (1.57)	3.8 (0.15)	10 (0.39)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4 (0.16)	175 (6.89)
MBF-80U24-M40-S	175 (1548.75)	200 (7.87)	50.5 (1.99)	40 (1.57)	3.8 (0.15)	10 (0.39)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5 (0.20)	215 (8.46)
MBF-80U24-M50-S	175 (1548.75)	200 (7.87)	50.5 (1.99)	50 (1.97)	3.8 (0.15)	12 (0.47)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5 (0.20)	215 (8.46)
MBF-100U24-M50-S	350 (3097.50)	250 (9.84)	59.6 (2.35)	50 (1.97)	3.8 (0.15)	12 (0.47)	290 (11.42)	125 (4.92)	35.1 (1.38)	11.5 (0.45)	6 (0.24)	270 (10.63)
MBF-100U24-M60-S	350 (3097.50)	250 (9.84)	59.6 (2.35)	60 (2.36)	5 (0.20)	15 (0.59)	290 (11.42)	125 (4.92)	35.1 (1.38)	11.5 (0.45)	6 (0.24)	270 (10.63)

PERFORMANCE										
Model	**Static Torque*** Nm (lbs.-in.)	**Coil Voltage** VDC	**Resistance Ohms** nom	**Power Watts** max	**Armature Engagement** msec	**Armature Disengage** msec	**Armature Inertia** kgcm^2 (lbs.-in.-sec^2)	**Weight** kg (lbs.)	**Energy Dissipation** ft.-lbs./min	**Recomm. Air Gap at Install** mm (in.)
MBF-26U24-xxx-S	5.5 (48.68)	24	52.2	11	5	20	0.476 (4.21 x 10^{-4})	0.32 (0.705)	2600	0.2 (0.008)
MBF-30U24-xxx-S	11 (97.35)	24	38.1	15	7	18	1.442 (1.28 x 10^{-3})	0.58 (1.279)	2900	0.2 (0.008)
MBF-40U24-xxx-S	22 (194.7)	24	28.92	20	6	37	4.255 (3.77 x 10^{-3})	1.07 (2.359)	5800	0.2 (0.008)
MBF-50U24-xxx-S	45 (398.25)	24	23.03	25	14	55	13.41 (1.19 x 10^{-2})	1.97 (4.343)	9000	0.3 (0.012)
MBF-60U24-xxx-S	90 (796.5)	24	16.44	35	15	44	46.655 (4.13 x 10^{-2})	3.45 (7.606)	10000	0.3 (0.012)
MBF-80U24-xxx-S	200 (1770)	24	12.8	45	16	165	145.819 (1.29 x 10^{-1})	7.1 (15.653)	50000	0.5 (0.020)
MBF-100U24-xxx-S	400 (3540)	24	10.8	60	37	205	387.284 (3.43 x 10^{-1})	12.2 (26.896)	70000	0.5 (0.020)

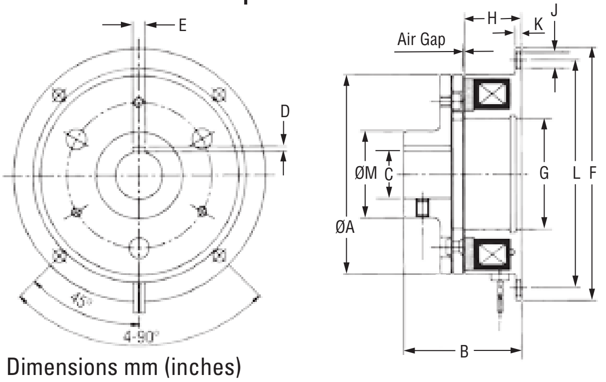
(-) denotes English equivalents. Specifications subject to change without notice. *Unburnished **Consult factory

BRAKES

STOP HOLD

MBF-26, 30, 40, 50, 60, 80 & 100-L (Long) Metric Brakes

Dimensions & Specifications



Dimensions mm (inches)

MBF-L Model Shown

DIMENSIONS													
Model	Static Torque Nm (lbs.-in.)	A: OD mm (in.)	B: OAL mm (in.)	C: Bore mm (in.)	D: K'way Height mm (in.)	E: K'way Width mm (in.)	F: Flange OD mm (in.)	G: Case ID mm (in.)	H: Case Height mm (in.)	J: Mtg Holes (4) mm (in.)	K: Mtg Pla Thickness mm (in.)	L:Mtg Hole BC mm (in.)	M:Hub Dia mm (in.)
MBF-26U24-M12-L	5.5 (48.68)	63 (2.48)	37 (1.46)	12 (0.47)	1.8 (0.07)	4 (0.16)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2 (0.08)	72 (2.83)	27.5 (1.08)
MBF-26U24-M15-L	5.5 (48.68)	63 (2.48)	37 (1.46)	15 (0.59)	2.3 (0.09)	5 (0.20)	80 (3.15)	35 (1.38)	18 (0.71)	5 (0.20)	2 (0.08)	72 (2.83)	27.5 (1.08)
MBF-30U24-M15-L	11 (97.35)	80 (3.15)	44 (1.76)	15 (0.59)	2.3 (0.09)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.5 (0.10)	90 (3.54)	31 (1.22)
MBF-30U24-M20-L	11 (97.35)	80 (3.15)	44 (1.76)	20 (0.79)	2.3 (0.09)	5 (0.20)	100 (3.94)	42 (1.65)	20 (0.79)	6 (0.24)	2.5 (0.10)	90 (3.54)	31 (1.22)
MBF-40U24-M20-L	22 (194.70)	100 (3.94)	53 (2.09)	20 (0.79)	2.3 (0.09)	5 (0.20)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3 (0.12)	112 (4.41)	41 (1.61)
MBF-40U24-M25-L	22 (194.70)	100 (3.94)	53 (2.09)	25 (0.98)	3.3 (0.13)	7 (0.28)	125 (4.92)	52 (2.05)	22 (0.87)	7 (0.28)	3 (0.12)	112 (4.41)	41 (1.61)
MBF-50U24-M25-L	45 (398.25)	125 (4.92)	61.3 (2.41)	25 (0.98)	3.3 (0.13)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.5 (0.14)	137 (5.39)	49 (1.93)
MBF-50U24-M30-L	45 (398.25)	125 (4.92)	61.3 (2.41)	30 (1.18)	3.3 (0.13)	7 (0.28)	150 (5.91)	62 (2.44)	24 (0.94)	7 (0.28)	3.5 (0.14)	137 (5.39)	49 (1.93)
MBF-60U24-M30-L	90 (796.50)	160 (6.30)	73.5 (2.89)	30 (1.18)	3.3 (0.13)	7 (0.28)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4 (0.16)	175 (6.89)	65 (2.56)
MBF-60U24-M40-L	90 (796.50)	160 (6.30)	73.5 (2.89)	40 (1.57)	3.8 (0.15)	10 (0.39)	190 (7.48)	80 (3.15)	26 (1.02)	9.5 (0.37)	4 (0.16)	175 (6.89)	65 (2.56)
MBF-80U24-M40-L	175 (1548.75)	200 (7.87)	87.2 (3.43)	40 (1.57)	3.8 (0.15)	10 (0.39)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5 (0.20)	215 (8.46)	83 (3.27)
MBF-80U24-M50-L	175 (1548.75)	200 (7.87)	87.2 (3.43)	50 (1.97)	3.8 (0.15)	12 (0.47)	230 (9.06)	100 (3.94)	30 (1.18)	9.5 (0.37)	5 (0.20)	215 (8.46)	83 (3.27)
MBF-100U24-M50-L	350 (3097.50)	250 (9.84)	102.6 (4.04)	50 (1.97)	3.8 (0.15)	12 (0.47)	290 (11.42)	125 (4.92)	35.1 (1.38)	11.5 (0.45)	6 (0.24)	270 (10.63)	105 (4.13)
MBF-100U24-M60-L	350 (3097.50)	250 (9.84)	102.6 (4.04)	60 (2.36)	5 (0.20)	15 (0.59)	290 (11.42)	125 (4.92)	35.1 (1.38)	11.5 (0.45)	6 (0.24)	270 (10.63)	105 (4.13)

PERFORMANCE										
Model	Static Torque* Nm (lbs.-in.)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Armature Engagement msec	Armature Disengage msec	Armature Inertia kgcm^2 (lbs.-in.-sec^2)	Weight kg (lbs.)	Energy Dissipation ft.-lbs./min	Recomm. Air Gap at Install mm (in.)
MBF-26U24-xxx-L	5.5 (48.68)	24	52.2	11	5	20	0.476 (4.21 x 10^{-4})	0.32 (0.705)	2600	0.2 (0.008)
MBF-30U24-xxx-L	11 (97.35)	24	38.1	15	7	18	1.442 (1.28 x 10^{-3})	0.58 (1.279)	2900	0.2 (0.008)
MBF-40U24-xxx-L	22 (194.7)	24	28.92	20	6	37	4.255 (3.77 x 10^{-3})	1.07 (2.359)	5800	0.2 (0.008)
MBF-50U24-xxx-L	45 (398.25)	24	23.03	25	14	55	13.41 (1.19 x 10^{-2})	1.97 (4.343)	9000	0.3 (0.012)
MBF-60U24-xxx-L	90 (796.5)	24	16.44	35	15	44	46.655 (4.13 x 10^{-2})	3.45 (7.606)	10000	0.3 (0.012)
MBF-80U24-xxx-L	200 (1770)	24	12.8	45	16	165	145.819 (1.29 x 10^{-1})	7.1 (15.653)	50000	0.5 (0.020)
MBF-100U24-xxx-L	400 (3540)	24	10.8	60	37	205	387.284 (3.43 x 10^{-1})	12.2 (26.896)	70000	0.5 (0.020)

(-) denotes English equivalents. Specifications subject to change without notice. *Unburnished **Consult factory

SB / FSB Series

Power-off Brakes

Spring-set electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. While the field (electromagnet) assembly is fixed and prevented from rotating, the rotor assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized, rotating components are disengaged, thus allowing the shaft to freely rotate.

- Torque: 1 to 1200 lbs.-in. (0.12 to 135 Nm)
- Diameter: 1.50 to 7.25 in. (38.1 to 184.2 mm)
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

Typical Applications

- Robotics
- Medical equipment
- Actuators
- Motor brakes
- Postal handling equipment
- Packaging

How to Order

SB - 26 B 24* - E08 L**

Series
SB = Power-off Servo Brake
FSB = Power-off Brake

Frame Sizes

SB	
15	= 1.50 (38.1)
17	= 1.79 (45.5)
19	= 2.00 (50.8)
23	= 2.36 (60.0)
26	= 2.87 (72.9)
28	= 3.03 (77.0)
30	= 3.35 (85.1)
40	= 4.25 (108.0)
50	= 5.00 (127.0)
70	= 7.25 (184.2)

FSB	
15	= 1.37 (34.8)
17	= 1.75 (44.5)

B = Burnished

Coil Voltage
12 = 12VDC
24 = **24VDC**
90 = **90VDC**

Hub Length**
L = Long
S = Short

Hub Bore

English		Metric	
E03	= .1870	**M03**	= 3mm
E04	= .2500	**M04**	= 4mm
E05	= .3125	**M05**	= 5mm
E06	= .3750	**M06**	= 6mm
E08	= .5000	**M08**	= 8mm
E10	= .6250	**M10**	= 10mm
E12	= .7500	**M12**	= 12mm
E14	= .8750	**M20**	= 20mm
E16	= 1.000	**M25**	= 25mm
E24	= 1.500	**M30**	= 30mm
E32	= 2.000	**M35**	= 35mm
		M40	= 40mm
		M45	= 45mm

Insulation Class:
SB: Class H (180°C)
FSB: Class B (130ºC)

* Other voltages available upon request

** Long Hub Length available on SB 15, 17, 19, 23, 26, 28; FSB 15, 17. Short Hub is not available on FSB-15.

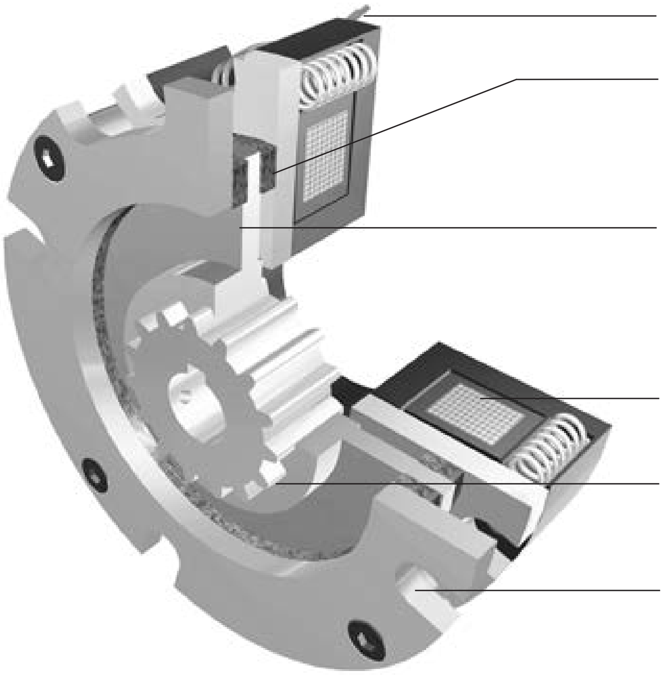
*** SB only.

General Notes

- Actual starting and/or stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.
- Working air gap should be checked periodically to ensure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

SB Series

Power-off Brakes



Heavy duty servo brakes are available for the most extreme environmental conditions. Please contact Thomson Customer Support for additional information.

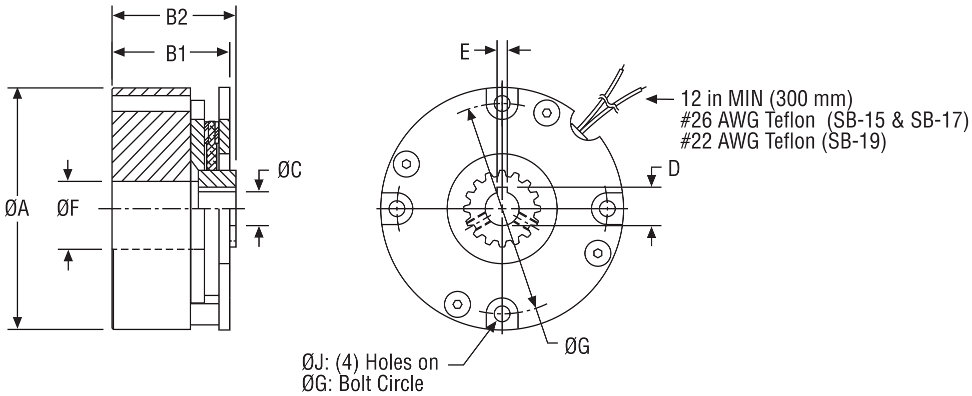
General Notes

- Actual stopping times depend on application variables, manufacturing tolerances and friction material wear. Please consult factory for evaluation of actual use before applying specific values to your application.
- Consult factory for additional options.
- Working air gap should be checked periodically to ensure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 & 90 volts are provided as standard, other coil voltages are available upon request.

HOLD

SB-15, 17 & 19 Brakes

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see page 128.

SB Model Shown

DIMENSIONS										
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B1: OAL Short Hub in. (mm)	B2: OAL Long Hub in. (mm)	C: Hub ID Ø in. (mm)	D: Keyway Height in. (mm)	E. Keyway Width in. (mm)	F: Case ID Ø in. (mm)	G: Mtg Hole BC Ø in. (mm)	J: (4) Mtg Holes in. (mm)
SB-15B24-E04X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-15B24-E05X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.312 (7.9)	.364 (9.2)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-15B24-E06X	5 (0.56)	1.50 (38.1)	1.06 (26.9)	1.18 (30)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.53 (13.5)	1.31 (33.3)	.125 (3.2)
SB-17B24-E04X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.37 (34.8)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-17B24-E06X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.37 (34.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-17B24-E08X	10 (1.13)	1.79 (45.5)	1.19 (30.2)	1.37 (34.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	0.58 (14.7)	1.64 (41.7)	.093 (2.4)
SB-19B24-E04X	18 (2.03)	2.00 (50.8)	1.19 (30.2)	1.44 (36.6)	.250 (6.4)	.286 (7.3)	.062 (1.6)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)
SB-19B24-E06X	18 (2.03)	2.00 (50.8)	1.19 (30.2)	1.44 (36.6)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.43 (10.9)	1.77 (45.0)	.146 (3.7)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
SB-15	5.0 (0.56)	24/90	96/1350	7.0	20.0	10.0	NA	4.38×10^{-6}	0.3 (0.1)	500
SB-17	10 (1.13)	24/90	64/908	10.0	20.0	10.0	NA	1.87×10^{-5}	0.7 (0.3)	700
SB-19	18 (2.03)	24/90	54/765	12.0	35.0	10.0	NA	2.36×10^{-5}	0.7 (0.3)	900

*See "How to order" model numbering system on page 105 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

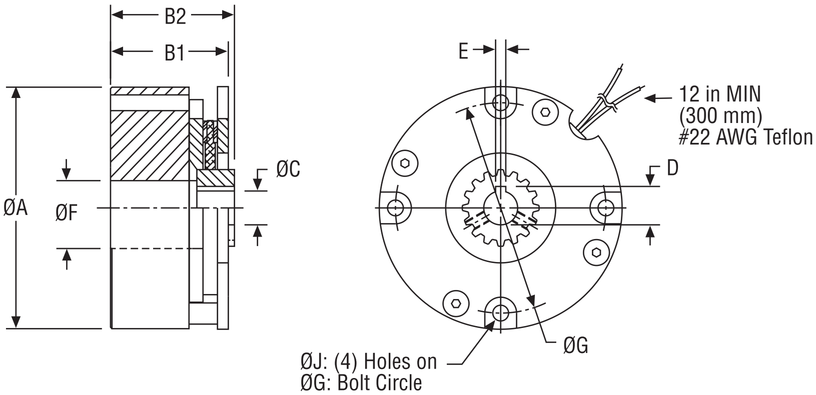
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.
- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

BRAKES

HOLD

SB-23, 26, 28 Brakes

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see page 128.

SB Model Shown

DIMENSIONS

Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B1: OAL Short Hub in. (mm)	B2: OAL Long Hub in. (mm)	C: Hub ID Ø in. (mm)	D: Keyway Height in. (mm)	E. Keyway Width in. (mm)	F: Case ID Ø in. (mm)	G: Mtg Hole BC Ø in. (mm)	J: (4) Mtg Holes in. (mm)
SB-23B24-E05X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.312 (7.9)	.364 (9.2)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E06X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.375 (9.5)	.425 (10.8)	.094 (2.4)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E08X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.500 (12.7)	.564 (14.3)	.125 (3.2)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-23B24-E10X	35 (4.0)	2.36 (60)	1.40 (35.6)	1.65 (41.9)	.625 (15.9)	.709 (18.0)	.188 (4.8)	.79 (20.0)	2.05 (52.1)	.177 (4.5)
SB-26B24-E06X	40 (4.5)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
SB-26B24-E08X	40 (4.5)	2.87 (72.9)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	0.63 (16.0)	2.50 (63.5)	.177 (4.5)
SB-28B24-E06X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
SB-28B24-E08X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)
SB-28B24-E10X	80 (9.0)	3.03 (77)	1.22 (31.0)	1.45 (36.8)	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.18 (30.0)	2.76 (70.0)	.177 (4.5)

PERFORMANCE

Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
SB-23	35 (4.0)	24/90	46.5/700	13.0	70.0	20.0	NA	1.77×10^{-5}	1.1 (0.5)	1200
SB-26	40 (4.5)	24/90	33/506	19.0	80.0	20.0	NA	1.14×10^{-4}	1.2 (0.5)	1400
SB-28	80 (9.0)	24/90	36/440	20.0	50.0	40.0	NA	1.06×10^{-4}	1.8 (0.8)	1800

*See "How to order" model numbering system on page 105 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

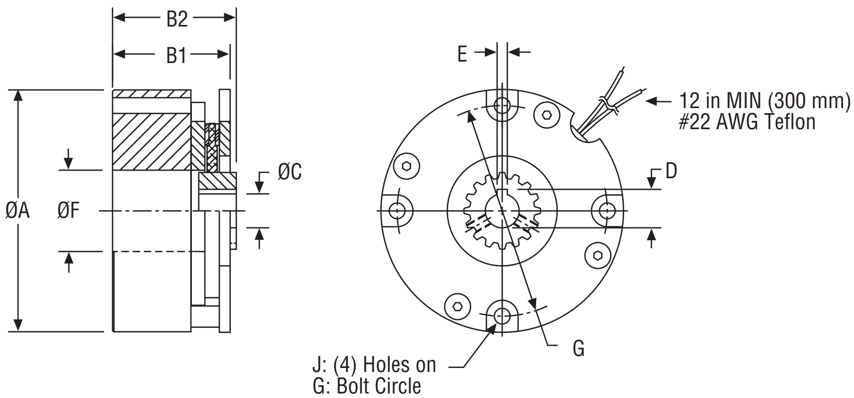
General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.
- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

HOLD

SB-30 & 40 Brakes

Dimensions & Specifications



Dimensions (mm)
Mounting requirements see page 128.

SB Model Shown

DIMENSIONS									
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B1: OAL Short Hub in. (mm)	B2: OAL Long Hub in. (mm)	C: Hub ID Ø in. (mm)	D: Keyway Height in. (mm)	E. Keyway Width in. (mm)	F: Case ID Ø in. (mm)	G: Mtg Hole BC Ø in. (mm)	J: (4) Mtg Holes in. (mm)
SB-30B24-E06X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-30B24-E08X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-30B24-E10X	140 (15.8)	3.35 (85.1)	1.63 (41.4)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.13 (28.7)	2.91 (73.9)	.218 (5.5)
SB-40B24-E06X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E08X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.500 (12.7)	.564 (14.3)	.125 (3.2)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E10X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)
SB-40B24-E12X	265 (29.9)	4.25 (108.0)	1.75 (44.5)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.50 (38.1)	3.75 (95.3)	.226 (5.7)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
SB-30	140 (15.8)	24/90	29/374	24.0	70.0	45.0	NA	1.72×10^{-4}	2.8 (1.3)	2200
SB-40	265 (29.9)	24/90	20/290	31.0	85.0	45.0	NA	8.34×10^{-3}	4.9 (2.2)	2500

*See "How to order" model numbering system on page 105 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

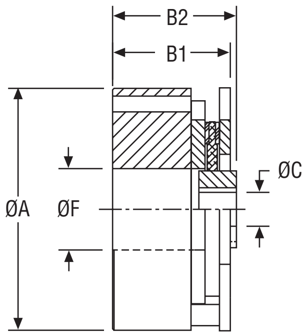
- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- All SB series brakes are shipped burnished.
- Brake coupling armature assembly is secured to shaft by (2) set screws and key.
- Metric bores available

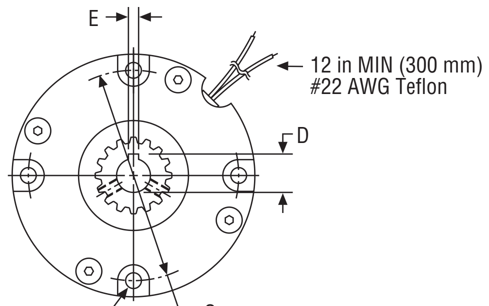
BRAKES

HOLD

SB-50, 70 Brakes

Dimensions & Specifications





Dimensions (mm)
Mounting requirements see page 128.

SB Model Shown

DIMENSIONS									
Model*	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B1: OAL Short Hub in. (mm)	B2: OAL Long Hub in. (mm)	C: Hub ID Ø in. (mm)	D: Keyway Height in. (mm)	E. Keyway Width in. (mm)	F: Case ID Ø in. (mm)	G: Mtg Hole BC Ø in. (mm)	J: (4) Mtg Holes in. (mm)
SB-50B24-E10X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	.625 (15.9)	.709 (18.0)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-50B24-E12X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	.750 (19.1)	.837 (21.3)	.188 (4.8)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-50B24-E16X	350 (39.5)	5.00 (127.0)	1.90 (48.3)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	1.75 (44.5)	4.50 (114.3)	.226 (5.7)
SB-70B24-E16X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	1.000 (25.4)	1.114 (28.3)	.250 (6.4)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
SB-70B24-E24X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	1.500 (38.1)	1.669 (42.4)	.375 (9.5)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)
SB-70B24-E32X	1200 (135.6)	7.25 (184.2)	2.77 (70.4)	NA	2.000 (50.8)	2.223 (56.5)	.500 (12.7)	3.35 (85.1)	6.81 (173.0)	.281 (7.1)

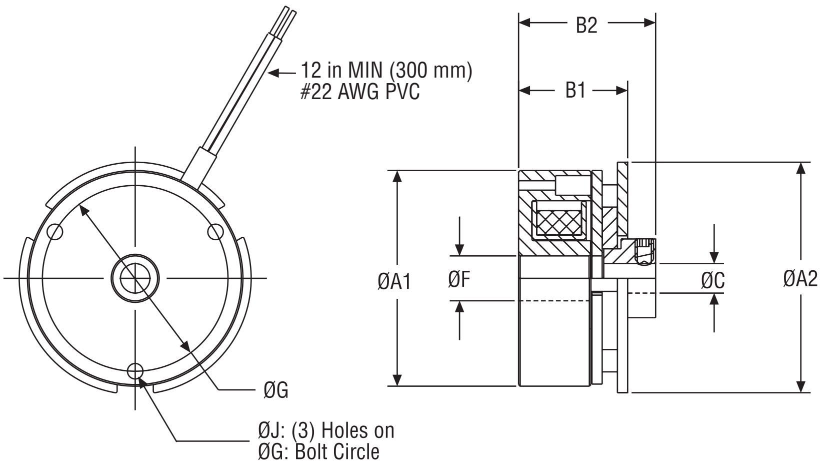
PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
SB-50	350 (39.5)	24/90	19/291	32.0	160.0	110.0	NA	2.07 x 10^{-3}	6.5 (3.0)	2650
SB-70	1200 (135.6)	24/90	12/180	53.0	140.0	250.0	NA	16.34 x 10^{-3}	20.2 (9.2)	3900

*See "How to order" model numbering system on page 105 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.
(-) denotes metric equivalents. Specifications subject to change without notice.

HOLD

FSB-15 & 17 Brakes

Dimensions & Specifications



FSB Model Shown

Dimensions (mm)
Mounting requirements see page 128.

DIMENSIONS									
Model*	Static Torque lbs.-in. (Nm)	A1: OD Body in. (mm)	A2: OD Flange in. (mm)	B1: OAL Short Hub in. (mm)	B2: OAL Long Hub in. (mm)	C: Hub ID Ø in. (mm)	F: Case ID Ø in. (mm)	G: Mtg Hole BC Ø in. (mm)	J: (3) Mtg Holes in. (mm)
FSB-15U24-E03L	1 (.12)	1.37 (34.8)	1.475 (17.5)	0.69** (17.5)	0.9 (22.9)	.187 (4.8)	0.285 (7.2)	1.18 (30.0)	3 x .125 (3.2)
FSB-15U24-E04L	1 (.12)	1.37 (34.8)	1.475 (17.5)	0.69** (17.5)	0.9 (22.9)	.250 (6.4)	0.285 (7.2)	1.18 (30.0)	3 x .125 (3.2)
FSB-17U24-E04X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.250 (6.4)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)
FSB-17U24-E05X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.312 (7.9)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)
FSB-17U24-E06X	3 (.34)	1.75 (44.5)	1.90 (48.3)	0.87 (22.0)	1.06 (26.9)	.375 (9.5)	0.415 (10.5)	1.545 (39.2)	3 x .125 (3.2)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohma nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia lbs.-in.-sec^2	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
FSB-15	1 (.12)	24/90	118/1750	6.0	25.0	15.0	NA	1.05 x 10^{-5}	0.2 (.09)	250
FSB-17	3 (.34)	24/90	92/1300	7.0	35.0	30.0	NA	1.45 x 10^{-5}	0.6 (.27)	350

*See "How to order" model numbering system on page 105 for power-off brakes.
X = Upon ordering, choose L or S for long or short hub length.

(-) denotes metric equivalents. Specifications subject to change without notice.
**Short Hub not available for size 15.

General Notes

- Customer shall maintain the perpendicularity of the case assembly mounting surface with respect to the shaft within .005 T.I.R. at the diameter of the bolt circle.
- Other voltages available upon request.
- Customer shall maintain concentricity of case assembly mounting pilot with respect to the shaft within .005 T.I.R.
- Brake coupling armature assembly is secured to shaft by (2) set screws.
- Metric bores available

BRAKES

RAB Series

Permanent Magnet Power-off Brakes

The RAB is a permanent magnet power-off brake series that provides zero back-lash stopping and/or holding of a load in the absence of power. While the field (electromagnet) is fixed and prevented from rotating, the output hub assembly is secured to the shaft. In the absence of power, the fixed and rotating components are engaged, thus stopping and/or holding the load. When the coil is energized, rotating components are disengaged, thus allowing the shaft to freely rotate. The RAB Series is RoHS, REACH and UL Class F compliant.

- Torque: 0.4 to 1239 lbs.-in. (.04 to 140 Nm)
- Diameter: 1.1 to 6.3 in. (28 to 160 mm)
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

Typical Applications

- Robotics
- Medical equipment
- Actuators
- Motor brakes
- Material handling equipment
- Packaging

How to Order

RAB - 26 B 24* - M15

Series
RAB = Permanent Magnet Power-off Brake

Frame Sizes

RAB
11 = 1.10 (28.0)
13 = 1.26 (32.0)
15 = 1.57 (40.0)
20 = 1.97 (50.0)
25 = 2.48 (63.0)
32 = 3.15 (80.0)
40 = 3.94 (100.0)
50 = 4.92 (125.0)
60 = 6.30 (160.0)

B = Burnished

Coil Voltage
24 = 24VDC

Hub Bore**
Metric
M06 = 6 mm
M10 = 10 mm
M15 = 15 mm
M18 = 18 mm
M20 = 20 mm
M30 = 30 mm
M40 = 40 mm

Insulation Class:
RAB: Class F (155°C)

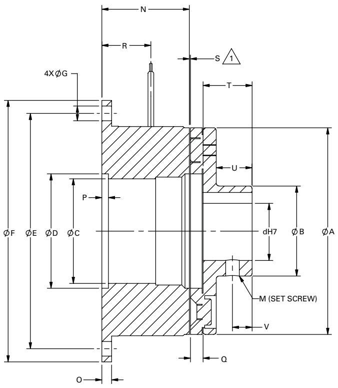
* Other voltages available upon request
** English versions available upon request

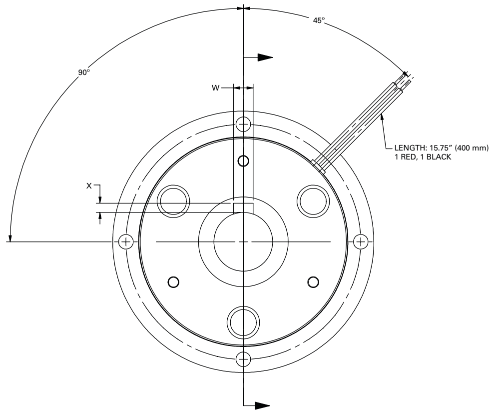
General Notes

- Consult factory for additional options.
- Working air gap should be checked periodically to ensure proper operation. If it exceeds maximum recommended dimensions, the clutch or brake may not function properly.
- All friction faces must be kept free of grease and oil for proper operation.
- Flying leads are provided as standard, terminal style connection available upon request.
- Coil of 24 volts are provided as standard, other coil voltages are available upon request.

RAB-11, 13, 15, 20, 25, 32, 40, 50 & 60 Metric Brakes

Dimensions & Specifications





DIMENSIONS										
Model	Static Torque lbs.-in. (Nm)	A: mm	B: mm	C: mm	D: mm	E. mm	F: mm	G: mm	M: mm	N: mm
RAB-11B24-M06	0.04 (0.4)	28	13.5	11	-	33.5	39	3.4	1X M3	19.5
RAB-13B24-M06	8.85 (1.0)	32	15	12.5	-	38	45	3.4	1X M3	21.5
RAB-15B24-M10	17.7 (2.0)	40	17	19	-	47	54	3.4	1X M4	22.5
RAB-20B24-M15	39.8 (4.5)	50	24	24	26	58	65	3.4	1X M4	28.5
RAB-25B24-M18	79.6 (9.0)	63	27.5	32	35	72	80	4.5	2X M5	26.8
RAB-32B24-M20	159.3 (18.0)	80	31	38	42	90	100	5.5	2X M5	29.9
RAB-40B24-M30	318.6 (36.0)	100	41	48.5	52	112	125	6.3	2X M6	33.9
RAB-50B24-M30	637.2 (72.0)	125	49	58	62	137	150	6.5	2X M6	37.8
RAB-60B24-M40	1239 (140.0)	160	65	75	80	175	190	9	2X M8	42.6

DIMENSIONS											
Model	O: mm	P: mm	Q: mm	R: mm	S: mm	T. mm	U: mm	V: mm	W: mm	X: mm	d: mm
RAB-11B24-M06	2	-	2.2	10.5	0.15-.20	7	5	2.5	2	1	6
RAB-13B24-M06	2	-	2.1	12	0.15-.20	10	8	4	2	1	6
RAB-15B24-M10	2	-	2.7	12	0.15-.25	12	9.5	4	3	1.4	10
RAB-20B24-M15	2	1.8	3	14	0.25-.35	12	9	5	5	2.3	15
RAB-25B24-M18	3	2	4	15	0.25-.35	15	11.5	6	6	2.8	18
RAB-32B24-M20	3	2	4.5	16.5	0.25-.35	20	16	8	6	2.8	20
RAB-40B24-M30	4	2.5	6.4	19	0.25-.35	25	20	10	8	3.3	30
RAB-50B24-M30	5	3.5	7.2	23	0.40-.50	30	24	12	7	3.3	30
RAB-60B24-M40	6	3.5	9.4	26	0.75-.85	38	31	14	10	3.8	40

PERFORMANCE			
Model	Coil Voltage VDC	Power Watts max	Weight lbs. (kg)
RAB-11B24-M06	24	8	0.26 (0.12)
RAB-13B24-M06	24	10	0.33 (0.15)
RAB-15B24-M10	24	11	0.49 (0.22)
RAB-20B24-M15	24	12	0.84 (0.38)
RAB-25B24-M18	24	18	1.23 (0.56)

PERFORMANCE			
Model	Coil Voltage VDC	Power Watts max	Weight lbs. (kg)
RAB-32B24-M20	24	24	2.20 (1.0)
RAB-40B24-M30	24	26	4.10 (1.86)
RAB-50B24-M30	24	40	7.12 (3.23)
RAB-60B24-M40	24	50	13.07 (5.93)

HOLD

PMB Series

Power-off Brakes

The PMB Series are a power-off, DC, spring set brake that provides a low-cost, multi-functional brake alternative for many applications. The series offers nine frame sizes (30, 40, 50, 60, 65, 75, 85, 100) and a superior torque-to-size ratio.

Many extra features are offered with this versatile product series.

- Torque adjustment collar allows the torque to be varied depending on application.
- Engineered friction material on rotor assembly boosts maximum brake performance and extends life.
- Brake easily mounts to motor or frame. Mounting hardware included with brake.
- Brake case design offers excellent heat dissipation.
- Fully potted coils meet minimum requirements for class “F” insulation.
- UL Recognized Component
- Splined hub with anti-rattle feature promotes quiet operation
- Brake leads can be customized (connectors, sleeving) to meet special requirements.
- Dust cover (option) keeps foreign materials from interfering with brake actuation.
- Manual release lever (option) provides override to release brakes in the absence of power.

Typical Applications

- Factory automation
- Semiconductor
- Medical equipment
- Elevators
- Lift trucks
- Pallet trucks
- Electric vehicles
- Electric hoists
- Construction equipment
- Winches & cranes
- Electric motor brakes
- Conveyors
- Robotics
- Floor sweepers
- Scissor lifts
- Automated material handling equipment

How to Order

PMB - 30 B 24* - E08 - MRD

Series
PMB = Power-off Brake

Frame Size
30 = 3.31(84)
40 = 4.02 (102)
50 = 5.00 (127)
60 = 5.79 (147)
65 = 6.38 (162)
75 = 7.40 (188)
85 = 8.47 (215)
100 = 10.00 (254)

B = Burnished

Coil Voltage
24 = **24VDC**
90 = **90VDC**
190 = 190VDC

Hub Bore

English		Metric	
E06	= .3750	**M11**	= 11mm
E08	= .5000	**M15**	= 15mm
E10	= .6250	**M20**	= 20mm
E12	= .7500	**M25**	= 25mm
E16	= 1.000	**M30**	= 30mm
E18	= 1.125	**M35**	= 35mm
E22	= 1.375	**M40**	= 40mm
E24	= 1.500		
E26	= 1.625		

Options
MRD = Manual Release & Dust Cover

Insulation Class:
PMB: Class F (155°C)

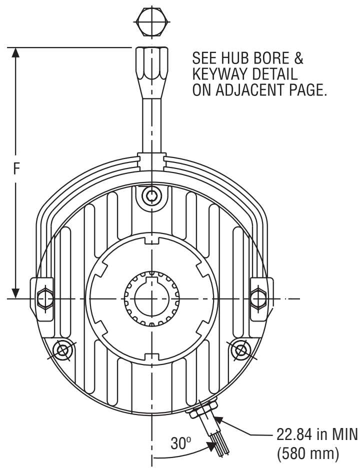
All PMB brakes are shipped burnished.

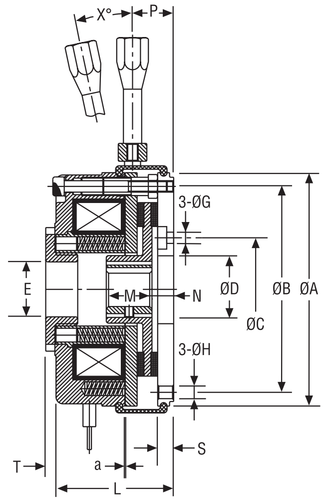
* Other voltages available upon request.

HOLD

PMB-30, 40, 50, 60, 65, 75, 85 & 100 Brakes

Dimensions & Specifications





Dimensions (mm)
Mounting requirements see page 128.

UL Recognized Component

PMB model shown with optional manual release & dust cover.

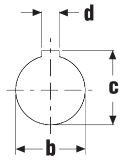
DIMENSIONS															
Model	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: Mtg Hole in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G, H in. (mm)	L in. (mm)	M in. (mm)	N in. (mm)	P in. (mm)	S in. (mm)	T in. (mm)	X deg.	a: Air Gap in. (mm)
PMB-30	45 (5)	3.307 (84)	2.835 (72)	1.181 (30)	1.220 (31)	0.748 (19)	3.86 (98)	0.177 (4.5)	1.614 (41)	0.701 (17.8)	0.157 (4)	0.697 (17.7)	0.236 (6)	0.118 (3)	10	0.006 (0.15)
PMB-40	70 (8)	4.016 (102)	3.543 (90)	1.772 (45)	1.181 (30)	0.945 (24)	4.29 (109)	0.217 (5.5)	2.048 (52)	0.787 (20)	0.374 (9.5)	1.004 (25.5)	0.276 (7)	0.394 (10)	8	0.008 (0.2)
PMB-50	142 (16)	5.000 (127)	4.409 (112)	2.205 (56)	1.575 (40.5)	1.378 (35)	5.47 (139)	0.256 (6.5)	2.244 (57)	0.787 (20)	0.492 (11.5)	1.280 (32.5)	0.346 (8.8)	0.157 (4)	7	0.008 (0.25)
PMB-60	283 (32)	5.787 (147)	5.197 (132)	2.441 (62)	1.772 (45)	1.575 (40)	6.02 (153)	0.256 (6.5)	2.598 (66)	0.984 (25)	0.472 (12)	1.280 (32.5)	0.354 (9)	0.197 (5)	8	0.012 (0.3)
PMB-65	530 (60)	6.378 (162)	5.709 (145)	2.913 (74)	2.165 (55)	1.890 (48)	7.28 (185)	0.354 (9)	2.992 (76)	1.181 (30)	0.551 (14)	1.417 (36)	0.433 (11)	0.197 (5)	8	0.012 (0.3)
PMB-75	708 (80)	7.402 (188)	6.693 (170)	3.307 (84)	2.559 (65)	2.047 (52)	7.88 (200)	0.354 (9)	3.367 (85.5)	1.181 (30)	0.551 (14)	1.634 (41.5)	0.433 (11)	0.236 (6)	8	0.012 (0.3)
PMB-85	1505 (170)	8.465 (215)	7.717 (196)	3.937 (100)	2.953 (75)	2.441 (62)	10.24 (260)	0.354 (9)	3.780 (96)	1.378 (35)	0.591 (15)	1.772 (45)	0.433 (11)	0.374 (9.5)	12	0.016 (0.4)
PMB-100	2655 (300)	10.000 (254)	9.055 (230)	4.331 (110)	3.543 (90)	3.346 (85)	16.46 (418)	0.433 (11)	4.252 (108)	1.575 (40)	0.689 (17.5)	1.850 (47)	0.433 (11)	N/A	12	0.016 (0.4)

PERFORMANCE										
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms@ 20°C nom.	Power Watts max	Speed RPM	Armature Engagement msec	Armature Disengagement msec	Rotor Inertia lbs.-in.-sec^2	Weight lbs. (kg)	Energy Dissipation ft.-lbs./min
PMB-30	45 (5)	24/90/190	30.4/405/1805	20	3000	15	55	1.15×10^{-4}	3 (1.36)	1840
PMB-40	70 (8)	24/90/190	24.5/324/1444	25	3000	20	60	3.98×10^{-4}	4 (1.8)	2240
PMB-50	142 (16)	24/90/190	19.8/270/1203	30	3000	20	90	2.30×10^{-3}	7.5 (3.4)	2790
PMB-60	283 (32)	24/90/190	15.2/202.3/903	40	3000	20	120	4.96×10^{-3}	11 (4.8)	3225
PMB-65	530 (60)	24/90/190	14.7/162/722	50	3000	20	210	6.75×10^{-3}	16 (7.3)	3550
PMB-75	708 (80)	24/90/190	10.6/124.6/555	65	3000	190	230	1.68×10^{-2}	27 (12)	4120
PMB-85	1505 (170)	24/90/190	7.84/95.3/425	85	1500	300	260	3.28×10^{-2}	40 (18)	4720
PMB-100	2655 (300)	24/90/190	5.2/73.6/328	110	1500	350	550	6.69×10^{-2}	55 (25)	5575

(-) denotes metric equivalents. Specifications subject to change without notice.

PMB Series Brakes

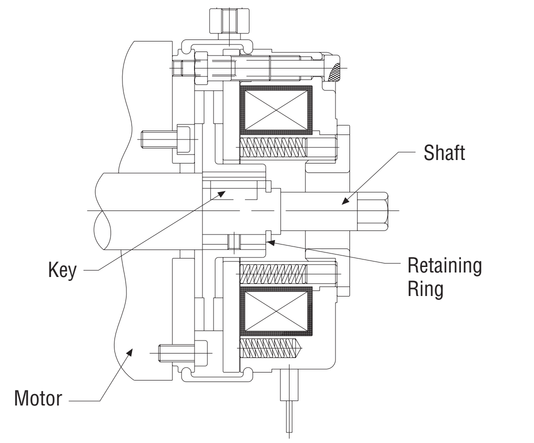
Dimensions & Specifications



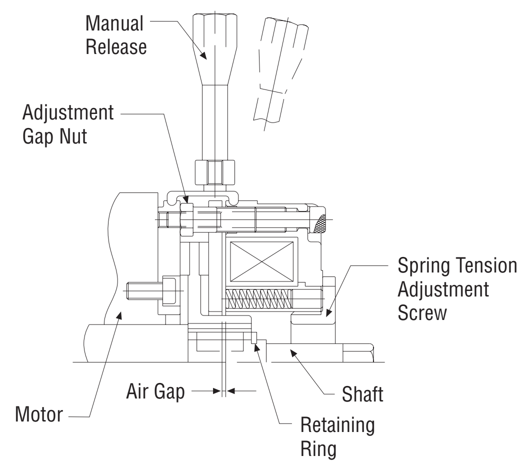
HUB BORE & KEYWAY DETAIL

BORE & KEYWAY DATA			
Model*	b: Bore** in. (mm)	c: Keyway Height in. (mm)	d: Keyway Width in. (mm)
PMB-30BXX-E06-MRD	0.375 (9.5)	0.425 (10.8)	0.094 (2.4)
PMB-30BXX-E08-MRD	0.500 (12.7)	0.564 (14.3)	0.125 (3.2)
PMB-30BXX-M11-MRD	0.433 (11.0)	0.512 (13.0)	0.157 (4)
PMB-40BXX-E08-MRD	0.500 (12.7)	0.564 (14.3)	0.125 (3.2)
PMB-40BXX-E10-MRD	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)
PMB-40BXX-M15-MRD	0.591 (15.0)	0.681 (17.3)	0.197 (5)
PMB-50BXX-E10-MRD	0.625 (15.9)	0.709 (18.0)	0.188 (4.8)
PMB-50BXX-E12-MRD	0.750 (19.0)	0.837 (21.3)	0.188 (4.8)
PMB-50BXX-M15-MRD	0.591 (15.0)	0.681 (17.3)	0.197 (5)
PMB-50BXX-M20-MRD	0.787 (20.0)	0.878 (22.3)	0.197 (5)
PMB-60BXX-E12-MRD	0.750 (19.0)	0.837 (21.3)	0.188 (4.8)
PMB-60BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-60BXX-M20-MRD	0.787 (20.0)	0.878 (22.3)	0.197 (5)
PMB-60BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-65BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-65BXX-E18-MRD	1.125 (28.6)	1.251 (31.8)	0.250 (6.3)
PMB-65BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-65BXX-M30-MRD	1.181 (30.0)	1.299 (33.0)	0.276 (7)
PMB-75BXX-E16-MRD	1.000 (25.4)	1.114 (28.3)	0.250 (6.3)
PMB-75BXX-E18-MRD	1.125 (28.6)	1.251 (31.8)	0.250 (6.3)
PMB-75BXX-M25-MRD	0.984 (25.0)	1.103 (28.0)	0.276 (7)
PMB-75BXX-M30-MRD	1.181 (30.0)	1.299 (33.0)	0.276 (7)
PMB-85BXX-E22-MRD	1.375 (34.9)	1.517 (38.5)	0.313 (7.9)
PMB-85BXX-E24-MRD	1.500 (38.1)	1.669 (42.4)	0.375 (9.5)
PMB-85BXX-M35-MRD	1.378 (35.0)	1.527 (38.8)	0.394 (10)
PMB-85BXX-M40-MRD	1.575 (40.0)	1.725 (43.8)	0.394 (10)
PMB-100BXX-E22-MRD	1.375 (34.9)	1.517 (38.5)	0.313 (7.9)
PMB-100BXX-E24-MRD	1.500 (38.1)	1.669 (42.4)	0.375 (9.5)
PMB-100BXX-M35-MRD	1.378 (35.0)	1.527 (38.8)	0.394 (10)
PMB-100BXX-M40-MRD	1.575 (40.0)	1.725 (43.8)	0.394 (10)

*See "How to order" model numbering system on page 114 for PMB brakes.
XX = Upon ordering, choose voltage, see page 114 for options.
(-) denotes metric equivalents. Specifications subject to change without notice.
**Other bore sizes available upon request.



Installation Diagram



Gap Adjustment

Model shown at left is complete with all accessories. Model on right is shown with accessories removed. Accessories include: (A) manual release; (B) spline hub, (C) anti-rattle feature (o-ring) and (D) dust cover.

Notes

HOLD

MBRP Series

Metric Power-off Spring Set Brakes

The MBRP Series are a power-off, DC, spring set brake that provides a low-cost, multi-functional brake alternative for many applications. The series offers five frame sizes (15, 19, 22, 26 & 30) and a superior torque-to-size ratio.

Many extra features are offered with this versatile product series.

- Engineered friction material on rotor assembly boosts maximum brake performance and extends life.
- Brake easily mounts to motor or frame. Simple square drive hub attached to shaft with set screw and keyway provided.
- Fully potted coils meet minimum requirements for class "F" insulation.
- UL Recognized Component
- Square drive hub with anti-rattle feature promotes quiet operation.
- Brake leads can be customized (connectors, sleeving) to meet special requirements.
- Manual release lever (option) provides override to release brakes in the absence of power.
- RoHS compliant

Typical Applications

- Mobility scooters & carts
- Factory automation
- Semiconductor
- Military/aerospace
- Medical equipment
- Electric hoists
- Robotics
- Automated material handling equipment

How to Order

MBRP - 22 B 24 - M5* - MR

Series
MBRP = Metric Power-off Brake

Frame Size
15 = 1.46 (37)
19 = 1.85 (47)
22 = 2.21 (56)
26 = 2.56 (65)
30 = 2.95 (75)

B = Burnished

Coil Voltage
12 = 12VDC
24 = 24VDC
90 = 90VDC

Hub Bore Metric
M5 = 5 mm
M6 = 6 mm
M7 = 7 mm
M8 = 8 mm
M10 = 10 mm
M11 = 11 mm
M12 = 12 mm

Options
MR**= Manual Release

Insulation Class:
MBRP: Class F (155°C)

All MBRP brakes are shipped burnished.

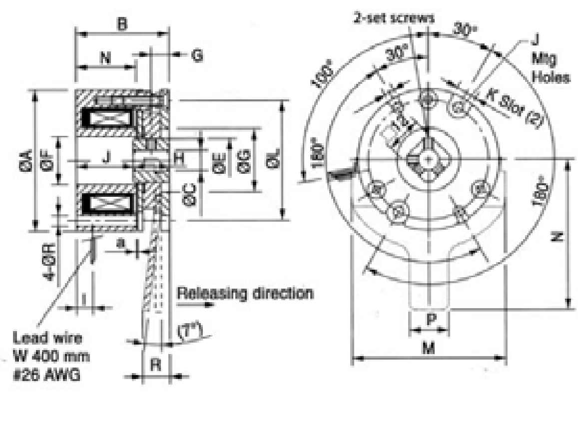
* See dimension tables for appropriate bore sizes available for each frame size.

** Manual release is not available for size 15 brake.

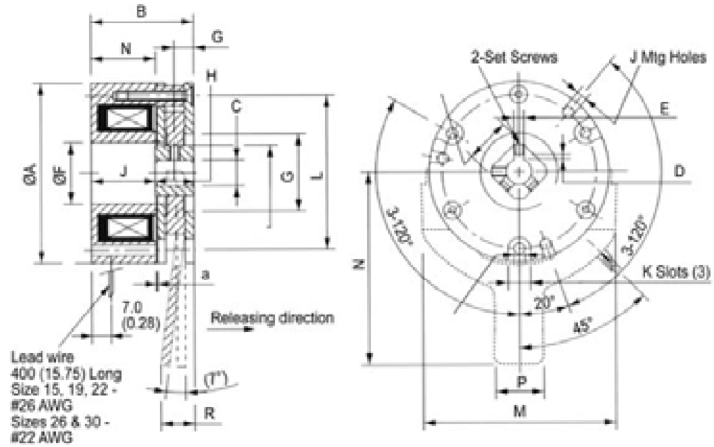
HOLD

MBRP-15, 19, 22, 26 & 30 Metric Brakes

Dimensions & Specifications



MBRP 15 & 19



MBRP 22, 26 & 30

Dimensions (mm)
Mounting requirements see page 128.

	DIMENSIONS												MANUAL RELEASE			
Model*	Static Torque NM (lbs.-in.)	A: OD mm (in.)	B: OAL mm (in.)	C: Bore mm (in.)	D: K'way Height mm (in.)	E: K'way Wigth mm (in.)	F: Case ID mm (in.)	G: Flange ID mm (in.)	H: Hub Length mm (in.)	J: Mtg Holes mm (in.)	K:Slot mm (in.)	L: Mtg Hole BC mm (in.)	M: mm (in.)	N: mm (in.)	P: mm (in.)	R: mm (in.)
MBRP-15BXX-M5	0.24 (2.12)	37 (1.46)	32 (1.26)	5 (0.197)	NA	NA	13.5 (0.53)	18 (0.71)	9 (0.35)	3 (0.12) 4 Holes	6 (0.24)	32 (1.26)	NA	NA	NA	NA
MBRP-15BXX-M6	0.24 (2.12)	37 (1.46)	32 (1.26)	6 (0.236)	NA	NA	13.5 (0.53)	18 (0.71)	9 (0.35)	3 (0.12) 4 Holes	6 (0.24)	32 (1.26)	NA	NA	NA	NA
MBRP-19BXX-M6-XX	0.50 (4.43)	47 (1.85)	32 (1.26)	6 (0.236)	NA	NA	16 (0.63)	21 (0.83)	12 (0.47)	3.40 (0.13) 4 Holes	7 (0.28)	40 (1.57)	51 (2.01)	50 (1.97)	13 (0.51)	9 (0.35)
MBRP-19BXX-M7-XX	0.50 (4.43)	47 (1.85)	32 (1.26)	7 (0.276)	NA	NA	16 (0.63)	21 (0.83)	12 (0.47)	3.40 (0.13) 4 Holes	7 (0.28)	40 (1.57)	51 (2.01)	50 (1.97)	13 (0.51)	9 (0.35)
MBRP-22BXX-M8-XX	1.00 (8.85)	56 (2.20)	32 (1.26)	8 (0.315)	NA	NA	19 (0.75)	24 (0.94)	12 (0.47)	3.40 (0.13) 4 Holes	7 (0.28)	48 (1.89)	60 (2.36)	60 (2.36)	15 (0.59)	11 (0.43)
MBRP-26BXX-M10-XX	2.00 (17.70)	65 (2.56)	34 (1.34)	10 (0.394)	1.20 (0.05)	3.00 (0.118)	24 (0.94)	35 (1.38)	14 (0.55)	3.40 (0.13) 6 Holes	7 (0.28)	58 (2.28)	70 (2.76)	70 (2.76)	15 (0.59)	12 (0.47)
MBRP-30BXX-M12-XX	4.00 (35.40)	75 (2.95)	36 (1.42)	12 (0.472)	1.50 (0.06)	4.00 (0.16)	28 (1.10)	36 (1.42)	14 (0.55)	4.50 (0.18) 6 Holes	9 (0.35)	66 (2.60)	80 (3.15)	80 (3.15)	20 (0.79)	14 (0.55)

PERFORMANCE										
Model	Static Torque Nm (lbs.-in.)	Coil Voltage VDC	Resistance Ohms nom.	Power Watts max	Armature Engagement msec	Armature Disengagement msec	Armature Inertia $kgcm^2$ (lbs.-in.-sec^2)	Weight kg (lbs.)	Energy Dissipation ft.-lbs./min	Recomm. Air Gap at Install mm (in.)
MBRP-15BXX-Bore	0.24 (2.12)	12/24/90	28.8/115/16220	5.0	15	10	0.000006 (5.31 x 10^{-9})	0.2 (0.441)	500	0.1 (0.004)
MBRP-19BXX-Bore-XX	0.50 (4.43)	12/24/90	21.8/87.3/1228	6.6	15	10	0.0000019 (1.68 x 10^{-9})	0.3 (0.661)	900	0.1 (0.004)
MBRP-22BXX-Bore-XX	1.00 (8.85)	12/24/90	16/64/988	8.2	30	25	0.0000038 (3.36 x 10^{-9})	0.4 (0.882)	1100	0.15 (0.006)
MBRP-26BXX-Bore-XX	2.00 (17.70)	12/24/90	12.5/50.1/810	11.5	35	30	0.000012 (1.06 x 10^{-8})	0.6 (1.323)	1400	0.15 (0.006)
MBRP-30BXX-Bore-XX	4.00 (35.40)	12/24/90	11.1/44.3/623	13.0	40	35	0.000023 (2.04 x 10^{-8})	0.8 (1.764)	1800	0.15 (0.006)

*See "How to order" model numbering system on page 105 for power-off brakes.
(-) denotes English equivalents. Specifications subject to change without notice. ** Unburnished *** Consult factory

BRAKES

START

TC / TCR Series

Power-on and Power-off Tooth Clutches

When used in either static or low-speed engagement applications, tooth clutches and clutch couplings provide an efficient, positive, switchable link between a motor and load on inline or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by a fixed flange, the rotor is generally attached to the input shaft. The armature assembly is securely mounted to either an inline load shaft or a parallel shaft by means of pulleys or gears. When the coil is energized, the tooth profile of the armature positively engages the tooth profile of the rotor, coupling the two inline or parallel shafts, thus driving the load.

Tooth brakes (not shown) provide an efficient, positive, switchable means of either holding a load or decelerating a load from a slow speed, generally 20 RPM or less. Utilizing the same principle as the tooth clutch, these brakes can be used to effectively hold a load in position. Available in power-on or power-off models, tooth brakes are ideal for applications requiring high torque in tight places.

- Torque: up to 250 lbs.-in. (28.2 Nm)
- Diameter: 2.13 in. (54.1 mm)
- Positive engagement, indexing capability
- Highest torque density
- Power-on and power-off
- Zero wear at speed when not engaged
- Standard and custom designs

Typical Applications

- Military aerospace actuators
- Avionics and flight control
- Medical equipment
- Postal handling equipment
- Machine tools
- Robotics

TCR Model Shown

How to Order

TC - 19 - 24 - E08

Series
TC = Power-on Tooth Clutch
TCR = Power-off Reverse-Acting

Frame Size
19 = 2.13 (54.1)

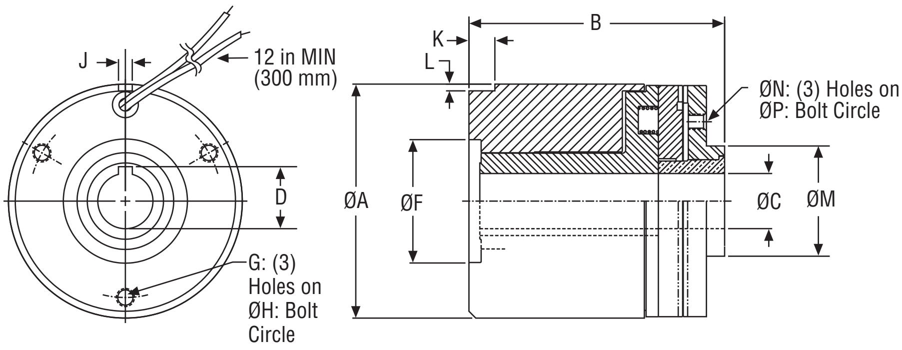
Bore
E06= .376 (9.6)
E08= .501 (12.7)

Coil Voltage
12 = 12VDC
24 = **24VDC**
90 = **90VDC**

START

TC-19 & TCR-19 Tooth Clutches

Dimensions & Specifications



TCR Model Shown

DIMENSIONS																
Model	Static Torque lbs.-in. (Nm)	A: OD in. (mm)	B: OAL in. (mm)	C: Bore Ø in. (mm)	D: K'way Height in. (mm)	E: K'way Width in. (mm)	F: Case Pilot Ø in. (mm)	G: (3) Case Mtg Holes in. (mm)	H: Case Mtg Holes Ø in. (mm)	J: Mtg Slot Width in. (mm)	K: Mtg Slot Length in. (mm)	L: Mtg Slot Depth in. (mm)	M: Mtg Pilot Ø in. (mm)	N: (3) Mtg Holes	P: Mtg Hole BC Ø in. (mm)
TC-19-24-E06	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .19 DP	1.44 (36.6)
TC-19-24-E08	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.500 (12.7)	.564 (14.3)	.126 (3.2)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .19 DP	1.44 (36.6)
TCR-19-24-E06	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.375 (9.5)	.425 (10.8)	.094 (2.4)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .16 DP	1.44 (36.6)
TCR-19-24-E08	250 (28.2)	2.13 (54.1)	2.38 (60.5)	.500 (12.7)	.564 (14.3)	.126 (3.2)	1.125 (28.6)	#8-32 x .22 DP	1.75 (44.5)	NA	NA	NA	1,000 (25.4)	#8-32 x .16 DP	1.44 (36.6)

PERFORMANCE							
Model	Static Torque lbs.-in. (Nm)	Coil Voltage VDC	Resistance Ohms nom	Power Watts max	Engagement Speed RPM (max)	RPM max	Weight lbs. (kg)
TC-19	250 (28.2)	24/90	47/653	16.7	20	3600	1.7 (0.7)
TCR-19	250 (28.2)	24/90	47/653	16.7	20	3600	1.8 (0.8)

(-) denotes metric equivalents. Specifications subject to change without notice.

General Notes

- Torque may decrease at higher RPM due to misalignment and vibration associated with the application.
- Engagement speed can be significantly increased and is directly related to system inertia. Consult factory for more information.
- Most tooth clutch applications require a high degree of attention with respect to shaft concentricity and mounting perpendicularity. Consult factory for details.
- Other voltages available upon request.
- Additional sizes and configurations are available upon request. Torque values can be greatly enhanced as well. Consult factory for additional information.

Engineered Products

Power-off Spring Set (Safety) - LBRP Series

Spring Set electromagnetic power-off brakes provide a safe, efficient means of stopping and/or holding a load in the absence of power. Custom manufactured for wheelchair and the handicap scooter industry, our LBRP series brakes have optional manual release handles and some models are available with micro switches (to indicate whether the brake is released or engaged). Our LBRP series power-off spring set brakes can be used as a stopping (emergency stopping) or holding brake (parking). These brakes are manufactured in low-cost regions, allowing the lowest prices available in the market.

- Static Torque: 1 to 13 Nm (8.85 to 115 lbs.-in.)
- Diameter: 42 to 100 mm
- Bore size (Shaft Dia.): 6 to 12 mm (0.236 to 0.472 in.)
- Assembly and all components meet EU Directive 2002/95/EC (RoHS)
- Plated steel surfaces to withstand corrosion
- Tough, durable, long-wearing friction materials
- Anti-rattle feature
- Operating speeds up to 3600 RPM

Other Applications Include:

- Patient lifts
- Handicap van/RV/truck actuators
- Electric vehicles

LBRP Series
Contact our Applications Team for more information.

Multi Disc Brakes and Clutches - MDB/MDC Series

Multiple Disc Clutches provide a smooth efficient, switchable link between a motor and a load on inline or parallel shafts. While the field (electromagnet) assembly is prevented from rotating by an anti-rotation tab or flange, the rotor is securely mounted on the drive shaft. The armature assembly is then mounted either directly on an opposing inline shaft or indirectly on a parallel shaft by means of gears or pulleys. When the coil is energized, the armature engages the friction surface of the rotor, further engaging the multiple discs within the assembly until full torque is achieved, thereby coupling the two inline or parallel shafts, thus driving the load. A brake operates similarly by eliminating the rotor.

- Torque: 25 lbs.-in. to 300 lbs.-ft. (2.8 to 407 Nm)
- Diameter: 2.0 to 10 in. (50.8 to 254.0 mm)
- Dynamic engagement capabilities
- Wet or dry operation
- Custom designs only

Typical Applications

- Flight control actuators
- Postal equipment
- Packaging
- Machine tools
- Agricultural equipment

MDC Model Shown

Complete Custom Assemblies and Subassemblies

Custom Brake and Clutch Value-Added Assemblies are a major strength of Thomson. Variations of any device shown in this catalog can be adapted specifically to meet the most demanding needs of your application.

Custom gears, pulleys, sprockets, integrally mounted to the clutch can be combined with special shaft sizes, coil voltages, connector assemblies or any other type of design imaginable.

We manufacture complete assemblies and subassemblies for many customers. Allow us to help cost-reduce your product and provide a more economical solution to your most complex clutch or brake application.

- Torque: 6.0 oz.-in. to 1200 lbs.-in. (0.04 to 135 Nm)
- Diameters: 0.6 to 7.25 in. (15.2 to 184.2 mm)
- Efficient means of cycling load
- Fast response, repeatable performance
- Static or dynamic engagement
- Simple installation
- Economical cost
- Energy efficient

See inside back cover of this catalog for more information.

Notes

Custom Clutch & Brake Capabilities

Can't find what you're looking for in this catalog? Deltran has you covered.

Deltran offers a wide variety of standard clutches and brakes that can be utilized in many applications. However, sometimes your design considerations fall outside of standard component specifications. In cases such as these, Deltran experts work closely with you and your team to provide customized solutions that meet the unique challenges of your applications.

Ask us about our highly engineered solutions – from small-volume aerospace and defense to high-volume automotive applications – all at a competitive cost.

Deltran builds custom clutches and brakes for a wide variety of markets and applications, including:

Medical
Our brakes are used in medical equipment as holding brakes to consistently hold a load in position at a specific stopping point. Our clutches are used to drive belts and cables for patient lifts and other medical applications.
- Patient tables and lifts
- Patient beds
- Mammography equipment
- Pill dispensing machines
- Nuclear imaging (C.A.T. scan)
- Digital Imaging
- X-ray machinery applications

Semiconductor and Electronic Assembly
Our clutch/brake technology ensures high reliability and quality while being cost effective in semiconductor applications.
- Wafer-handling robots
- Inspection test sytems
- Pick-and-place machines
- Automated die bonding equipment
- Product handling storage elevator
- Surface mount technology (SMT)

Material Handling/Packaging
Long life and reliability are key attributes for clutches and brakes used in material handling and packaging applications.
- Conveyor systems
- Baggage handling conveyors
- Pick-and-place machines
- Strapping machines
- Food labelling systems
- Food dispensing
- Egg packing equipment
- Crimping machines

Aerospace and Defense
Wrap spring and friction units are used in commercial and military aircraft vehicles and equipment.
- Autopilot systems
- Satellites
- Fuel control
- Tank gun turret
- Helicopter actuators
- Onboard instrumentation
- Valves
- Air cabin control backup systems
- Missiles/precision guided munition

Automotive
Cars, vans and SUV utilize wrap spring clutches, custom power-off brakes and power-on tooth clutches in many applications.
- Cinch/latch mechanisms for doors and trunks
- Actuators
- Cruise control
- Power liftgate
- Transaxles
- Power sliding doors

Electric Vehicle Systems
Friction brakes are utilized in many battery-powered vehicle applications, including lift tucks, golf cars and sweeping machines.
- Scissor lifts
- Electric hoists and cranes
- Steering applications
- Lift trucks
- By wire applications
- Electric sweeping machines

Office Automation
Wrap spring and friction clutches and brakes are widely used in office equipment.
- Copiers
- Label dispensing
- Staplers
- Paper punching
- Folding machines
- Printers
- Wire stitchers

Agricultural
Wrap spring and friction clutches and brakes are used in agricultural equipment.
- Seeders
- Balers
- Tractors
- Ride-on lawnmowers
- Harvesters
- Electric vehicle systems equipment

Design Considerations

Factors To Consider

Brake and Clutch design considerations are based on a number of factors. Depending upon the particular application, these factors can become either more or less important. The discussion of Application Definitions differentiates between heavy, medium and light duty, as well as static versus dynamic applications. In a simple light-duty, static-use application, clutch or brake selection can be made based on an estimate of torque required considering the motor torque capacity and the load driven (or held). However, when precise control and life expectancy are of concern, one must consider inertia, heat dissipation and speed as key factors.

Inertia Calculations

Total system inertia, typically expressed in lbs.-in.-sec² units, equals the sum of reflected inertia (I_R) and clutch inertia (I_C).

Clutch inertia values can be found in our catalog, reflected inertia is calculated beginning with **load inertia**.

Load inertia (I_L) for cylindrical rotational bodies, expressed in units of lbs.-in.-sec², is equal to $WR^2/772$, where W = weight in lbs. and R = radius in inches. The following chart may be used as reference (based on steel, per inch of length) to help simplify this calculation. To determine the inertia of a given shaft, multiply the WR^2/L shown below by the length of the shaft or the thickness of the disc in inches. For hollow shafts, subtract the WR^2/L of the ID from the WR^2/L of the OD and multiply by the length.

Diameter in.	WR²/L lbs.-in.²/in.	Diameter in.	WR²/L lbs.-in.²/in.	Diameter in.	WR²/L lbs.-in.²/in.	Diameter in.	WR²/L lbs.-in.²/in.
0.250	0.00011	2.00	0.445	6.00	36.00	10.00	277.92
0.312	0.00027	2.25	0.712	6.25	42.39	10.25	306.72
0.375	0.00055	2.50	1.085	6.50	49.60	10.50	337.71
0.437	0.00102	2.75	1.584	6.75	57.68	10.75	371.04
0.500	0.00173	3.00	2.250	7.00	66.71	11.00	406.78
0.562	0.00279	3.25	3.100	7.25	76.76	11.25	444.96
0.625	0.00425	3.50	4.176	7.50	87.91	11.50	485.93
0.687	0.00623	3.75	5.494	7.75	100.23	11.75	529.59
0.750	0.00879	4.00	7.113	8.00	113.90	12.00	576.00
0.812	0.01215	4.25	9.072	8.25	128.71	12.25	626.10
0.875	0.01634	4.50	11.393	8.50	145.00	12.50	678.31
0.937	0.02142	4.75	14.144	8.75	162.86	12.75	734.22
1.000	0.02778	5.00	17.365	9.00	182.29	13.00	793.52
1.250	0.06783	5.25	21.107	9.25	203.40	13.25	856.35
1.500	0.14065	5.50	25.488	9.50	226.30	13.50	922.83
1.750	0.26058	5.75	30.371	9.75	252.00	13.75	993.11

To obtain this information for materials other than steel, multiply the inertia of the proper steel diameter from the above chart using the correct multiplier in the chart at right.

Reflected inertia can now be calculated as $I_R = I_L(\omega_L/\omega_C)^2$, where ω_L = load RPM and ω_C = clutch input RPM.

Material	Multiplier
Bronze	1.05
Steel	1.00
Iron	0.92
Powder Metal Bronze	0.79
Powder Metal Iron	0.88
Aluminum	0.35
Nylon	0.17

Design Considerations

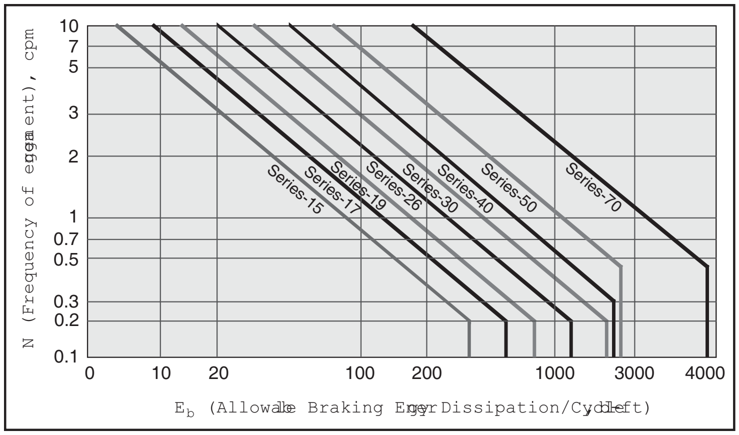
Energy Dissipation Calculations

Total energy dissipation (E_c), typically expressed in units of ft.-lbs., is defined as the sum of kinetic (E_k) and slip (E_s) energy dissipated each clutch or brake cycle.

Kinetic energy dissipation (E_k) is equal to $4.6 \times 10^{-4} \times I \times \omega^2$, where I = total system inertia in lbs.-in.-sec^2 units, and ω = differential slip speed in RPM.

Slip energy dissipation (E_s) is equal to $43.6 \times 10^{-4} \times \omega \times D \times t_s$, where D = load drag reflected to the clutch shaft in lbs.-in. units, and t_s = total slip time in seconds.

Brake Energy Dissipation Chart



Use to evaluate size of a power-off brake after determining the energy dissipation.

Optimum Torque and Response

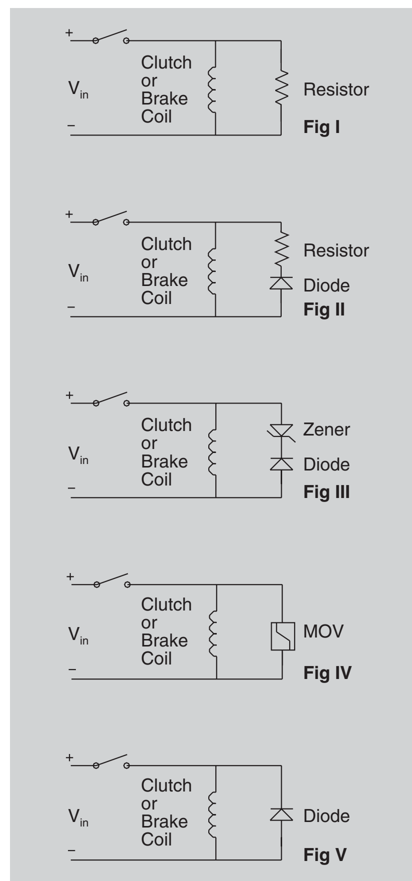
Burnishing: Burnishing is a process of running-in the mating friction surfaces of a clutch or brake to ensure the highest possible output torque. By forcing the unit to slip rotationally when energized, the mating frictional surfaces establish an optimal wear pattern within a relatively short time. This can be accomplished at the factory or during the initial stages of installed application. However, whenever possible, it is more desirable to perform the burnishing process at the actual installation to ensure a consistent alignment of the friction faces.

Engagement: Coil overexcitation is a technique that makes a clutch or brake engage faster and have greatly improved starting and stopping accuracy. It is accomplished by applying over-voltage to the clutch or brake coil to reduce current buildup time, thereby reducing the magnetizing time. However, this overexcitation does not increase the torque of the unit. It simply reduces the start/stop times and friction face wear normally associated with slippage that can occur during a slower engagement time. In many applications, the reduction in start-time can be reduced significantly when using an overexcitation circuit. However, adequate coil suppression must be employed to prevent damage to the system. Please contact the factory for more detailed information.

Disengagement: When a clutch or brake is disengaged, a reverse voltage is generated in the coil. This voltage can be extremely high and could cause potential damage to the unit and the switch in the circuit. Therefore, an arc suppression circuit should be used to protect the coil and switch. When properly applied, such a circuit will not adversely affect the clutch or brake engagement time.

In most applications, a simple resistor connected in parallel with the clutch or brake coil is sufficient (Fig. I). The resistor should be rated at six times the coil resistance and approximately 25% of the coil wattage. To eliminate any added current draw, a diode may be added to the circuit as shown

(Fig. II). If faster release times are desired, a zener diode with two times the coil voltage should be incorporated into the circuit (Fig. III). However, the fastest disengagement time is achieved with the use of an MOV (metal oxide varistor) (Fig. IV). Conversely, if slower disengagement times are required, the use of a diode connected in parallel with the coil (Fig. V), or simply switching the A/C side of the circuit, will achieve this result.



Mounting Requirements

CS, CSC, BF, SB, FSB and PMB units

(Bearing- and flange-mounted clutches, couplings and brakes)

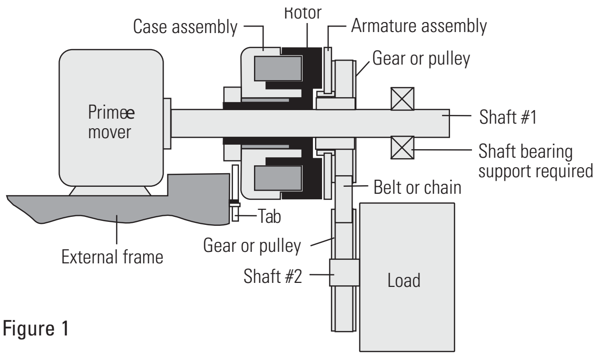


Figure 1

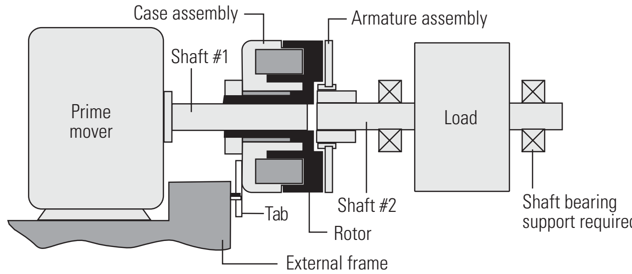


Figure 2

Bearing-Mounted Clutches - CS models
Figure 1 - Used to couple two parallel shafts. The rotor and armature are mounted on the same shaft. The armature is bearing mounted on the shaft and is free to rotate independent of the shaft. The knurled hub can press fit a gear or pulley onto the armature assembly, which, in turn, drives the parallel shaft. The case assembly is bearing mounted and is provided with anti-rotation tab.

Bearing-Mounted Clutch Couplings - CSC models
Figure 2 - Used to couple two inline shafts. The rotor is attached to one shaft and the armature to the other shaft. The case assembly is bearing mounted and is provided with an anti-rotation tab.

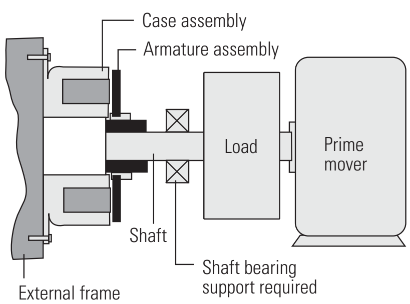


Figure 3

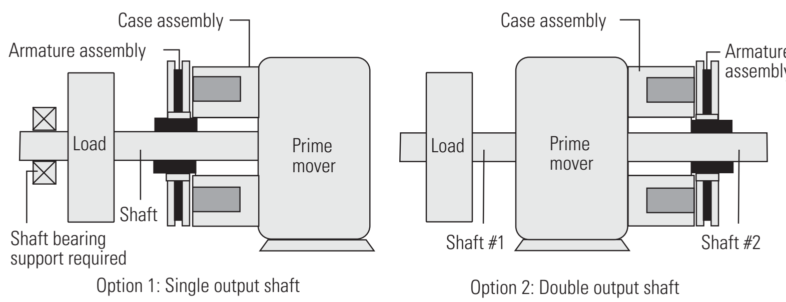


Figure 4

Flange-Mounted Brakes - BF models
Figure 3 - Used to stop or hold the armature and load to which it is attached. Units are furnished with coupling-type armature hubs. The case assembly is flange mounted for fastening to a bulkhead.

Power-Off Brakes - SB, FSB & PMB models
Figure 4 - Used to stop or hold a load in the absence of power. The case assembly is mounted or fastened to a bulkhead. The armature assembly is attached to the rotating load.

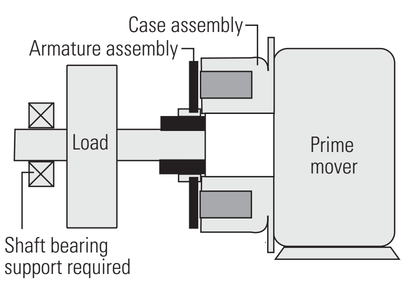
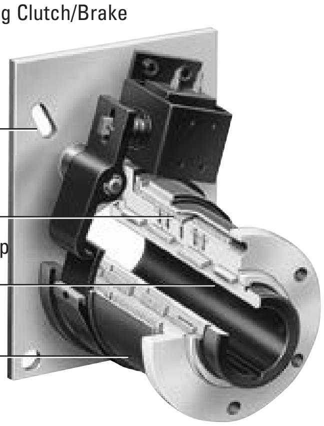


Figure 5

Permanent Magnet Brakes - RAB models
Figure 5 - XX

Glossary of Terms

Wrap Spring Clutch/Brake



Acceleration Time - The time required to change the speed of a system from the moment the clutch engages until it is statically engaged and the system is moving at a constant speed.

Actuator Limit Stop - The actuator limit stop is a restraining pin or plate on a wrap spring clutch that limits the motion of the actuator on solenoid-actuated models.

Air Gap - The physical axial space between rotor and armature that is overcome when the magnet body is energized, engaging the clutch or brake.

Anti-Backup (AB) - The anti-backup spring prevents oscillation between the clutch and brake springs on a wrap spring device and prevents the output load from reversing. Anti-backup is a standard feature on CB Series clutch/brake combinations.

Anti-Overrun (AO) - The anti-overrun spring prevents overhauling loads from overrunning the input on a wrap spring. For example, anti-overrun is being applied when an eccentric output load is held at the same speed as the constant speed input. Anti-overrun is a standard feature on all CB Series products.

Anti-Rattle Feature - PMB brakes are available with an anti-rattle feature. This feature minimizes noise that occurs when the brake is released (Power On) and is running at speed. On the PMB Series, a rubber "O" ring is embedded in the "splined hub" that applies a slight pressure on the mating spline teeth, eliminating most of the rattling noise.

Anti-Rotation Slot - A slot used in clutch models to prevent rotation during operation.

Armature (assembly) - The component in a friction clutch or brake that is attracted to the rotor or case assembly by the magnetic field created by the case assembly, affecting the coupling of input and output.

Armature Disengagement Time (ADT) - The time required from the instant electrical power is removed from the actuation system until the clutch is disengaged. ADT is also often referred to as Drop-Out Time.

Burnishing - A process of running in a clutch or a brake to reach full-potential torque. All standard catalog values of torque are indicated as burnished. Generally, any unit will become burnished during the first few cycles of normal operation at the customer's site. Pre-burnishing at the factory is normally an additional operation required only by those customers needing immediate out-of-box torque prior to the normal application run-in period.

Case Assembly - The fixed component in a clutch or brake that is energized, creating a magnetic field, affecting the engagement of rotor and armature.

Control Collar - A combination of protective cover and controlling device in a wrap spring product. The control tang of the spring fits in this collar; thus by allowing or preventing rotation of this collar, the spring is allowed or not allowed to wrap tight on the hubs. Stops are molded or machined on this plastic collar and can be engaged by an external arm to control engagement. A single stop is standard and most any number up to 24 can be machined for special applications.

Control Tang - A control tang at the end(s) of the wrap spring is/are used to engage and disengage the input and output hubs on on-off, start-stop and indexing units.

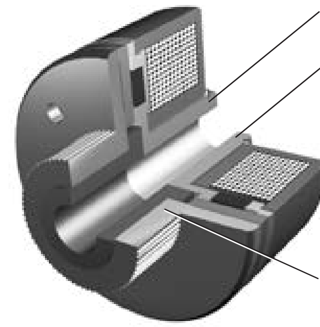
Drag Torque - The torque necessary to overcome static friction in a clutch or brake.

Dust Cover - PMB brakes are available with a dust cover. The dust cover protects the braking surfaces against, dust, dirt and dripping water. This feature is made from flexible rubber and is fitted between the case and the mounting plate.

Dynamic Torque - The torque developed where there is a relative motion between mating surfaces in a friction clutch or brake. The torque varies with the speed of rotation and amount of slip. Please contact our engineers for specific data.

Engagement Time - The time required, from the moment the clutch receives the appropriate electrical signal, for the magnet to attract the armature and the clutch faces are engaged. At this point the load begins to accelerate.

Friction Clutch



Frictional Torque - The torque created by friction reflected at the output of the clutch or brake.

Inertia - That property of a body to continue in the state of motion or rest in which it may be placed until acted on by some force.

Inertial Torque - The torque developed by accelerating or decelerating a given load.

Inner & Outer Pole (face) - Areas of the rotor that form the magnetic flux path and torque carrying friction within a clutch. In a brake the case assembly forms these poles.

Manual Release - Spring set brakes such as our PMB Series are available with a manual release. This allows the brake to be released mechanically in place of the electric coil operation. When power is removed, the brake is "holding" if there is no electrical power available. Simply push or pull the lever (handle) and the brake will release (not hold the load, shaft - hub will be allowed to rotate freely). Once pressure is removed from the handle (let go), the manual release handle will go back to its original position automatically. The brake will then "hold" (shaft - hub will be locked once again).

OTS/AB - If the load inertia is greater than the wrap spring tang can absorb without damage, an overtravel stop can be added to absorb a portion of the stopping torque. The anti-backup feature will prevent the output from reversing.

Glossary of Terms

Overrunning - The most basic control function performed by PSI Series wrap spring clutches in which the clutch transmits torque in one direction and allows the load to free wheel or overrun when the input drive is stopped or reversed.

Positive Engagement - An engagement that will not slip.

Radial Bearing Load - The maximum permissible load that can be applied to a clutch or brake unit at maximum velocity without incurring damage.

Residual Magnetism - The condition in electromagnets where low-level magnetism remains after the electrical current is removed.

Rotor (assembly) - The rotating component in a clutch that is generally attached (keyed or pinned) to the input (motor) shaft.

Split Cam - A sleeve design incorporated in all standard and super CB-5, CB-6, CB-7, CB-8, and SAC-5 & SAC-6 units. This design makes setting the spring differential (overtravel) simple. With the one-piece construction (older style), the relative position of the brake and drive springs are set together. The split cam design allows the user to set the position of the brake spring by just wrapping the spring in the direction opposite of the clutch input rotation.

Spring Differential - Spring differential is the positional relationship of the drive spring to the brake spring. Correctly adjusted spring differential is imperative for proper clutch/ brake performance. The spring differential is factory set.

Start-Stop Clutch - This control function is a basic engage-disengage operation resulting in random load-stopping positions. Both SP and PSI Series (mechanically actuated) clutches can be used as start-stop clutches, as can the SAC, BIMAC, MAC and DL.

Start-Stop Clutches and Brakes - Most wrap spring clutches and brakes can be configured to perform the start-stop control function in which loads are started and stopped accurately.

Static Torque - In wrap springs this is defined as the maximum torque that can be applied statically with the spring completely wrapped down before damage occurs. In friction devices this is the torque level beyond which the clutch or brake will slip or overrun.

Stop Collar - A combination cover and control device on a wrap spring device that has detent positions to enable the clutch or brake to be engaged or disengaged. Standard stop collars have one stop per revolution. Specials are available with as many as 24 stops per revolution.

Time To Engagement (TTE) - The time required from the instant the actuation system is signaled until the clutch is engaged. At this point the system begins to accelerate. Time to Engagement is also often referred to as Pull-In Time.

Time To Speed (TTS) - The time required from the instant the actuation system is signaled until the output reaches the input RPM. Time to Speed is the equivalent of the sum of engagement time and acceleration time.

Time to Zero - The time required to fully disengage the motor from its load, thus allowing the load to drop to zero speed. Note: Factors such as system friction and inertia naturally play an important role in both of these critical measurements.

Torque - The product of the force and the perpendicular distance from its line of action to the instantaneous center of rotation, generally expressed in lbs.-in. or Nm. Static torque occurs when there is no relative movement or slippage between mating friction surfaces. Fully engaged clutches, or a brake holding a load are examples of static torque. Dynamic torque is developed when there is relative motion between mating friction surfaces.

Torque Adjustment Feature - Our PMB Series brakes are available with a Torque Adjustment Feature. This feature allows the torque to be adjusted down from maximum holding force (Static Torque). This feature is in the form of a threaded “spanner-type nut”; to turn the nut, a simple spanner wrench may be used. This feature relieves the “tension” on the springs, therefore reducing the holding torque. This feature allows for a “softer” stop or less holding force (torque).

Total Cycle Time - Sum of the device time-on and time-off as measured in seconds. Duty cycle is the percentage of total cycle time that a clutch or brake is engaged. For example, 5 seconds on/5 seconds off corresponds to a 50% duty cycle and a 10 second cycle time. Cycle rate is expressed in cycles per minute (CPM), as the number of times the clutch or brake is engaged and disengaged during a one minute period.

Undercut - A process of cutting back one of the pole surfaces in relation to the other. Generally done to reduce any residual magnetism or to derate a device. Also a term used to describe the recessing of friction material so as to affect a more efficient burnished condition.

Wrap Angle - The number of degrees a spring tang must rotate in order to engage or disengage a load in a wrap spring device.

Wrap Spring - High tensile strength coiled wire, which transmits a substantial amount of torque when wrapped tightly around two hubs.

Application Definitions

Heavy Duty is defined as one where the clutch is engaged in concert with the movement of the load. Example: a paper feed clutch that is engaged each time that a sheet of paper is introduced into the print path.

Light to Medium Duty is defined as one where running speed is achieved in the absence of loading (or the clutch is engaged at zero speed). Example: a machine tool head that is engaged and at speed before the cutting of metal begins.

A **Dynamic Clutch** application is another way of defining “Heavy Duty”. Factors such as inertia, energy dissipation and life become critical.

A **Static Clutch** application is defined as one where the clutch is engaged at zero speed. Example: a tooth clutch that is used to couple and position an X-ray machine head.

A **Dynamic Brake** application is defined as one where the brake is engaged to actually stop the load. Again, inertia, energy dissipation and life must be well defined. Example: an emergency stop of a motor that is running at speed, particularly if under load.

A **Static Brake** application is defined as one where the brake is engaged after the system has come to rest. Example: a holding brake on a Z-axis to hold the load in place in the event of a power failure.

Conversion Chart

Listed Alphabetically

To Convert From	To	Multiply By
cm	feet	3.281×10^{-2}
cm	inches	.3937
degrees/sec	RPM	.1667
degrees/sec	rad/sec	1.745×10^{-2}
feet	cm	30.48
ft.-lbs./min	Watts	2.259×10^{-2}
g-cm	lbs.-ft.	7.233×10^{-5}
g-cm	oz.-in.	1.389×10^{-2}
g-cm^2	lbs.-in.^{2}	3.417×10^{-4}
g-cm^2	lbs.-ft.^{2}	2.373×10^{-6}
gm-cm^2	oz.-in.^{2}	5.467×10^{-3}
horsepower	ft.-lbs./min	33,000
horsepower	watts	7.457×10^{-2}
inches	cm	2.540
kg-m	lbs.-ft.	7.233
kg-m	lbs.-in.	.6026
kg-cm^2	lbs.-in.^{2}	3.417×10^{-1}
kg-cm-sec^2	lbs.-in.^{2}	335.1
kg-m^2	lbs.-ft.^{2}	23.73
kg-m^2	lbs.-in.^{2}	3417
kilograms	pounds	2.205
lbs.-ft.	lbs.-in.	12
lbs.-ft.	oz.-in.	192
(lbs.-ft.)(RPM)	HP	1.904×10^{-4}

To Convert From	To	Multiply By
(lbs.-ft.)(RPM)	Watts	.142
lbs.-ft.^{2}	gm-cm^2	4.214×10^{5}
lbs.-ft.^{2}	lbs.-in.^{2}	144
lbs.-ft.^{2}	lbs.-in.-sec^2	.37272
lbs.-ft.^{2}	oz.-in.^{2}	2304
lbs.-ft.^{2}	oz.-in.-sec^2	5.969
lbs.-in.	g-cm	165960
lbs.-in.	kg-cm	165.96
lbs.-in.	kg-m	1.6596
lbs.-in.	lbs.-ft.	.083
lbs.-in.	Nm	.113
lbs.-in.	oz.-in.	16
(lbs.-in.)(RPM)	HP	1.587×10^{-5}
(lbs.-in.)(RPM)	Watts	.0118
lbs.-in.^{2}	kg-cm^2	2.926
lbs.-in.^{2}	Nm^2	2.870×10^{-3}
lbs.-in.^{2}	kg-m^2	2.9265×10^{-4}
lbs.-in.^{2}	lbs.-in.-sec^2	2.590×10^{-3}
lbs.-in.^{2}	lbs.-ft.^{2}	6.944×10^{-2}
lbs.-in.^{2}	oz.-in.^{2}	16
meters	millimeters	1000
millimeters	inches	3.937×10^{-2}
Nm	lbs.-ft.	.738
Nm	lbs.-in.	8.85

To Convert From	To	Multiply By
Nm	oz.-in.	141.69
Nm^2	lbs.-in.^{2}	348.47
Nm-sec^2	lbs.-in.^{2}	3417
Newtons	pounds	.225
oz.-in.	lbs.-ft.	5.208×10^{-3}
oz.-in.	lbs.-in.	6.25×10^{-2}
(oz.-in.)(RPM)	HP	9.917×10^{-7}
(oz.-in.)(RPM)	Watts	7.395×10^{-4}
oz.-in.^{2}	gm-cm^2	182.9
oz.-in.^{2}	lbs.-ft.^{2}	4.340×10^{-4}
oz.-in.^{2}	lbs.-in.^{2}	6.25×10^{-2}
oz.-in.^{2}	oz.-in.-sec^2	2.590×10^{-3}
oz.-in.-sec^2	oz.-in.^{2}	3.8609×10^{-2}
oz.-in.-sec^2	lbs.-in.^{2}	24.125
RPM	rad/sec	.1047
radians	degrees	57.3
rad/sec	RPM	9.549
revolutions	radians	6.283
revolutions/min.	degrees/sec	6
square-inches	square-mm	645.2
temp. (°C) +17.78	temp. (°F)	1.8
temp. (°F) -32	temp. (°C)	.555
Watts	ft.-lbs./min	44.2
Watts	HP	1.341×10^{-3}

Notes

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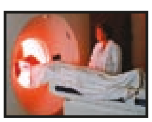
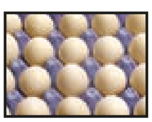


MEDICAL
SB Power-off Brake
Holds table in position



PACKAGING
Wrap Spring CB-6
Moves product

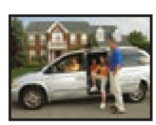
ELECTRIC VEHICLE
PMB Power-off Brake
Brake holds cart

AGRICULTURE
Wrap Sprng SAC-6
Turns seeder on and off

ELECTRONIC ASSEMBLY
Wrap Spring CB-2
Pick and place

OFFICE AUTOMATION
Wrap Spring DL-33
Paper feed

AEROSPACE & DEFENSE
TCR-19 Tooth Clutch
Environmental control



AUTOMOTIVE
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