Spring-Set Brakes for Static Holding and Emergency Stopping Applications

Statically engaged holding brakes are applied where the rotating shaft needs to be held after it has stopped and is in a static condition. Spring-set brakes automatically stop and hold a load in the event of power failure or other emergency stop situations. The spring clamping force provides holding torque until the brake is electromagnetically released.

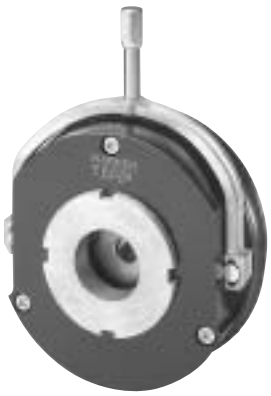
ERS Series

Static Engaged Brakes

Although this brake should be engaged only when the shaft is at rest, it can occasionally act as a braking device on a rotating shaft in an emergency situation. However, it is intended to be used for static applications.

ERD Series

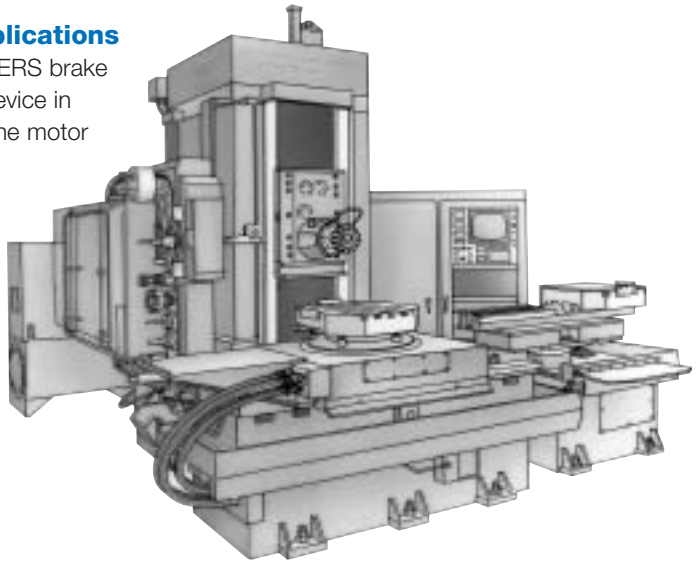
Dual Purpose Engagement Brakes



This brake can be engaged when the shaft is at rest or when the shaft is in motion.

ERS Typical Applications

The Warner Electric ERS brake is an ideal holding device in applications where the motor is used to stop and accurately position the load.

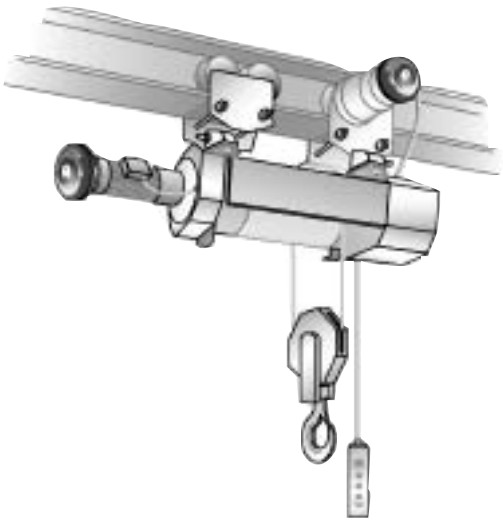


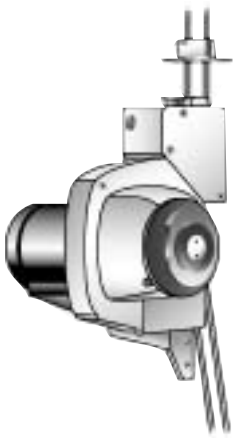
Machine Tools

ERS Brakes are used on automatic tool changers to hold the load and maintain precise positioning accuracy.

ERD Typical Applications

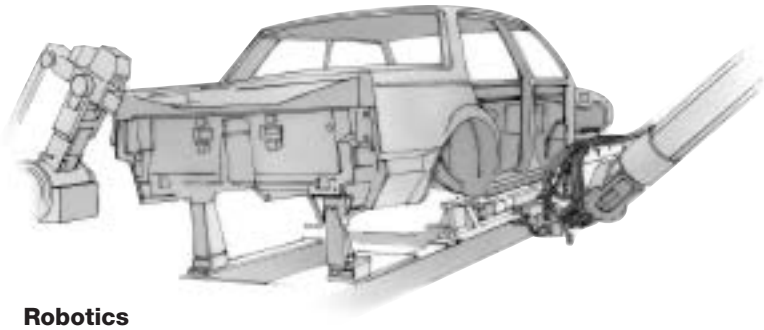
The Warner Electric line of ERD electrically released, dynamic, spring-set brakes offers a high-performance, cost effective solution for power-off load holding applications.



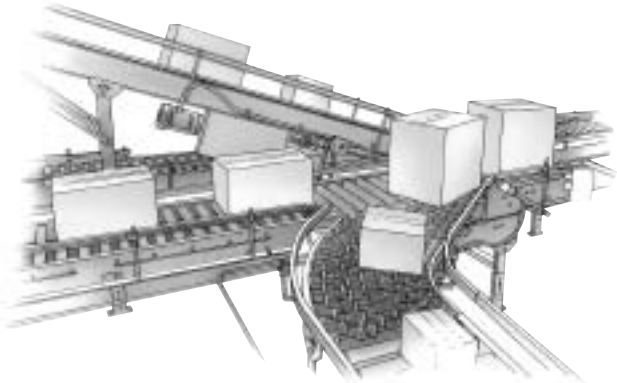


Hoist/Winch

The ERD with central torque adjustment can be used to consistency stop the rated load within a fixed distance by dialing-in the proper torque level on each production hoist. The addition of a manual release allows the load to be gradually and safely lowered to the ground in the event of power failure.



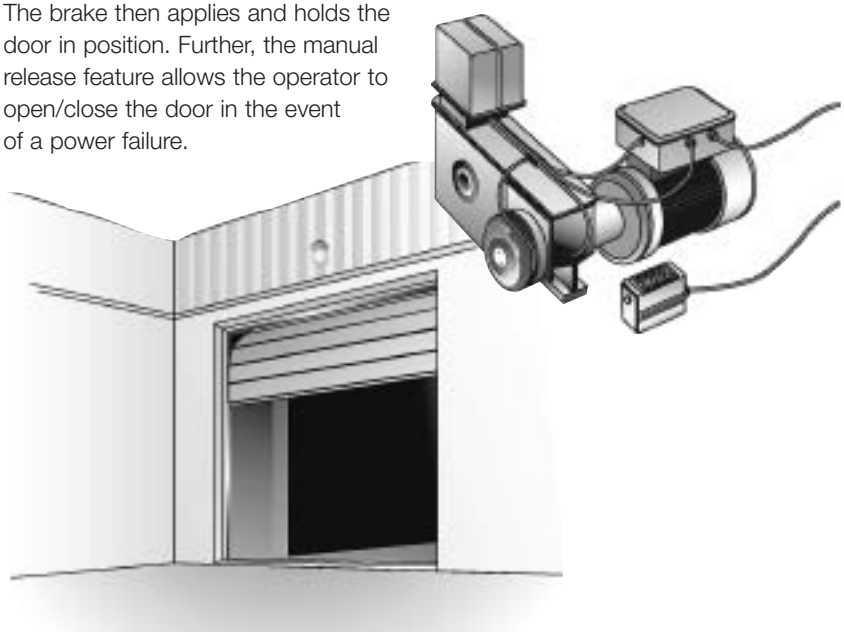
Robotics
ERS Brakes can position and hold robotic equipment. Emergency braking in the event of power loss can prevent damage to equipment.

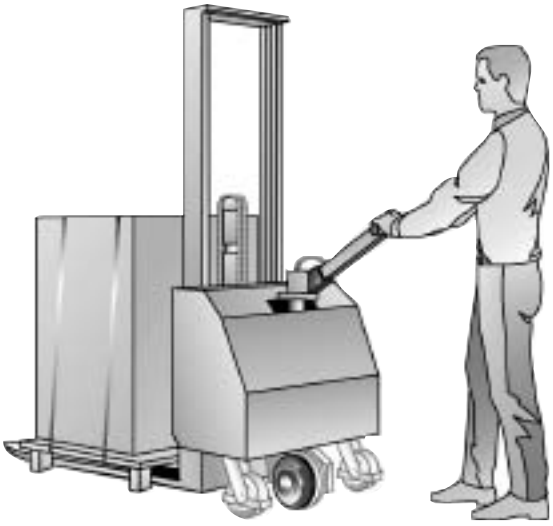


Automated Material Handling Systems
ERS Brakes hold rollers and lift mechanisms in place, and lock drive wheels in place.

Medical Equipment
ERS brakes are used as parking brakes in wheelchairs and holding brakes in medical apparatus such as mammography and cat scan equipment.

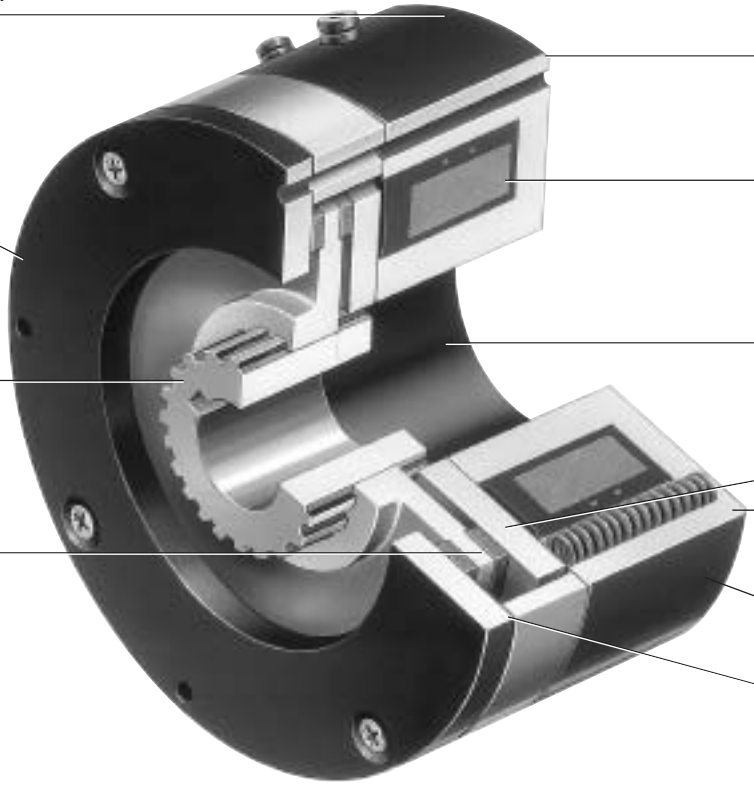
Overhead Door
The ERD can be used in conjunction with a photo eye. In this application, whenever the light beam is broken, voltage to the brake is removed. The brake then applies and holds the door in position. Further, the manual release feature allows the operator to open/close the door in the event of a power failure.





Mobile Equipment
ERS Brake, applied as a parking brake function on lift trucks, prevent rolling on slanted surfaces without the need for manual brake linkage or expensive hydraulic brakes.

For Static Holding and Emergency Stopping



Packaged Performance

Warner Electric ERS Brakes are pre-assembled and burnished at the factory. The engineering is built-in. Each unit is checked to ensure full rated torque right out-of-the-box. Just secure the hub, bolt down the brake and wire it up. An optional AC to DC control is available for use with all 90 volt units. Unique mounting features make it easy to adapt the ERS Brake to almost any application requirement.

ERS brakes are available in NEMA C-face mounted modules. Please consult factory for assistance.

Features

- Designed for static holding operations
- Brake automatically engages when power is turned off
- Flexible mounting
- Electrically released – spring actuated
- Quick, quiet response for rapid engagement
- Compact, low profile design saves space
- Spline drive for high torque, minimal backlash and long life
- Available in five sizes. Static torque ratings from 1.5 lb.ft. to 100 lb.ft.
- ERS-26 and ERS-42 UL approved.

Principle of Operation

ERS Brake torque is developed when springs apply a clamping force between the brake armature and the friction disc to the end plate. Spring clamping force provides the holding torque of the brake.

To release the brake, electrical power is applied to the magnet coil, generating a magnetic attractive force between the armature and magnet. The magnetic force overcomes the spring action, allowing the friction disc to rotate freely.

"Electrically Released" brakes are so named because, when power is removed, the brake will stop and hold a load. This occurs when power is lost either intentionally or unexpectedly due to a machine malfunction. When power is on, the brake electrically releases the load, allowing it to move freely.

Sizing

Three factors are important for proper sizing:

- Static holding torque requirement
- System inertia and brake RPM
- Stopping time

Step 1

Holding Torque

Select the size unit with torque capacity closest to, but not less than, the holding torque required.

Brake Size	Holding Torque Rating lb. ft.
ERS-26	1.5
ERS-42	7.0
ERS-49	15.0
ERS-57	34.0
ERS-68	100.0

Step 2

System Inertia/Emergency Stop

In an emergency stop (when power is interrupted), the ERS Brake will engage and bring the load to a stop. To properly size a brake for this application, load inertia must be known. This is the total inertia of all components which are to be brought to a stop. Adding the inertia of the ERS Brake is not necessary; it has been included in the selection chart.

With the load inertia and brake RPM known, use the Emergency Stop Selection Chart to verify your brake selection. Simply locate the intersection of your RPM and inertia and make sure you are not above the line for the brake you selected based on Holding Torque (Step 1). If you are above the line, select the brake designated by the next higher line.

Selection Procedure

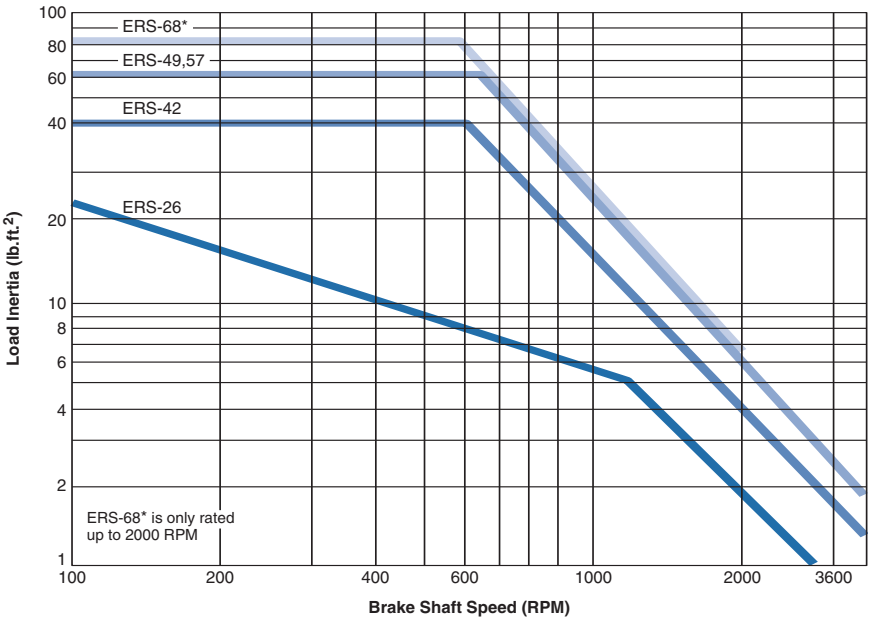
ERS Brakes are available in five models for an optimum size to match your application requirements. Static torque capabilities range from 1.5 lb.ft. to 100 lb.ft.

The stopping function is an important consideration when deciding which brake to use. Will the brake be engaged and disengaged in a static condition (zero speed difference between the armature disc and the friction disc)? If yes, the ERS Brake is the right choice.

Will the brake be normally engaged and disengaged in a static condition with intermittent engagements dynamically? An emergency stop is a good example. If yes, the ERS Brake is the ideal choice.

Will the brake be subject to frequent dynamic braking action? If yes, then a Warner Electric ER, FB or ERD brake should be considered. The ERS Brake is not the best choice for use as a high cycle rate dynamic brake.

Emergency Stop Selection Chart



*ERS-68 is only rated up to 2000 RPM

Selection

Step 3

Stopping Time

In some applications, it is desirable to know how fast a brake will bring a load to rest. The time to stop a load can be determined if the system inertia and brake holding torque are known, according to the following equation:

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

t = time to stop the load in seconds (sec.)

WR^2 = system inertia at the brake location in pound-feet squared ($lb.ft.^2$)

N = speed of the brake shaft in revolutions per minute (RPM)

T = rated brake holding torque in pound-feet (lb.ft.) See step 1, page 89.

Actual stopping times depend on application variables, which include brake temperature, electrical suppression (see the brake apply time data below), manufacturing tolerances, friction material wear, etc. For this reason, specific stop times should be evaluated under actual application conditions.

If your application has special requirements, please call us.

Step 4

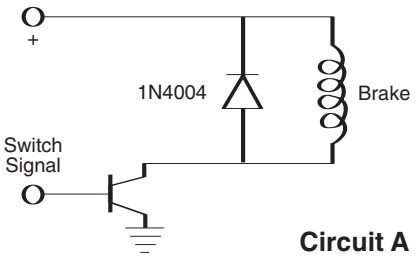
Select Control

Consult the Controls Section for control product overview. The holding torque for an ERS is not adjustable. Therefore, an adjustable torque control is not required.

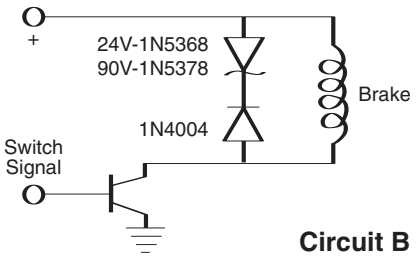
Brake Apply/Release Time (Typical Values)

	Brake Release Time (Seconds)		Brake Apply Time (Seconds)			
			Suppression Circuit A		Suppression Circuit B	
Model	24V	90V	24V	90V	24V	90V
ERS-26	0.03	0.03	0.04	0.04	0.01	0.01
ERS-42	0.05	0.06	0.10	0.10	0.01	0.02
ERS-49	0.07	0.08	0.15	0.15	0.02	0.02
ERS-57	0.11	0.11	0.15	0.15	0.02	0.02
ERS-68	0.16	0.20	0.20	0.20	0.03	0.03

Note: Release and Apply Times are armature engagement and release only.



Circuit A

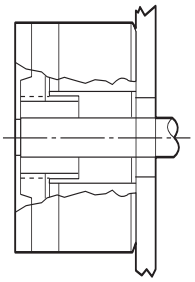


Circuit B

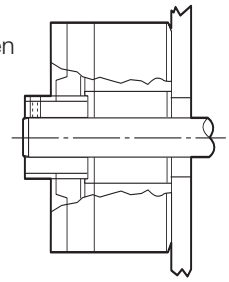
Armature Drives

The rugged splined drive provides flexibility in selecting the most efficient method of coupling a load to the ERS Brake. Each unit size has standard splined hubs available for common shaft sizes.

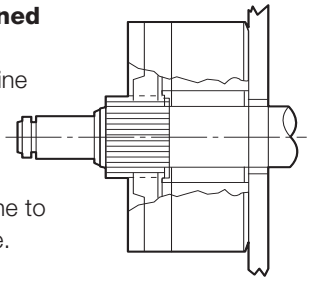
Recessed Hub
For maximum space efficiency, mount hub on shaft, then mount brake over hub.



Extended Hub
Mount brake first, then position hub on shaft so hub is beyond the brake.

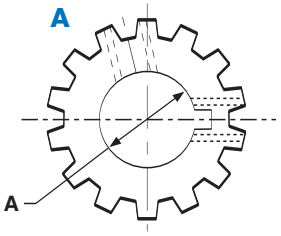


Mating Splined Member
Machined spline on drive member matches armature spline to operate brake.

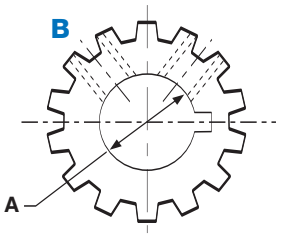


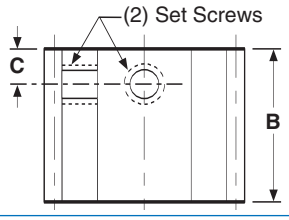
Drive Hub/Spline and Interface Data

Set Screw Orientation



Set Screw Orientation





Model	A Bore	Mating Key (Not furnished)	Set screw Orientation	B Nom.	C Nom.	Set Screws	No. of Teeth	Dia. Pitch	Pressure Angle
	.2525/ .2505	1/16 x 1/16	B						
ERS-26	.3150/ .3130	1/16 x 1/16	B	.600	.135	6-32	14	20/40	30°
	.3775/ .3755	3/32 x 3/32	B						
	.3775/ .3755	3/32 x 3/32	A						
	.5025/ .5005	1/8 x 1/8	A						
ERS-42	.6275/ .6255	3/16 x 3/16	A	.700	.150	8-32	19	16/32	30°
	.7525/ .7505	3/16 x 3/16	B						
	.3775/ .3755	3/32 x 3/32	A						
	.5025/ .5005	1/8 x 1/8	A						
ERS-49	.6275/ .6255	3/16 x 3/16	A	.800	.160	10-32	21	16/32	30°
	.7525/ .7505	3/16 x 3/16	B						
	.8775/ .8755	3/16 x 3/16	B						
	.5025/ .5005	1/8 x 1/8	A						
	.6275/ .6255	3/16 x 3/16	A						
ERS-57	.7525/ .7505	3/16 x 3/16	A	.800	.190	1/4-20	15	10/20	30°
	.8755/ .8755	3/16 x 3/16	B						
	1.0025/1.0005	1/4 x1/4	B						
	1.0025/1.0005	1/4 x 1/4	A						
	1.1275/1.1255	1/4 x 1/4	A						
ERS-68	1.2525/1.2505	1/4 x 1/4	A	.900	.190	1/4-20	22	10/20	30°
	1.3775/1.3755	5/16 x 5/16	A						
	1.5025/1.5005	3/8 x 3/8	B						

Note: Involute spline data per ANSI B92. 1a-1976, Class 5.

Backlash

Total unit backlash includes spline and armature movement. It is typically less than one degree of rotation. Spline backlash alone is typically 15 minutes of rotation or less.

Mounting

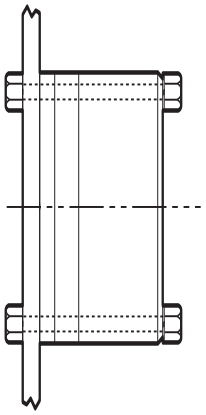
Mounting Orientation

ERS Brakes are easily modified to accommodate different mounting orientations. The brake can be mounted with either face against the mounting surface. The following mountings are possible with the standard ERS brake.

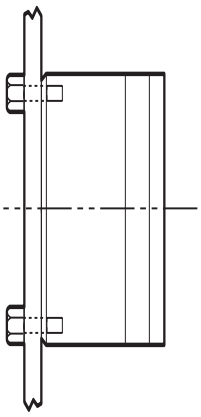
Mounting Requirements

1. Mounting surface to be perpendicular to shaft with in .006" T.I.R.
2. Mounting holes to be within .015" true position to the shaft.

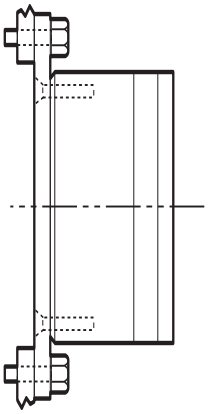
Through Bolt
Provides rigid support. May be mounted on either side of brake.



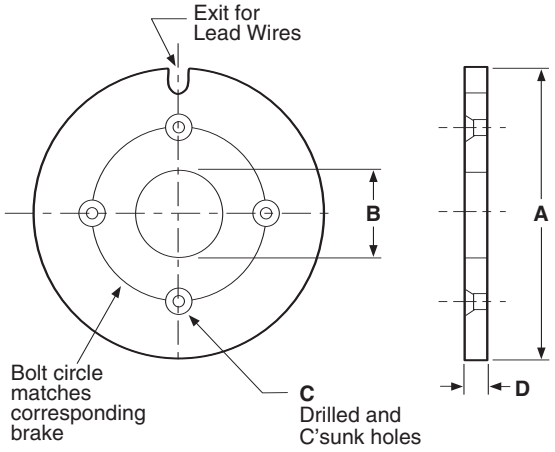
Tapped Hole
Works well where through bolt mounting is impractical.



Flange
Flange mounting to brake tapped holes for most versatile attachment to many different housings, motors, and frames.



Optional Adapter Mounting Flange

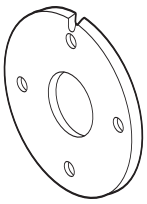


Model	A Nom.	B Nom.	C Holes	D Nom.
ERS-26	4.000	.935	#4	.100
ERS-42	5.000	1.450	#6	.144
ERS-49	6.250	1.575	#8	.193
ERS-57	7.500	1.825	#10	.193
ERS-68	9.500	2.500	1/4	.224

Note: Holes for attaching flange to mounting surface to be provided by customer.

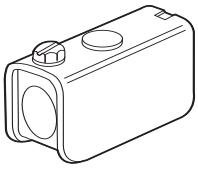
Accessories

Adapter Flanges



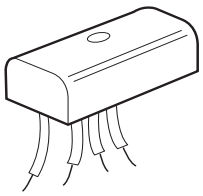
Model	Part Number
ERS-26	686-0182
ERS-42	686-0183
ERS-49	686-0184
ERS-57	686-0185
ERS-68	686-0186

Conduit Box



Model	Part Number
Conduit Box	5154-101-001
Mounts to ERS-49, 57 and 68 only	

Controls



Model	Part Number
CBC-100-1	6003-448-101
AC to DC Control	
To be used with 90V ERS brakes	

See the Controls Section on page 141 for complete information.

CBC-100-1 is 110 volt only

Ordering Information

Ordering the appropriate ERS brake for your application is a simple, step-by-step procedure based on the intended function, brake size, mounting configuration and operating voltage of the unit best suited for your needs, including any optional parts and accessories that you may require. A Warner Electric sales representative or distributor is always happy to provide assistance.

How to Order

1. Verify that the brake is to be used in a static holding/intermittent engagement application.
2. Choose the correct size ERS Brake from the selection procedure on pages 89-90. Select the correct brake part number for the appropriate size and desired operating voltage.
3. Choose the splined hub part number for the required bore diameter and unit size.
4. Select optional accessories, such as: adapter flange kit, AC to DC control and conduit box kit.

ERS Brake

Model	Voltage	Part Number
ERS-26	24V	5158-170-016
	90V	5158-170-015
ERS-42	24V	5151-170-002
	90V	5151-170-001
ERS-49	24V	5155-170-002
	90V	5155-170-001
ERS-57	24V	5153-170-003
	90V	5153-170-002
ERS-68	24V	5154-170-002
	90V	5154-170-001

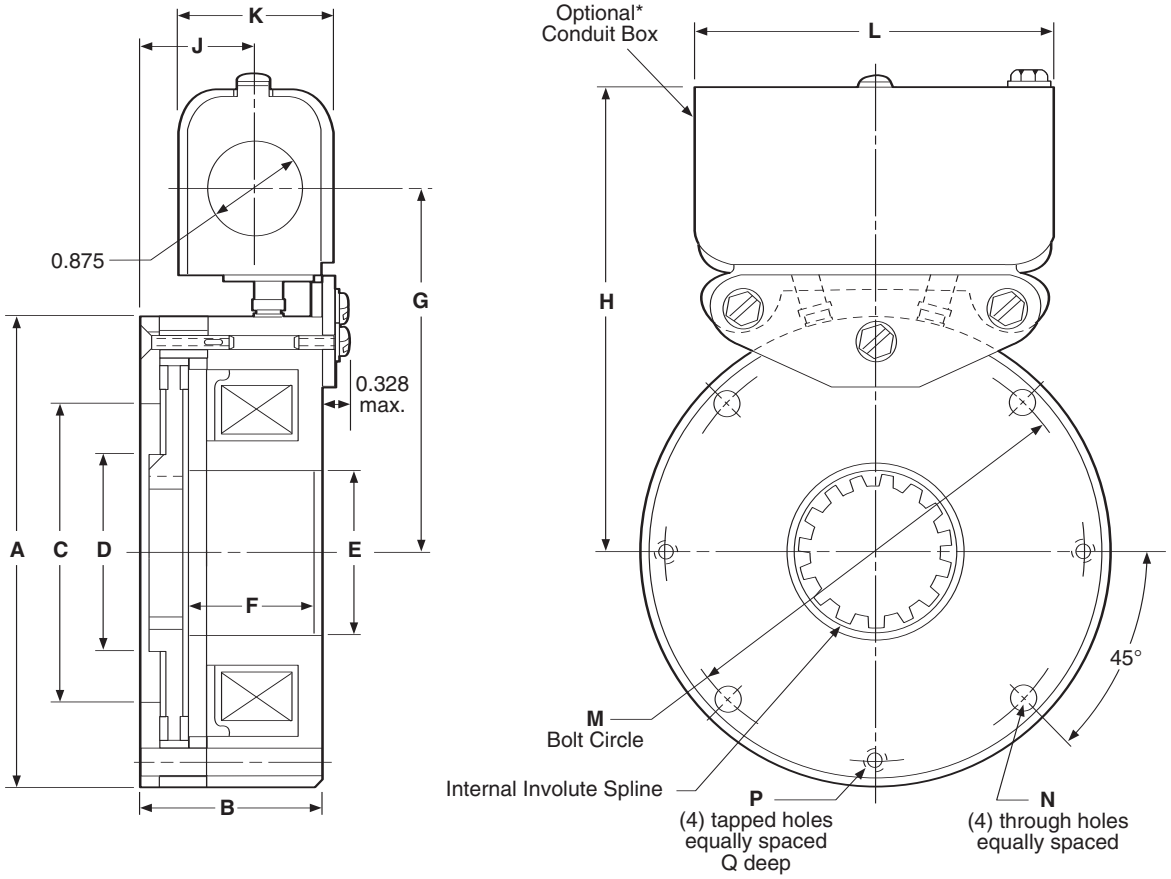
Splined Hub

Model	Bore Dia.	Part Number
ERS-26	.250	5158-541-006
	.312	5158-541-007
	.375	5158-541-008
ERS-42	.375	5151-541-002
	.500	5151-541-003
	.625	5151-541-004
	.750	5151-541-005
ERS-49	.375	5155-541-002
	.500	5155-541-003
	.625	5155-541-004
	.750	5155-541-005
	.875	5155-541-006
ERS-57	.500	5153-541-004
	.625	5153-541-005
	.750	5153-541-006
	.875	5153-541-007
	1.000	5153-541-008
ERS-68	1.000	5154-541-005
	1.125	5154-541-006
	1.250	5154-541-007
	1.375	5154-541-008
	1.500	5154-541-009

Special Requirements

ERS Brake modifications such as metric bores, special voltages and low torque units are available. Consult factory.

ERS-26, ERS-42, ERS-49, ERS-57, ERS-68



*Available only for the ERS-49, 57, and 68 sizes

ERS-26, ERS-42, ERS-49, ERS-57, ERS-68

All dimensions are nominal, unless otherwise noted.

Model	A Max.	B Max.	C	D	E	F	G
ERS-26	2.460	1.515	1.375	1.125	.860	1.250	—
ERS-42	3.520	1.595	2.000	1.600	1.375	1.255	—
ERS-49	4.270	1.767	2.600	1.750	1.500	1.332	3.625
ERS-57	5.020	1.937	3.240	2.100	1.750	1.503	4.000
ERS-68	6.520	2.030	4.504	2.800	2.425	1.565	4.750

Model	H	J	K	L	M Dia.	N Dia.	P	Q
ERS-26	—	—	—	—	2.125	.172/.164	4-40	.375
ERS-42	—	—	—	—	3.125	.200/.190	6-32	.400
ERS-49	4.625	1.000	1.625	3.750	3.750	.228/.218	8-32	.400
ERS-57	5.000	1.170	1.625	3.750	4.500	.288/.278	10-24	.400
ERS-68	5.750	1.265	1.625	3.750	5.875	.413/.404	1/4-20	.500

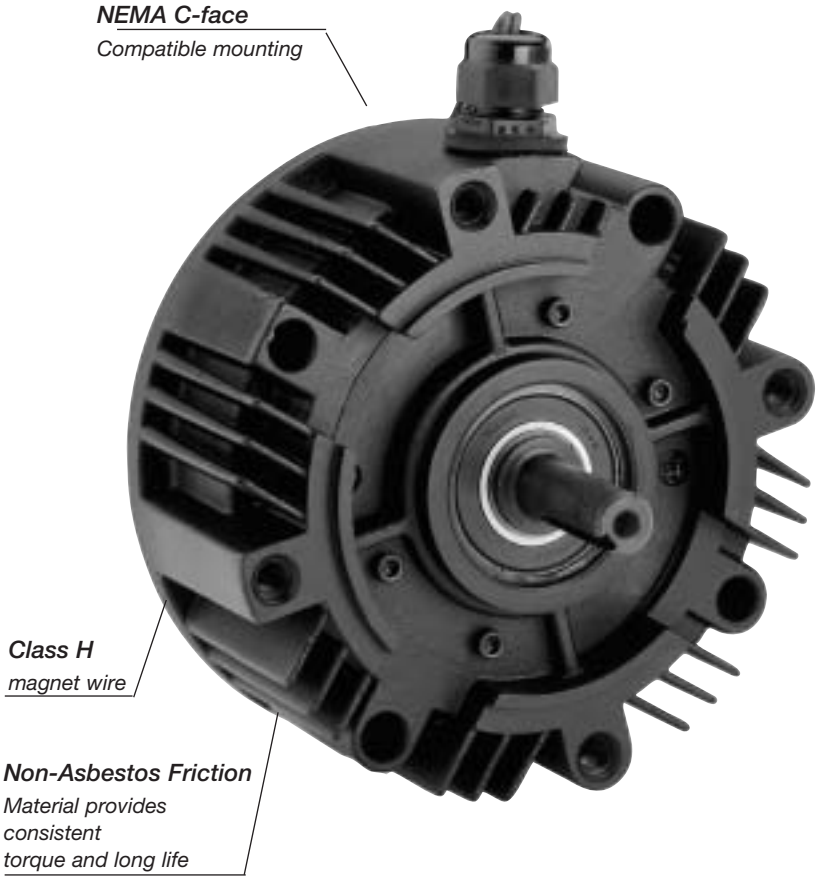
Specifications

Model	Voltage DC	Power (Watts)	Current (Amperes)	Resistance (Ohms)	Static Torque (lb.ft.)	Inertia (lb.in.^{2}) Unit	Inertia (lb.in.^{2}) Hub	Weight (lbs.) Unit	Weight (lbs.) Hub
ERS-26	24V 90V	17.6 16.0	0.733 0.178	32.75 506.5	1.5	0.03	0.004	1.20	0.06
ERS-42	24V 90V	23.3 21.5	0.973 0.239	24.67 376.2	7	0.14	0.040	2.50	0.20
ERS-49	24V 90V	27.3 25.8	1.136 0.287	21.12 313.6	15	0.45	0.060	4.30	0.25
ERS-57	24V 90V	36.2 35.2	1.510 0.391	15.9 230.1	34	0.54	0.110	6.50	0.38
ERS-68	24V 90V	54.9 51.9	2.286 0.577	10.5 155.9	100	1.44	0.550	11.30	0.75

SSBM Series- EM/ERS

Packaged Spring-Set Brake Module for Holding Applications

The Spring-Set Brake Module is a NEMA C-face compatible unit designed to perform holding as well as occasional emergency stopping functions, making it particularly well-suited for motor brake applications. Because it is designed to be mounted on the front of a motor, it is an excellent choice for retrofitting an existing motor, or for use on custom designed machinery.



Features

- NEMA C-face compatible mounting
- Performs holding functions with occasional e-stops
- Completely assembled and preburnished at the factory
- Easy to install
- No adjustment required
- High torque, lead-free and asbestos-free friction material

Principle of Operation

SSBM Brake torque is developed when springs apply a clamping force between the brake armature and the friciton disc to the end plae. Spring clamping force provides the holding torque of the brake.

To release the brake, electical power is applied to the magnet coil, generating a magnetic attractive force between the armature and magnet. The magnetic force overcomes the spring action, allowing the friction disc to rotate freely.

Specifications

Model	NEMA Frame Size	Holding Torque (ft-lbs)	Max RPM	Unit Weight (lbs)	Unit Inertia ($lb\text{-}in^2$)	Voltage (DC)	Power (Watts)	Current (Amperes)	Resistance (Ohms)	Part Number
EM-50/ERS-42	56C/48Y	7.0	3600	6.4	.295	24 90	23.3 21.5	0.973 0.239	24.67 376.2	5370-170-122 5370-170-123
EM-50/ERS-49	56C/48Y	15.0	3600	8.2	.673	24 90	27.3 25.8	1.136 0.287	21.12 313.6	5370-170-124 5370-170-125
EM-180/ERS-57	182C/143TC 184C/145TC	34.0	3600	10.4	.955	24 90	36.2 35.2	1.510 0.391	15.90 230.1	5370-170-126 5370-170-127
EM-210/ERS-68	213C/182TC 215C/184TC	100.0	2000	24.7	3.842	24 90	54.9 51.9	2.286 0.577	10.50 155.9	5371-170-042 5371-170-043

Applications

The Warner Electric Spring-Set Brake Module is an ideal holding device in applications where the motor is used to stop and accurately position the load. The SSBM brake will hold the load in that position until electrically realeased. The SSBM is also a cost effective emergency stopping device in the event of power failure, machine malfunciton, or other occasional dynamic stopping.

Application examples include holding railroad crossing arms, basketball backboards, robotic arms, and assemblies on vertical ball screws.

Selection

SSBM Series Brakes are available in four models with static torque capabilities ranging from 7.0 lb.ft. to 100 lb.ft.

The stopping function is an important consideration when deciding which brake to use. Will the brake be engaged and disengaged in a static condition (zero speed difference between the armature disc and the friction disc)? If yes, then the SSBM Brake is the right choice.

Will the brake be normally engaged and disengaged in a static condition with intermittent engagements dynamically? An emergency stop is a good example. If yes, then the SSBM Brake is the ideal choice.

Will the brake be subject to frequent dynamic braking action? If yes, then a Warner Electric EM-FBB, EUM-FBB, EM-MBFB, EUM-MBFB, EM-FBC or UM-FBC should be considered because these are the best choices for use as high cycle rate dynamic brakes in NEMA C-face applications.

Sizing

Four factors are important for proper sizing:

- Motor frame size
- Static holding torque requirement
- System inertia and brake RPM
- Stop time

Be sure to consider each of these factors as outlined below to effectively select the most appropriate brake for your application.

1. NEMA C-face Mounting

Verify the brake is to be used in a static holding/intermittent engagement application.

Based on the NEMA C-face frame size of the prime mover, select the correct brake module size from the Frame Size Selection Chart.

Frame Size Selection Chart

NEMA Frame Size	Brake Model
56C/48Y	EM-50/ERS-42 EM-50/ERS-49
182C/143TC 184C/145TC	EM-180/ERS-57
213C/182TC 215C/184TC	EM-210/ERS-68

2. Holding Torque

Select the size unit with the torque capacity closest to, but not less than, the holding torque required.

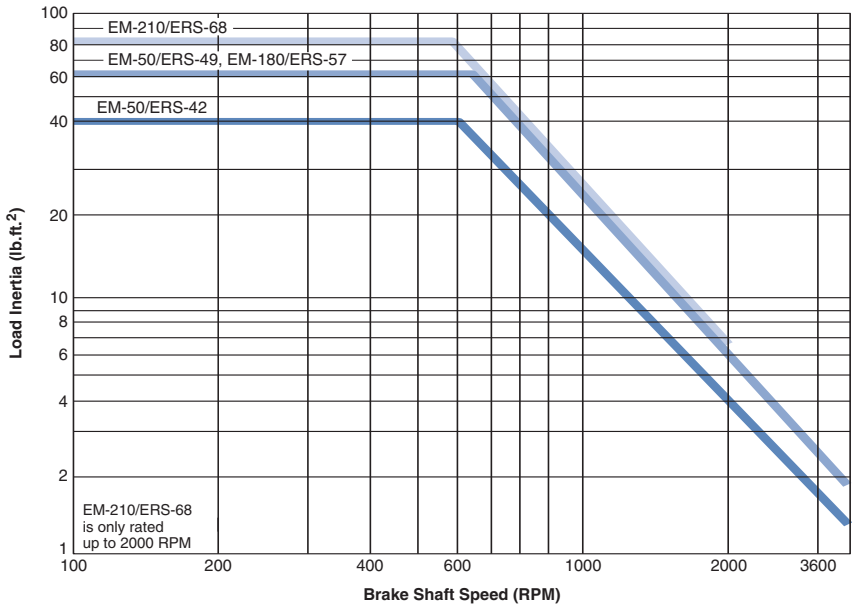
Holding Torque Rating (ft.lb.)	Brake Model
7.0	EM-50/ERS-42
15.0	EM-50/ERS-49
34.0	EM-180/ERS-57
100.0	EM-210/ERS-68

3. System Inertia/Emergency Stop

In an emergency stop (when power is interrupted), the SSBM will engage and bring the load to a stop. To properly size a brake for this application, load inertia must be known. This is the total inertia of all components which are to be brought to a stop. Adding the inertia of the SSBM Brake is not necessary as it has been included in the selection chart.

With the load inertia and brake RPM known, use the Emergency Stop Selection Chart to verify your brake selection. Simply locate the intersection of your RPM and inertia and make sure you are not above the line for the brake you selected based on Holding Torque (Step 1). If you are above the line, select the brake designed by the next higher line.

Emergency Stop Selection Chart



Actual stopping times depend on application variables, which include brake temperature, electrical suppression (see the brake apply time data below), manufacturing tolerances, friction material wear, etc. For this reason, specific stop times should be evaluated under actual application conditions.

If your application has special requirements, please call Warner Electric Technical Support.

5. Select Control

Consult the Controls Section on page 141 for control product overview. The holding torque for a SSBM is not adjustable: therefore, an adjustable torque control is not required.

4. Stopping Time

In some applications, it is desirable to know how fast a brake will bring a load to rest.

The time to stop a load can be determined if the system inertia and brake holding torque are known, according to the following equation:

Where: $t = (WR^2N)/(308T)$

t = time to stop the load in seconds (sec.)

WR^2 = system inertia at the brake location in pound-feet squared ($ft.lb^2$)

N = speed of the brake shaft in revolutions per minute (RPM)

T = rated brake holding torque in foot-pounds (ft.lb.)

Special Requirements

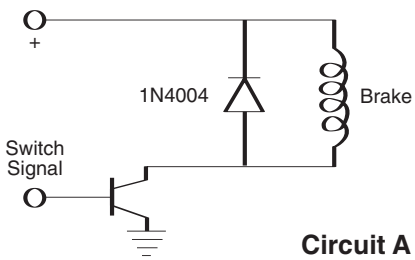
SSBM brake modifications, such as special voltages, rear motor mounting, and low torque units are available.

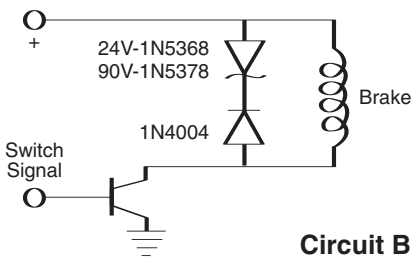
Contact Warner Electric Technical Support at 800-825-9050.

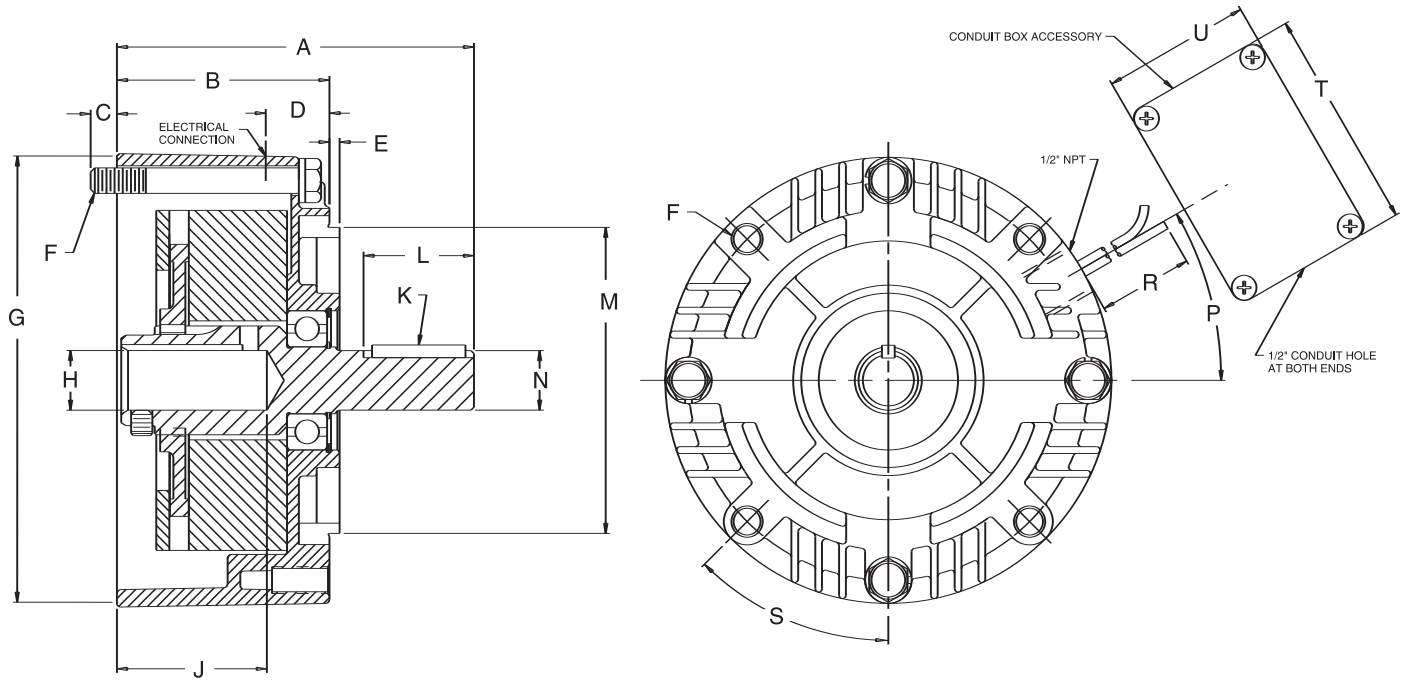
Brake Apply/Release Time (Typical Values)

	Brake Release Time (Seconds)		Brake Apply Time (Seconds)			
			Suppression Circuit A		Suppression Circuit B	
Model	24V	90V	24V	90V	24V	90V
EM-50/ERS-42	0.05	0.06	0.10	0.10	0.01	0.02
EM-50/ERS-49	0.07	0.08	0.15	0.15	0.02	0.02
EM-180/ERS-57	0.11	0.11	0.15	0.15	0.02	0.02
EM-210/ERS-68	0.16	0.20	0.20	0.20	0.03	0.03

Note: Release and Apply Times are armature engagement and realease only.







All dimensions are nominal, unless otherwise noted.

Model	A Max	B	C Max	D	E Max	F	G	H Dia	H Key
EM-50	5.232	3.125	.475	.937	.156	(4) 3/8-16 UNC on 5.875 Dia	6.688	.625	3/16x3/16
EM-180	5.292	3.125	.475	.937	.156	(4) 3/8-16 UNC on 5.875 Dia	6.688	.875	3/16x3/16
EM-210	7.579	4.609	.562	1.500	.315	(4) 1/2-13 UNC on 7.250 Dia	9.344	1.125	1/4x1/4

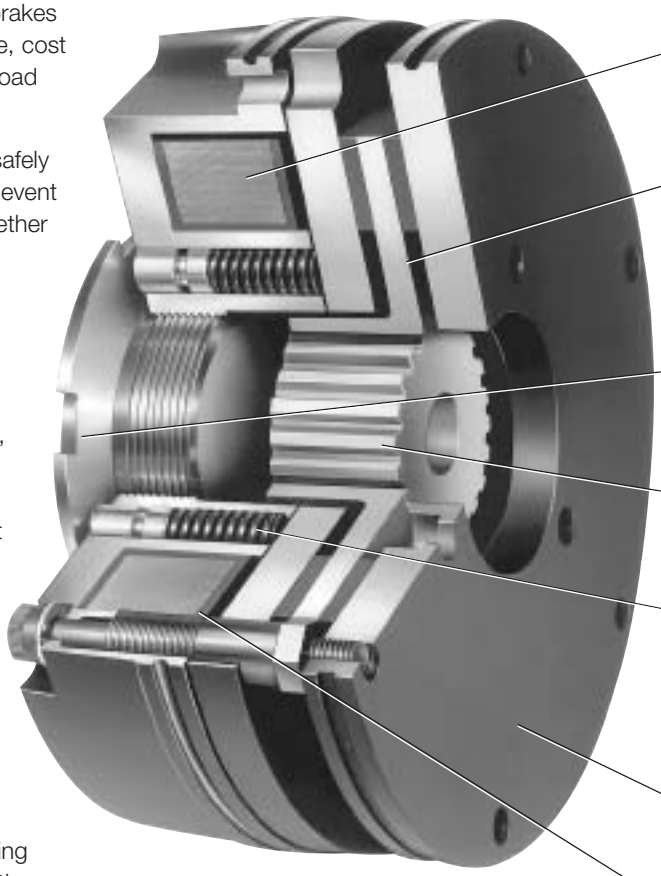
Model	J	K	L	M	N	P	R	S	T	U
EM-50	2.212	3/16x3/16	1.437	4.500 Pilot Dia	.625 Dia	30°	36	45°	3.25	2.188
EM-180	2.216	3/16x3/16	1.437	4.500 Pilot Dia	.875 Dia	30°	36	45°	3.25	2.188
EM-210	3.002	1/4x1/4	2.125	8.500 Pilot Dia	1.125 Diza	25°	36	45°	3.25	2.188

Dynamic Braking With Reliable, Fast Response

The Warner Electric line of electrically released, dynamic, spring-set brakes (ERD) offers a high-performance, cost effective solution for power-off load holding applications.

These brakes are designed to safely keep the load in position in the event of a power or motor failure, whether intentional or accidental. An optional manual release allows the operator to safely move the load even when no power is available.

By applying voltage to the ERD, an electromagnetic field is created which causes the armature plate to pull-in against helical compression springs, thus releasing the brake. When power is removed, the springs force the armature to compress the friction carrier against the mounting flange, thus stopping and holding the load. Fully dynamic friction material on the carrier allows for repeated braking cycles from full motor speed with no torque fade.



Continuous Duty Coil
Epoxy-sealed; windings have Class F insulation. Lead wires have standard Class B insulation rating.

Friction Carrier
Double friction surfaces for increased torque in small package size.

Central Torque Adjustment
(optional) Allows braking torque adjustment down to 50% of nominal rating; ideal for controlling stopping distances.

Splined Center Hub
Steel for wear resistance and available in a variety of bore sizes and keyways.

Compression Springs
Used to provide balanced armature plate loading.

Mounting Flange
Easily modified to suit unique bolt patterns. In special cases, brakes may be mounted directly to the motor without the need for the flange.

Air Gap
Factory pre-set and easy to adjust during field maintenance.

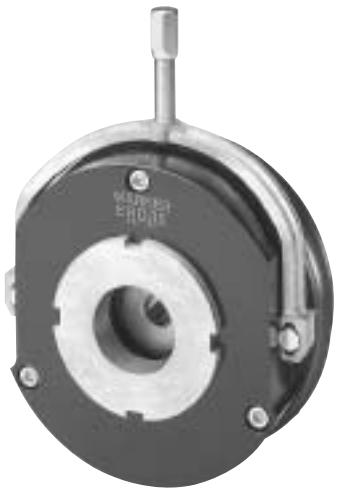
Features

- Spring-set design holds the load in place when voltage is removed from the brake. Dynamic friction material can stop loads from motor speeds up to 3600 RPM.
- Few moving parts mean quiet operation
- Lead and asbestos free, dynamic friction material is suited for high cycle rates.
- Adjustable air gap for ease of service and long life in the field.
- Variety of voltages available.
- Simple DC control (or AC with available rectifiers).
- Low power requirements for energy savings.
- Eight different sizes ranging from 3.3 inches to 9.9 inches in diameter.
- Torque capacities from 4 to 220 lb.ft.
- Bi-directional stopping capability.

Options

Manual Release
Allows the brake to be released by hand; ideal for lowering suspended loads.

Dust Cover
Shields the brake actuation system from external dust and debris.



Torque Adjustment

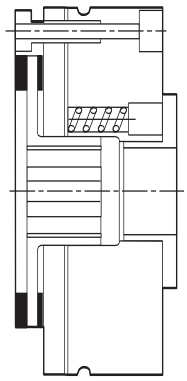
Brakes are factory set at the minimum torque rating shown in the Specifications chart.

Friction Disc Carriers

Replaceable Friction carriers are available
in two types:

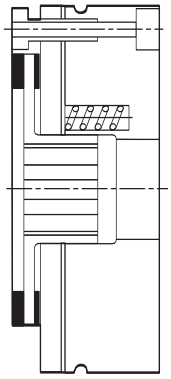
- Metallic Standard on all brakes
- Thermoplastic can be used as an option on sizes 5 and 10 brakes only

Design Variations



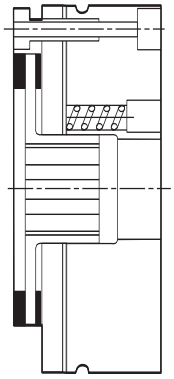
VAR 2
Central ring nut adjusts torque

- Up to 50% torque reduction possible
- Available in all sizes



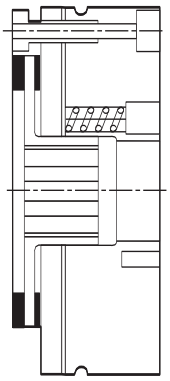
VAR 0
Torque preset and constant

- No torque adjustments possible
- Available in all sizes



VAR 1
Four screw torque adjustment

- Up to 50% torque reduction possible
- Available in sizes 5, 10, 20 and 35 only



VAR 3
Four screw torque adjustment with provision for tachometer

- Up to 50% torque reduction possible
- Mounting holes for tachometer
- Available in sizes 5, 10, 20 and 35 only

Note: VAR 2 and VAR 0 are most common.

Specifications

	Holding Torque		Max. Speed	Rotating Inertia (lb. in.²)		Current Draw (Amps)				Resistance (Ohms)				Weight
Size	lb. in.	lb. ft.	RPM	Thermoplastic	Metallic Disc	24	96	190	215	24	96	190	215	(lbs.)
ERD-5	45	3.75	3600	0.041	0.103	0.83	0.21	0.11	0.09	28.9	454	1775	2380	2
ERD-10	85	7.08	3600	0.137	0.321	1.03	0.26	0.13	0.12	23.4	372	1450	1813	4
ERD-20	175	14.58	3600		0.957	1.22	0.31	0.16	0.14	19.6	310	1209	1545	7
ERD-35	310	25.83	3600		2.529	1.61	0.41	0.21	0.18	14.9	233	912	1175	10
ERD-60	530	44.17	3000		7.415	1.94	0.577	0.293		12.4	166.2	648.1		14
ERD-100	890	74.17	3000		12.472	2.35	0.569	0.302		10.22	168.6	628.5		22
ERD-170	1500	125.00	3000		14.010	2.73	0.69	0.375		8.78	139.2	507.2		34
ERD-300	2650	220.83	3000		29.386	4.11	1.122	0.602		5.83	85.63	315.6		57

Selection

Proper ERD brake selection involves determining,in order:

1. Static Holding Torque

The ERD brake nominal holding torque should exceed the torque from the load by a minimum safety factor of 2.0

2. Dynamic Torque

This is determined from the equation:

$$T = \frac{5250\ P}{N}$$

where:

T = Dynamic Torque in lb.ft.
N = Motor Speed in RPM
P = Motor Horsepower

Once the dynamic torque has been calculated, check the dynamic torque curves (adjacent) at the required operating speed to determine the suitable brake.

3. Energy Capacity

ERD sizing by energy capacity is a function of the cycling frequency (cycles per hour) and the single cycle energy put into the brake as determined from the equation:

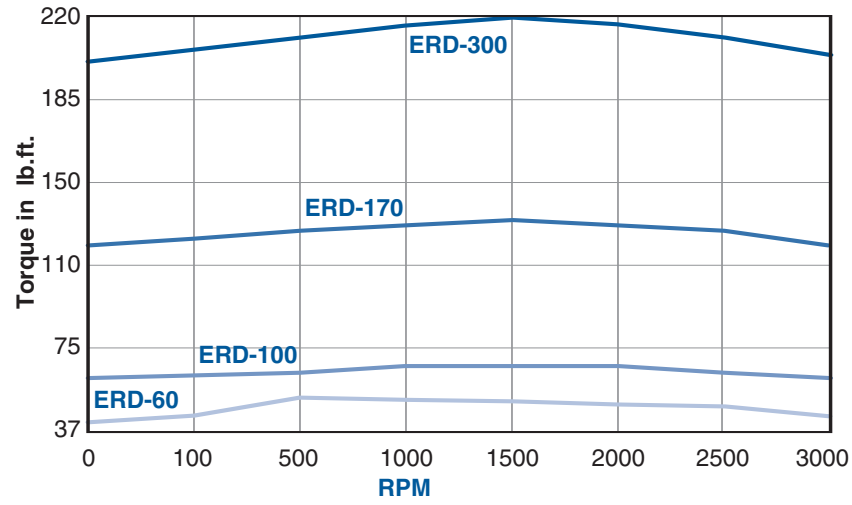
$$E = 1.7 \times WR^2 \left(\frac{N}{100}\right)^2$$

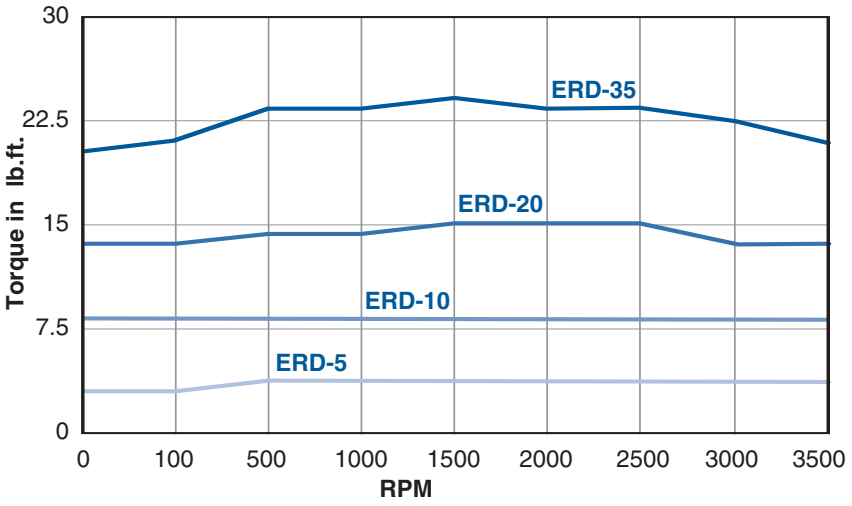
where:

E = Single Cycle Energy in lb.ft.
WR^2 = Load Inertia in $lb.ft^2$
N = Speed in RPM

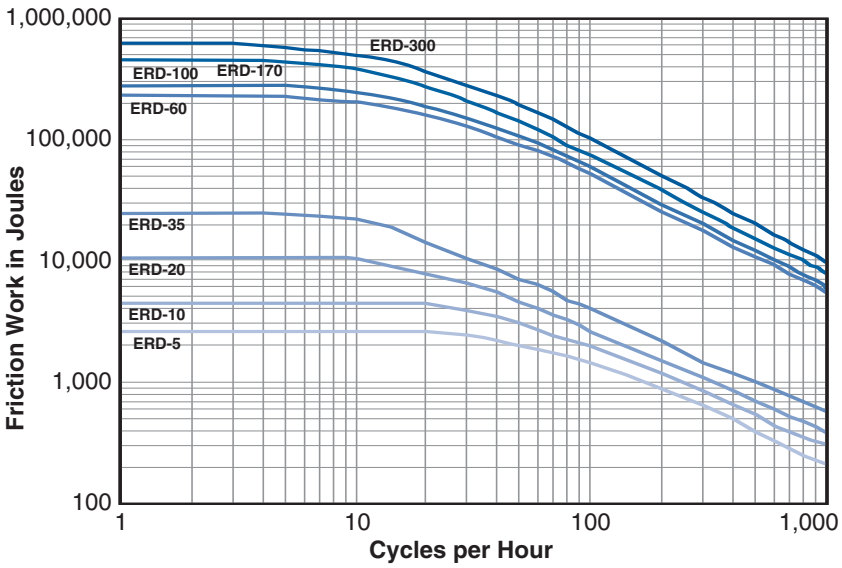
Applying the energy per cycle with the cycle rate to the energy curve, the brake selection is verified.

Dynamic Torque



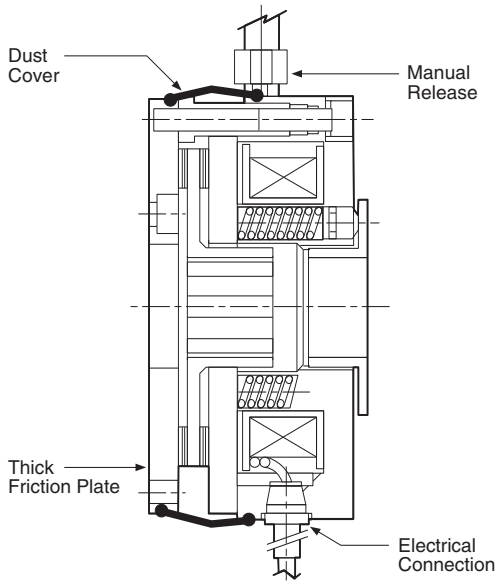


Energy Capacity



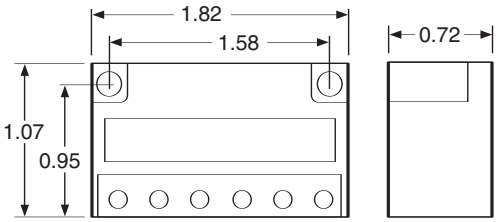
Note: To convert Joules/min. to ft.lbs./min, multiply times .7376

Fully Assembled Unit



Typical brake unit (VAR 2) with options installed

Connections



Rectifiers

AC Input	DC Output	Rectifier	Part No.
240/220 V	96 V	Half Wave	ACG830A1P1
415/380 V	190 V	Half Wave	ACG830A1P1
240/220 V	190 V	Full Wave	ACG830A1P2
110 V	96 V	Full Wave	ACG830A1P2

Max. current = 1 AMP CG830 A1P1
= 2 AMP CG830 A1P2

Mounting Options

Flange Type	Screw Kit	Mounting Style
Thick	Short	Standard – Customer Mounting via Hole Pattern H
Thin	Long	Customer Mounting via Hole Pattern E
None	Long	Customer Mounting via Hole Pattern E

How to Order

Specify

1. ERD Series

2. Size: 5, 10, 20, 35, 60, 100, 170, or 300

3. Variation

0 – No torque adjustment
1 – With torque adjusting screws
2 – With central torque adjusting ring
3 – With mounting holes for tachometer

4. Voltage

24 DC is standard

12, 96, 190, and 215 DC are modifications

5. Friction Carrier

Metallic carrier is standard

Thermoplastic carrier is available on sizes 5 and 10

6. Bore Size

ERD-5: 1/2" max
ERD-10: 5/8" max
ERD-20: 1" max
ERD-35: 1-1/8" max
ERD-60: 1-1/4" max
ERD-100: 1-3/8" max
ERD-170: 1-3/4" max
ERD-300: 1-3/4" max

7. Mounting Flange

Thick Flange is standard

Thin Flange available up to size 35

8. Mounting Screws

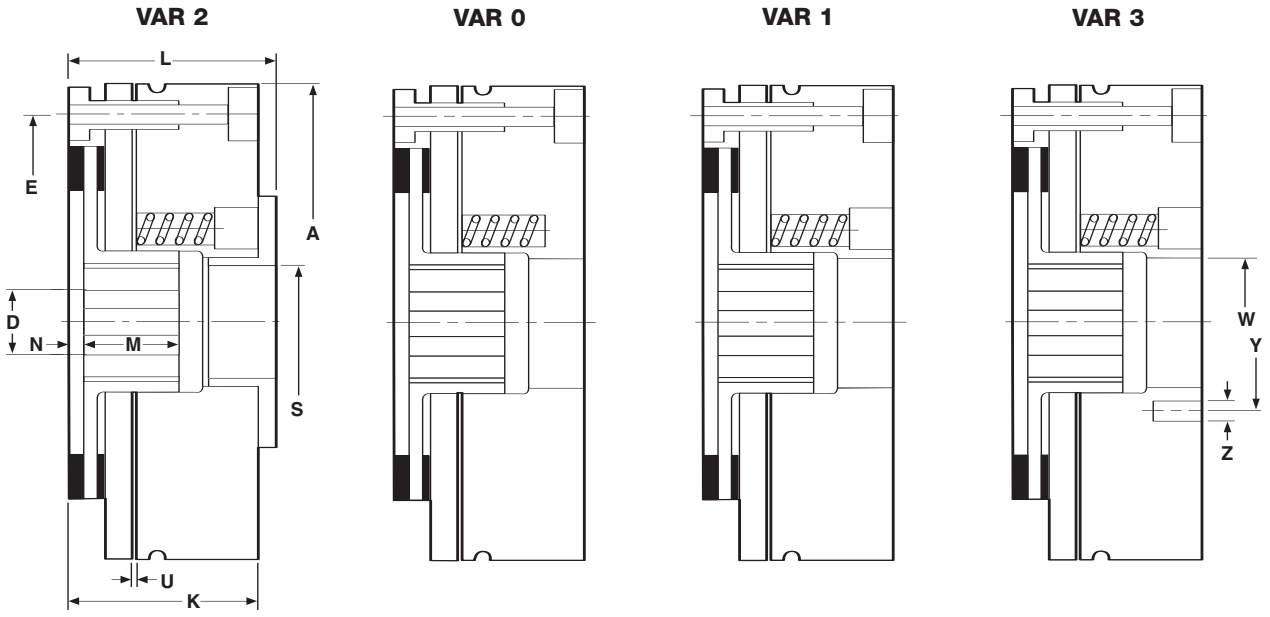
Short Kit is standard
Long Kit is available

9. Options

Dust Cover

Manual Release

Dimensions–Brake Units

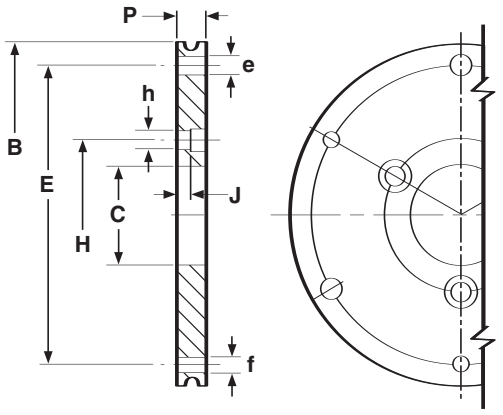


ERD Size	A	D Max.	E	K	L Max.	M +0.000/-0.008	N
5	3.307	0.5	2.835	1.378	1.575	0.709	0.071
10	4.016	0.625	3.543	1.614	1.831	0.787	0.098
20	5.000	1	4.409	1.870	2.165	0.787	0.138
35	5.787	1.125	5.197	2.146	2.559	0.984	0.118
60	6.378	1.25	5.709	2.520	2.933	1.181	0.118
100	7.402	1.375	6.693	2.795	3.209	1.181	0.118
170	8.465	1.75	7.717	3.268	3.780	1.378	0.177
300	9.921	1.75	9.055	3.819	4.528	1.575	0.197

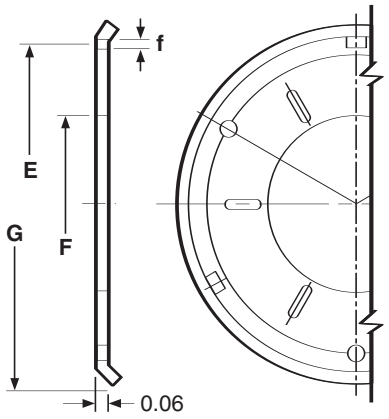
ERD Size	S	U +/-0.002	W	Y	Z Bolt Pattern	Variations Available
5	0.748	0.006	0.925	1.299	4xM4	0, 1, 2, 3
10	0.945	0.006	1.122	1.594	4xM5	0, 1, 2, 3
20	1.378	0.008	1.594	2.224	4xM5	0, 1, 2, 3
35	1.575	0.008	1.909	2.244	4xM5	0, 1, 2, 3
60	1.890	0.012	2.303			0, 2
100	2.047	0.012	2.500			0, 2
170	2.362	0.012	2.894			0, 2
300	2.874	0.012	3.484			0, 2

For service information, request manual P-229.

Friction Plates



Thick Friction Plate (Standard – all sizes)

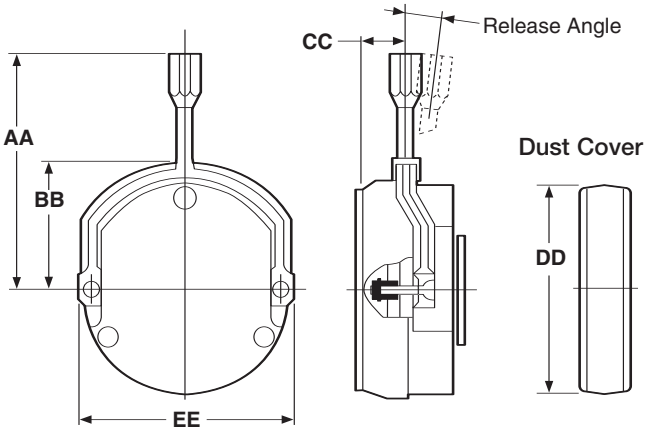


Thin Friction Plate (Sizes 5 thru 35 only)

ERD Size	B	C	E	e Bolt Pattern	f Bolt Clearance Holes	F	G	H	h Bolt Clearance Holes	J	P
5	3.268	0.787	2.835	3xM4	3x0.177	1.654	3.425	1.181	3x0.177	0.079	0.236
10	3.937	1.181	3.543	3xM5	3x0.217	2.126	4.213	1.772	3x0.217	0.079	0.276
20	4.921	1.575	4.409	3xM6	3x0.256	2.362	5.217	2.205	3x0.256	0.118	0.354
35	5.709	1.772	5.197	3xM6	3x0.256	2.953	6.004	2.441	3x0.256	0.118	0.354
60	6.299	2.165	5.709	3xM8	3x0.335	3.346	6.732	2.913	3x0.335	0.118	0.433
100	7.283	2.559	6.693	3xM8	3x0.335	3.858	7.717	3.307	3x0.335	0.118	0.433
170	8.346	2.953	7.717	6xM8	6x0.335			3.937	6x0.335	0.118	0.433
300	9.843	3.543	9.055	6xM10	6x0.413			4.724	6x0.413	0.118	0.433

The thick mounting flange provides the proper material and mounting tolerances for the brake. The thin mounting flange provides the proper material in applications where flatness, squareness and concentricity requirements are met on the machine already.

Manual Release

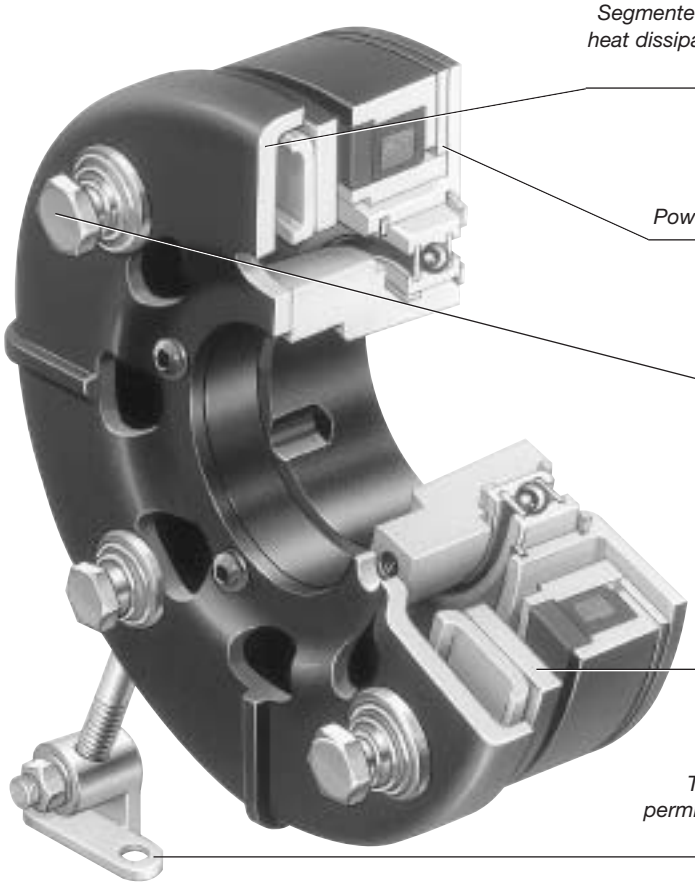


ERD Size	AA	BB	CC	DD	EE	Release Angle
5	3.86	2.09	0.67	3.46	3.46	10
10	4.21	2.44	0.71	4.17	4.17	8
20	5.08	2.99	0.98	5.20	5.20	7
35	5.47	3.39	0.87	5.98	5.98	7
60	6.75	4.09	1.61	6.06	6.54	7
100	7.74	4.72	1.73	7.01	7.36	7
170	9.57	5.51	2.09	7.99	8.78	10
300	12.44	6.38	2.36	9.33	10.33	10

Permanent Magnet Brakes

Frequent cycling applications which regularly engage the brake to stop a moving load call for FB or ER models. Frequent cycling keeps working surfaces burnished and operating at top efficiency. The convenience of power off braking combines with stopping capability in the event of power failure to provide the ideal brake for many applications.

Packaged Convenience for Power Off Applications



Long Life – High Cycle Rates
Segmented armature provides high heat dissipation and long service life. Capable of rapid cycling.

High Torque
Powerful permanent magnets.

Autogap®
Automatic wear adjust.

Electrically Released
Brake automatically engages when power is turned off– releases when power is applied.

Mounting Flexibility
The FB torque arm feature permits mounting on any shaft. Wide range of shaft sizes.

FB Series (Shaft Mounted)

FB Series permanent magnet brakes are offered as off-the-shelf, pre-assembled packages in three sizes. Packaged products are easy to install.

ER Series (Flange Mounted)

ER Series permanent magnet brakes allow customers added flexibility and larger sizes. 825 and 1225 are available in both standard and heavy duty models.

Principle of Operation

Electrically Released Brakes automatically engage when the power goes off. Reliable permanent magnets provide a permanent holding force. Electrical power applied to the coil nullifies the attraction of the permanent magnet and the brake releases. No power is required to stop or hold a load.

FB Magnetically Set, Electrically Released, Dynamic Engagement Brake

Packaged brake assembly complete with conduit box is ready to install.

This brake must be engaged while the shaft is in motion. Shaft speed should be 100 RPM or greater when the brake is engaged. This style brake offers quick and easy bearing mounting on the shaft, high cycle rate capability, and excellent life.

FB Brake on double shaft motor.

Features

- Designed for dynamic stopping operations
- Brake automatically engages when power is turned off
- High cycle rate capability
- Never needs adjustment – automatically compensates for wear
- Mounting flexibility
- Powerful permanent magnets
- Segmented armature design provides high heat dissipation and long service life.
- Complete controllability for soft stops.
- UL, CSA listed

Selection Procedure

FB (Shaft Mounted) Series brakes are available in three models to provide an optimum size to match your application requirements. Static torque capabilities range from 10.5 lb.ft. to 56 lb.ft.

1. Verify that the brake will be cycled frequently in normal operation.
2. Determine the horsepower and speed at the brake location.
3. The correct size Electrically Released Brake is shown at the intersection of the HP and shaft speed on the chart below.
4. Available bore sizes are listed in the bore data chart. When ordering, specify voltage and bore size.
5. Five motor adapters are also available for mounting Electrically Released Brakes on single shaft extension motors (see motor adapter bore size chart on page 108). For double shaft extension motors, the adapter can be eliminated. Specify motor shaft size.

How to Order

1. Specify brake part number.
2. For FB-475 and FB-650, order bushing separately. FB-375 does not require a bushing.
3. For single shaft motor mounting, order adapter separately (Item 2 below). Specify the following bore size for the FB brake. This is the bore size required for mounting the electrically released brake on the end of the motor adapter.

   FB-375 5/8" bore

   FB-475 1-1/8" bore

   FB-650 1-3/8" bore
4. See the Controls Section for controls. FB Series brakes require a control with a potentiometer to vary brake channel output.

   CBC-200, 300 or 500/550 are recommended.

Horsepower vs. Shaft Speed*

HP	SHAFT SPEED AT BRAKE (IN RPM) *																			
▼	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4500
1/12																				
1/8																				
1/6																				
1/4																				
1/3										FB-375										
1/2																				
3/4																				
1																				
1-1/2										FB-475										
2																				
3										FB-650										
5																				
7-1/2																				
10																				
15																				

* For applications which require stopping below 100 RPM, consult factory.

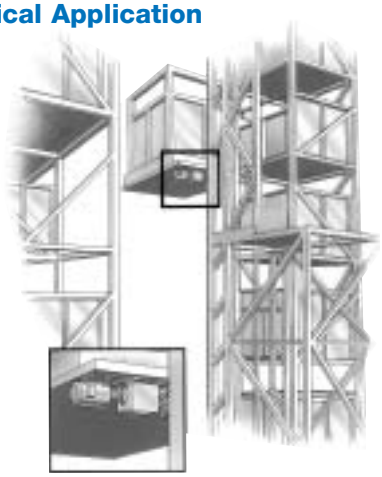
Specifications

Model	Voltage DC	Static Torque (lb.ft.)	Max. RPM	Total Weight (lbs.)
FB-375	24V 90V	10.5	5000	4.5
FB-475	24V 90V	21	4500	6.3
FB-650	24V 90V	56	3600	13.2

Electrically Released Brake Assemblies

Unit Size	Bore	Voltage DC	Part Number
FB-375	1/2"	24	5390-170-024
FB-375	1/2"	90	5390-170-021
FB-375	5/8"	24	5390-170-023
FB-375	5/8"	90	5390-170-022
FB-475	—	24	5391-170-012
FB-475	—	90	5391-170-009
FB-650	—	24	5392-170-010
FB-650	—	90	5392-170-007

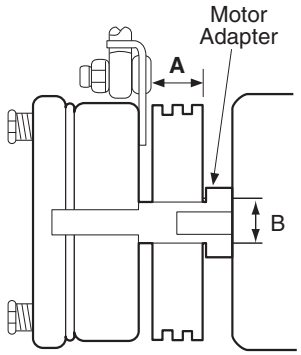
Typical Application



Storage Elevator
These brakes will stop as well as keep a load in position until they are electrically released. They are also used as emergency stopping devices.

Motor and Shaft Adapaters

Motor Adapter Bore Sizes

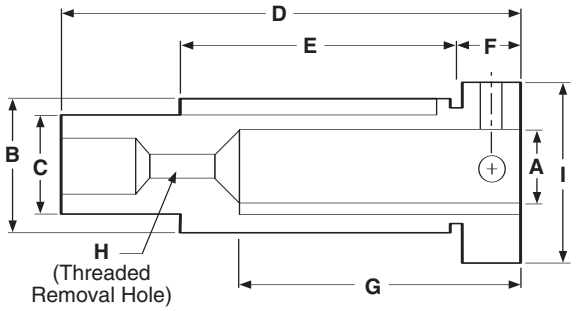


Model Size	Motor Shaft Size	A Usable Length	B Dia.	When using an adapter order the following Adapter	Dodge Bushing
375	.625	2.000	.875	5380-101-005	*None
	.875	2.250	1.250	5380-101-004	*None
475	1.125	2.750	1.625	5381-101-003	#1008 1"
650	1.375	3.000	2.000	5382-101-003	#1310 1.375"
	1.625	3.625	2.250	5382-101-002	#1310 1.375"

*Order FB-375 with 5/8" bore.

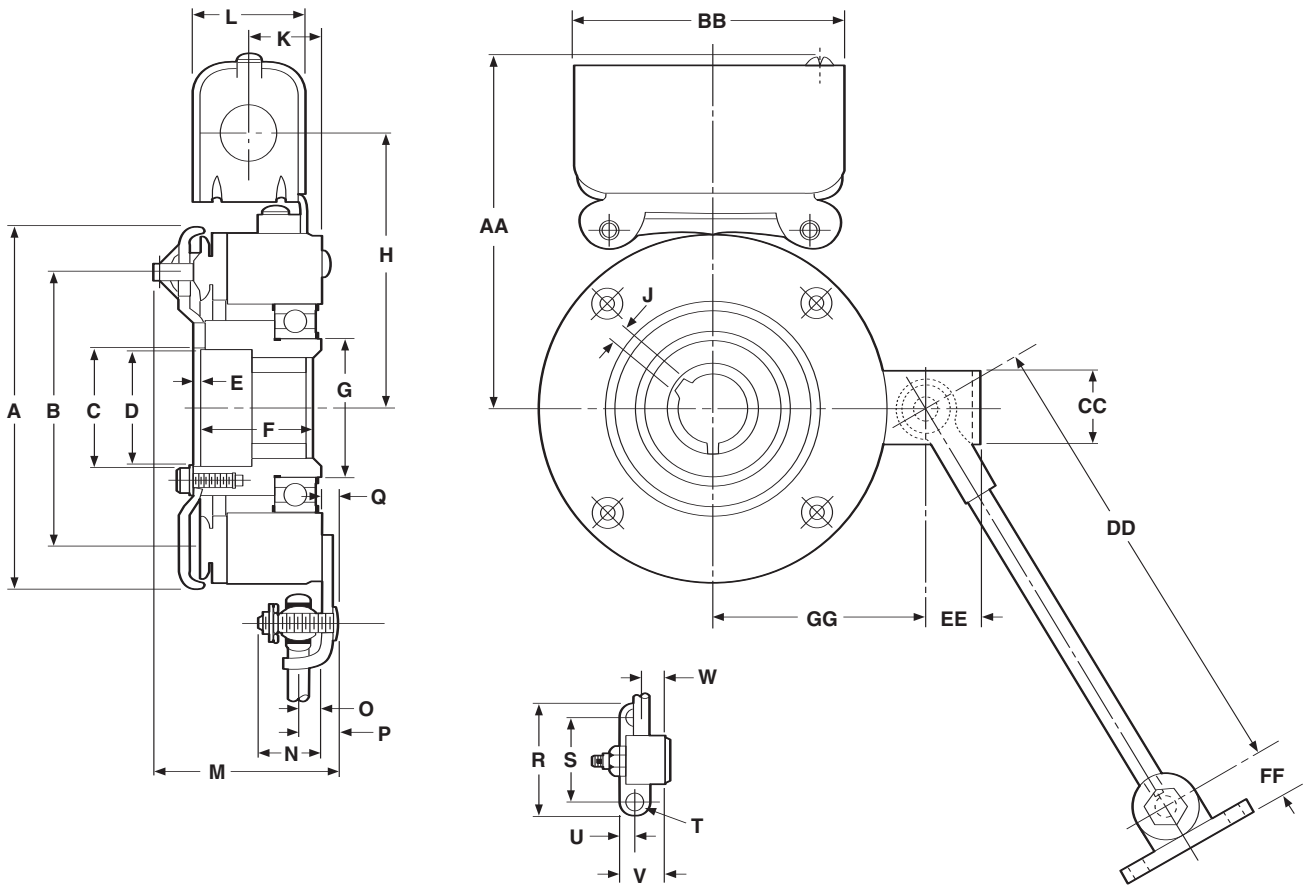
FB Shaft Adapter

Shown below are dimensions and specifications for the optional shaft adapter available for mounting FB Series brakes on a motor. A standard sheave, pulley, or sprocket, with either a tapered bushing or straight bore, can be installed on the shaft adapter. The brake is mounted on the end of the shaft adapter and the complete assembly fits onto the motor shaft, secured with setscrews. Fitting the belts or chain and torque arm completes the installation.



Model	A	Kwy.	B	Kwy.	Key Part No.	C	Kwy.	Key Part No.	Dodge Bushing Size	D	E	F	G	H	I
FB-375	5/8	3/16 x 3/32	7/8	3/16 x 3/32	590-0016	5/8	3/16 x 3/32	590-0043	None	4.391 4.359	2	.391 .359	2	1/4-20 UNC	1.125
FB-375	7/8	3/16 x 3/32	1-1/4	1/4 x 1/8	590-0022	5/8	3/16 x 3/32	590-0043	None	4.578 4.742	2-1/4	.516 .484	2-1/4	1/4-20 UNC	1.500
FB-475	1-1/8	1/4 x 1/8	1-5/8	3/8 x 3/16	590-0041	1	1/4 x 1/8	—	#1008 1"	4.516 4.484	2-3/4	.641 .609	2-3/4	1/2-13 UNC	1.750
FB-650	1-3/8	5/16 x 5/32	2	1/2 x 1/4	590-0042	1-3/8	5/16 x 5/32	590-0044	#1310 1-3/8"	5.547 5.515	3-3/8	.641 .609	3-3/8	1/2-13 UNC	2.125
FB-650	1-5/8	3/8 x 3/16	2-1/4	1/2 x 1/4	590-0042	1-3/8	5/16 x 5/32	590-0044	#1310 1-3/8"	6.172 6.140	4	.641 .609	4	1/2-13 UNC	2.375

All dimensions are nominal unless otherwise noted.



Bore Data (Key furnished)

Size	Bore Dia.	Keyway
FB-375	.626/.625 .501/.500	3/16 x 3/32 1/8 x 1/16
FB-475 Dodge #1008	.500 – .562 .625 – .875 .937 – 1.000	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8
FB-650 Dodge #1310	.500 – .562 .625 – .875 .937 – 1.250 1.312 – 1.375	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32

Note: FB-375 has a straight bore. Bushing not required. Bushings also available in metric bores.

All dimensions are nominal, unless otherwise noted

Size	A Max.	B Dia	C Min.	D Dia.	E Min.	F	G Dia.	H	J	K	L	M Max.	N	O	P
375	4.078	3.125	.7505	—	.031	1.906	1.375	3.359	.187	1.281	1.546	2.716	.843	.281	.531
475	5.171	4.000	1.663	1.593	—	1.875	1.781	3.875	—	1.218	1.546	3.390	1.093	.312	.531
650	6.578	5.125	2.343	2.281	—	2.250	2.562	4.800	—	1.550	1.546	3.765	1.031	.343	.640

Size	Q Max.	R	S Dia.	T	U	V	W	AA Max.	BB	CC	DD	EE	FF	GG
375	—	2.000	1.500	.270	.270 .260	.781	.359	4.468	3.750	1.000	8.000	.666	.635	2.578
475	.281	2.000	1.500	.270	.270 .260	.781	.390	4.984	3.750	1.000	10.000	.697	.635	3.094
650	.359	2.000	1.500	.270	.270 .260	.781	.437	5.843	3.750	1.125	11.000	.843	.635	4.062

Ideal for Dynamic Braking Applications

ER Series
Dynamic Engagement Brakes

This brake must be engaged while the shaft is in motion. Shaft speed should be 100 RPM or greater when the brake is engaged. This style brake offers a bulkhead flange mounting system, the highest torque rating offered by Warner Electric in the power released series, high cycle rate capability, and excellent life.

- Expands the electrically released product family with two larger sizes
- Designed for dynamic stopping operations
- High cycle rate capability
- Inside or outside mount options for 475 or 650 sizes
- Normal or heavy duty options available in larger sizes

Selection Procedure

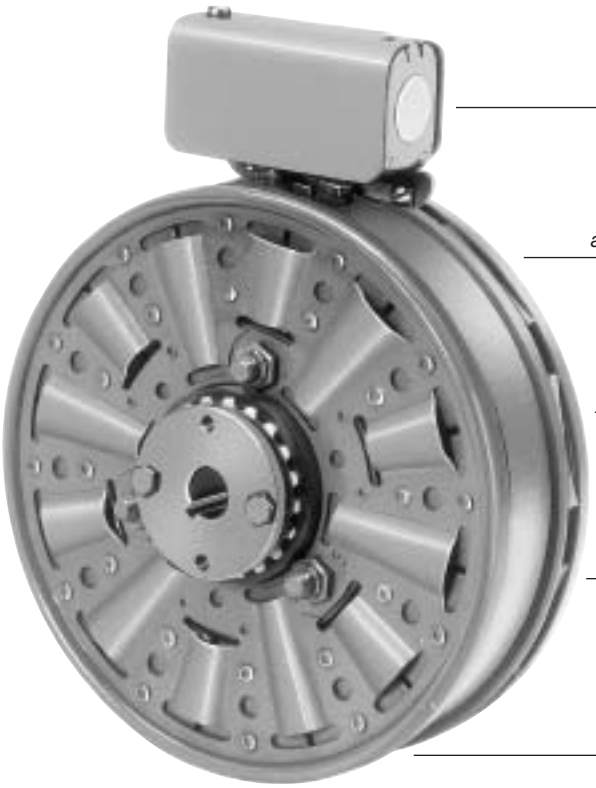
ER Series brakes are available in five sizes. Static torque ratings range from 10.5 lb.ft. to 400 lb.ft.

1. Verify that the brake will be cycled frequently in normal operation.
2. Determine the horsepower and speed at the brake location.
3. The correct size ER Series brake is shown at the intersection of the HP and shaft speed.
4. When ordering, specify voltage and bore size. Available bore sizes are listed in the specifications chart.

How to Order

1. Specify model number
2. For thru-shaft mounting, specify bore size. For ER-475 and ER-650 order bushing separately, ER-375 does not require a bushing.
3. Models ER-475 and ER-650: Specify inside or outside mount. Models ER-825 and ER-1225: Specify normal or heavy duty.
4. See the Controls Section for controls. ER Series brakes require a control with a potentiometer to vary brake channel output; CBC-200, 300 or 500.550 (ER-825 only) or MCS-805-1 or -2 (ER-1225 only) are recommended.

Flange Mounted Brakes



Powerful permanent magnets.

Never needs adjustment– automatically compensates for wear.

Brake automatically engages when power is turned off.

Pre-burnished to assure rated torque upon installation.

Segmented armature design provides high heat dissipation and long service life.

Horsepower vs. Shaft Speed

HP	SHAFT SPEED AT BRAKE (IN RPM)																			
▼	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600	4000	4500
1/12																				
1/8																				
1/6																				
1/4							ER-375													
1/3																				
1/2																				
3/4																				
1							ER-475													
1-1/2																				
2																				
3							ER-650													
5																				
7-1/2							ER-825													
10																				
15																				
20							ER-1225													
25																				
30																				
40																				
50																				
60																				
75																				

Specifications

Model	Bore Size	Voltage DC	Static Torque lb. ft.	Max. RPM	Drive	Inertia lb.ft.² Arm. & Carrier	Inertia lb.ft.² Hub	Weight lbs. Arm. & Carrier	Weight lbs. Hub	Total Weight lbs.
ER-375	.500" & .625"	90V	10.5	5000	–	.010	.001	.60	.49	4.5
ER-475	.500" to 1.000" Dodge #1008	90V	21	4500	–	.072	.006	1.13		6.3
ER-650	.500" to 1.375" Dodge #1310	90V	56	3600	–	.106	.020	2.3	1.6	13.2
ER-825 ND	.500" to 1.625" Dodge #1615	90V	125	3600	Pin Spline	.323 .326	.043 .006	4.783 5.263	1.857 .834	15.6
ER-825 HD	.500" to 1.500" Browning #H-1	90V	125	3600	Pin Spline	.323 .326	.043 .006	4.783 5.263	1.857 .834	15.6
ER-1225 ND	.937" to 3.00" Dodge #3030	35-75V	400	3000	Pin Spline	1.667 1.737	.380 .077	10.227 13.317	6.716 3.582	60.3
ER-1225 HD	.75" to 2.687" Browning #Q-1	35-75V	400	3000	Pin Spline	1.667 1.737	.380 .077	10.227 13.317	6.716 3.582	60.3

Bushing Part Numbers

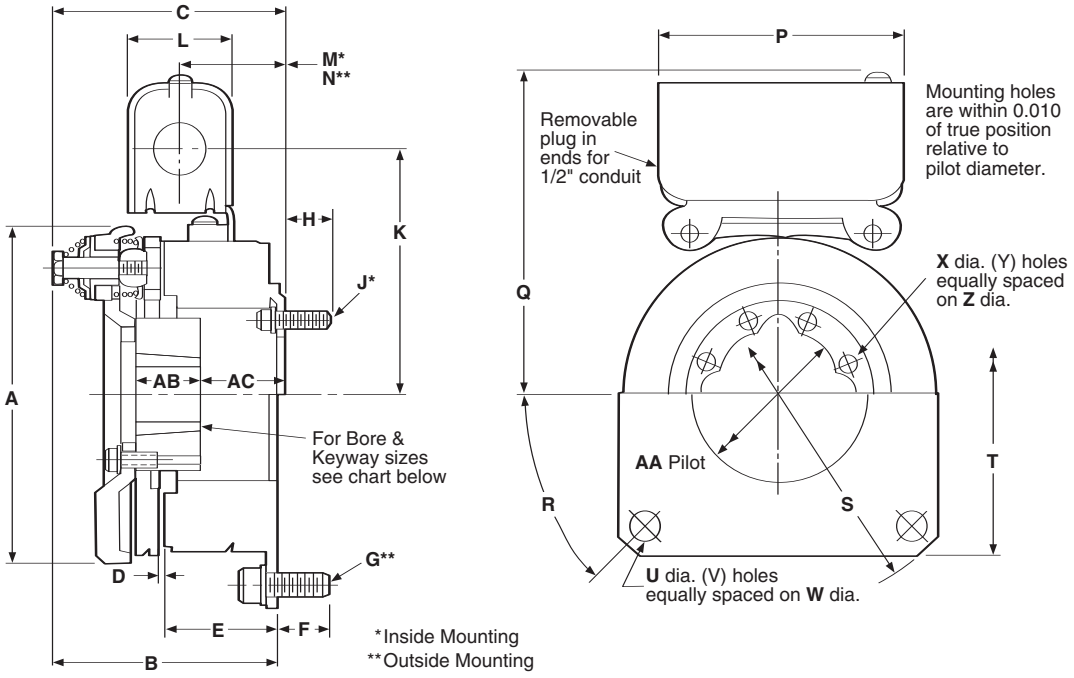
Shaft Size	Keyway Size	Bushing Number Warner Electric	Bushing Number Browning
1/2	1/8 x 1/16	180-0002	
9/16	1/8 x 1/16	180-0003	
5/8	3/16 x 3/32	180-0004	
11/16	3/16 x 3/32	180-0005	
3/4	3/16 x 3/32	180-0006	
13/16	3/16 x 3/32	180-0007	
7/8	3/16 x 3/32	180-0008	
15/16	1/4 x 1/8	180-0009	H-1
1	1/4 x 1/8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

Browning® is registered to Emerson Electric Co. Dodge and Browning bushings are also available in metric bores.

Shaft Size	Keyway Size	Bushing Number Warner Electric	Bushing Number Browning
2-5/16	5/8 x 5/16	180-0051	
2-3/8	5/8 x 5/16	180-0052	
2-7/16	5/8 x 5/16	180-0053	
2-1/2	5/8 x 5/16	180-0054	QI-2
2-9/16	5/8 x 5/16	180-0055	
2-5/8	5/8 x 5/16	180-0056	
2-11/16	5/8 x 5/16	180-0057	
1/2	1/8 x 1/16	180-0131	
9/16	1/8 x 1/16	180-0132	
5/8	3/16 x 3/32	180-0133	
11/16	3/16 x 3/32	180-0134	
3/4	3/16 x 3/32	180-0135	
13/16	3/16 x 3/32	180-0136	
7/8	3/16 x 3/32	180-0137	
15/16	1/4 x 1/8	180-0138	
1	1/4 x 1/8	180-0139	
1-1/16	1/4 x 1/8	180-0140	1615
1-1/8	1/4 x 1/8	180-0141	
1-3/16	1/4 x 1/8	180-0142	
1-1/4	1/4 x 1/8	180-0143	
1-5/16	5/16 x 5/32	180-0144	
1-3/8	5/16 x 5/32	180-0145	
1-7/16	3/8 x 3/16	180-0146	
1-1/2	3/8 x 3/16	180-0147	
1-9/16	3/8 x 3/16	180-0148	
1-5/8	3/8 x 3/16	180-0149	
15/16	1/4 x 1/8	180-0262	
1	1/4 x 1/8	180-0263	
1-1/16	1/4 x 1/8	180-0264	
1-1/8	1/4 x 1/8	180-0265	
1-3/16	1/4 x 1/8	180-0266	
1-1/4	1/4 x 1/8	180-0267	
1-5/16	5/16 x 5/32	180-0268	
1-3/8	5/16 x 5/32	180-0269	3030
1-7/16	3/8 x 3/16	180-0270	
1-1/2	3/8 x 3/16	180-0271	
1-9/16	3/8 x 3/16	180-0272	
1-5/8	3/8 x 3/16	180-0273	
1-11/16	3/8 x 3/16	180-0274	
1-3/4	3/8 x 3/16	180-0275	
1-13/16	1/2 x 1/4	180-0276	
1-7/8	1/2 x 1/4	180-0277	

Shaft Size	Keyway Size	Bushing Number Warner Electric	Bushing Number Browning
1-15/16	1/2 x 1/4	180-0278	
2	1/2 x 1/4	180-0279	
2-1/16	1/2 x 1/4	180-0280	
2-1/8	1/2 x 1/4	180-0281	
2-3/16	1/2 x 1/4	180-0282	
2-1/4	1/2 x 1/4	180-0283	
2-5/16	5/8 x 5/16	180-0284	
2-3/8	5/8 x 5/16	180-0285	
2-7/16	5/8 x 5/16	180-0286	3030
2-1/2	5/8 x 5/16	180-0287	
2-9/16	5/8 x 5/16	180-0288	
2-5/8	5/8 x 5/16	180-0289	
2-11/16	5/8 x 5/16	180-0290	
2-3/4	5/8 x 5/16	180-0291	
2-13/16	3/4 x 3/8	180-0292	
2-7/8	3/4 x 3/8	180-0293	
2-15/16	3/4 x 3/8	180-0294	
3	3/4 x 3/8	180-0295	
1/2	1/8 x 1/16	180-0410	
9/16	1/8 x 1/16	180-0411	
5/8	3/16 x 3/32	180-0412	
11/16	3/16 x 3/32	180-0413	
3/4	3/16 x 3/32	180-0414	1008
13/16	3/16 x 3/32	180-0415	
7/8	3/16 x 3/32	180-0416	
15/16	1/4 x 1/16	180-0417	
1	1/4 x 1/16	180-0418	
1/2	1/8 x 1/16	180-0421	
9/16	1/8 x 1/16	180-0422	
5/8	3/16 x 3/32	180-0423	
11/16	3/16 x 3/32	180-0424	
3/4	3/16 x 3/32	180-0425	
13/16	3/16 x 3/32	180-0426	
7/8	3/16 x 3/32	180-0427	
15/16	1/4 x 1/16	180-0428	1310
1	1/4 x 1/8	180-0429	
1-1/16	1/4 x 1/8	180-0430	
1-1/8	1/4 x 1/8	180-0431	
1-3/16	1/4 x 1/8	180-0432	
1-1/4	1/4 x 1/8	180-0433	
1-5/16	15/16 x 5/32	180-0434	
1-3/8	15/16 x 5/32	180-0435	

ER-375, ER-475, ER-650



Mounting Requirements

Customer Shall Maintain:

1. Squareness of brake mounting face with armature hub shaft within .006 T.I.R.
2. Concentricity of brake mounting pilot diameter with armature hub shaft within .010 T.I.R.
3. If magnet mounting surface is a magnetic material, the magnet is to be insulated approximately 1/2" from that surface with a plate or spacers of non-magnetic material.

ER-375 available outside mounted only.

Bore and Keyway Dimensions

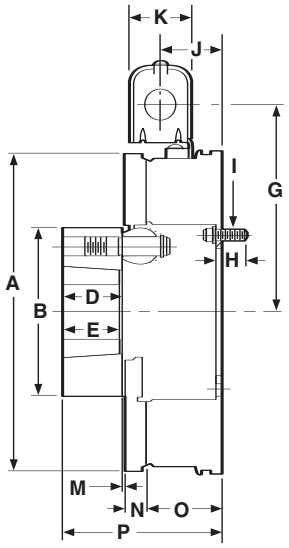
Size	Bore Dia.	Keyway
375	.501/.500 .626/.625	1/8 x 1/16 3/16 x 3/32
475	.500 - .562 .625 - .875 .937 - 1.000	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8
650	.500 - .562 .625 - .875 1.000 - 1.250 1.312 - 1.375	1/8 x 1/16 3/16 x 3/32 1/4 x 1/8 5/16 x 5/32

All dimensions are nominal, unless otherwise noted.

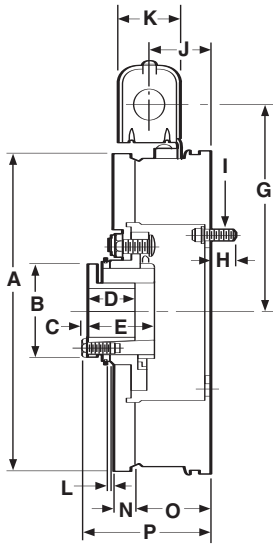
Size	A Max.	B Max.	C Max.	D	E	F Max.	G	H Max.	J	K	L	M	N	P
375	4.078	2.583	2.583	.032	1.410	.600	5/16-18 UNC-3A	—	—	3.325	1.547	—	—	3.750
475	5.172	3.195	3.274	.031	1.630	.431	3/8-16 UNC-3A	.390	8-32	3.875	1.547	1.354	1.236	3.750
650	6.578	3.525	3.525	.032	1.880	.542	5/16-18 UNC-3A	.542	5/16-18 UNC-3A	4.800	1.547	—	—	3.750

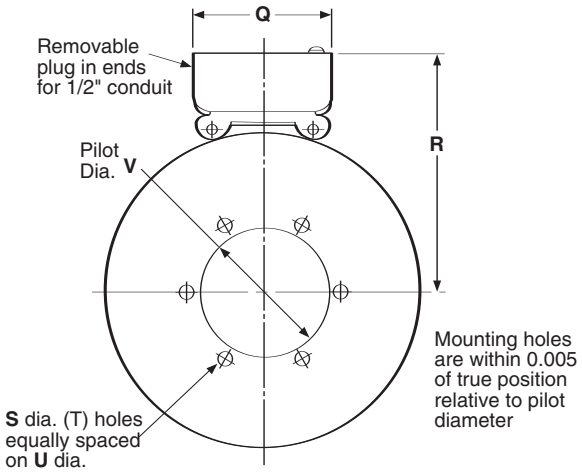
Size	Q Max.	R	S	T Sq.	U	V	W Dia.	X	Y	Z Dia.	AA Dia.	AB	AC
375	4.505	—	5.625 5.623	—	.350 .341	3	5.000	—	—	—	—	23/32	1-3/4
475	5.000	45°	6.500 6.498	5.000	.419 .403	4	5.875	.208 .201	8	2.375	2.065 2.062	29/32	1-3/16 I.M. 1-1/16 O.M.
650	5.844	45°	8.000 7.998	6.500	.358 .338	4	7.250	.358 .338	4	3.688	2.822 2.820	1-1/32	1-3/8

ER-825 and ER-1225
Normal Duty (N.D.)



ER-825 and ER-1225
Heavy Duty (H.D.)





ER-825 & ER-1225 Magnet View
(Same for Pin Drive and Spline Drive)

Mounting Requirements

Customer Shall Maintain:

1. Squareness of magnet mounting face with armature shaft within .006 T.I.R.
2. Concentricity of magnet mounting pilot diameter with armature shaft within .010 T.I.R.
3. If magnet mounting surface is a magnetic material, the magnet is to be insulated approximately 1/2" from that surface with a plate or spacers of non-magnetic material.

Size	A Max.	B Dia.	C	D	E	G	H Max.	I	J	K Min.	L Min.
825 N.D.	8.656	4.625	—	1.593	1.500	5.625	.531	5/16-18 UNC-3A	1.687	1.546	—
825 H.D.	8.656	2.500	.156	1.250	1.765	5.625	.531	5/16-18 UNC-3A	1.687	1.546	.062
1225 N.D.	12.671	6.875	—	3.000	3.000	7.671	.546	5/16-18 UNC-3A	1.718	1.546	—
1225 H.D.	12.671	4.093	.234	2.500	2.171	7.671	.546	5/16-18 UNC-3A	1.718	1.546	.062

Size	M When New	N	O	P Max.	Q	R Max.	S	T	U	V
825 N.D.	.093	.562	2.080 .338	4.359	3.750	6.750 3.501	.358	6	4.250	3.503
825 H.D.	—	.531	2.080 .338	3.546	3.750	6.750 3.501	.358	6	4.250	3.503
1225 N.D.	.156	.593	2.500 .338	6.218	3.750	8.796 6.376	.358	6	7.250	6.378
1225 H.D.	—	.562	2.500 .338	5.031	3.750	8.796 6.376	.358	6	7.250	6.378

Bore and Keyway Dimensions

ER-825	Bore Dia.	Keyway
Pin Drive	.500 - .562	1/8 x 1/16
	.625 - .875	3/16 x 3/32
	.937 - 1.250	1/4 x 1/8
	1.312 - 1.375	5/16 x 5/32
	1.437 - 1.500	3/8 x 3/16
	1.562 - 1.625*	3/8 x 3/16
Spline Drive	.500 - .562	1/8 x 1/16
	.375 - .625	3/16 x 3/32
	.937 - 1.187	1/4 x 1/8
	1.250*	1/4 x 1/8
	1.312- 1.375*	5/16 x 5/32
	1.437 - 1.500*	3/8 x 3/16
ER-1225		
Pin Drive	.937 - 1.250	1/4 x 1/8
	1.312 - 1.375	5/16 x 5/32
	1.437 - 1.750	3/8 x 3/16
	1.812- 2.250	1/2 x 1/4
	2.312 - 2.750	5/8 x 5/16
	2.187 - 3.000*	3/4 x 3/8
Spline Drive	.750 - .875	3/16 x 3/32
	.937- 1.250	1/4 x 1/8
	1.312 - 1.375	5/16 x 5/32
	1.437 - 1.750	3/8 x 3/16
	1.812 - 2.062	1/2 x 1/4
	2.125 - 2.250*	1/2 x 1/4
	2.312 - 2.687	5/8 x 5/16

*Key furnished

For Dynamic Stopping and Cycling Applications

Warner Electric's modular design brakes and clutch/brake units offer material handling system users a high performance alternative to spring-set brakes. These modular units provide long life, maintenance free operation, and consistent performance with minimal downtime.

These brakes are offered in power-off types for double shaft motors and for installation between C-face motor and reducer or other drive device. Powerful permanent magnets generate braking torque. The brakes release when voltage is applied to the coil, countering the force of the permanent magnets. No power is required to stop or hold a load. An optional integral conduit box provides simple wiring direct from the motor power leads.

- Designed for dynamic stopping operations
- Brake automatically engages when power is turned off
- High cycle rate capability
- Never needs adjustment – automatically compensates for wear
- Powerful permanent magnets provide braking force
- Choice of open or enclosed brakes
- Prepackaged, preburnished UM version

Three C-face Compatible Designs

The UM Series (UniModule Clutch/Brakes) are preassembled clutch/electrically released brake modules.

- The UM-1020-FBC brake/motor clutch combination is used for clutch/power-off brake applications. It mounts directly to C-face compatible components.
- The UM-2030-FBC brake/input clutch combination is used for clutch/power-off brake applications. It has shafts on both the input and output sides for base mounting.

The EUM Series (Enclosed Motor Brakes) are totally enclosed non-vented units that keep wear particles in and contaminants out.

- The EUM-FBB brake unit can be mounted between two C-face compatible components.
- The EUM-MBFB motor brake is mounted directly to the rear of a double-shafted motor.

The EM Series (Electro Module Brakes and Clutch/Brakes) are comprised of individual units that may bolt together to form various combinations:

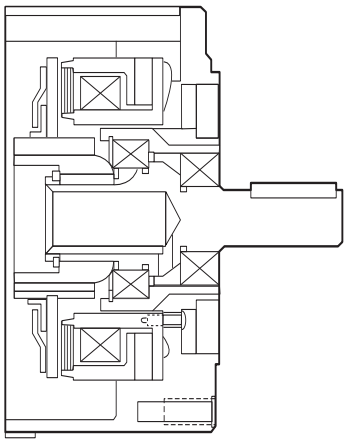
- The EM-FBB brake module mounts between a C-face motor and a gear box or reducer.
- The EM-MBFB motor brake module is mounted to the rear of a double-shafted motor.
- The EM-FBC brake module is used in combination with a motor clutch or input clutch unit to make a cluch/electrically released brake or can be used alone as a brake only.

Brake Modules (FBB) – For mounting between a C-face motor and a gearbox or reducer

EM Series
Shaft mounted,
vented housing

EUM Series
Shaft mounted,
totally enclosed
non-vented housing

Use for brake alone applications.

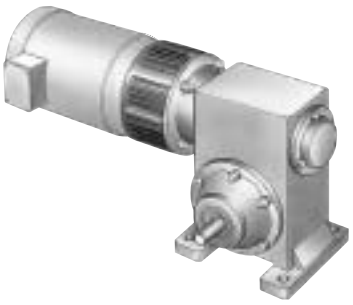


Features

- Single armature for brake alone applications
- Output shaft
- Permanent magnets
- UL listed and CSA certified

EM-FBB
Available in 4 sizes

EUM-FBB
Available in 4 sizes



EM-FBB Electro Module brake unit between a motor and a reducer.

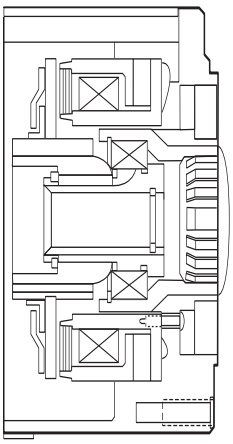
C-face Compatible Brakes and Clutch/Brakes

Motor Brake Modules (MBFB) – For mounting directly to the rear of a double-shafted motor

EM Series vented housing

EUM Series totally enclosed non-vented housing

Use as a motor brake on C-face type motors.

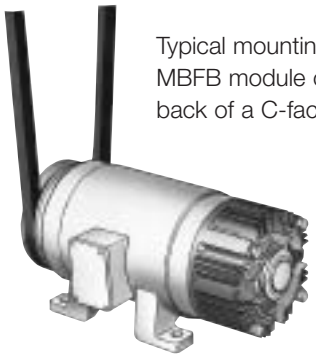


Features

- Single armature design
- Complete torque control
- Precision cast housing
- Ceramic type permanent magnets

EM-MBFB
Available in 4 sizes

EUM-MBFB
Available in 5 sizes



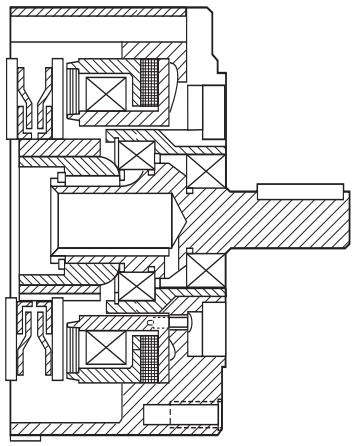
Typical mounting of an MBFB module on the back of a C-face motor

Clutch/Brake Modules (FBC) – Clutch/Fail-safe brake for mounting between a C-face motor and a gearbox or reducer

EM Series Modular unit with C/B capability

UM Series Fully assembled C/B combination package

Combine with a motor or input clutch for clutch/brake applications or use alone as a brake only.

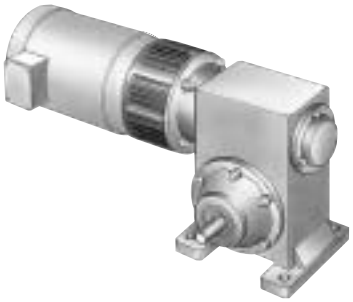


Features

- Dual armature for clutch/brake combination
- Output shaft
- Can be base mounted for use as a separate drive unit.

EM-FBC
Available in 3 sizes

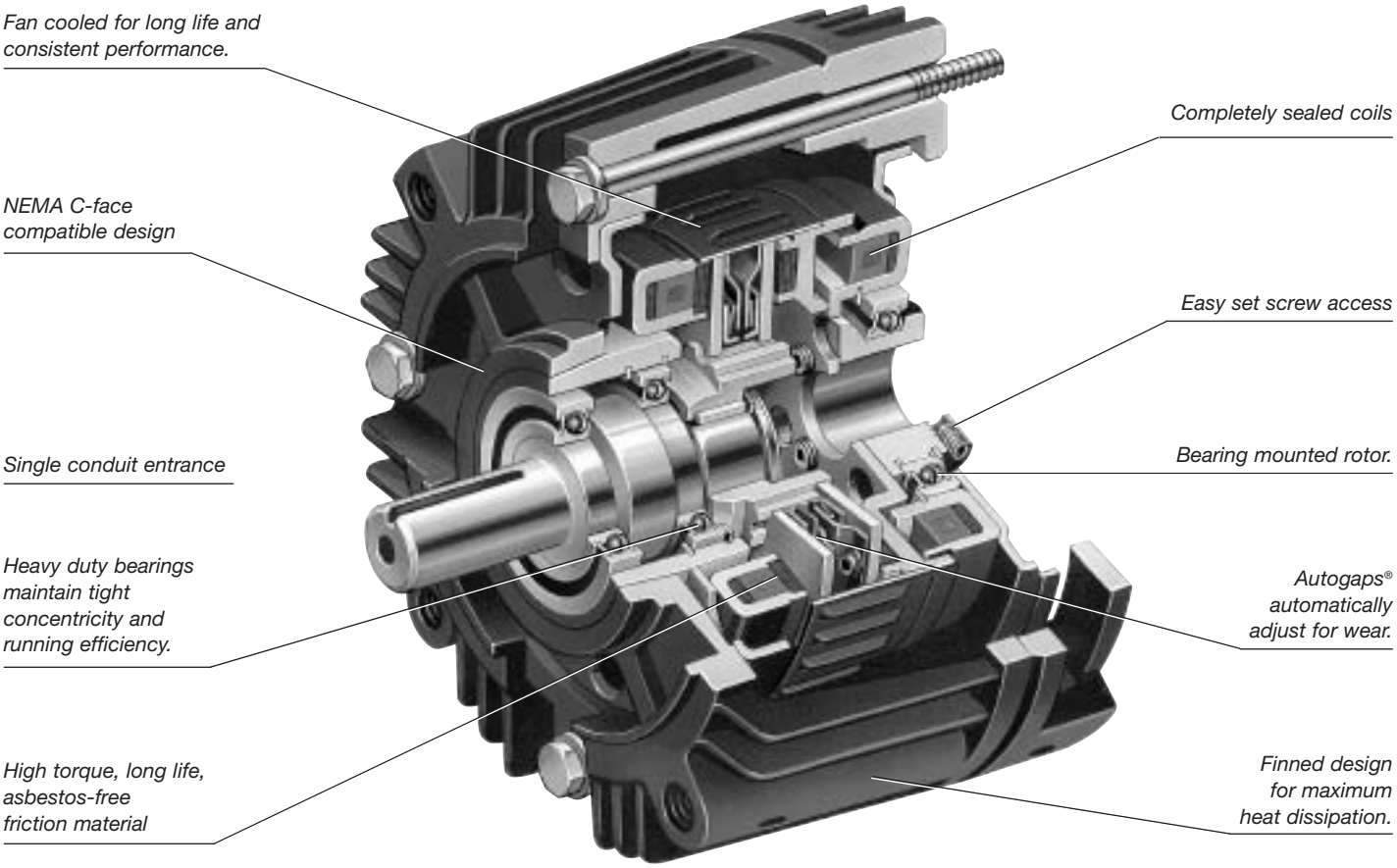
UM-FBC
Available in 4 size combinations



EM-FBC Electro Module brake unit combined with a motor clutch module

UM-FBC UniModule clutch/brake mounted on a base

UniModule Clutch/Electrically Released Brake Combination



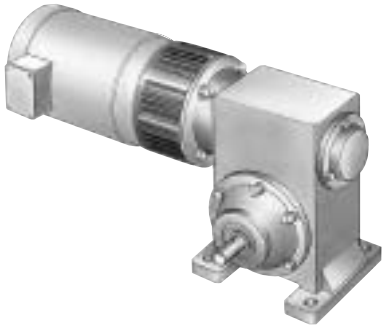
Warner Electric offers the convenience of pre-assembled UniModule clutch/electrically released brake packages. Assembly, alignment, and pre-burnishing have been done at the factory. Bolt it on, wire it up, and your clutch/electrically released brake is ready to go. Available in both C-face and base mounted versions.

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

UniModule clutch/electrically released brake units may be mounted directly to NEMA C-face motors and reducers, or can be base mounted.

1. Select Configuration

a. NEMA C-face Mounting (1020 Configuration)



Verify the unit will be cycled frequently.

To select the correct UniModule package, determine the NEMA frame size of your motor and/or reducer, and choose the corresponding size UniModule from the Frame Size Selection chart. Verify torque ratings.

b. Base Mounting (2030 Configuration)

Verify the unit will be cycled frequently.

Select the correct size module from the Horsepower vs. Shaft Speed chartby determining the motor horsepower and RPM at the module location. The correct size UniModule is shown at the intersection of the HP and operating speed. For additional sizing information, refer to the technical sizing procedure (step 2).

2. Determine Technical Requirements

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

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

Horsepower vs. Shaft Speed

HP	SHAFT SPEED AT CLUTCH (IN RPM)																	
▼	100	200	300	400	500	600	700	800	900	1000	1100	1200	1500	1800	2000	2400	3000	3600
1/4													UM-50					
1/2																		
3/4																		
1																		
1-1/2												UM-100 or UM-180						
2																		
3																		
5													UM-210 or UM-215					
7-1/2																		

Frame Size Selection and Technical Ratings Chart

NEMA Frame Size	UniModule Size	Static Torque Brake lb.ft.	Static Torque Clutch lb.	Max. RPM	Voltage DC
56C/48Y	UM-50* UM-100**	10.5 21	16 30	3600	24 or 90
182C/143TC 184C/145TC	UM-180	21	30	3600	24 or 90
213C/182TC 215C/184TC	UM-210	56	95	3600	24 or 90
213TC/215TC	UM-215	56	95	3600	24 or 90

*For 56C/48Y C-frame motors 3/4 HP and smaller, the UM-100 size may be used where extended life is desirable.

**The UM-100 size is recommended for motors 1 HP and larger.

a. Heat Dissipation Sizing

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

Heat dissipation requirement is calculated as follows:

$E = 1.7 \times WR^2 \times (N/100)^2 \times F$

where:

E = Heat (lb. ft./min.)

WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. ($lb.ft.^2$)

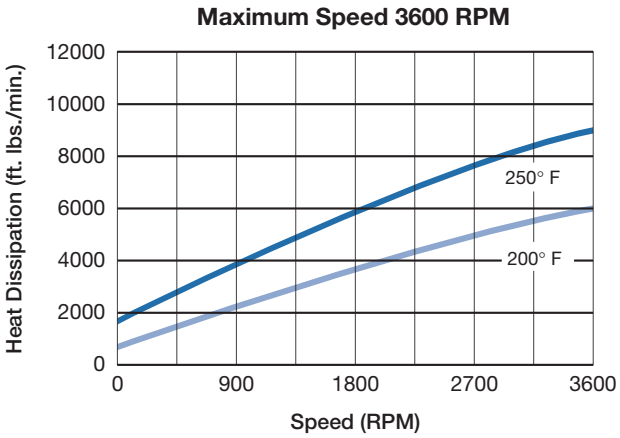
N = Speed in revolutions per minute. (RPM)

F = Cycle rate in cycles per minute (CPM)

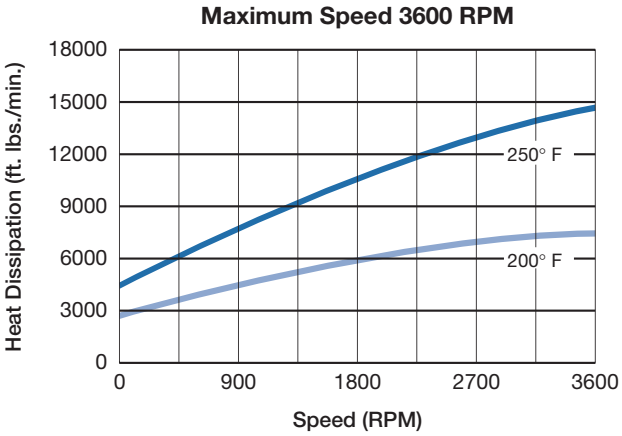
Compare the calculated heat generated in the application to the unit ratings using the heat dissipation curves. Select the appropriate unit that has adequate heat dissipation ability.

Heat Dissipation Curves

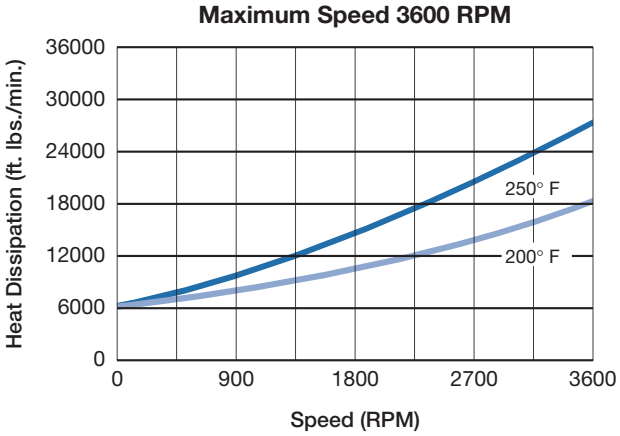
Size 50



Size 100/180



Size 210/215



b. Torque Sizing

For most applications, the correct size clutch/brake can be selected from the Horsepower vs. Shaft Speed chart on page 117. Determine the motor horsepower and the RPM at the clutch/brake. The correct size unit is shown at the intersection of horsepower and shaft speed.

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

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

The torque requirements are calculated as follows:

$T = (WR^2 \times N) / (308 \times t)$

where:

T = Average Dynamic Torque (lb. ft.)

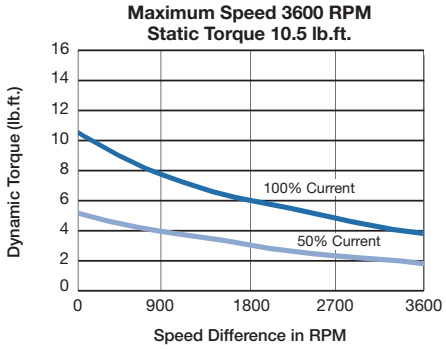
WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. (lb. ft.^{2})

N = Speed in revolutions per minute. (RPM)

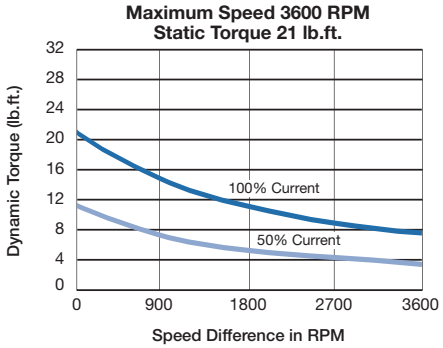
t = Time allowed for the engagement (sec)

C-face Electrically Released Brake Dynamic Torque Curves

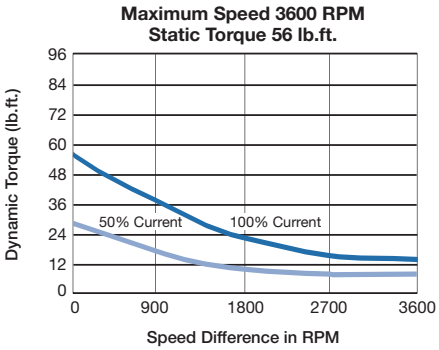
Size 50



Size 100/180

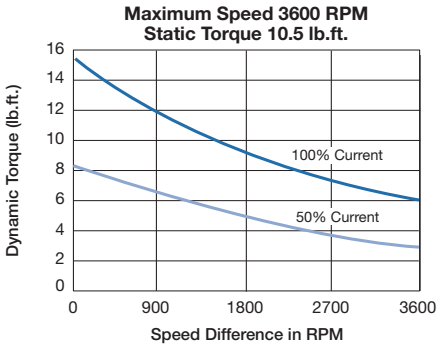


Size 210/215

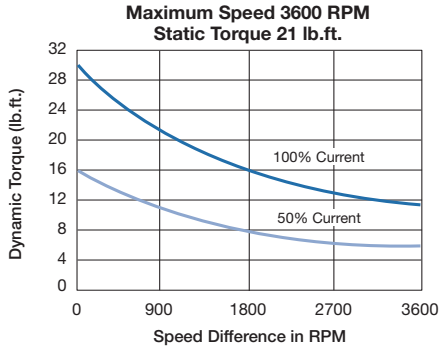


C-face Clutch Dynamic Torque Curves

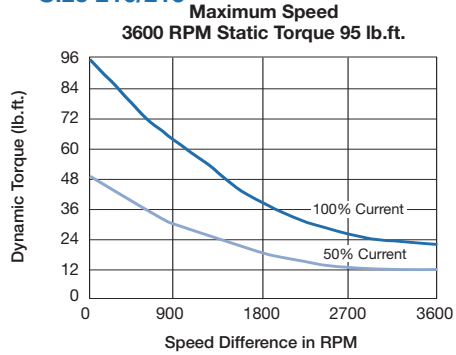
Size 50



Size 100/180



Size 210/215



Specifications (Max. Speed 3600 RPM)

Size	Voltage DC	Nominal Weight (lbs.) 1020	Nominal Weight (lbs.) 2030	Armature (both)	Armature Hub	Component Inertia–WR² (lb. ft.²) 1020 Shaft	1020 Rotor w/Fan and Hub	2030 Output Shaft	2030 Input Shaft	2030 Rotor w/Fan and Hub	NEMA Frame Size
50	24 90	12	15	.018	.001	.001	.020	.001	.001	.020	56C/48Y
100	24 90	16	19	.046	.002	.002	.046	.002	.002	.046	56C/48Y
180	24 90	16	19	.046	.002	.002	.046	.002	.002	.046	182C/143TC 184C/145TC
210	24 90	36	47	.162	.016	.014	.190	.016	.015	.183	213C/182TC 215C/184TC
215	24 90	37	48	.162	.016	.016	.190	.017	.016	.183	213TC/215TC

3. Select Options

Warner Electric Enclosed UniModules can be fitted with several accessories to extend their capacity and ease of mounting.

4. Select Control

All electrically released modules require a control with a potentiometer that will vary brake channel output. UM-FBC units require either a CBC-300 or a CBC 500/550 control.

UM Combination	UM Model No.	Voltage DC	Part No.
Motor Clutch/ ER Brake	UM-50-1020FBC	24	5370-273-037
	UM-50-1020FBC	90	5370-273-036
	UM-100-1020FBC	24	5370-273-153
	UM-100-1020FBC	90	5370-273-125
	UM-180-1020FBC	24	5370-273-047
	UM-180-1020FBC	90	5370-273-046
	UM-210-1020FBC	24	5371-273-013
	UM-210-1020FBC	90	5371-273-012
	UM-215-1020FBC	24	5371-273-099
	UM-215-1020FBC	90	5371-273-079
Input Clutch/ ER Brake	UM-50-2030FBC	24	5370-273-042
	UM-50-2030FBC	90	5370-273-041
	UM-100-2030FBC	24	5370-273-154
	UM-100-2030FBC	90	5370-273-155
	UM-180-2030FBC	24	5370-273-052
	UM-180-2030FBC	90	5370-273-051
	UM-210-2030FBC	24	5371-273-018
	UM-210-2030FBC	90	5371-273-017
	UM-215-2030FBC	24	5371-273-100
	UM-215-2030FBC	90	5371-273-101

Accessories

Description	UM Size	Part No.
Conduit Box	UM series All sizes	5370-101-042
Base Mount Kit for 2030 FBC	50/100 180 210/215	5370-101-036 5370-101-037 5371-101-039
Motor Mount Kit for 1020 FBC	50/100 180 210/215	5370-101-010 5370-101-012 5371-101-012

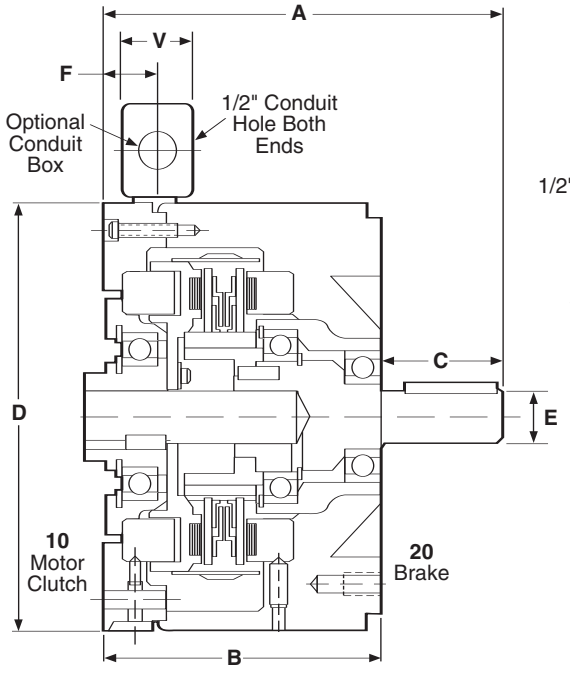
How to Order

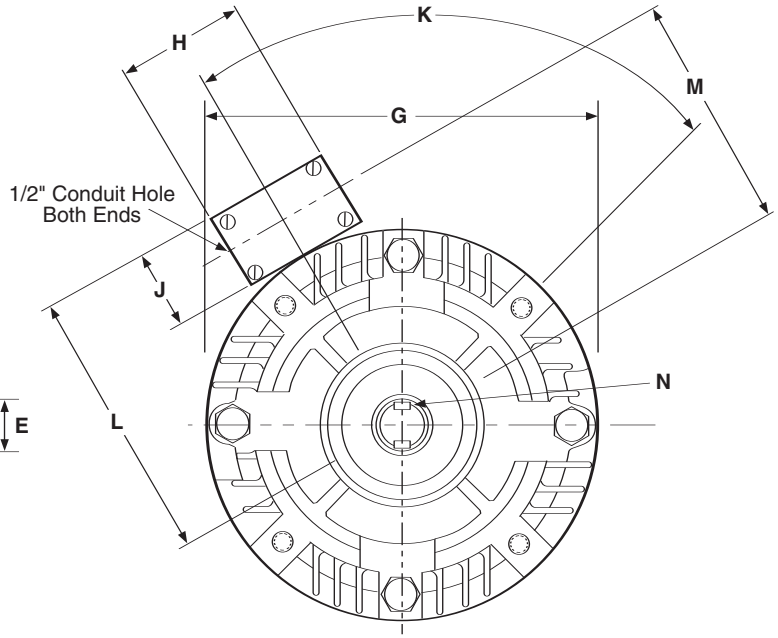
1. Specify model number and voltage or the corresponding part number.
2. Specify conduit box, if desired. See the Controls Section.
3. Specify required control unit. See the Controls Section.

Ordering Example

UM-50-1020FBC, 90V or 5370-273-036; 5370-101-042 conduit box; CBC-300 control.

UM-1020 FBC Motor Clutch/Electrically Released Brake



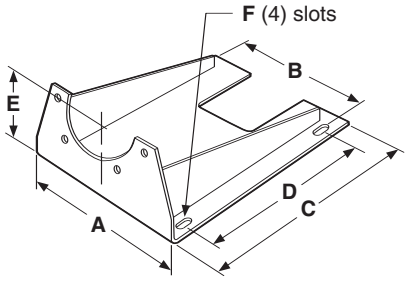


Note: Conduit box is optional and is ordered separately.

All dimensions are nominal, unless otherwise noted.

Size	A	B	C	D	E	F	G	H	J	K	L	M	N (Key)
50	7.281	5.375	1.813	6.750	.625	.938	6.688	3.250	2.188	75°	5.531	4.438	3/16 x 3/16 x 1-1/4
100	7.281	5.375	1.813	6.750	.625	.938	6.688	3.250	2.188	75°	5.531	4.438	3/16 x 3/16 x 1-1/4
180	7.359	5.375	1.891	6.750	.875	.938	6.688	3.250	2.188	75°	5.531	4.438	3/16 x 3/16 x 1-1/4
210	9.688	7.031	2.500	9.250	1.125	.625	9.688	3.250	2.188	70°	6.869	5.766	1/4 x 1/4 x 2
215	10.568	7.44	3.125	9.25	1.375	1.2	9.688	3.250	2.188	70°	6.869	5.766	5/16 x 5/16 x 2

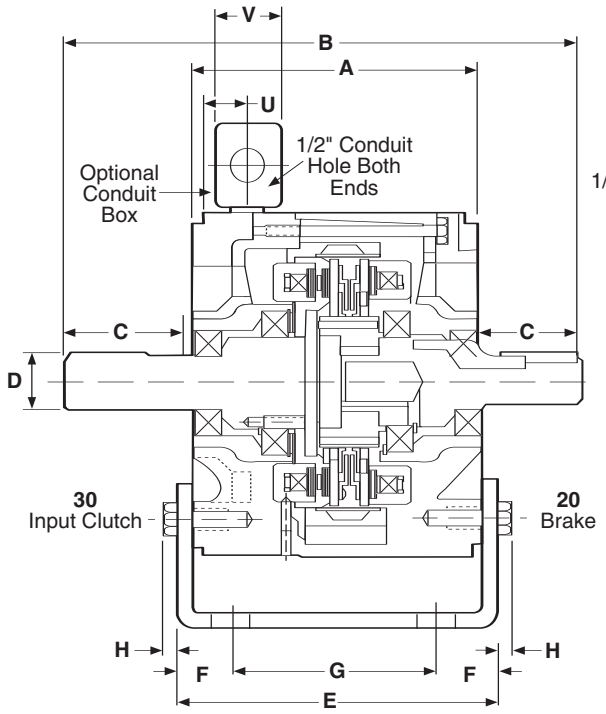
Motor Mount (M)

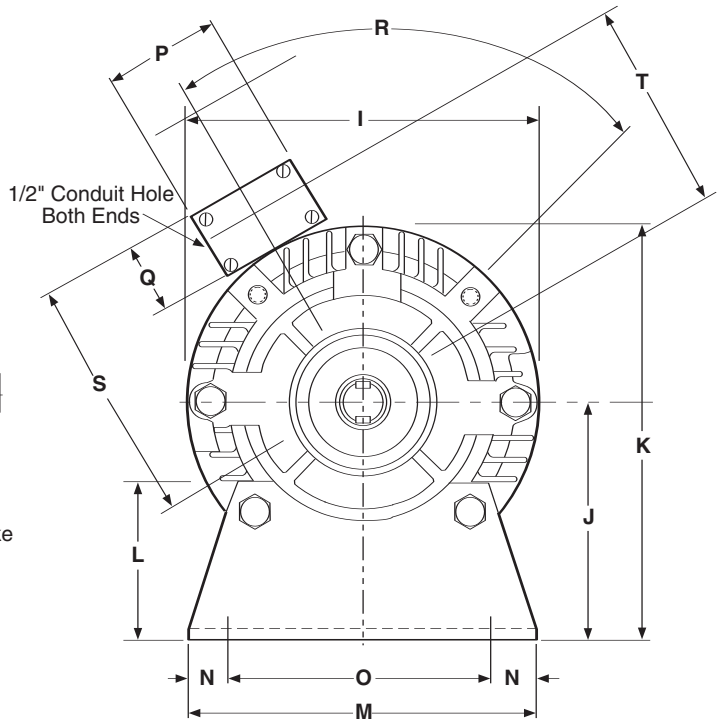


For use with 1020, 1040, 20, 20 FBB and 1020 FBC Combinations.

Size	A	B	C	D	E	F	Part No.
50/100	9.25	8.25	11.00	8.000	3.50	.797 x .406	5370-101-010
180	9.25	8.25	11.00	8.000	4.50	.797 x .406	5370-101-012
210/215	11.50	10.50	12.00	9.000	5.25	.750 x .406	5371-101-012

UM-2030 FBC Input Clutch/Electrically Released Brake
UM-2030 FBC-Input Clutch/Electrically Released Brake – Base Mounted





Note: Mounting base and conduit box are optional and are ordered separately.

All dimensions are nominal, unless otherwise noted.

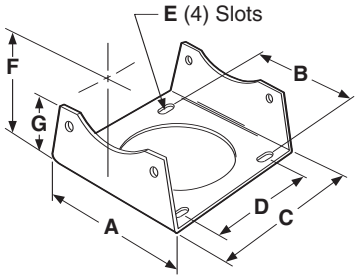
Size	A	B	C Min.	D	E	F	G	H	I	J	K
50	6.250	10.047	1.813	.625	6.219	1.109	4.000	.344	6.688	3.500	6.844
180	6.250	10.188	1.891	.875	6.219	1.109	4.000	.344	6.688	4.500	7.844
210	8.516	13.766	2.500	1.125	8.938	1.469	6.000	.438	9.688	5.250	9.906

Size	L	M	N	O	P	Q	R	S	T	U	V
50	2.000	6.000	.500	5.000	3.250	2.188	75°	5.531	4.438	1.125	2.203
180	3.000	6.625	.813	5.000	3.250	2.188	75°	5.531	4.438	1.125	2.203
210	3.375	9.000	.625	7.750	3.250	2.188	70°	6.859	5.766	1.625	2.203

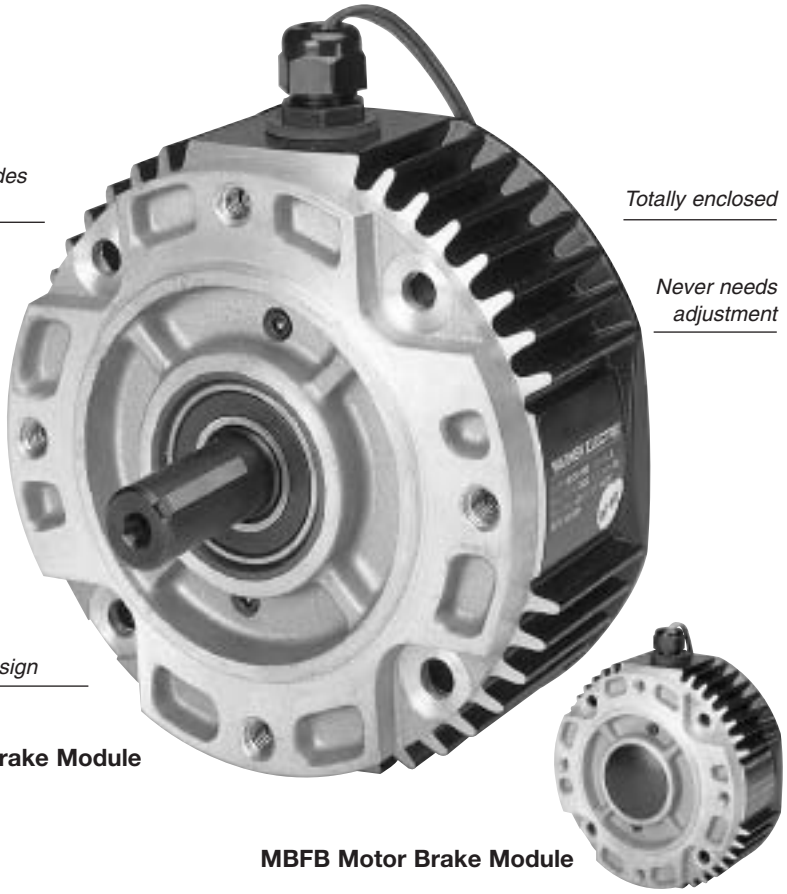
Base (B)

For use with 2030 FBC units.

Size	A	B	C	D	E	F	G	Part No.
50/100	6.000	5.000	6.219	4.000	.750 X .406	3.500	2.000	5370-101-036
180	6.625	5.000	6.219	4.000	.750 X .406	4.500	3.000	5370-101-037
210	9.000	7.750	8.938	6.000	.750 X .531	5.250	3.375	5371-101-019



Preassembled, Totally Enclosed, Electrically Released Brake Units



Available in Two Design Styles

EUM-FBB Brake Module
Use for brake alone applications. Mounts between a motor and gear box or reducer. Available in four sizes.

EUM-MBFB Motor Brake Module
Mounts to a double shafted C-face motor. Available in five sizes.

Warner Electric offers the convenience of pre-assembly in UniModule electrically released brake packages. Assembly, alignment, and preburnishing have been done at the factory. Bolt it on, wire it up, and your electrically released brake is ready to go. (Control and conduit box optional)

Care must be exercised to assure proper sizing and selection of electrically released brakes. Motor brakes are used for dynamic stopping and holding of loads when power is removed from the motor. Typical applications include conveyors, process equipment, and lifting devices.

Warner Electric brakes are designed for NEMA C-face motors which match the motor frame size and shaft diameter to the brake. To select a brake, determine the motor frame size and pick an MBFB for double shafted motors or an FBB for mounting between a motor and a gear reducer. Select the torque required for the application. Higher torque brakes stop loads faster. Lower torque models provide softer stopping to prevent boxes on conveyors from tipping or skidding.

They are sized to provide nominal stopping of a motor in the event of power loss. If your application requires true “Fail safe” braking, the brake must be sized to meet or exceed peak motor torque and placed as close to the load shaft as possible. Peak motor torque can be determined by the formula:

$$\text{Peak Torque} = \frac{(\text{HP} \times 5250)}{\text{Motor Speed}}$$

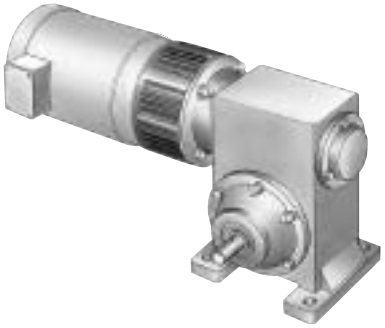
EUM-FBB, EUM-MBFB Selection

Warner Electric Electrically Released Enclosed UniModules are available in two styles. The EUM-FBB Brake Module is used in brake only applications and mounts between a C-face motor and a gear box or reducer. The EUM-MBFB Motor Brake Module mounts to the back of a double shafted motor.

Note: Care must be exercised when selecting a brake to ensure it is sized properly for your application.

1. Select Configuration

a. FBB for NEMA C-face Mounting Between a Motor and Reducer



Verify that the brake will be cycled frequently.

Determine the NEMA C-face frame size of your motor and/or reducer, and choose the corresponding size Enclosed UniModule from the Frame Size Selection chart.

Size EUM-100 modules utilize a 5/8" diameter shaft to fit 56C/48Y motor frames with components of EUM-180 units for higher torque and heat dissipation capacity than the EUM-50.

EUM-FBB Frame Size Selection

NEMA Frame Size	EUM Size
56C/48Y	EUM-50* EUM-100**
182C/143TC 184C/145TC	EUM-180
213C/182TC 215C/184TC	EUM-210
213TC/215TC	EUM-215

*For 56C/48Y C-frame motors 3/4 HP and smaller, the EUM-100 size may be used where extended life is desirable.

**The EUM-100 size is recommended for motors 1 HP and larger.

b. MBFB for NEMA C-face Mounting on the Back of a Double Shafted Motor

Verify that the brake will be cycled frequently.

Determine the NEMA C-face frame size of your motor and/or reducer, and choose the corresponding size Enclosed UniModule MBFB from the Frame Size Selection chart, and verify that the motor shaft diameter and mounting bolt circle are the same for the brake and the motor.

Size EUM-100 modules utilize a 5/8" diameter shaft to fit 56C/48Y motor frames with components of EUM-180 units for higher torque and heat dissipation capacity than the EUM-50.

EUM-MBFB Frame Size Selection

NEMA Frame Size	EUM Brake Size	Bolt Hole Mounting Circle	Motor Shaft Dia.
56C/48Y	EUM-50* EUM-100**	5.875	0.625
182C/143TC 184C/145TC	EUM-180	5.875	0.875
213C/182TC 215C/184TC	EUM-210-7/8 EUM-210	7.25 7.25	0.875 1.125

*For 56C/48Y C-frame motors 3/4 HP and smaller, the EUM-100 size may be used where extended life is desirable.

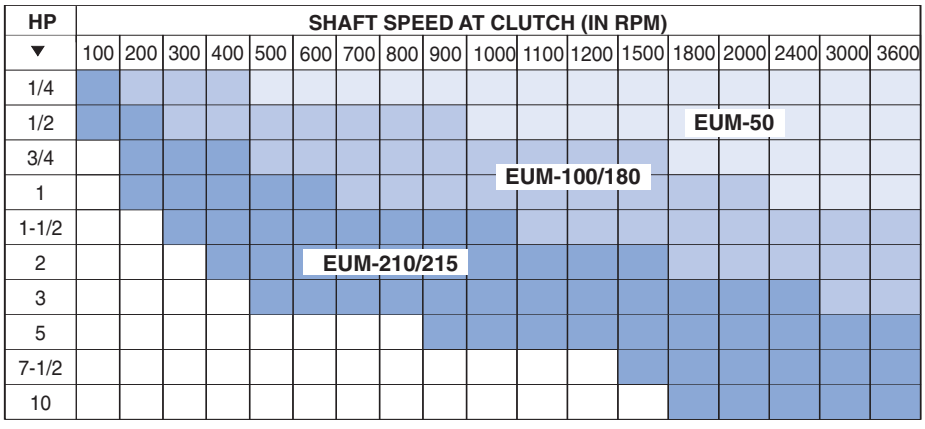
**The EUM-100 size is recommended for motors 1 HP and larger.

2. Determine Technical Requirements

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

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

Horsepower vs. Shaft Speed



a. Heat Dissipation Sizing

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

Heat dissipation requirement is calculated as follows:

$E = 1.7 \times WR^2 \times (N/100)^2 \times F$

where:

E = Heat (lb. ft./min.)

WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. ($lb.ft.^2$)

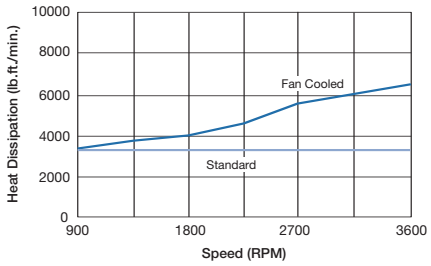
N = Speed in revolutions per minute. (RPM)

F = Cycle rate in cycles per minute (CPM)

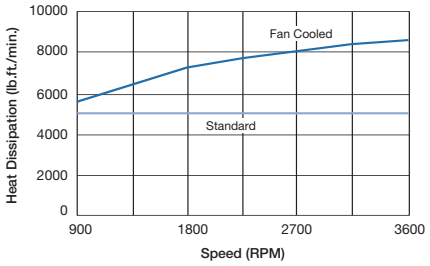
Compare the calculated heat generated in the application to the unit ratings using the heat dissipation curves. Select the appropriate unit that has adequate heat dissipation ability.

Heat Dissipation Curves

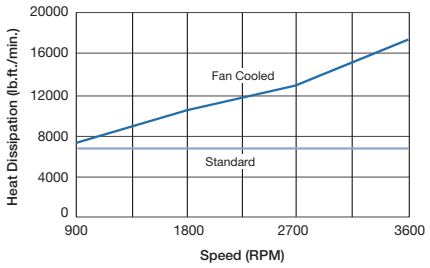
EUM 50



EUM 100/180



EUM 210/215 (fan not available for 215)



b. Torque Sizing

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

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

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

The torque requirements are calculated as follows:

$T = (WR^2 \times N) / (308 \times t)$

where:

T = Average Dynamic Torque (lb. ft.)

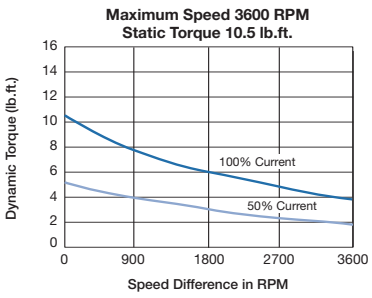
WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. ($lb.\ ft.^2$)

N = Speed in revolutions per minute. (RPM)

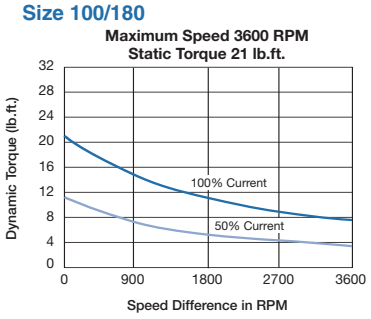
t = Time allowed for the engagement (sec)

C-face Electrically Released Brakes Dynamic Torque Curves

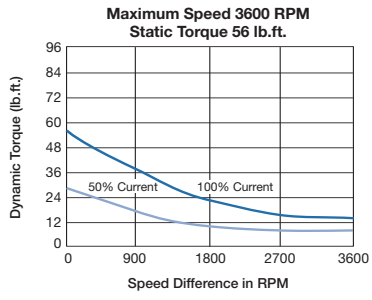
Size 50



Size 100/180



Size 210/215



Preassembled, Totally Enclosed, Electrically Released Brake Units

Specifications

Size	Voltage DC	Static Torque (lb.ft.)	Max. Speed (RPM)	Total Weight (lbs.)	Armature (lb.ft.²)	Component Inertia –WR² (lb.ft.²) FBB Hub	FBB Shaft	MBFB Hub Spliced	MBFB Shaft Input	NEMA Frame Size
50	90	6	3600	8.6	.009	.001	.0005	.001	.0003	56C/48Y
100	90	12	3600	10.5	.023	.002	.002	.002	.002	56C/48Y
180	90	12	3600	10.5	.023	.002	.002	.002	.002	182C/143TC 184C/145TC
210	90	32	3600	27	.081	.016	.016	.016	.007	213C/182TC 215C/184TC

3. Select Options

Warner Electric Enclosed UniModules can be fitted with several accessories to extend their capacity and ease of mounting.

4. Select Control

All electrically released modules require a control with a potentiometer that will vary brake channel output. For FBB and MBFB brake modules, the CBC-160, CBC-200, CBC-300, or CBC-500/550 is recommended. The FBC units require either a CBC-300 or a CBC 500/550 control.

Selection Procedure

Note: Care must be exercised when selecting the proper brake size for your application.

The selection charts list NEMA motor frame sizes, motor shaft diameters, and the matching FBB or MBFB brakes.
To select a brake:

1. Determine the motor NEMA C-face frame size.
2. Select brake configuration
   a. FBB to mount between a NEMA C-face motor and a gear reducer.
   b. MBFB to mount on double shafted NEMA C-face motors.
3. Select the brake model from the charts by the torque required – higher torque for faster stopping, lower torque for longer, "soft" stopping.

Note: Size 100 brakes are typically used on motors with a rating of 1 HP or greater.

4. **Important:** Verify that the motor shaft diameter and mounting bolt circle dimensions are the same for the brake selected and the motor.

Control Selection

An optional conduit box enclosure is available. All electrically released units require a control with a potentiometer to vary brake channel output. For FBB and MBFB brake modules, control models CBC-160, CBC-200, CBC-300, or CBC-500/550 are recommended. (See Controls Section.)

Frame Size

EUM Size	NEMA Frame Size	Bolt Hole Mounting Circle	FBB Motor to Reducer Shaft Dia.	MBFB Motor Brake Shaft Dia.
EUM-50	56C	5 7/8	5/8	5/8
EUM-100	56C	5 7/8	5/8	5/8
EUM-180	143TC 145TC	5 7/8	7/8	7/8
EUM-210-7/8	213TC 215TC	7 1/4	N/A	7/8
EUM-210	182TC 184TC	7 1/4	1 1/8	1 1/8
EUM-215	213TC 215TC	7 1/4	1 3/8	N/A

How to Order

1. Specify model number and voltage or the corresponding part number.
2. Specify conduit box, if desired. See the Controls Section.
3. Specify required control unit. See the Controls Section.

Ordering Example

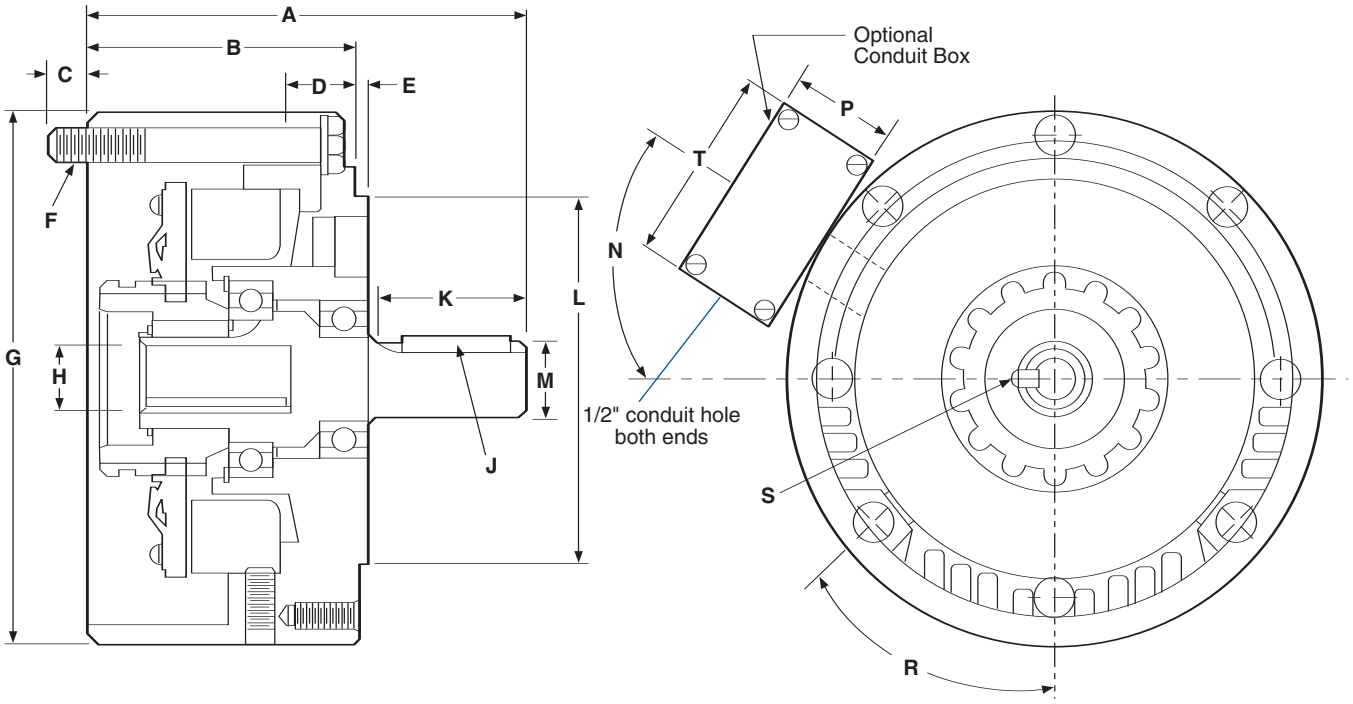
EUM-50-20FBB-6, 90V or 5370-169-983; 5370-101-042 conduit box; CBC-160-2 control.

EUM Description	EUM Model No.	Static Torque (lb.ft.)	Part No.
FBB Brake Module (90VDC)	EUM-50-20FBB-6	6	5370-169-983
	EUM-50-20FBB-10	10.5	5370-169-986
	EUM-100-20FBB-12	12	5370-169-989
	EUM-100-20FBB-21	21	5370-169-992
	EUM-180-20FBB-12	12	5370-169-995
	EUM-180-20FBB-21	21	5370-169-998
	EUM-210-20FBB-32	32	5371-169-078
	EUM-210-20FBB-56	56	5371-169-082
	EUM-215-20FBB-32	32	5371-169-086
	EUM-215-20FBB-56	56	5371-169-090
MBFB Motor Brake Module (90VDC)	EUM-50-20MBFB-6	6	5370-169-965
	EUM-50-20MBFB-10	10.5	5370-169-968
	EUM-100-20MBFB-12	12	5370-169-971
	EUM-100-20MBFB-21	21	5370-169-974
	EUM-180-20MBFB-12	12	5370-169-977
	EUM-180-20MBFB-21	21	5370-169-980
	EUM-210-7/8-20MBFB-32	32	5371-169-064
	EUM-210-7/8-20MBFB-56	56	5371-169-068
	EUM-210-20MBFB-32	32	5371-169-056
	EUM-210-20MBFB-56	56	5371-169-060

Accessories

Description	FBB Size	Part No.
Conduit Box	FBB series All sizes	5370-101-042
Motor Mount Kit for 20 FBB	50/100/180 210/215	5370-101-012 5371-101-012

EUM-FBB Brake Module

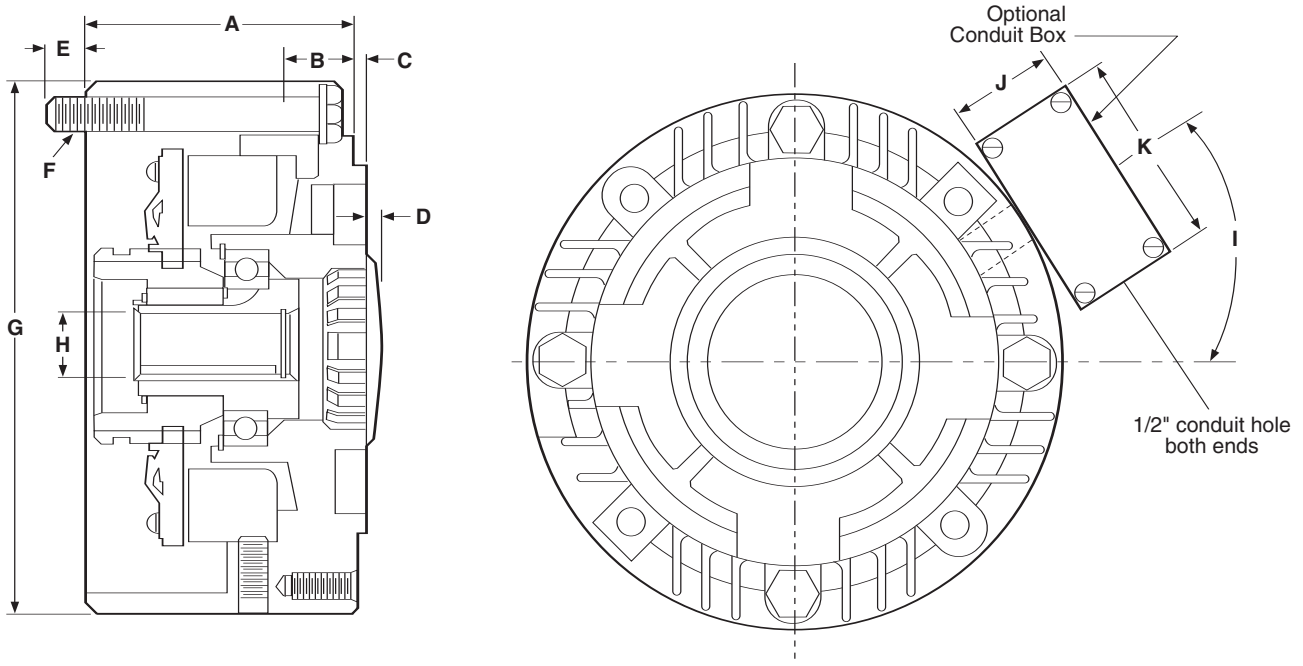


All dimensions are nominal, unless otherwise noted.

Size	A Max.	B	C Max.	D	E Max.	F	G Dia.	H Dia.
50	5.188	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.625
100	5.266	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.625
180	5.266	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.875
210	7.578	4.609	.594	1.500	.313	1/2-13 UNC-2A (4) Equally Spaced on 7.250 Dia.	9.344	1.125
215	7.578	4.609	.594	1.500	.313	1/2-13 UNC-2A (4) Equally Spaced on 7.250 Dia.	9.344	1.375

Size	J Key	K Min.	L Pilot Dia.	M Dia.	N	P	R	S Integral Key	T
50	3/16 x 3/16 x 1-1/4	1.813	4.500	.625	30°	2.188	45°	3/16 x 3/16	3.125
100	.3/16 x 3/16 x 1-1/4	1.891	4.500	.625	30°	2.188	45°	3/16 x 3/16	3.125
180	3/16 x 3/16 x 1-1/4	1.891	4.500	.875	30°	2.188	45°	3/16 x 3/16	3.125
210	1/4 x 1/4 x 2	2.500	8.500	1.125	25°	2.188	45°	1/4 x 1/4	3.125
215	5/16 x 5/16 x 2	2.500	8.500	1.375	25°	2.188	45°	5/16 x 5/16	3.125

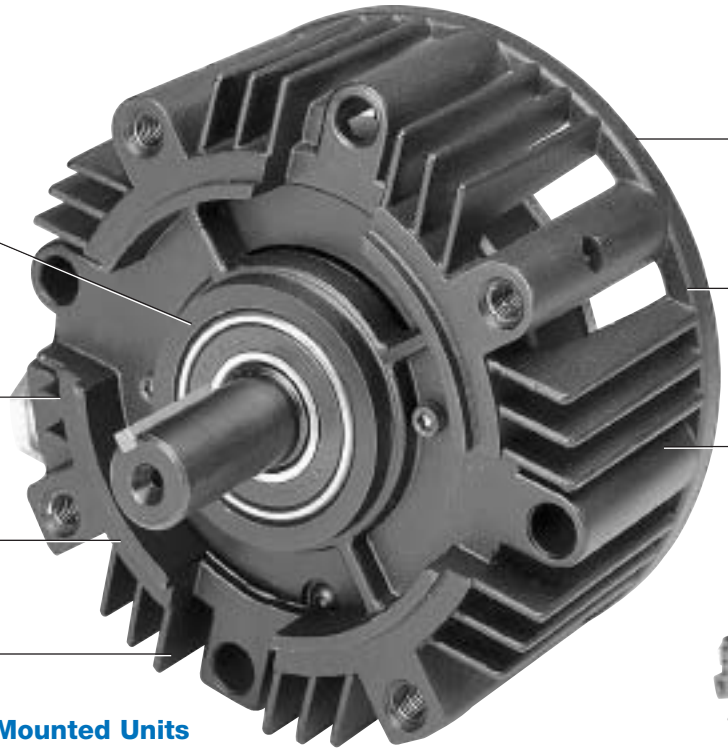
EUM-MBFB Motor Brake Module



All dimensions are nominal, unless otherwise noted.

Size	A	B	C Max.	D	E Max.	F	G Dia.	H Dia.	H Max. Length	H Integral Key	I	J	K
50	3.125	1.000	.156	.219	.300	3/8-16 UNC-2A	6.688	.625	2.094	3/16 x 3/16	30°	2.188	3.125
100	3.125	1.000	.156	.219	.300	3/8-16 UNC-2A	6.688	.625	2.094	3/16 x 3/16	30°	2.188	3.125
180	3.125	1.000	.156	.219	.500	3/8-16 UNC-2A	6.688	.875	2.063	3/16 x 3/16	30°	2.188	3.125
210-7/8"	4.609	1.500	.313	.250	.594	1/2-13 UNC-2A	9.344	.875	2.766	3/16 x 3/16	30°	2.188	3.125
210	4.609	1.500	.313	.250	.594	1/2-13 UNC-2A	9.344	1.125	2.766	1/4 x 1/4	30°	2.188	3.125

Electro Module, Electrically Released Brakes and Clutch/Brake Units for Dynamic Stopping and Cycling Applications



Shaft Mounted Units
FBB Brake Module
FBC Brake Module for use with a clutch

MBFB Motor Brake Module

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

Available in Three Design Styles

EM-FBB Brake Module
Use for brake alone applications. Mounts between a C-face motor and a gear box or reducer. Available in five sizes.

EM-MBFB Motor Brake Module
Mounts to the back of a double shafted motor. Available in four sizes.

EM-FBC Brake Module for use with a Clutch
Combine with a motor or input clutch for clutch/brake applications. Three sizes are available.

Specifications

Size	Voltage DC	Static Torque (lb.ft.) Brake	Static Torque (lb.ft.) Clutch	Max. Speed (RPM)	Total Weight (lbs.)	Component Inertia –WR² (lb.ft.²) Armature FBB/MBFB	Armature FBC	Hub	Shaft	NEMA Frame Size
EM-50	24 90	10.5	16	3600	8.6	.0071	.014	.003	.001	56C/48Y
EM-100	90	21	—	3600	10.5	.018	—	.004	.002	56C/48Y
EM-180	24 90	21	30	3600	10.5	.018	.036	.004	.002	182C/143TC 184C/145TC
EM-210	24 90	56	95	3600	27	.081	.162	.027	.017	213C/182TC 215C/184TC

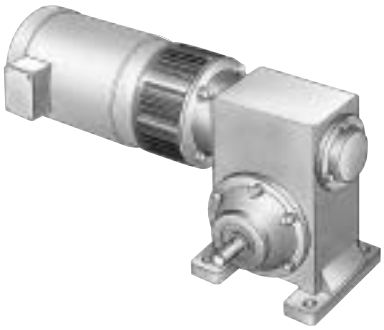
EM-FBB, EM-FBC, EM-MBFB Selection

Warner Electric Electrically Released Electro Modules are available in three styles. The EM-FBB Brake Module is used in brake only applications and mounts between a C-face motor and a gear box or reducer. The EM-MBFB Motor Brake Module mounts to the back of a double shafted motor. The EM-FBC Brake Module is combined with a motor clutch (EM-10) or an input clutch (EM-30) for clutch/electrically released brake applications.

Note: Care must be exercised when selecting a brake to ensure it is sized properly for your application.

1. Select Configuration

a. For FBB and MBFB Modules NEMA C-face Mounting



Verify that the brake will be cycled frequently.

Determine the NEMA C-face frame size of your motor and/or reducer, and choose the corresponding size Electro Module from the Frame Size Selection chart.

FBB AND MBFB Frame Size Selection

NEMA Frame Size	EM Size
56C/48Y	EM-50* EM-100**
182C/143TC 184C/145TC	EM-180
213C/182TC 215C/184TC	EM-210
213TC/215TC	EM-215

*For 56C/48Y C-frame motors 3/4 HP and smaller, the EM-100 size may be used where extended life is desirable.

**The EM-100 size is recommended for motors 1 HP and larger.

Size EM-100 modules utilize a 5/8" diameter shaft to fit 56C/48Y motor frames with components of EM-180 units for higher torque and heat dissipation capacity than the EM-50

Select Brake Configuration: use an EM-FBB for mounting between a motor and a reducer; or an EM-MBFB for mounting on the rear of a double shafted motor. NOTE: When selecting an MBFB, ensure the shaft dimensions on the rear of the motor are compatible with the EM-MBFB unit selected.

b. For FBC Modular Units, NEMA C-face Mounting

Verify that brake will be cycled frequently, and will be used with a motor mounted clutch (EM-10) for C-face mounting.

Determine the NEMA C-face frame size of your motor and/or reducer, and choose the corresponding size Electro Module from the Frame Size Selection chart.

FBC Frame Size Selection

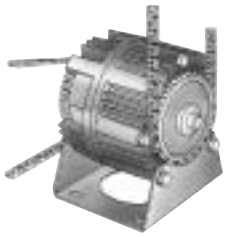
NEMA Frame Size	EM Size
56C/48Y	EM-50* EM-100**
182C/143TC 184C/145TC	EM-180
213C/182TC 215C/184TC	EM-210

For torque ratings, refer to the "Specifications" chart. Note that separate torque ratings are listed for the clutch and brake segments of the module.

* For 56C/48Y C-frame motors 3/4 HP and smaller, the EM-100 size may be used where extended life is desirable.

** The EM-100 size is recommended for motors 1 HP and larger.

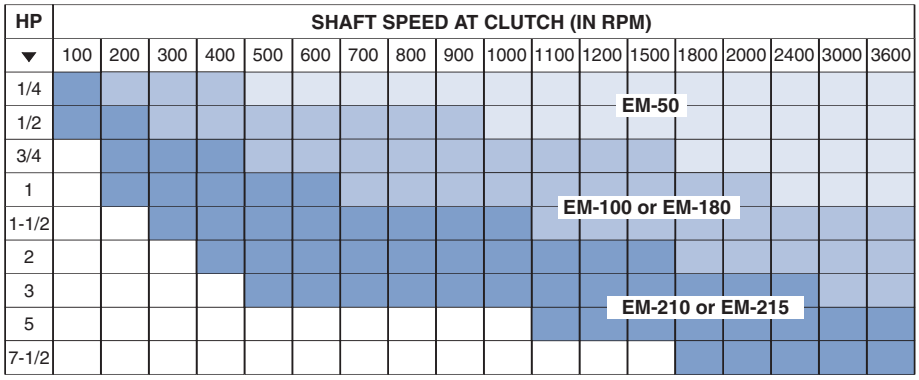
c. For FBC Modular Units, Base Mounting



Verify that brake will be cycled frequently, and will be used with an input clutch (EM-30) for base mounting.

Select the correct size module from the Horsepower vs. Shaft Speed chart (at the bottom of this page) by determining the motor horsepower and RPM at the module location. The correct size EM is shown at the intersection of the HP and operating speed. For additional sizing information, refer to the technical sizing procedure (step 2).

Horsepower vs. Shaft Speed



2. Determine Technical Requirements

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

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

a. Heat Dissipation Sizing

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

Heat dissipation requirement is calculated as follows:

$E = 1.7 \times WR^2 \times (N/100)2 \times F$

where:

E = Heat (lb. ft./min.)

WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. ($lb.ft.^2$)

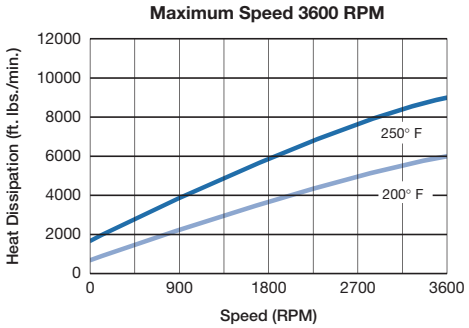
N = Speed in revolutions per minute. (RPM)

F = Cycle rate in cycles per minute (CPM)

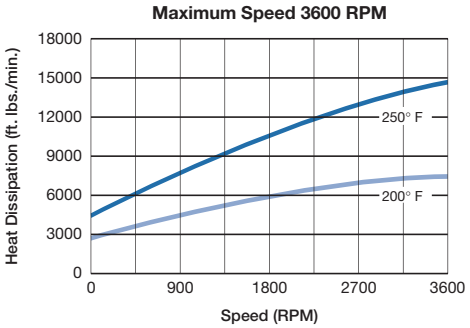
Compare the calculated heat generated in the application to the unit ratings using the heat dissipation curves. Select the appropriate unit that has adequate heat dissipation ability.

Heat Dissipation Curves

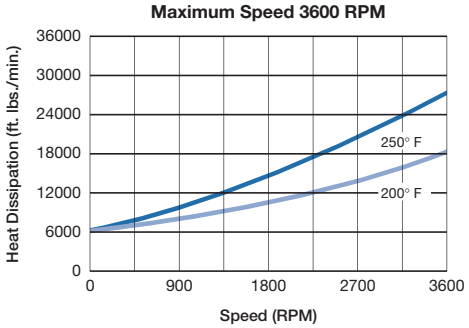
Size 50



Size 100/180



Size 210/215



b. Torque Sizing

For most applications, the correct size clutch/brake can be selected from the Horsepower vs. Shaft Speed chart on page 131. Determine the motor horsepower and the RPM at the clutch/brake. The correct size unit is shown at the intersection of horsepower and shaft speed.

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

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

The torque requirements are calculated as follows:

$T = (WR^2 \times N) / (308 \times t)$

where:

T = Average Dynamic Torque (lb. ft.)

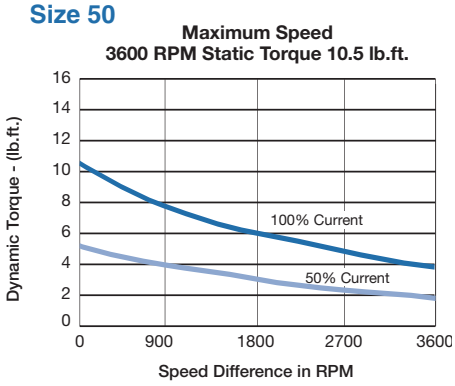
WR^2 = Total reflected inertia at the clutch/brake shaft. Include the clutch/brake output inertia. ($lb.\ ft.^2$)

N = Speed in revolutions per minute. (RPM)

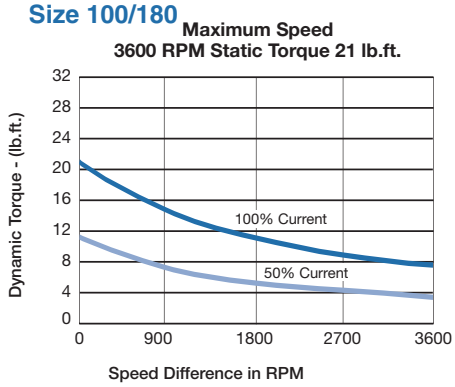
t = Time allowed for the engagement (sec)

C-face Electrically Released Brakes Dynamic Torque Curves

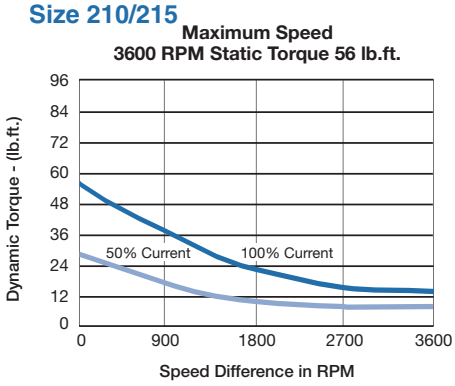
Size 50



Size 100/180



Size 210/215



3. Select Accessories

Warner Electric Electro Modules can be fitted with several accessories to extend their capacity and ease of mounting.

4. Select Control

All electrically released modules require a control with a potentiom eter that will vary brake channel output. For FBB and MBFB brake modules, the CBC-160, CBC-200, CBC-300, or CBC-500/550 is recommended. The FBC units require either a CBC-300 or a CBC 500/550 control.

How to Order

1. Specify model number and voltage or the corresponding part number.
2. Specify conduit box, if desired. See the Controls Section.
3. Specify required control. See the Controls Section.

Ordering Example

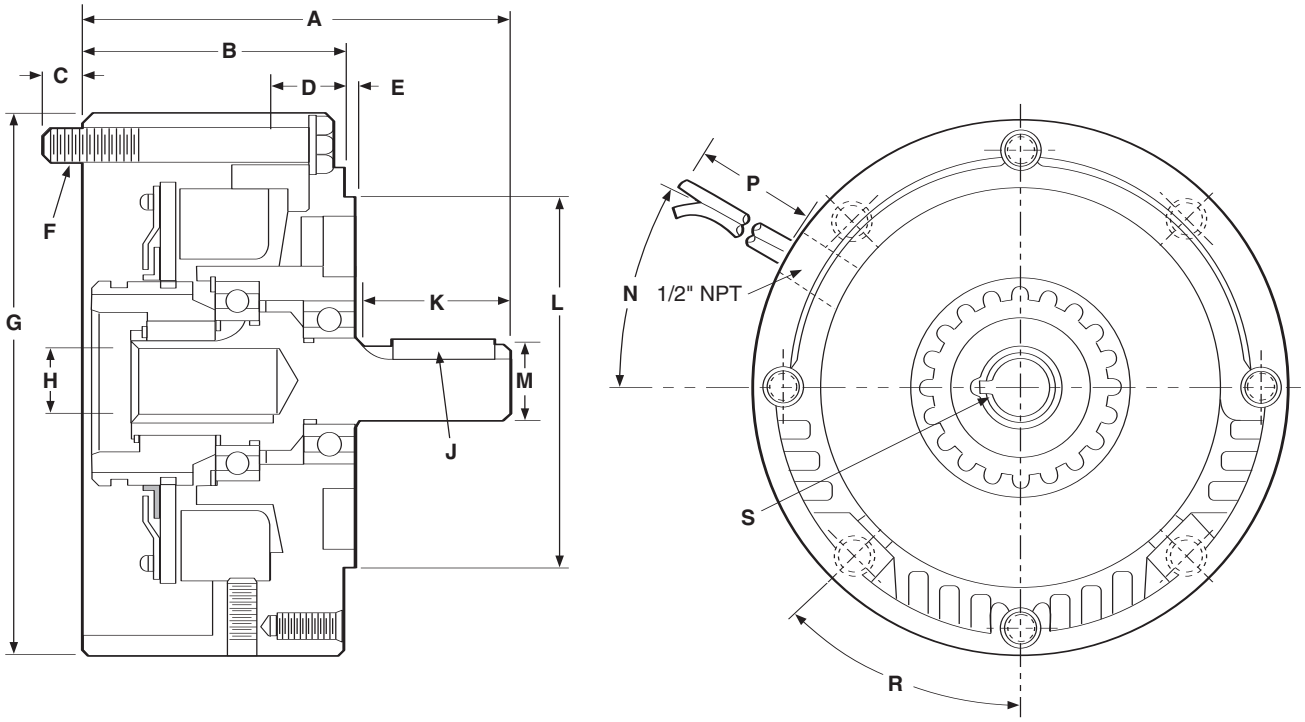
EM-50-20FBB, 90V or 5370-169-058; 5370-101-042 conduit box; CBC-160-2 control.

EM Description	EM Model No.	Voltage DC	Part No.
FBB Brake Module for use as brake only	EM-50-20FBB	24	5370-169-066
	EM-50-20FBB	90	5370-169-058
	EM-100-20FBB	24	5370-169-020
	EM-100-20FBB	90	5370-169-084
	EM-180-20FBB	24	5370-169-068
	EM-180-20FBB	90	5370-169-059
	EM-210-20FBB	24	5371-169-032
	EM-210-20FBB	90	5371-169-029
	EM-215-20FBB	24	5371-169-100
	EM-215-20FBB	90	5371-169-054
FBC Brake Module for use with EM clutch	EM-50-20FBC	24	5370-169-065
	EM-50-20FBC	90	5370-169-056
	EM-100-20FBC	24	5370-169-109
	EM-100-20FBC	90	5370-169-108
	EM-180-20FBC	24	5370-169-067
	EM-180-20FBC	90	5370-169-057
	EM-210-20FBC	24	5371-169-031
	EM-210-20FBC	90	5371-169-028
MBFB Motor Brake Module	EM-50-20MBFB	24	5370-169-063
	EM-50-20MBFB	90	5370-169-060
	EM-100-20MBFB	24	5370-169-007
	EM-100-20MBFB	90	5370-169-085
	EM-180-20MBFB	24	5370-169-069
	EM-180-20MBFB	90	5370-169-061
	EM-210-7/8-20MBFB	24	5371-169-101
	EM-210-7/8-20MBFB	90	5371-169-072
	EM-210-20MBFB	24	5371-169-033
	EM-210-20MBFB	90	5371-169-030

Accessories

Description	EM Size	Part No.
Conduit Box	EM series All sizes	5370-101-042
Base Mount Kit for 2030 FBC	50/100	5370-101-036
	180	5370-101-037
	210/215	5371-101-019
Motor Mount Kit for 20 FBB, 1020 FBC	50/100	5370-101-010
	180	5370-101-012
	210/215	5371-101-012

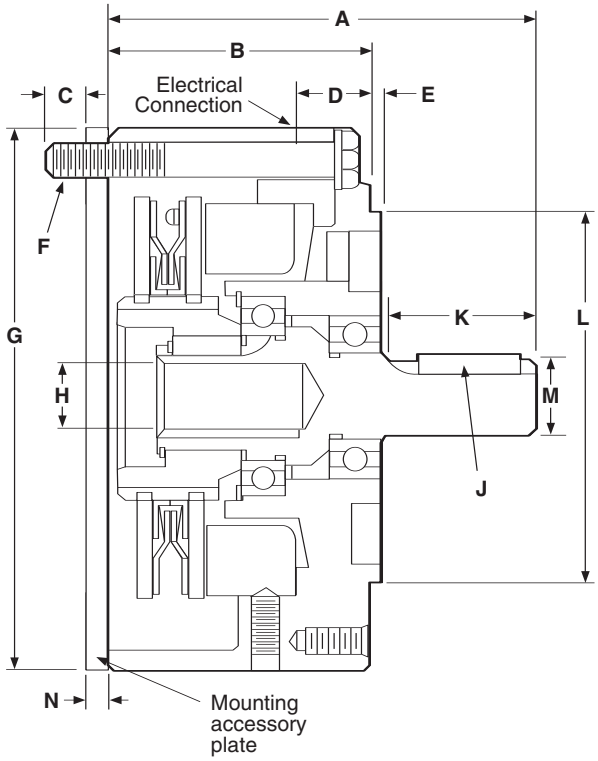
EM-20 FBB Brake Module

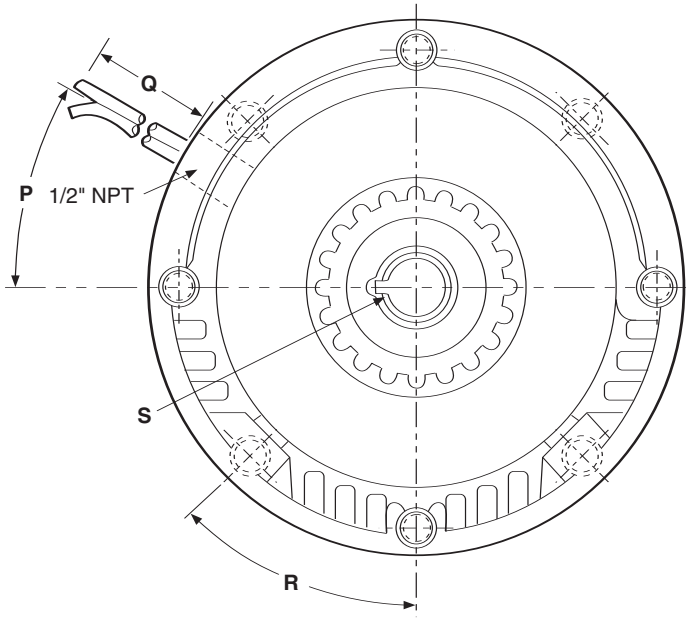


All dimensions are nominal, unless otherwise noted.

Size	A Max.	B	C Max.	D	E Max.	F	G Dia.	H Dia.	J	K Min.	L Pilot Dia.	M Dia.	N	P Min.	R	S Key
50/100	5.188	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.625	3/16 x 3/16 x 1-3/8	1.813	4.500	.625	30°	36	45°	3/16 x 3/16
180	5.266	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.875	3/16 x 3/16 x 1-3/8	1.891	4.500	.875	30°	36	45°	3/16 x 3/16
210	7.578	4.609	.594	1.500	.313	1/2-13 UNC-2A (4) Equally Spaced on 7.250 Dia.	9.344	1.125	1/4 x 1/4 x 2	2.500	8.500	1.125	25°	36	45°	1/4 x 1/4
215	7.578	4.609	.594	1.500	.313	1/2-13 UNC-2A (4) Equally Spaced on 7.250 Dia.	9.344	1.375	5/16 x 5/16 x 2	2.500	8.500	1.375	25°	36	45°	5/16 x 5/16

EM-20FBC Brake Module for use with a Clutch

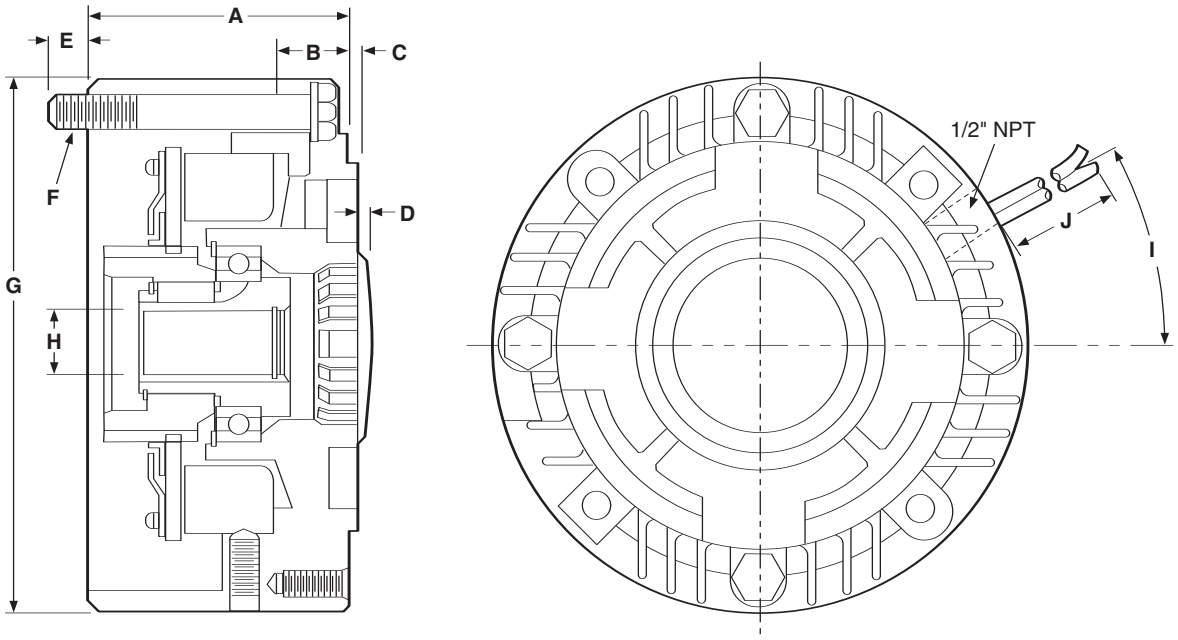




All dimensions are nominal, unless otherwise noted.

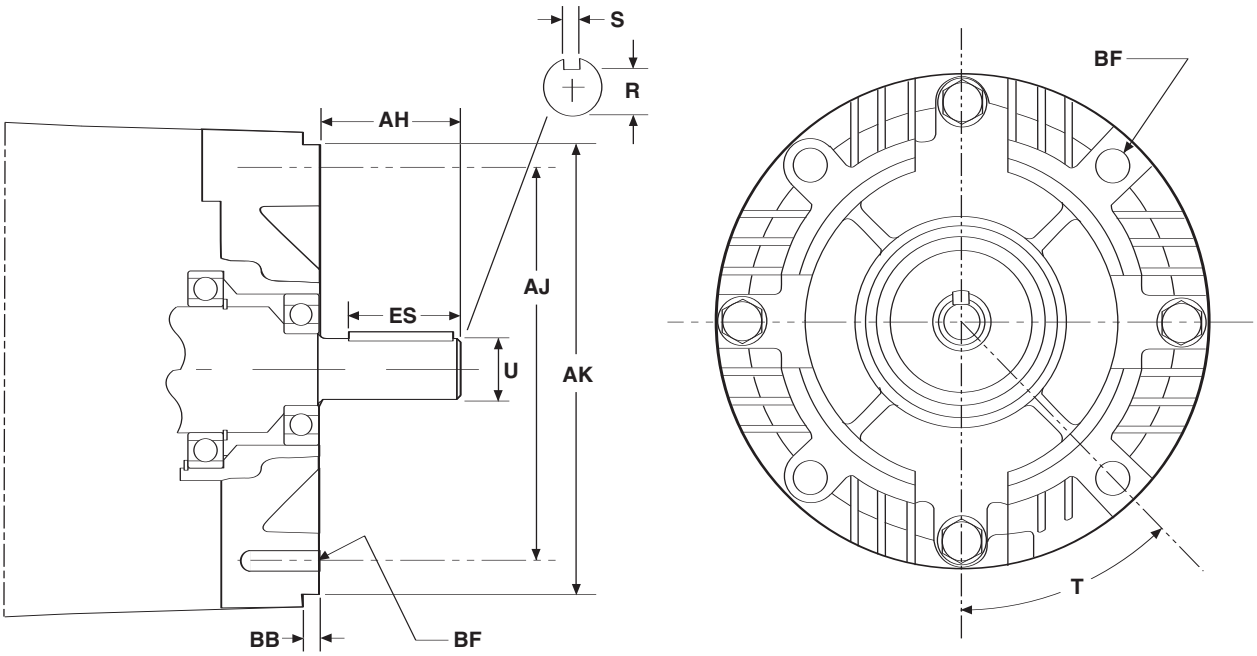
Size	A Max.	B	C Max.	D	E Max.	F	G Dia.	H Dia.	J	K Min.	L Pilot Dia.	M Dia.	N Max.	P	Q Min.	R	S Key
50/100	5.188	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.625	3/16 x 3/16 x 1-3/8	1.813	4.500	.625	.531	30°	36	45°	3/16 x 3/16
180	5.266	3.125	.500	1.000	.156	3/8-16 UNC-2A (4) Equally Spaced on 5.875 Dia.	6.688	.875	3/16 x 3/16 x 1-3/8	1.891	4.500	.875	.531	30°	36	45°	3/16 x 3/16
210	7.578	4.609	.594	1.500	.313	1/2-13 UNC-2A (4) Equally Spaced on 7.250 Dia.	9.344	1.125	1/4 x 1/4 x 2	2.500	8.500	1.125	.797	25°	36	45°	1/4 x 1/4

EM-20 MBFB Motor Brake Module



All dimensions are nominal, unless otherwise noted.

Size	A	B	C Max.	D	E Max.	F	G Dia.	H			I	J Min.
								Diameter	Max. Length	Required Key Size		
50/100	3.125	1.000	.156	.219	.300	3/8-16 UNC-2A	6.688	.625	2.094	3/16 x 3/16	30°	36
180	3.125	1.000	.156	.219	.500	3/8-16 UNC-2A	6.688	.875	2.063	3/16 x 3/16	30°	36
210-7/8"	4.609	1.500	.313	.250	.594	1/2-13 UNC-2A	9.344	.875	2.766	3/16 x 3/16	30°	36
210	4.609	1.500	.313	.250	.594	1/2-13 UNC-2A	9.344	1.125	2.766	1/4 x 1/4	30°	36



Specifications

Module Size	AH Shaft Length	AJ Mtg. Bolt Center Dia.	AK Mtg. Flange Pilot Dia.	BB Pilot Depth	BF Mtg. Bolt Size, Qty.	ES Keyway Length	R Depth Over Keyway	S Keyway Width	T Mtg. Bolt Ref.	U Shaft Dia.
50	2.06	5.875	4.500	5/32	3/8-16 UNC 4 @ 90°	1-1/4	.517	3/16	45°	.625
100	2.06	5.875	4.500	5/32	3/8-16 UNC 4 @ 90°	1-1/4	.517	3/16	45°	.625
180	2.04	5.875	4.500	5/32	3/8-16 UNC 4 @ 90°	1-1/4	.771	3/16	45°	.875
210	2.56	7.250	8.500	5/16	1/2-13 UNC 4 @ 90°	2	.986	1/4	45°	1.125
215	3.12	7.250	8.500	5/16	1/2-13 UNC 4 @ 90°	2	1.201	5/16	45°	1.375

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

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

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

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

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

ER-825, 1225	ER-825	ER-1225
Voltage – DC	90	35-75
Resistance @ 20° C – Ohms	304	235
Current – Amperes	.29	.383
Watts	26	35
Coil Build-up – milliseconds	400	700
Coil Decay – milliseconds	20	20

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

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

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

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

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

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

UM/EM/UMFB/EMFB		Clutch	UM/EM Brake	Clutch	Brake	Clutch	Brake	UMFB/EMFB Brake
		90	90	24	24	6	6	90
Voltage – DC	EM-50	452	452	31.8	31.8	1.86	1.86	446
Resistance	EM-100	392	392	26.7	26.7	1.80	1.80	310
(ohms)	EM-180	392	392	26.7	26.7	1.80	1.80	310
	EM-210/215	248	248	17.9	17.9	1.22	1.22	205
Amperes	EM-50	.199	.199	.755	.755	3.23	3.23	.210
	EM-100	.230	.230	.896	.896	3.30	3.30	.300
	EM-180	.230	.230	.896	.896	3.30	3.30	.300
	EM-210/215	.363	.363	1.34	1.34	4.90	4.90	.380
Watts	EM-50	18	18	18	18	19	19	18
	EM-100	21	21	21.5	21.5	20	20	27
	EM-180	21	21	21.5	21.5	20	20	27
	EM-210/215	33	33	32	32	30	30	34
Build-up	EM-50	52	53	52	53	52	53	40
(millisecond)	EM-100	72	75	72	75	72	70	80
	EM-180	72	75	72	75	72	70	80
	EM-210/215	120	100	120	100	110	100	90
Decay	EM-50	6.2	5.0	6.2	5.0	6.5	5.0	5
(millisecond)	EM-100	12	10	12	10	12	10	8
	EM-180	12	10	12	10	12	10	8
	EM-210/215	20	10	20	10	20	10	10

Application Data Form

Mail or FAX to:

Warner Electric
Brake and Clutch Application Engineering
449 Gardner Street, South Beloit, Illinois 61080
Phone number: 800-825-9050 • FAX number: 815-389-2582

Date _____

Company _____

Address _____

City _____ State _____ Zip _____

Name _____

Title _____ Phone (_____) _____

Application: ☐ New ☐ Existing

Torque required: _____ oz. in. _____ lb. in. _____ lb. ft.

☐ Static ☐ Dynamic

Prime mover:

Frame size _____

H.P. _____

Speed of:

Clutch/Brake _____

Reducer ratio _____

Belt/Chain ratio _____

Linear velocity _____

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

State units _____

How is clutch/brake to be controlled?

On/off _____ Torque adjust _____ OEX _____

Switching method?

PLC _____ Relay _____ Sensor _____

System friction: _____ lb. in. _____oz. in.

Distant moved per cycle: _____ degrees

Total single cycle time: _____

Maximum cycle rate:

Per min. _____ Per hour _____ Per day _____

Desired life:

Cycles _____ Months _____ Years _____

Environmental ambient temp: _____ °F

Additional comments about application or sketch: