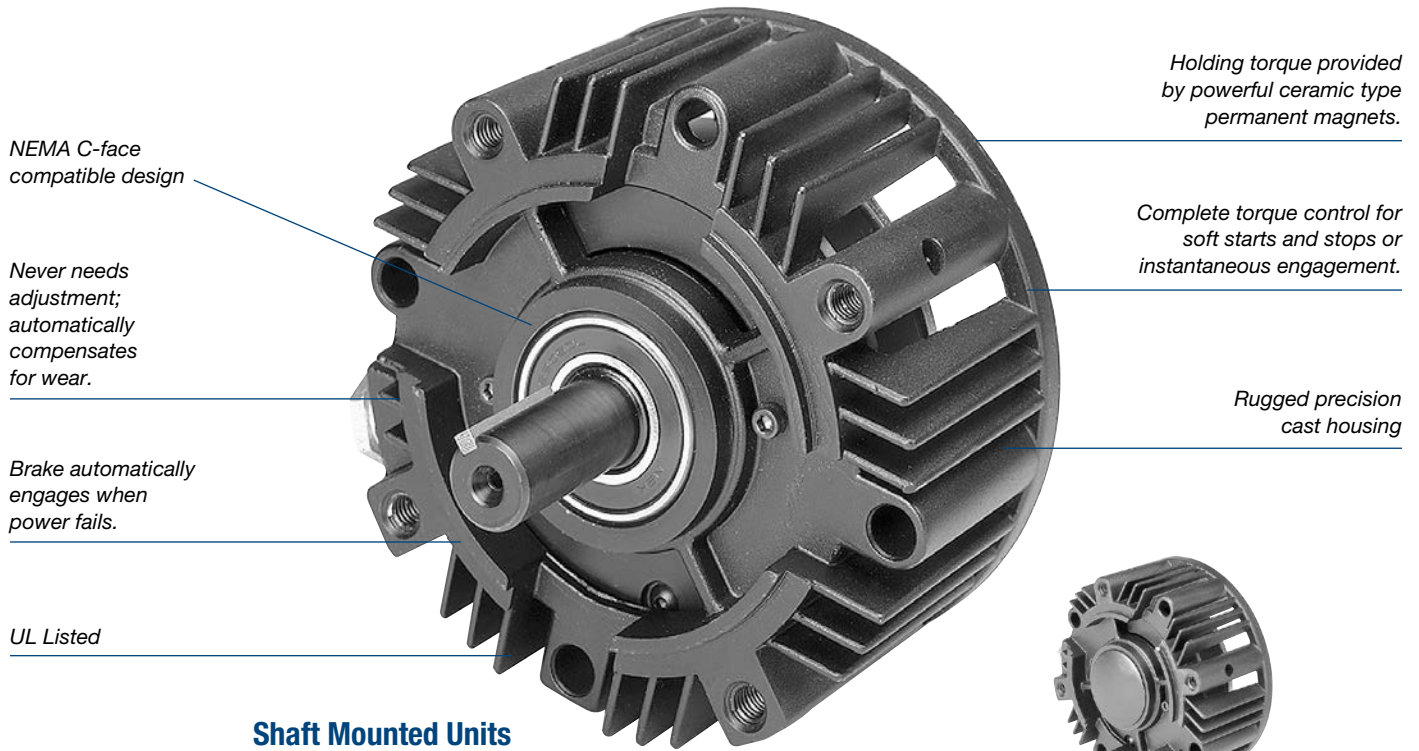


EM Series Electrically Released NEMA C-face Brakes

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



NEMA C-face compatible design

Never needs adjustment; automatically compensates for wear.

Brake automatically engages when power fails.

UL Listed

Holding torque provided by powerful ceramic type permanent magnets.

Complete torque control for soft starts and stops or instantaneous engagement.

Rugged precision cast housing

Shaft Mounted Units

FBB Brake Module

FBC Brake Module for use with a clutch

MBFB Motor Brake Module

210/215 size shown

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

EM Series Electrically Released NEMA C-face Brakes

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 clutch/electrically released brake or can be used alone as a brake only.

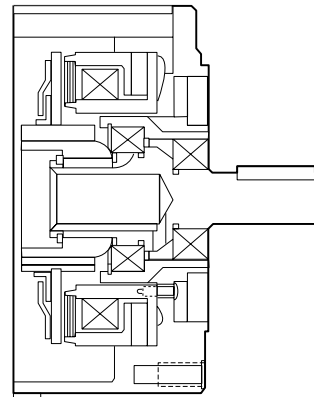
Brake Modules (FBB)

For mounting between a C-face motor and a gearbox or reducer



**EM Series
Shaft mounted,
vented housing**

Use for brake alone applications.

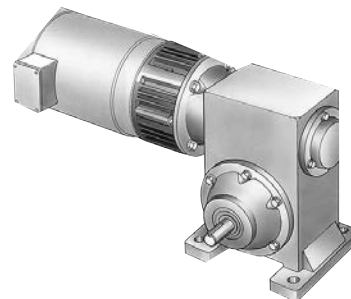


Features

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

EM-FBB

Available in 5 sizes



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

EM Series Electrically Released NEMA C-face Brakes

C-face Compatible Brakes and Clutch/Brakes

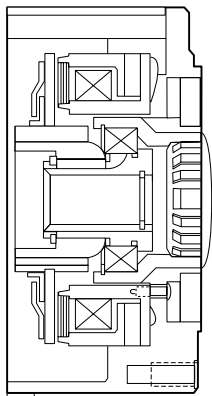
Motor Brake Modules (MBFB)

For mounting directly to the rear of a double-shafted motor



EM Series vented housing

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

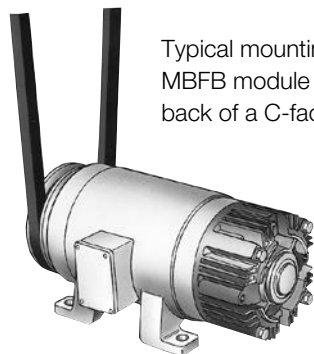


Features

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

EM-MBFB

Available in 5 sizes



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

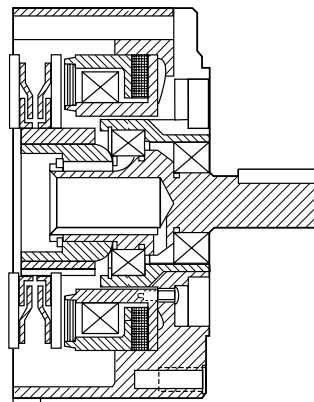
Clutch/Brake Modules (FBC)

Clutch/Fail-safe brake for mounting between a C-face motor and a gearbox or reducer



EM Series Modular unit with C/B capability

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

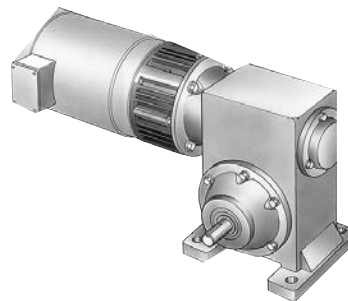


Features

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

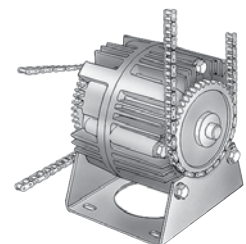
EM-FBC

Available in 4 sizes



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

EM-FBC UniModule clutch/brake mounted on a base



EM Series Electrically Released NEMA C-face Brakes

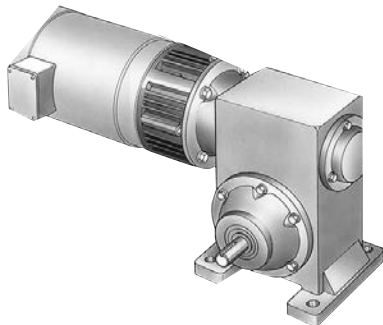
EM-FBB, EM-FBC, EM-MBFB Selection

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.

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

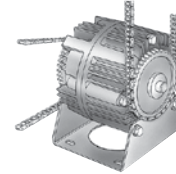
For torque ratings, refer to the "Specifications" chart. Note that separate torque ratings are listed for the clutch and brake segments of the module.

* 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).

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.

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																			
1/2														EM-50					
3/4																			
1																			
1-1/2														EM-100 or EM-180					
2																			
3																			
5																			
7-1/2																			

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

EM Series Electrically Released NEMA C-face Brakes

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:

$$E = \text{Heat (lb. ft./min.)}$$

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

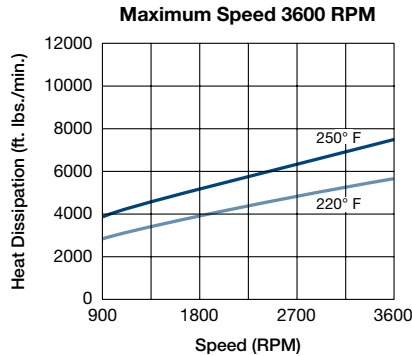
N = Speed in revolutions per minute. (RPM)

F = Cycle rate in cycles per minute (CPM)

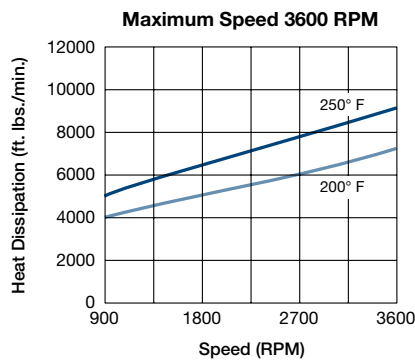
Compare the calculated heat generated in the application to the unit ratings using the heat dissipation curves. Select the appropriate unit that has adequate heat dissipation ability.

Heat Dissipation Curves

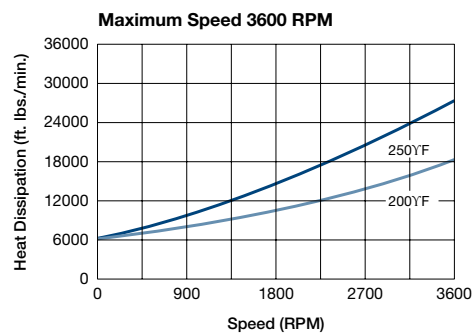
Size 50



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 A-32. 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)

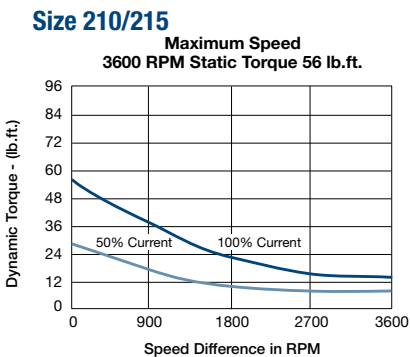
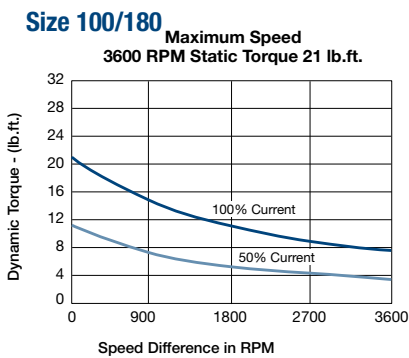
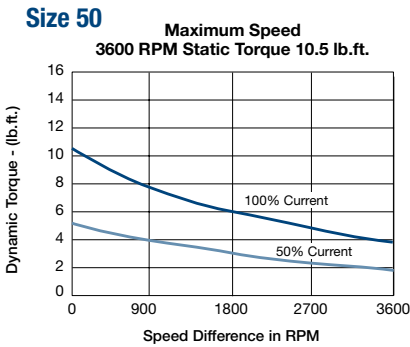
N = Speed in revolutions per minute (RPM)

t = Time allowed for the engagement (sec)

EM Series Electrically Released NEMA C-face Brakes

Ordering Information

C-face Electrically Released Brakes Dynamic Torque Curves



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 potentiometer that will vary brake channel output. For FBB and MBFB brake modules, the CBC-160, 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.
3. Specify required control. See the Controls Section (page CLT-1).

Ordering Example

EM-50-20FBB, 90V or 5370-169-234;
5370-101-042 conduit box;
CBC-160-2 control.

Part Numbers

Model No.	Voltage DC	Part Number
FBB Brake Module for use as brake only		
EM-50-20FBB	24	5370-169-278
EM-50-20FBB	90	5370-169-279
EM-100-20FBB	24	5370-169-283
EM-100-20FBB	90	5370-169-284
EM-180-20FBB	24	5370-169-288
EM-180-20FBB	90	5370-169-289
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	5370-169-233
EM-50-20FBC	90	5370-169-234
EM-100-20FBC	24	5370-169-238
EM-100-20FBC	90	5370-169-239
EM-180-20FBC	24	5370-169-243
EM-180-20FBC	90	5370-169-244
EM-210-20FBC	24	5371-169-031
EM-210-20FBC	90	5371-169-028
MBFB Motor Brake Module		
EM-50-20MBFB	24	5370-169-248
EM-50-20MBFB	90	5370-169-249
EM-100-20MBFB	24	5370-169-253
EM-100-20MBFB	90	5370-169-254
EM-180-20MBFB	24	5370-169-258
EM-180-20MBFB	90	5370-169-259
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

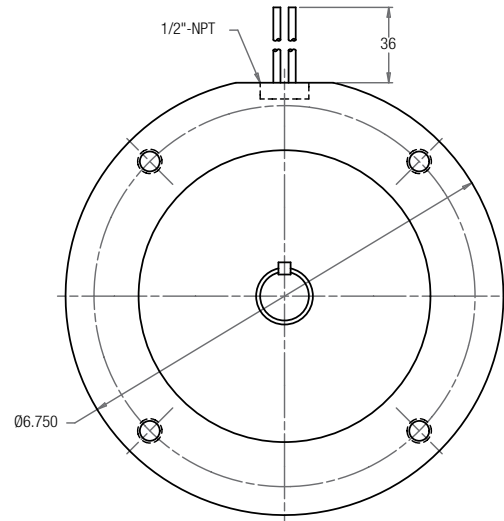
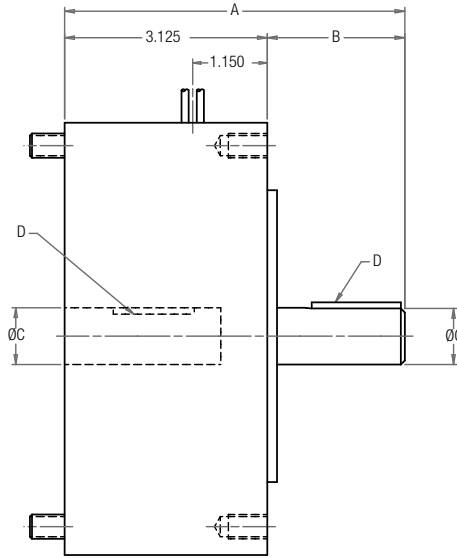
Subheads

Description	EM Size	Part No.
Conduit Box	EM series	5370-101-042
	All sizes	
Base Mount Kit for 2030 FBC	50/100	5370-101-004
	180	5370-101-002
	210/215	5371-101-019
Motor Mount Kit for 20 FBB, 1020 FBC	50/100	5370-101-078
	180	5370-101-079
	210/215	5371-101-012
Cover Kit	50/100/180	5370-101-076
	50/180 (FBB or MBFB)	5370-101-082

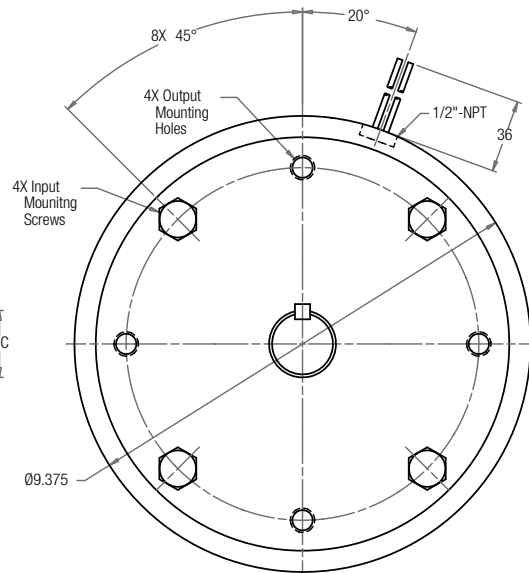
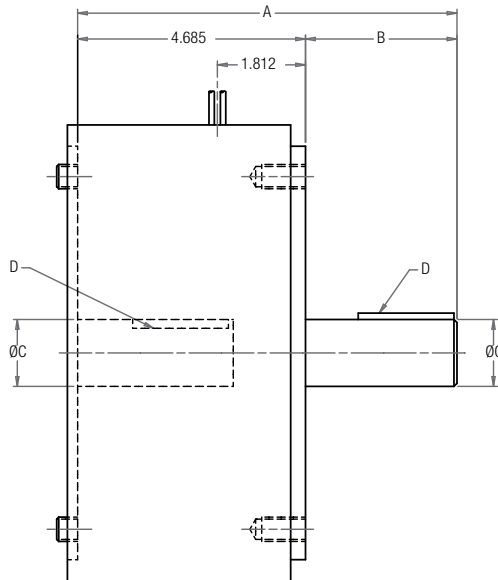
EM-FBB Series Electrically Released NEMA C-face Brakes

EM-20 FBB Brake Module

SIZE 50/100/180



SIZE 210/215



Dimensions

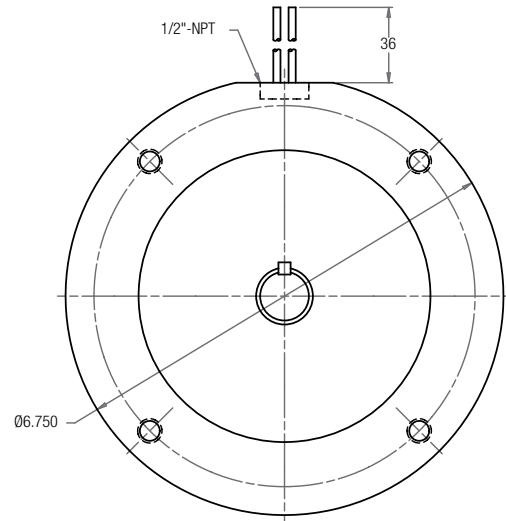
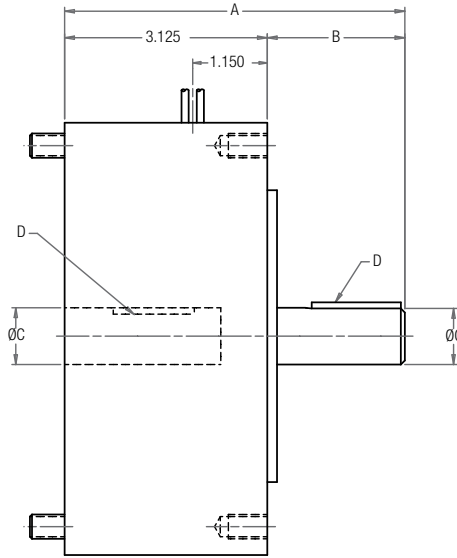
Size	A	B	C	D
50	5.165	2.040	0.625	3/16 x 3/16
100	5.186	2.061	0.625	3/16 x 3/16
180	5.246	2.121	0.875	3/16 x 3/16
210	7.299	2.614	1.125	1/4 x 1/4
215	7.799	3.114	1.375	5/16 x 5/16

For standard NEMA frame dimensions, see page G-3.

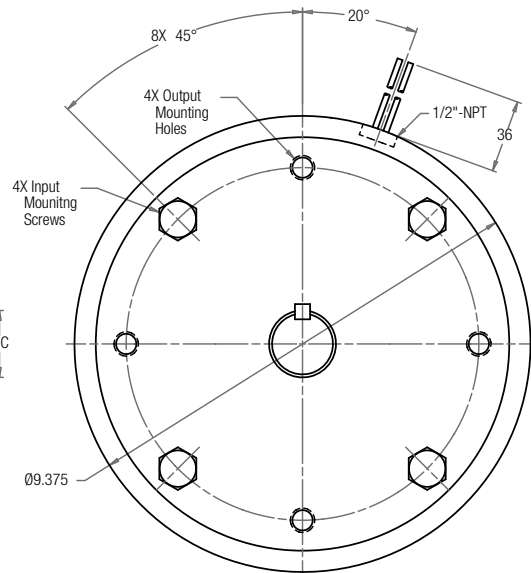
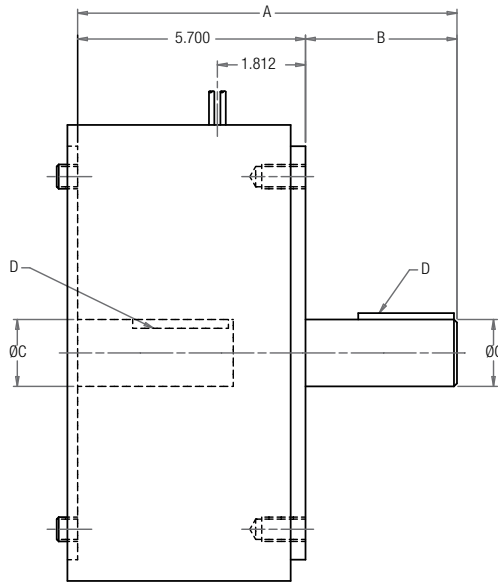
EM-FBC Series Electrically Released NEMA C-face Brakes

EM-20FBC Brake Module for use with a Clutch

SIZE 50/100/180



SIZE 210/215



Dimensions

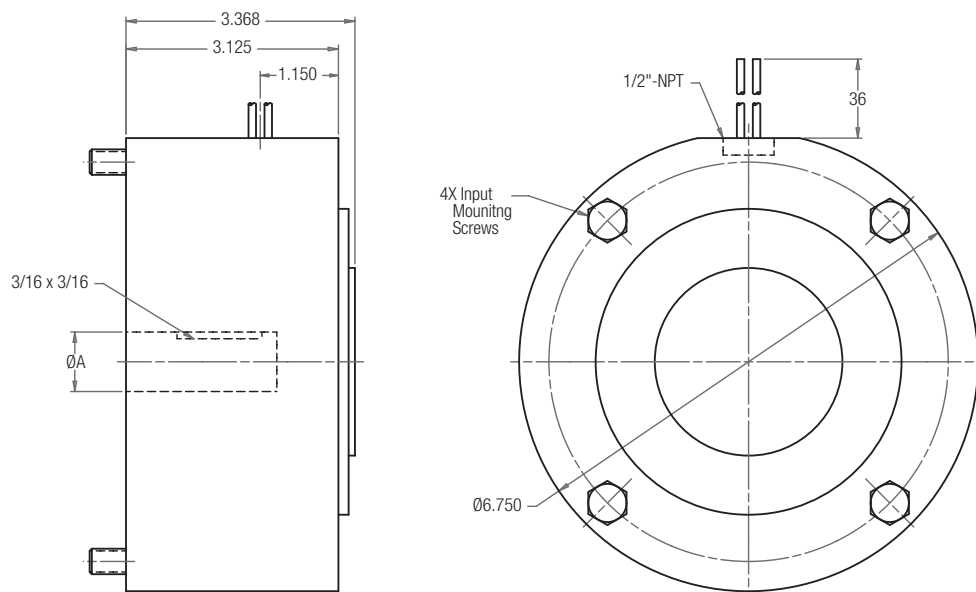
Size	A	B	C	D
50	5.165	2.040	0.625	3/16 x 3/16
100	5.186	2.061	0.625	3/16 x 3/16
180	5.246	2.121	0.875	3/16 x 3/16
210	8.314	2.614	1.125	1/4 x 1/4

For standard NEMA frame dimensions, see page G-3.

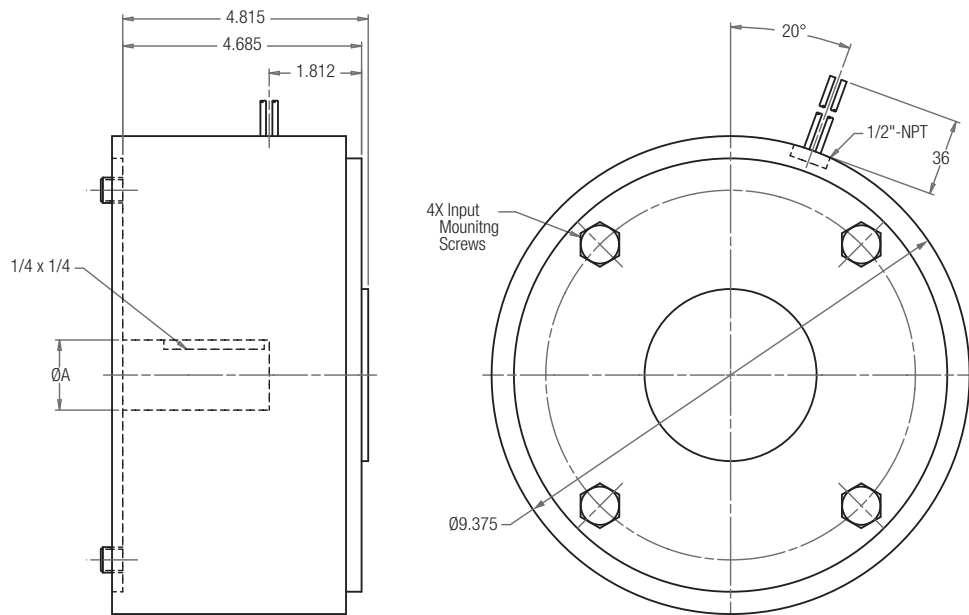
EM-MBFB Series Electrically Released NEMA C-face Brakes

EM-20 MBFB Motor Brake Module

SIZE 50/180



SIZE 210



Dimensions

Size	A
50	0.625
180	0.875
210	1.125

For standard NEMA frame dimensions, see page G-3.

EM Series Electrically Released NEMA C-face Brakes

Enclosing EM Series

Clean, quiet, operation. Nothing can get in, nothing can get out. Enclosed design eliminates damage to the working components. Prevents friction wear particles from escaping.

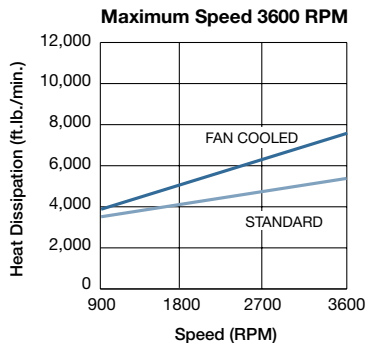
Totally Enclosed Version

The Enclosed Electro Module packages the hardworking components from EM products into a totally enclosed housing. This rugged housing keeps wear particles in and contaminants out and provides quiet operation. Pre-burnished at the factory for rated torque directly out-of-box. When enclosed, they are suitable for most industrial applications and tolerate infrequent, light washing.

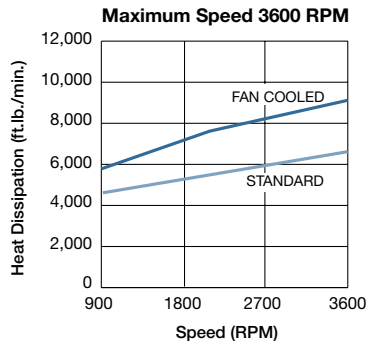
- Keeps contaminants out
- Keeps wear particles in
- Quiet operation
- Finned for heat dissipation
- UL listed when optional conduit box is installed

Heat Dissipation Curves

EM-50 with Cover Kit



EM-100/180 with Cover Kit

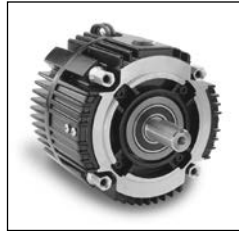


To convert any EM Series Electro Module 50, 100, and 180 sizes to an enclosed model, purchase optional Cover Kit

Enclosed Electro Module 10-20FBC, 20-30FBC

Part Number 5370-101-076

An optional cover kit can be purchased separately to enclose the open vents in the housing. Each cover kit includes two vent covers, two gaskets and four screws needed to convert a vented Electro Module to an enclosed design (non-washdown).



Enclosed Electro Module-Brake Only 20FBB or 20MBFB

Part Number 5370-101-082 For Brake Only

An optional cover kit can be purchased separately to enclose the open vents in the housing and a cover plate to close off the back of the module. Each cover kit includes two vent covers, two gaskets, four screws and one cover plate needed to convert a vented Electro Module 20 to an enclosed design (non-washdown).



NOTE:

Enclosed option is not available for existing 210 & 215 size Electro Modules (EM). See page A-26 for enclosed versions of size 210 & 215 in MBFB and FBB Series.

Packaged Performance Products Service Parts for Electrically Released Brakes

* Permanent Magnet Brakes

FB Series Shaft Mounted Brakes	SP-2
ER Series Flange Mounted Brakes	SP-4

* EM

UM-FBC Series Clutch/Electrically Released Brakes	N/A
EM-FBB, EM-FBC, EM-MBFB Series Brake Modules	N/A

* It is recommended that electrically released brakes such as the EM-FBB, UM-FBC and EM or EM-MBFB not be rebuilt in the field. Specific custom-fixtures are used during factory assembly that ensure proper alignment of internal components and therefore unit function. These brakes are commonly used in applications involving personnel or equipment safety and an incorrectly rebuilt brake might result in danger to personnel or damage to expensive equipment. Therefore, replacement components are not available for these products.



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

Common Replacement Practices:

Electrically released brakes

- On all Electrically released brakes the magnet and armature are only sold as a matched set and must be replaced as a set.

A note on burnishing:

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