

Introduction to Solenoid Actuated Brakes (SAB's)



Stearns Brakes Set the Standard for Excellence

Stearns offers the most comprehensive line of solenoid actuated brakes (SAB's) on the market today. We have earned the reputation as the industry's quality leader by working closely with you, our customers, understanding your needs and developing products with design features to handle your most challenging applications. We have installed millions of Stearns brakes worldwide since 1935. Many brakes operating today are 40 years old or more; evidence of our product quality and reliability.

Stearns motor brakes can be mounted directly to an electric motor or foot mounted. The compact design delivers high torque in a small size with fast, positive response and no residual drag when released. Our brakes can be mounted directly onto NEMA C-face motors without special alignment procedures. Many motor manufacturers offer a brake kit which will convert a stock fan-cooled motor into a brakemotor. Stearns Solenoid Actuated Brakes feature unitized construction which makes servicing friction discs easy using only a screwdriver and wrench. The Stearns SAB ensures automatic stopping and holding any time power to the brake is interrupted. And, as with ALL Stearns products, the friction material is non-asbestos.

We can produce a brake which meets your specifications, including metric mounting. Chances are, we've already manufactured similar requirements from a long list of pre-engineered options.

Enclosure Types

Stearns brakes, when properly installed, are provided in a variety of IP enclosure types.

IP 21 - intended for general purpose, indoor applications, as a ventilated enclosure. Protected against dripping water.

IP 23 - intended for indoor applications, as a non-ventilated enclosure. It provides protection against falling, non-corrosive dirt and liquid. Protected against spraying water.

IP 54 - intended for dust protected indoor and outdoor applications. Protected against splashing water.

IP 55 - intended for dust protected indoor and outdoor applications. Protected against water jets.

IP 56 - intended for dust protected indoor and outdoor applications. Protected against heavy seas or powerful jets.

IP 57 - intended for dust protected indoor and outdoor applications. Protected against the effects of immersion.

NOTE: IP 21, 23 & 54 - formerly referred to by Stearns as NEMA 1, 2 & 4 respectively.

IP 55, 56 & 57 - formerly referred to by Stearns as NEMA Type 4X (BISSC Certified with epoxy coating and stainless steel hardware on exterior, or with a stainless steel enclosure).

Self-Adjusting Disc Brakes

Remote inaccessible locations or high cycling applications require a specially designed, low-maintenance brake that will operate at peak efficiency and provide uniform braking for long periods of time. Stearns exclusive self-adjusting feature helps eliminate the major cause of brake maintenance - friction lining wear. Self-adjusting brakes are also well suited for applications where rapid cycling requires frequent resetting of solenoid air gap. Automatic adjustment also eliminates the errors that can occur with hand adjustment. They can be easily modified to suit your particular application. Depending upon the series you select, these brakes can be direct mounted on motors ranging in size from NEMA 182TC through NEMA 505C.



Manually Adjusted Disc Brakes with Automatic Reset

It's an unbeatable combination; the features you want most in spring-set disc brakes. Standard features now include: a unique spring design which allows for

universal mounting, an air gap adjustment gauge for visual recognition that the brake needs adjustment, a new patented hub design, and genuine Stearns friction discs which are trademarked and patented. The 56 Series Brakes come in static torque ratings from 1.5 through 25 lb-ft with



NEMA C-face mountings 56C, 143TC, 145TC, 182TFC and 184TFC. Ten different housing, endplate, and release configurations, with a wide variety of pre-engineered modifications, you can select from 120,000 possible combinations! In addition, for holding applications where friction disc wear is not a factor, Stearns 87,000 Series Brakes are available with an optional manual adjust. The 87,000 Series Brakes are available in static torque ratings from 6 lb-ft through 105 lb-ft, with NEMA C-face mountings, 182TC through 286TC.

Brakes for Hazardous Locations

Although rugged Stearns Brakes are built to withstand rigorous industrial environments, many applications require additional protection from explosive gases or ignitable dusts. Stearns manufactures a complete line of disc brakes designed from the hazardous locations defined in the *National Electric Code (NEC)*. Each brake is labeled to show the Class, Group, and maximum operating temperature of the brake enclosure. We offer both motor-mounted and foot-mounted designs, and all Stearns Hazardous Location Brakes are UL Listed and CUL or CSA certified.



Double C-Face Disc Brake Couplers

Stearns Disc Brake Couplers provide maximum versatility, allowing you to add a brake to a C-face motor with a single shaft extension. Using these reliable products, you can couple a C-face motor to a C-face gear reducer.



Washdown Brakes

Stearns Washdown Brakes include the 56,000 and 87,000 Series brake models. These brakes meet BISSC Standards, AAA Dairy Standards, and other food industry washdown requirements. They feature stainless steel hardware, neoprene gasketing, and FDA-approved white epoxy paint or stainless steel enclosure.



Marine Applications

Brakes used in marine applications are customized to meet specific standards. These standards are established to provide various levels of corrosion resistance and performance standards under specific conditions.

Maritime and Naval Brakes

are designed for U.S. Navy and Coast Guard military specifications. These units conform to MIL-B-16392C or 46CFR 110.10-1 and IEEE Standard 45. Special material components help prevent corrosion due to shipboard environments. SAB's used in marine environments can be custom built to meet the specifications. In addition, all Stearns SAB's are "Type Approval Certified" by the American Bureau of Shipping.



Today, Stearns is focused on being your worldwide, value-added supplier. Our factory-trained field sales force is available to work with you in person to determine your application needs, as well as provide training and support to your engineers and maintenance staff. Our extensive network of more than 900 distributor branches is your assurance of quality service after the sale.

Stearns is a division of Rexnord Industries, LLC, a world leader in power transmission products. We have the resources, experience and dedication to meet your industrial brake, clutch and solid-state electronic centrifugal switch needs.

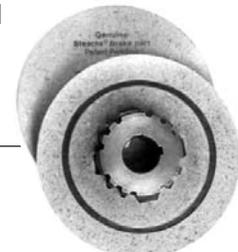
Solenoid Actuated Brakes versus Armature Actuated Brakes

Solenoid Actuated Brakes	Armature Actuated Brakes
Simple wear adjustment	Complex wear adjustment
Easy coil exchange for different voltages	Difficult to change out complete magnet assembly
Maintained manual release with automatic reset for brake release during set-up	Non-maintained release (deadman) requires constant external force to operate
Add on options easily assembled to standard unit	Options require complete brake in most units
Rapid set and release times.	Response time is slower due to required magnetic field build-up in magnet-style coil
Connection can be made directly to AC power source	Direct connection to AC power source requires an optional electric control

Trademarked and Patented Friction Discs

Now you can rely on identifying genuine Stearns Friction Discs which assure continuous, reliable performance backed by the Stearns name.

A molded ring in the Stearns friction discs makes it easy to visually identify a Stearns disc. The new splined discs are trademarked and patented by Stearns Division, Rexnord Industries, LLC.



SELECTION - Solenoid Actuated Brakes

NOTE: For overhauling/high inertia loads, to stop in a specified time/distance, or for brakes combined with variable frequency drives, please refer to *Application Engineering Section*.

Stearns Solenoid Actuated Brakes can be easily selected from Table 1 and 2.

Given motor data:

1. Horsepower (hp)
2. Speed (RPM)
3. NEMA C-face frame size

Determine:

1. Static torque rating of the brake (lb-ft)
2. Brake series

Step 1 – Given the motor horsepower and speed, select the brake torque from Table 1. Torque in table 1 is calculated using formula:

$$T_s = \frac{5,252 \times P}{N} \times SF$$

Where, T_s = Static torque, lb-ft

P = Motor horsepower, hp

N = Motor full load speed, rpm

SF = Service Factor

5,252 = constant

Example: Given a 5 hp, 1800 RPM motor, the selected brake is 20 or 25 lb-ft.

Step 2 – Given the NEMA C-face motor frame size, select the brake series from Table 2.

Example: Given the 5 hp, 1800 RPM motor in Step 1 with a NEMA 184TC frame, Series 87,000; 87,300 or 87,700 Brakes can be selected to mount directly to the motor.

Table 1 – Torque Selection

In this table, brake torque ratings are no less than 140% of the motor full load torque.

Motor hp	Brakemotor Shaft Speed (RPM)						
	700	900	1200	1500	1800	3000	3600
	Static Torque Rating of Brake (lb-ft)						
1/6	3	1.5	1.5	1.5	0.75	0.5	0.5
1/4	3	3	3	1.5	1.5	0.75	0.5
1/3	6	3	3	3	1.5	1.5	0.75
1/2	6	6	3	3	3	1.5	1.5
3/4	10	6	6	6	6	3	3
1	15	10	6	6	6	3	3
1-1/2	20	15	10	10	10	6	3
2	25	20	15	10	10	6	6
3	35	25	20	15	15	10	6
5	75	50	35	25	20 or 25	15	10
7-1/2	105	75	50	50	35	25	15
10	105	105	75	50	50	25	25
15	175	125	105	75	75	50	35
20	230	175	125	105	105	50	50
25	330	230	175	125	105	75	50
30	330	330	230	175	125	75	75
40	440	330	330	230	175	105	105
50	550	440	330	330	230	*	*
60	750	500	440	330	330	*	*
75	1000	750	500	440	330	*	*
100	—	1000	750	500	440	*	*
125	—	1000	1000	750	500	*	*
150	—	—	1000	750	750	*	*
200	—	—	—	1000	1000	*	*
250	—	—	—	—	1000	*	*

*See catalog pages for maximum rpm by series. Thermal capacity must be considered in load stops over 1800 rpm.

Table 2 – Brake Series Selection by NEMA Frame Size

Torque Range (lb-ft)	Brake Series	C-Face Motor Frame Size											
		48C	56C	143TC 145TC	182TC 184TC	213TC 215TC	254TC 254UC 256TC 256UC	284TC 284UC 286TC 286UC	324TC 324UC 326TC 326UC	364TC 364UC 365TC 365UC	404TC 404UC 405TC 405UC	444TC 444UC 445TC 445UC	504UC 504SC 505C 505SC
Manually-Adjusted Brakes (require periodic adjustment to compensate for friction disc wear)													
1.5-6	48,100	①											
1.5-25	56,000		①	①	②	②	②						
10-25	56,500				①								
Self-Adjusting Brakes (automatically compensate for friction disc wear)													
6-105	87,000		③	③	①	①	①	②	②	②	②		
50-105	87,100							①					
125-230	81,000				②	②	②	②	①	①	①	②	
125-440	82,000				②	②	②	②	①	①	①	②	
500-1000	86,000								②	②	②	①	
500-1000	86,100												①
Division I Hazardous Location Brakes (for atmospheres containing explosive gases or ignitable dusts) / Motor Mounted													
1.5-15	65,300		①	①	②	②	②						
10-105	87,300				①	①	①	②	②	②	②		
125-330	82,300				②	②	②	②	①	①	①	②	
Division I Hazardous Location Brakes (for atmospheres containing explosive gases or ignitable dusts) / Foot Mounted													
10-105	87,300				④	④	④						
125-330	82,300								④	④	④		
Division 2 Hazardous Location Brakes													
1.5-25	56,800		①	①	②	②	②						
6-105	87,800		③	③	①	①	①	②	②	②	②		
Double C-Face Brake Couplers (for direct coupling a C-face motor to a C-face gear reducer)													
1.5-25	56,700		①	①	①	①	①						
10-105	87,700												

- ① Brake mounts directly to motor C-face.
- ② Adapter required to mount brake to motor C-face. Refer to brake specifications for adapter information.
- ③ Brake endplate modified for direct mounting to motor C-face without an adapter.
- ④ Brake is foot mounted for coupling to a hazardous-location motor.

