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# CPB Convection Powder Brake

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## FEATURES

- Highest torque per volume
- Available torque: 5, 10, 25 N·m
- Braking power: up to 110 W
- Stable braking torque
- Low moment of inertia
- Low residual torque
- Operation in both rotational directions
- Rated torque available from 0 rpm
- Mount with shaft in any orientation

## DESCRIPTION

Magtrol's Convection Powder Brakes (CPB series) are ideal for applications operating in the low speed range or middle-to-high torque range. Convection powder brakes provide full torque at zero speed and are convection cooled, allowing power ratings up to 110 W.

## APPLICATIONS

These units are suited for tension control applications, such as wire winding, foil, film, and tape tension control.

Mounted on test benches, CPB Convection Powder Brakes allow performance and reliability testing on driving elements such as electric motors, hand-held power tools, geared motors, reduction gears and hydraulic transmission systems. Other applications include load simulation for life testing on electric motors, actuators, gearboxes, power steering, and many other rotating devices and assemblies.

## POWER SUPPLY

A constant-current DC power supply is recommended for the best accuracy in open-loop control systems. Magtrol offers a variety of power supply options.



## COUPLING

Although intended for coupled service, moderate overhung loads can be tolerated depending on operating characteristics as speed, weight and center of gravity of the load. Care should be taken to ensure precise shaft alignment. Couplings should be of proper size and flexibility to adequately protect bearings from undue stress and shock loading.

## OPERATING PRINCIPLES

The CPB Series Convection Powder Brakes contain, as their name suggests, a magnetic powder. The electrical current passing through the coil generates a magnetic field, which changes the property of the powder, thus producing a smooth braking torque through magnetic coupling between the rotor and stator.

Convection powder brakes produce their rated torque at zero speed. The element to be tested can be loaded at zero speed to determine the starting torque. Without electrical excitation, the shaft rotates freely. Since the magnetic powder is always contained within the brake, all powder brakes have a minimum drag torque associated with them. With electrical excitation, the shaft becomes magnetically coupled. While the element torque is less than the brake output torque, the shaft will not rotate. When the element torque is increased, the brake will slip smoothly at the torque level set by the input current.

**RATINGS**

Model	Min. Torque at Rated Current	Rated Current	Voltage*	Resistance at 25°C ±10%	Nominal Power	Max. Speed
	N·m	mA	V <sub>dc</sub>	Ω	W	rpm
CPB-5	6.8	320	23	72	7.4	1800
CPB-5C	6.8	320	23	72	7.4	1800
CPB-5H	6.8	320	23	72	7.4	1800
CPB-10	13.0	490	23	47	11.3	1800
CPB-10C	13.0	490	23	47	11.3	1800
CPB-10H	13.0	490	23	47	11.3	1800
CPB-25B	25.0	720	22.3	31	16.1	1000
CPB-25BC	25.0	720	22.3	31	16.1	1000
CPB-25BH	25.0	720	22.3	31	16.1	1000
CPB-25	25.0	2000	13.4	6.7	26.8	500

Model	Max. Kinetic Power**	De-energized Drag Torque @ 1/3 rated speed	External Inertia	Torque to Inertia Ratio	Max. Radial load***	Max. Axial load***	Weight
	W	N·m	kg·cm <sup>2</sup>	rad/s <sup>2</sup>	kg	kg	kg
CPB-5	50	0.13	0.492	138211	15	7	4
CPB-5C	50	0.13	0.470	144681	15	7	3.5
CPB-5H	50	0.13	0.450	151111	15	7	3.5
CPB-10	55	0.13	0.688	188953	18	8	4.2
CPB-10C	55	0.13	0.669	194320	18	8	3.6
CPB-10H	55	0.13	0.650	200000	18	8	3.6
CPB-25B	110	TBD	3.520	71023	32	15	10
CPB-25BC	110	TBD	3.467	72108	32	15	10
CPB-25BH	110	TBD	3.370	74184	32	15	10
CPB-25	110	0.5	3.060	81699	10	9	10

\* Other coil voltages are available upon request.

\*\* Kinetic power ratings are maximum values based upon limiting coil and/or bearing temperature to approximately 100°C and outside case temperature to approximately 70°C, and should not be exceeded. Actual values may vary ±50% depending on mounting, ventilation, ambient temperature, etc.

\*\*\* Although intended for coupled service, moderate overhung loads can be tolerated, depending on such operating conditions as speed, torque, and kinetic power. Published loads are calculated based upon ANSI/ABMA Std. 9:2008 and  $1 \times 10^6$  revolutions of life at the continuous power rating and are for reference only. Care should be taken to make certain that the shaft is properly aligned. Couplings should be of proper size and flexibility to adequately protect bearings from undue stress and shock loading.

## Continuous Braking Power

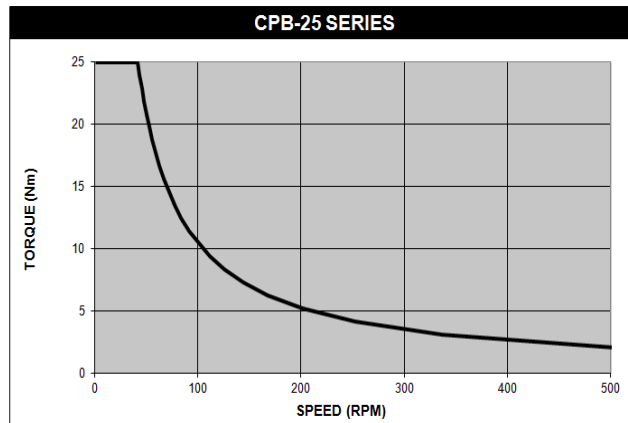
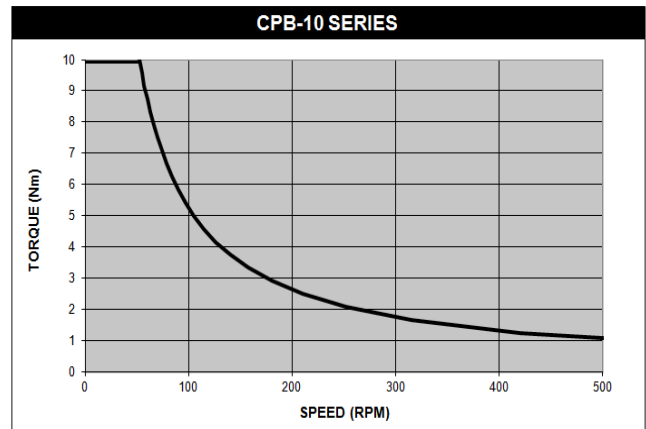
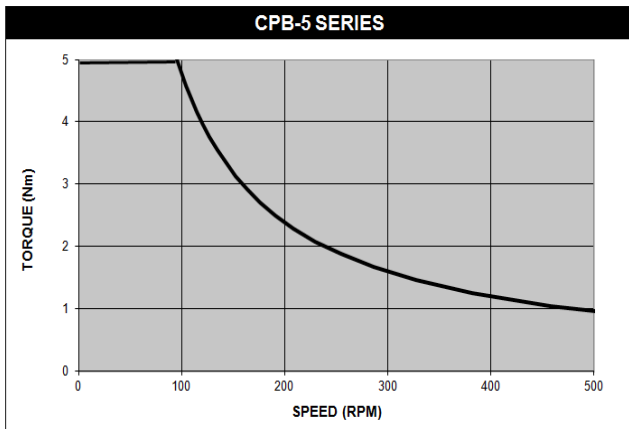
The brake can dissipate higher amounts of heat for short periods of time, but the average must not exceed 1 max kinetic power rating.

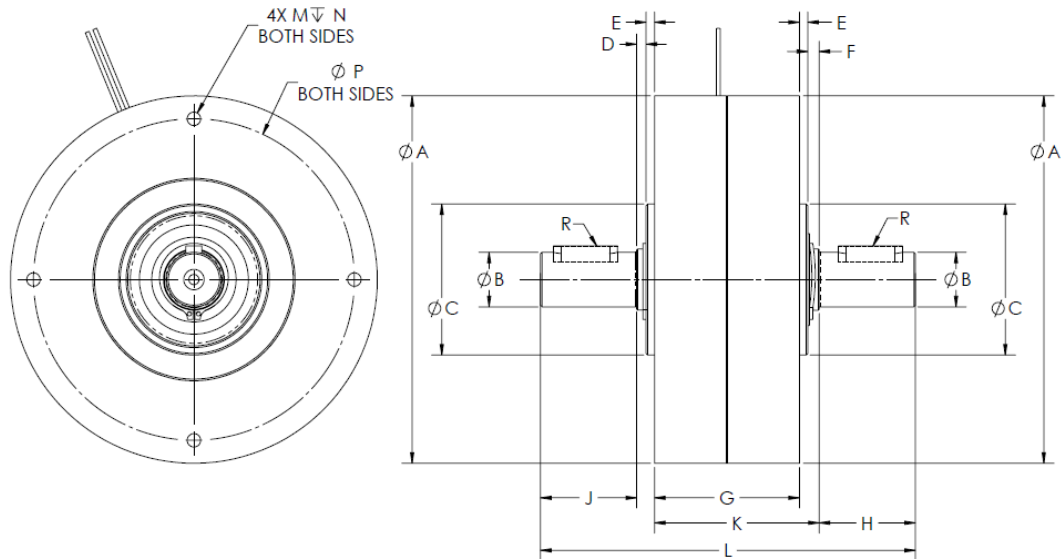
For continuous power, please use the formula :

$$\text{POWER (watts)} = [\text{SPEED (rpm)} \times \text{TORQUE (N-m)}] / 9.550$$

## TORQUE-SPEED-POWER CURVES

The diagrams below show the characteristic curves for the CPB Convection Powder Brakes.



**BRAKE DIMENSIONS**


Model	$\varnothing$ A	$\varnothing$ B	$\varnothing$ C	D	E	F	G	H
CPB-5*	114.3	17h6	47h6	2.9	2.6	3.6	45.2	30.0
CPB-5C	114.3	17h6	47h6	2.9	2.6	3.6	45.2	30.0
CPB-5H	114.3	12H8	47h6	1.1	2.6	3.6	45.2	2.0
CPB-10*	119.5	17h6	47h6	2.9	2.6	3.6	45.2	30.0
CPB-10C	119.5	17h6	47h6	2.9	2.6	3.6	45.2	30.0
CPB-10H	119.5	12H8	47h6	1.1	2.6	3.6	45.2	2.0
CPB-25B*	158.8	25h6	92h5	4.4	2.2	4.4	66.9	40.0
CPB-25BC	158.8	25h6	92h5	4.4	2.2	4.4	66.9	40.0
CPB-25BH	158.8	22H7	92h5	0.8	2.2	4.6	66.9	5.0
CPB-25*	159.9	18h6	90g6	1.9	2.7	1.6	66.5	35.0

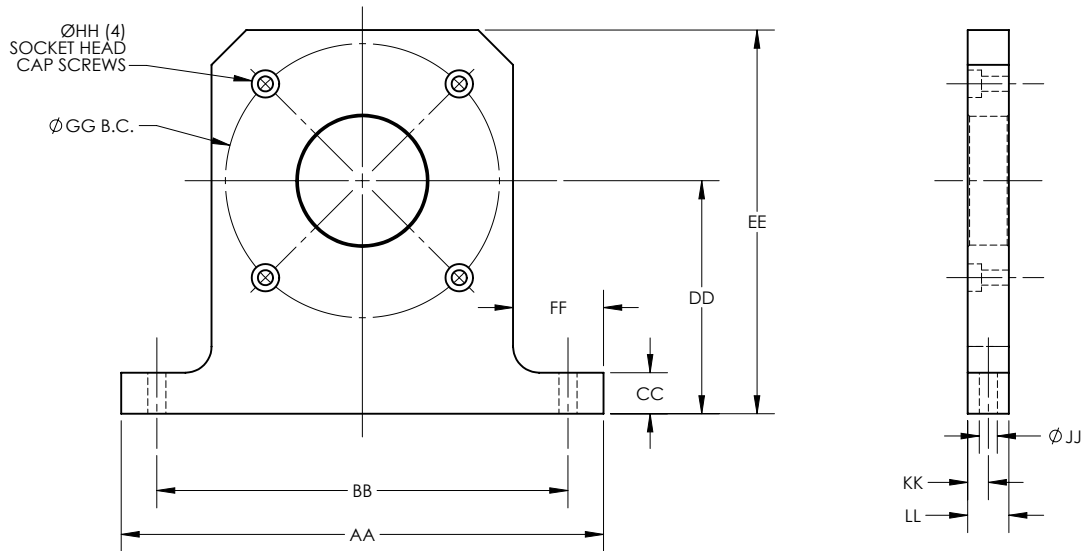
Model	J	K	L	M	N	$\varnothing$ P	R	$\varnothing$ T
CPB-5*	30.0	51.3	116.8	M5x0.8	10.0	100.0	5 x 5 x 20	N/A
CPB-5C	NA	51.3	86.8	M5x0.8	10.0	100.0	5 x 5 x 20	N/A
CPB-5H	10.0	51.3	65.0	M5x0.8	10.0	100.0	N/A	3H12
CPB-10*	30.0	51.3	116.8	M5x0.8	10.0	110.0	5 x 5 x 20	N/A
CPB-10C	N/A	51.3	86.8	M5x0.8	10.0	110.0	5 x 5 x 20	N/A
CPB-10H	10.0	51.3	65.0	M5x0.8	10.0	100.0	N/A	3H12
CPB-25B*	40.0	73.4	160.0	M8x1.25	14.0	145.0	8 x 7 x 25	N/A
CPB-25BC	N/A	73.4	120.0	M8x1.25	14.0	145.0	8 x 7 x 25	N/A
CPB-25BH	16.0	73.7	92.6	M8x1.25	14.0	145.0	N/A	5H11
CPB-25*	35.0	69.2	145.0	M6x1.0	12.0	145.0	N/A	N/A

C = Single Shaft

H = Hollow Shaft -  $\varnothing$ B Dimension = Thru bore with crosspin hole  $\varnothing$ T

\*Standard brake is dual shaft

**PILLOW BLOCK DIMENSIONS**



Pillow Block Model	For CPB Model(s)	AA	BB	CC	DD	EE	FF
4750	CPB-5, CPB-5C, CPB-5H	176	150	15	85	140	33
4710	CPB-10, CPB-10C, CPB-10H	176	150	15	95	150	33
4713	CPB-25B, CPB-25BC, CPB-25BH	220	200	15	105	172	35
4739	CPB-25	220	200	15	150	230	30

Pillow Block Model	For CPB Model(s)	GG	HH	ØJJ	KK	LL
4750	CPB-5, CPB-5C, CPB-5H	100	M5 X 0.8	6.6	7.5	15
4710	CPB-10, CPB-10C, CPB-10H	110	M5 X 0.8	6.6	7.5	15
4713	CPB-25B, CPB-25BC, CPB-25BH	145	M8 X 1.25	6.6	7.5	15
4739	CPB-25	145	M6 X 1.0	7	7.5	15

## SPECIAL DESIGNS

Since 1953, Magtrol has created literally thousands of special and modified brake designs to help solve specific application problems for our customers.

### Common Modifications

- Non-Standard Coil Voltages
- Special Shaft Configurations: keyways, flats, holes and hollow
- Speed Pickups
- Special Mounting Configurations
- Non-Standard Lead: material, lengths, location

## SOLID MODELS

Solid 3D models are available for most Magtrol Hysteresis Devices by contacting Customer Service:

E-mail: [magsales@magtrol.com](mailto:magsales@magtrol.com)  
Phone: 1-716-668-5555

## POWER SUPPLIES

For optimum torque stability, Magtrol offers four different power supplies for its Hysteresis Brakes and Clutches:

### Model 5200 Power Supply

The Model 5200 is an unregulated 0 to 35 VDC Power Supply which offers control and regulation of the braking torque via a 10 turn potentiometer. The 5200 is our most basic control for manual testing in an open loop torque control mode.



### Model 5210 Current Regulated Power Supply

The Model 5210 provides the same control capabilities as the 5200, and also provides current regulation of the brake. With regulated current, the 5210 will eliminate torque drift caused by temperature changes within the brake coil.

### Model 5250 Current Regulated Power Supply

Model 5250-2 is an open frame, current regulated power supply. With regulated current, the 5250 will eliminate torque drift caused by temperature changes within the brake coil.

### VM Series Proportional Amplifier/controller

The VM Series Proportional Amplifier/Controller is used to supply and control current (up to 3 A) to Magtrol Hysteresis Brakes and Clutches and Convection Powder Brakes. The analog inputs of the amplifier/controller are designed for 0-10 V or 4-20mA signals (using switches S1 and S2).

*Due to the continual development of our products, we reserve the right to modify specifications without forewarning.*



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