Dynamic Brake Resistors

Drivecon
MOTOR DRIVES AND CONTROLS

820 Lakeside Drive - Gurnee, IL 60031
Ph: 847-855-9150 Fax: 847-855-9650
800-374-8266
E-mail: drive.sales@drivecon.com
www.drivecon.com

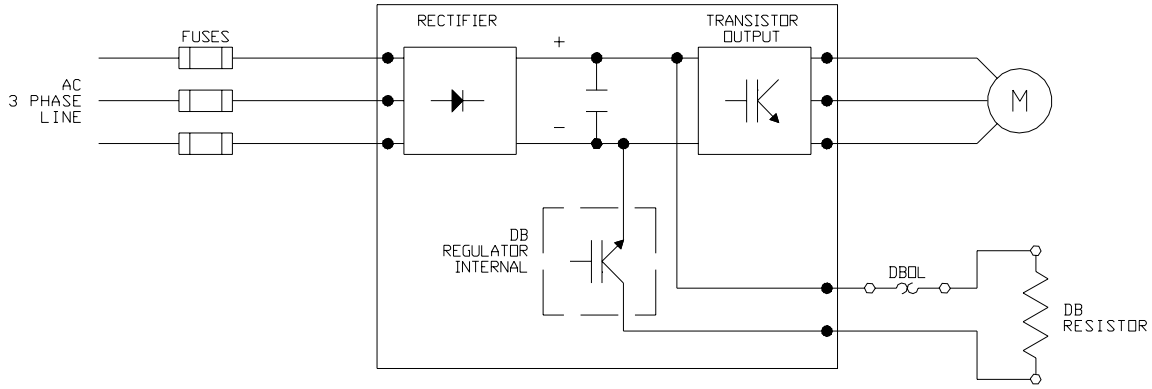
Dynamic Brake Resistors

Heavy duty NEMA class resistor ballast for high duty cycle dynamic braking. Drivecon offers various configurations and enclosures to meet any AC drive application such as: test stands, hoists, centrifuges, and other high D.B. loads. Rugged treated steel or optional stainless steel perforated or louvered enclosures provide a rigid frame and protection from physical contact with resistor coil. Internal or external double insulated for maximum protection against grounding. All resistors are supplied with thermal overloads for protection from damage in overload conditions. Designed to provide smooth, precise electronic braking of Drivecon AC Drives without overvoltage faults. Normal sizing allows 100% braking torque over 10% duty cycle. *

Specifications	
Wattage range	Standard 300W through 50KW; or custom as specified
Voltage rating	1000VAC double insulated
Enclosures	Perforated, louvered sides or open construction. Treated or stainless steel.
Resistor construction	Wire wound, helical wound, edge wound, or grid.
Maximum operating temperature	375°C
Duty rating	Continuous at rated amps.
Mounting	Enclosure, floor, or wall.
Element	Nichrome wire or stamped grid.
Overload protection	Seperate bimetallic thermal overload supplied.
Cooling	Convection or optional forced air.

* Consult Drivecon for VF61R line regenerative drives for applications which require continuous regeneration. Consult sizing chart or Drivecon for applications which require D.B. operation for greater than 10% duty cycle.

Typical DB circuit:



DB regulator is furnished internally in small capacity AC drives. Large capacity AC drives require an external VFDB module (not pictured here). A thermal overload device is typically provided to disconnect AC line supply in event of DB resistor overload not shown above.

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Application:
AC variable frequency drives are commonly used with general purpose AC induction motors to form a reliable variable speed drive system. For applications that require faster deceleration rates, or where motor speeds are exceeding the synchronous speed set by the output frequency of the drive (an overhauling load condition), a dynamic braking resistor is required. Dynamic braking resistors increase the braking torque capability of a variable frequency drive, producing faster and more controlled braking. The resistor dissipates regenerated power to keep the bus voltage from exceeding the rated limit of the drive.

Selecting a standard design:
Drivecon offers a standard selection of dynamic braking resistors for 230V, 460V and 575V drives. These braking resistors are designed to produce either 100% or 150% braking torque and are available in five standard duty cycles. The following information is required to select a standard design:

Data requirements:
Drive horsepower, braking torque, minimum ohm rating specified for your drive or DB module, or maximum allowable braking current braking cycle.

Braking torque:
The resistance determines the braking torque and thus the deceleration rate of the motor. It is important that the resistance values must be within the allowable limits of the drive or braking module (too low of a value may cause harm to the drive or DB regulator). Also, when the DB module activates, the resistance value will produce a specific braking current. The peak braking currents of each standard design are listed with each resistor design and must not exceed the rated limits of your drive or DB module.

Voltage rating:
All DB resistors are designed to withstand voltages generated by rectification of AC supply voltages. Typically DC bus voltage will be $\sqrt{2}$ times the RMS value of the AC supply.

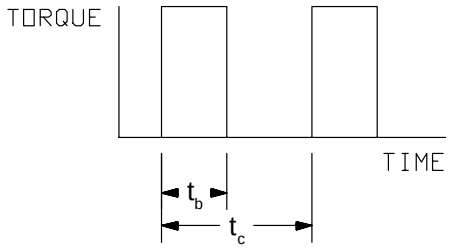
DC voltages will reach peak levels of 800V before a drive trips on over voltage protection in case of 460V power supply voltages.

Duty cycle:
The duty cycle determines the power rating of the braking resistor. Duty cycle is calculated by dividing the braking stop time by the total cycle time as follows:

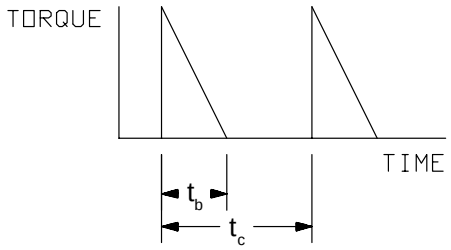
Duty cycle = $\mathbf{t_b / t_c \times 100\%}$

Also, it is important to determine whether your application is an overhauling load cycle or a deceleration braking cycle (refer to the graphs for proper identification).

Overhauling Load Cycle:
Requires the braking resistor to keep the motor from increasing speed beyond the synchronous speed set by the drive. During an overhauling load cycle, the required braking torque remains constant.



Deceleration Braking Cycle:
Requires the braking resistor to stop of reduce the speed of the motor. During deceleration braking, the required braking torque reduces with speed, therefore, approximately one-half the power of an overhauling load cycle is required of the braking resistor.



Dynamic Brake Resistors

Construction:
Standard units include resistors installed in a screened enclosure with galvanized finish. All enclosures are assembled with stainless steel hardware. Refer to the enclosure section of the catalog for enclosure details and finish options.

Ratings:
Dynamic brake resistors are available in either 100% or 150% torque ratings and 5 duty cycles based on cycle time of one minute. All braking resistors are designed for a 375°C temperature rise when operating at maximum duty cycle. Resistance values are measured at 25°C and have a ± 10% tolerance.

Cooling:
All resistors are cooled by normal convection, therefore it is important to mount resistors in areas of adequate ventilation and free of combustible materials.

Maximum Braking Times of Duty Cycles		
Duty Cycle	**Maximum Braking Time**	
	Overhauling Load	**Deceleration Braking**
10%	6 sec.	12 sec.
20%	12 sec.	24 sec.
30%	18 sec.	36 sec.
50%	30 sec.	Continuous
100%	Continuous	Continuous

Braking resistors for 230 Volt Drives

Braking resistors for 230V drives requiring 100% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	375.0	1.1
.75	250.0	1.6
1	190.0	2.1
1.5	125.0	3.2
2	95.0	4.2
3	63.0	6.3
5	38.0	11.0
7.5	26.0	15.0
10	19.0	21.0
15	12.6	32.0
20	9.6	42.0
25	7.5	53.0
30	6.3	63.0
40	4.9	82.0
50	3.9	100.0
60	3.3	120.0
75	2.7	150.0
100	1.9	210.0
125	1.6	250.0
150	1.3	310.0
200	1.0	400.0
250	0.8	500.0

Braking resistors for 230V drives requiring 150% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	250.0	1.6
.75	170.0	2.4
1	125.0	3.2
1.5	85.0	4.7
2	63.0	6.3
3	42.0	9.5
5	25.0	16.0
7.5	16.8	24.0
10	12.6	32.0
15	8.4	48.0
20	6.3	63.0
25	5.0	80.0
30	4.2	95.0
40	3.2	125.0
50	2.5	160.0
60	2.1	190.0
75	1.7	235.0
100	1.3	310.0
125	1.0	400.0
150	0.85	470.0
200	0.65	610.0
250	0.50	800.0

Dynamic Brake Resistors

Braking resistors for 460 Volt Drives

Braking resistors for 460V drives requiring 100% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	1500.0	0.5
.75	1000.0	0.8
1	750.0	1.1
1.5	500.0	1.6
2	375.0	2.1
3	250.0	3.2
5	150.0	5.3
7.5	100.0	8.0
10	75.0	11.0
15	50.0	16.0
20	38.0	21.0
25	30.0	27.0
30	25.0	32.0
40	19.0	42.0
50	15.0	53.0
60	12.6	63.0
75	10.0	80.0
100	7.5	110.0
125	6.0	130.0
150	5.0	160.0
200	3.8	210.0
250	3.0	270.0
300	2.5	320.0
350	2.2	360.0
400	1.9	420.0
500	1.5	530.0

Braking resistors for 460V drives requiring 150% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	1000.0	0.8
.75	675.0	1.2
1	500.0	1.6
1.5	335.0	2.4
2	250.0	3.2
3	170.0	4.7
5	100.0	8.0
7.5	67.0	12.0
10	50.0	16.0
15	34.0	24.0
20	25.0	32.0
25	20.0	40.0
30	17.0	47.0
40	12.6	63.0
50	10.0	80.0
60	8.4	95.0
75	6.7	120.0
100	5.0	160.0
125	4.0	200.0
150	3.4	235.0
200	2.5	320.0
250	2.0	400.0
300	1.7	470.0
350	1.5	530.0
400	1.3	610.0
500	1.0	800.0

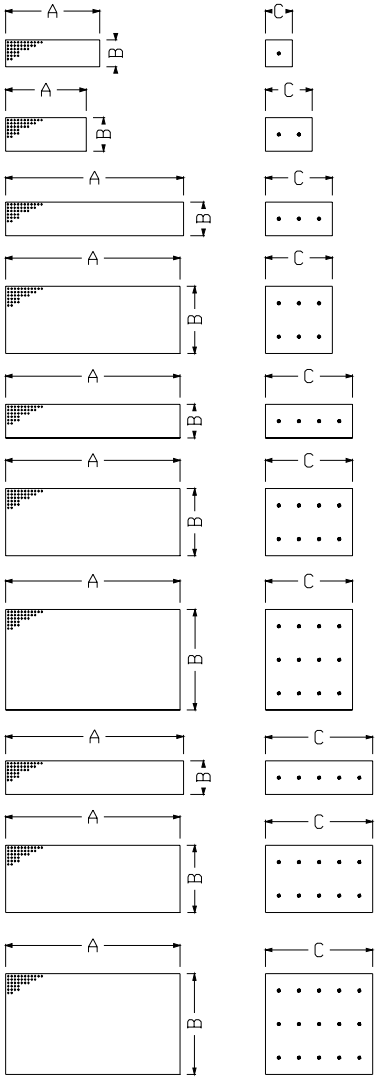
Braking resistors for 575 Volt Drives

Braking resistors for 575V drives requiring 100% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	2000.0	0.5
.75	1500.0	0.7
1	1200.0	0.8
1.5	800.0	1.3
2	575.0	1.7
3	400.0	2.5
5	235.0	4.3
7.5	150.0	6.7
10	120.0	8.3
15	78.0	13.0
20	59.0	17.0
25	47.0	21.0
30	39.0	26.0
40	29.0	34.0
50	23.0	43.0
60	20.0	50.0
75	15.6	64.0
100	11.7	85.0
125	9.3	110.0
150	7.8	130.0
200	5.9	170.0
250	4.7	210.0

Braking resistors for 575V drives requiring 150% braking torque		
H.P.	**Ohms**	**Braking Amps**
.50	1500.0	0.7
.75	1000.0	1.0
1	800.0	1.3
1.5	525.0	1.9
2	400.0	2.5
3	260.0	3.8
5	160.0	6.3
7.5	100.0	10.0
10	80.0	13.0
15	52.0	19.0
20	39.0	26.0
25	32.0	31.0
30	26.0	38.0
40	20.0	50.0
50	16.0	63.0
60	13.0	77.0
75	10.4	96.0
100	7.8	130.0
125	6.3	160.0
150	5.2	190.0
200	3.9	250.0
250	3.2	310.0

Package outlines

Wall mount type



Package A

Package B

Package C

Package D

Package E

Package F

Package G

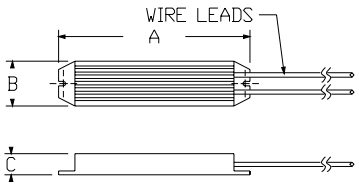
Package H

Package I

Package J

Package outline dimension chart			
Package	Dimensions (inches)		
	A	B	C
A	12	4	5
B	12	5	7
C	12	5	10
	18	5	10
	26	5	10
D	26	10	10
E	12	5	13
	18	5	13
	26	5	13
F	26	10	13
G	26	15	10
H	12	5	16
	26	5	16
I	26	10	16
J	26	15	16
S1	9	1.5	.75
S2	9	3	1.5
S3	12	3	1.5

Chassis mount type



Package S1, S2, S3

Free standing rack type