

# BRAKE MOTORS

## Brake Motors - General Technical Information

Brake motors are used where the safe & effective stopping with very short time is desired. The fail safe type electromagnetic brake is mounted on rear side end shield of motor and it works on DC power supply. The braking is applied once the power supply is switched OFF.

LHP Brake motors are manufactured with rectifiers mounted in the motor terminal box which converts the AC power supply to DC for brake operations.

### **BRAKE WORKING PRINCIPLE:-**

The brake consists of two plates in which one is fixed and other is spring loaded. The magnetic coil is located at spring loaded plate side. When the brake coil is energized the plate is pulled to coil side and rotating disc is released to rotate freely in between two plates.

When power supply is disconnected/ switched OFF, the coil de-energizes and spring loaded plates stuck the rotating disc and brake is applied which prevents the rotation of disc.

Braking types are depends on the application. To select correct

type and rating brake, the braking type shall be confirmed in enquiry.

### **BRAKING TORQUE:-**

The torque depends on the load and power required to brake. For general application 150% of motor full load torque is sufficient. In special applications like cranes, hoists, the braking torque shall be min 200% of motor full load torque.

### **RECTIFIER:-**

Half wave rectifiers are used to convert AC Power supply to DC. Normally AC power supply is given from motor terminal. However independent AC power supply shall be used in case VVVF motors application.

### **Brake motors with VVVF operation:-**

When brake motor operated with VVVF, the brake operation depends on the system design. The voltage across motor terminal vary with frequency variation. Hence the independent power supply shall be used for brake operation with synchronization with VVVF operation. Also DC Power supply form VVVF, can be used for brake operation.



## **BRAKE MOTORS**

Upto 355 Frame

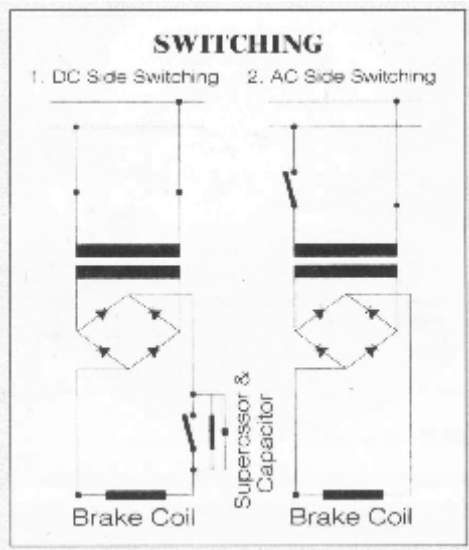
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Table No. 23 - For optimum performance we suggest to use following Rectifiers (Power supply)

Brake Coil Voltage	AC Input Voltage	Current Rating	Rectifier Type
190 VDC	415 VAC	1.5 Amp	EH 720 HHD
	230 VAC	1.5 Amp	EH 720 AD
96VDC	230 VAC	1.5 Amp	EH 720 CD
	110 VAC	1.5 Amp	EH 720 BD

All RECTIFIERS offered by us are with inbuilt DC switching protection circuit. Use of inferior quality & cheap Rectifiers may damage your costly brake coils.

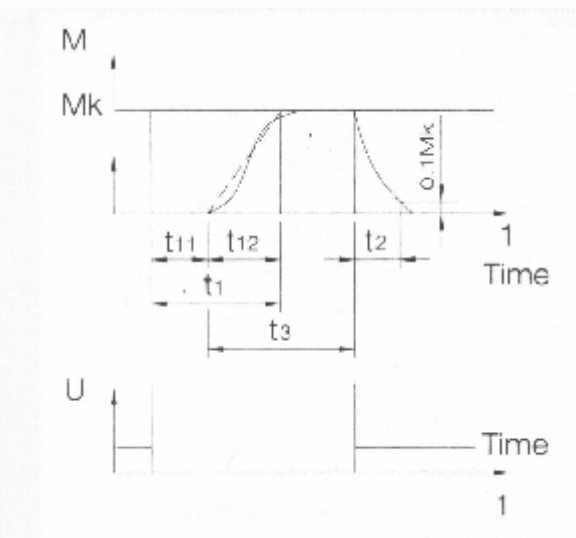


### Switching

Brake coils are operated with DC voltage. Generally when braking time is not critical AC side switching is done. This method is often used with brake motors. Where brake is switched with motor contacts. Due to the inductance of the brake coil, engagement time can be 3-6 times longer than with DC switching. Therefore this arrangement is not suitable for hoist applications. For falling loads such as hoist, lift and cranes, also the high inertia loads, a brake motor to some extent regenerate the supply and hold off the brake. Here it is essential to switch on the DC side of the rectifier. DC side switching requires provision of universal spark suppressor and capacitor to protect the coil and switches against inductive voltages.

For normal rectifier converting AC to DC you can use separate universal spark suppressor and capacitor across the switch. Rectifier supplied by us are designed to include suppressor and capacitor suitable for DC switching.

### Operating Times



t1 Engagement time                      t12 Rise time of brake torque  
t2 Disengagement time                t3 Slipping time  
t11 Delay time

Table No. 24

Brake Size	t11 ms	t12 ms	t1 ms	t2 ms
06	7	10	17	35
08	10	25	35	65
10	10	30	40	90
12	10	40	50	120
14	15	50	65	150
16	20	70	90	180
18	30	80	110	300
20	50	150	200	400
25	70	200	270	500

The engagement times are valid for switching on DC side. The table shows the delay during engagement t11, the rise time of brake torque t12 and the engagement time t1 = t11 + t12. Disengagement time is not influenced by DC or AC side switching. However it can be reduced by suitable excitation or over excitation.

For electrical performance please refer Page No.23 to 30.

### Brake Selection Chart

#### 2 Pole Brake Motor

KW	Frame Size	S.F. = 2	S.F. = 2.5	S.F. = 3
0.12	63	6	6	6
0.18	63	6	6	6
0.37	71	6	6	6
0.55	71	6	8	8
0.75	80	8	8	8
1.1	80	8	10	10
1.5	90S	10	10	10
2.2	90L	10	12	12
3.7	100L	12	12	14
5.5	132S	14	14	14
7.5	132S	14	14	16
9.3	132M	14	16	16
11	160M	16	16	18
15	160M	16	18	18
18.5	160L	18	18	20
22	180M	18	20	20
30	200L	20	20	25
37	200L	20	25	25
40	225M	25	25	31
55	250M	25	31	31
75	280S	31	31	40
90	280M	31	40	40

#### 4 Pole Brake Motor

KW	Frame Size	S.F. = 2	S.F. = 2.5	S.F. = 3
0.12	63	6	6	6
0.18	63	6	6	6
0.37	71	8	8	8
0.55	80	8	10	10
0.75	80	10	10	10
1.1	90S	10	12	12
1.5	90L	12	12	12
2.2	100L	12	14	14
3.7	112M	14	14	16
5.5	132S	16	16	18
7.5	132M	16	18	18
9.3	160M	18	18	20
11	160M	18	20	20
15	160L	20	20	25
18.5	180M	20	25	25
22	180L	25	25	31
30	200L	25	31	31
37	225S	31	31	40
40	225M	31	40	40
55	250M	40	40	40
75	280S	40	40	50
90	280M	40	50	50

#### 6 Pole Brake Motor

KW	Frame Size	S.F. = 2	S.F. = 2.5	S.F. = 3
0.12	71	6	6	6
0.18	71	6	8	8
0.37	80	8	10	10
0.55	80	10	10	10
0.75	90S	10	12	12
1.1	90L	12	12	12
1.5	100L	12	14	14
2.2	112M	14	14	16 <sub>(FR132)</sub>
3.7	132S	16	16	18
5.5	132M	18	18	20 <sub>(FR160)</sub>
7.5	160M	18	20	20
9.3	160L	20	20	25 <sub>(FR180)</sub>
11	160L	20	25 <sub>(FR180)</sub>	25 <sub>(FR180)</sub>
15	180L	25	25	31
18.5	200L	25	31	31
22	200L	31	31	40 <sub>(FR225)</sub>
30	225M	31	40	40
37	250M	40	40	40
40	280S	40	40	40
55	280M	40	50	50

#### 8 Pole Brake Motor

KW	Frame Size	S.F. = 2	S.F. = 2.5	S.F. = 3
0.18	80	8	8	8
0.37	90S	10	10	10
0.55	90L	10	12	12
0.75	100L	12	12	12
1.1	100L	12	14	14
1.5	112M	14	14	14
2.2	112M/132S	14	16 <sub>(FR132)</sub>	16 <sub>(FR132)</sub>
3.7	132M/160M	16	18	18
5.5	160M	18	20	20
7.5	160L	20	20	25 <sub>(FR160)</sub>
9.3	180L	20	25	25
11	180L	25	25	31
15	200L	25	31	31

Note :-

1. S.F. 2 Brake to be selected for continuous duty (for light application)
2. S.F. 2.5 Brake to be selected for crane duty cross long travel application (for medium duty & intermittent application)
3. S.F. 3.0 Brake to be selected for crane duty hoisting / vertical lifting application (Heavy duty & intermittent application)
4. A.C. Brake can be given on demand.
5. Brakes above 255 frame can be given as per customer requirement.
6. Brakes are available with 24 VDC, 96 VDC & 190 VDC
7. Brakes are suitable for 50° C ambient.
8. Ambient above 60° C can be given on demand.
9. For dimensions of Brake Motor refer General Arrangement Drawing/ Dimensions Table for Std. and FLP motors.

\*S.F. = Safety Factor