Electromagnetic Brakes: A.C. type / D.C. type

A.C.FAIL SAFE DISC TYPE BRAKE

GENERAL APPLICATION

In any application where instantaneous stopping of machinery or equipment of rotary type is necessary, ‘OMEGA’ Electro Magnetic Brake is inevitable.

Electro Magnetic Brakes have found vast use on Hoists, Cranes and Winches; in Paper, Rubber, Steel, Textile, Cement, Sugar, Mining & other industries; in Machine tools, printing machinery etc. and in many other types of equipment.

Its 'Fail Safe' characteristic renders it very essential for material handling equipments like Hoists, Cranes, and Elevators etc.

We manufacture Spring Loaded Disc type brakes suitable for A.C. Single phase/Three phase 50cycle power supply. Normally the brake is in “Brake ON” position. Brake is OFF (Brake-OFF) when power is supplied Braking action automatically takes place (i.e. Brake-ON) when power supply is cut off or power failure occurs.

CONSTRUCTION:

As the name suggests, it works on electromagnetic principle and consist of an electromagnet fixed to the end plate, a floating plate on one side of which is fixed the armature, a friction plate with either a square hole or internal spline at its centre, and the mounting plate and a square piece of shaft or spline shaft. The square centre piece is keyed to the motor shaft. The friction plate rotates with the motor shaft but is free to float axially on the square shaft. Normally, due to spring pressure, the friction plate is, held tight between the mounting plate
and the floating plate and brake is ‘ON’? When the current is supplied to the electro magnet the magnet attracts the floating plate against spring, pressure, thus releasing the brake, i.e. Brake is ‘OFF’. This brake is very ideal for mounting directly on the motor flange and no separate foundation is necessary to fix the brake.

The brake can also be supplied with twin or triple-friction discs for higher torque capacity, and can be provided with manual release mechanism, if necessary. Manual release mechanism is inevitable if the brake is to be used on hoisting gear of crane, winch or hoist.

For assessing the size of ‘OMEGA’ brake required for a particular application, it is necessary to know the H. P. of the equipment and the speed of the shaft in R. P. M. where the brake is to be mounted. The following formula enables calculating the average breaking torque required for the equipment.

\[
\text{TORQUE [Kgs. Cms.] = } \frac{71620 \times H.P.}{\text{Speed in r.p.m.}}
\]
\[
\text{TORQUE [LB. Ft.] = } \frac{5250 \times H.P.}{\text{Speed in r.p.m.}}
\]

As seen above, torque is inversely proportional to the speed in r.p.m. The brake of smallest size will be required if it is provided on the fastest running shaft i.e. motor shaft, of the equipment.

For heavier duty requirements and where the brake is required to hold the load against gravity, as in case of electric winches, cranes, hoists etc. Generally the brake torque is assessed on the basis of 150% full load torque.

As an example, suppose the hoist, motor of an electric hoist, is of 5 HP, 1440 r.p.m. the brake torque calculation, allowing for 150% full load torque will be as follows :-

\[
\text{BRAKE TORQUE T (Kg. Cms.) = } \frac{71620 \times 5 \times 150}{1440 \times 100} = 370 \text{ Kg. Cms.}
\]

Referring to the date sheet one can select the brake model OOBT 2801 or Twin disc model OD8T 2602.

When the brake size selected is based on average torque basis, the brake will be able to stop the equipment in approximately the same time as it took to accelerate it to that speed from rest.

In application where there is higher moment of inertia and the equipment is to be stopped faster, or in a particular time following formula should be used to find out brake torque :-

\[
T (\text{Lbs. Ft.}) = \frac{WR^2}{3.8} \frac{\text{Change R.P.M}}{t}
\]

Where \( WR^2 \) is moment of inertia of rotating parts of the machine reflected to the shaft where the brake is mounted “t” is time in seconds during which change in r.p.m. is affected.
In case you want us to suggest size of brake required for your application please let us know the following particulars.

1. Motor H.P., R.P.M, Voltage, Torque, etc.
2. Kind of driven machinery, location of Brake desired, moment of inertia $WR^2$ of driven parts.
3. Number of stopping?s per hour, time in which stopping is required.
4. A sketch of the drive.

**D.C. ELECTROMAGNETIC FAIL SAFE DISC TYPE BRAKE**

![DC Brake Image]

**DC Type Brakes**

**GENERAL**

‘OMEGA’ Electromagnetic FAIL SAFE Disc type DC Brake finds its application where instantaneous stopping of machinery or equipment of rotary type is necessary.

Though E.M. Brake working on AC supply have been available for last many years, since recently DC Brakes due to compactness, silent working, positive response and many other features, are finding more and more preference with the users.

Due to its 'fail safe' characteristic to hold the load in case of power failure, it is now widely used on hoist, cranes, winches, elevators and other material handling equipments

**CONSTRUCTION AND WORKING PRINCIPLE**

DC fail safe disc brake consists of a disc type liner plate sandwiched between mounting plate on one side and a floating plate on the other side. The floating plate is under pressure towards the mounting plate due to springs, which are housed inside the magnet shell. Due to spring pressure the friction liner plate is caught between the mounting plate and the floating plate. Between the floating plate and the magnet shell is kept an air gap. When the magnet is energised the floating plate is attracted towards the magnet against the spring pressure there by releasing the friction liner plate which was otherwise caught between the floating plate and mounting plate. Thus brake is released 'BRAKE OFF' when the power is ON and the brake is applied "BRAKE ON" when the power is OFF. This renders "fail safe" characteristic of the brake.

**APPLICATIONS**

Due to fail safe characteristics these brakes are widely used on material handling equipments.
like hoists, cranes conveyors, elevators, winches, also in machine tools, textiles, plastic printing, paper and other industries where immediate stoppage of the equipment is necessary.

**SELECTION OF SUITABLE SIZE OF BRAKE**

Knowing the H. P. of the equipment and shaft R.P.M. where the brake is to be mounted. The following formula gives average breaking torque.

\[
\text{TORQUE [KGM]} = \frac{71620 \times H.P.}{\text{Speed in r.p.m.}}
\]

Depending upon the duty requirement and where the brake is required to hold the load against gravity, as in case of hoists cranes, winches etc, suitable safety factor 'K' is selected from K = 1.5 to 5

\[
\text{TORQUE CAP of Brake T_B [KGM.]} = \frac{71620 \times H.P. \times K}{\text{Speed in r.p.m.}}
\]

**RANGE**

Standard DC Brakes are manufactured from 0.3 kgm to 25 kgm brake torque capacities and in 24V or 190V DC coil voltage. Sizes other than standard can also be manufactured to suit particular application. Also brakes operating on other coil voltage of 48V, 96V DC can be supplied.

**TECHNICAL SPECIFICATION**

For details regarding dimension, power etc please refer to the specification sheet
DC FAIL SAFE DISC Brake data sheet
D. C. ELECTROMAGNETIC CLUTCH Data Sheet

**Attachments:**
- AC Brake select data sheet
- DC FAIL SAFE DISC Brake data sheet
- D. C. ELECTROMAGNETIC CLUTCH Data Sheet

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