

# DC Injection Breaking for Industrial Applications

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**Abstract-** This paper introduces practical architecture for industrial application to the emergency breakage system. The main goal of this project is to constantly start and stop motor as this will protect against severe injury during an accident. A DC injection break system can be used as an alternative to a friction break system.

**Index terms-** Induction motor, breaking, Rotor, DC voltage, SMPS

## INTRODUCTION

In induction motor are used in much industrial production process because of their low cost, high reliability, robustness and efficiency. In a wide number of industrial applications and drives such as mills, lift, centrifuges and machine tool. It is very necessary to safe machine parts and prevents injuries to the people in the proximity in case a fault occur. This means that good techniques are needed which are able to efficiently remove the kinetic energy of the motor. The motor are often used to run high inertia machine, quick retardation of which needs highly effective breaking technique.

In literature there are two techniques of braking system for induction motor: the first is friction breaking and the second is electrical breaking like dynamic and regenerative. Breaking is one mechanism to a retardation torque by removal of stored kinetic energy from mechanical part of the system. The aim of this project is to improve DC injection breaking mechanism through a designed system separately connected and completely independent from the actual drive motor.

## CONTROL TECHNIQUE

In this paper only DC injection breaking control scheme, This is done by disconnecting 3-phase supply from motor and connecting DC supply to any one winding of motor. Due to disconnecting there is constant flux created by DC supply motor gets brake.

Higher the DC voltage the brake will be strong. When motor is in running condition main contractor in energized and when we de-energized main contractor another contractor is energized and inject DC voltage to the winding which cause brake on the motor. DC supply is obtained by switch mode power supply in which stepped down the voltage and further rectify with bridge rectifier. Timer switch is use for DC for disconnecting this contractor after brake is done. This is to be done to prevent winding from damage because if DC supply on winding for more than necessary damage to the winding.

## BLOCK DIAGRAM

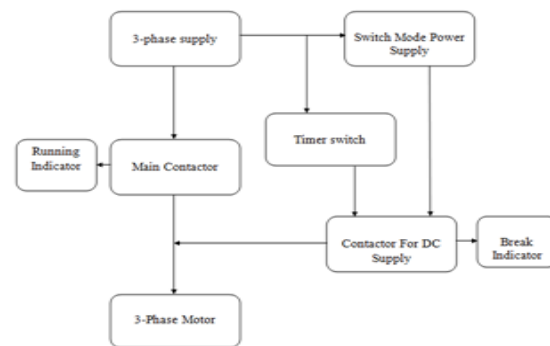


Fig (a)

Three phase supply of 400 V 50 Hz is given to the 3-Phase Induction motor through main contractor. Single phase supply is taken from 3 phase supply for operation of contractor, timer and switch mode power supply. By the using of SMPS, The 230V 50 Hz is converted to 24 V DC. The SMPS consist of Step down transformer, bridge rectifier. The secondary output is rectified by a full-wave bridge rectifier. As shown in block diagram Rectified DC is connected to any one winding of motor passing through contractor. For the operation of contractor for DC supply, single phase supply is given by passing through timer switch. Timer switch is connected in NC contact. The purpose of using timer switch is to disconnect DC

supply after braking is done. In our project two indicators are used for indication of running and braking of motor. Running indicator is placed in parallel to main contactor and braking indicator is placed in parallel to contactor for DC supply.

**CONTACTOR**

A contactor is an electrically operated switch, similar to a relay but with higher current levels, used to switch a power circuit. A contactor is operated by a circuit which has a much lower power level than the switched circuit.



Fig (b)

**TIMER**

In this paper timer switch will be used to remove the DC supply from the brake. The timer switch controls the contactor that is used for supplying DC. Contactor is connected to the Timer switch NC point. When timer switch receives supply then the contactor gets supply and the contactor gets disconnected after set time has reached.



Fig (c)

**SMPS**

Switched-mode power supply is an electronic power supply containing a switching regulator to efficiently transform electric power. Like other power supplies,

such as a personal computer, an SMPS transfers power from a DC or AC source to DC loads.



Fig (d)

**RELAY**

Essentially a relay consists of a wire, an armature, a spring, and a variety of electrical contacts. The electromagnet coil receives power via a switch or relay driver and allows the armature to be attached in such a way that the power supply is provided by the charge. Movement of the armature is caused by the use of a spring.



Fig (e)

**RESULT**

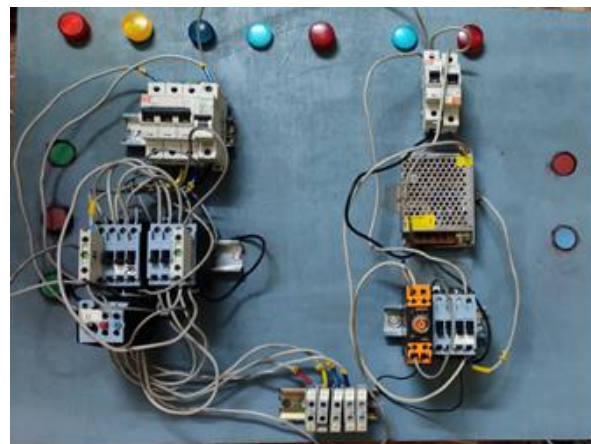


Fig (f)

## CONCLUSION

This paper has helped to learn a lot about electric braking system, the breaking of DC injection is an inexpensive and effective way to rapidly decelerate a high inertia load. No external components are required, so DC breaking can be easily implemented in your application now.

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