American International University- Bangladesh
Department of Electrical and Electronic Engineering
EEE 4227: Power System Protection Laboratory

Title: Determination of Time Current Characteristics (TCC) curve of a MCB.

Introduction:

MCBs are used extensively in LV domestic, commercial and industrial applications. They replace conventional fuses and combine the features of a good HRC fuse and a good switch.

The objectives of this lab are:

1) To get familiarize with MCBs.
2) To draw time current characteristics curve.

Theory and Methodology:

For normal operation it is used as switch. During overloads or faults, it automatically trips off. The tripping mechanism is actuated by magnetic and thermal sensing devices provided within the MCB. Over current is sensed by over current release which helps to open the contact of the MCB. On the other hand short circuit is sensed by magnetic release which provides the means of opening the contact of MCB.

Tripping mechanism and the terminal contacts are assembled in a moulded case, moulded out of thermo setting powders. They ensure high mechanical strength, high dielectric strength and virtually no ageing. The current carrying parts are made of electrolytic copper or silver alloy depending upon the rating of the breaker. All other metal parts are of non ferrous, non rusting type. Sufficient cross section for the current carrying parts is provided to ensure low temperature rise even under high ambient temperature environment. The arc chute has a special construction which increases the length of the arc by the magnetic field created by the arc itself and arc chute is so placed in the breaker that the hot gases may not come in contact with any of the important parts of the breaker.

Pre-Lab Homework:

Answer this question:
1) What is MCB?
2) What is time current characteristics curve?

Apparatus:

1) Current Injector.
2) Clamp on meter.
3) MCB (10A)
4) Connecting Wire.

Precautions:

1) Try to maintain safe distance from the current injector; Do not touch the current output terminals.

2) While taking readings of *'current'* from the clamp ammeter and current injector display, justify the readings.

Experimental Procedure:

Connect the current injector set to a 230V supply line. There are two output current terminals; one is of 0-20A and the other is 0-200A, Use 0-200A output terminals. At first the 0-200A current output terminals are shorted by a thick wire. Then the output current is set at a desired value by changing the knob. Keeping the knob position at the desired current value, switch off the current injector. Then connect directly the 0-200A output terminals to the terminals of the MCB after disconnecting the shorting wire. Then switch on the current injector set. The desired current flows through the MCB. Measure and record the tripping time of the MCB. As the increased current flows through the MCB, the tripping time of the MCB is reduced. Measure and Record the currents and their corresponding tripping time of the MCB in Table 3.1

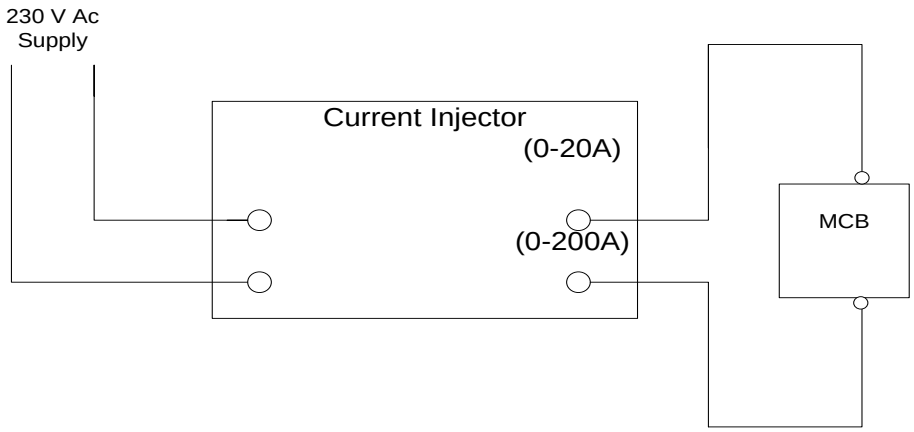

Fig 3.1. Experimental setup for TCC

Use the tabulated values in table 1 to plot the value of time (s) against current (A) to obtain the TCC.

Table 3.1

Sl. No	Current (A)	Tripping time of MCB (S)
1		
2		
3		
4		
5		

Questions for report writing:

1) Draw the TCC curve on a graph paper using the data of the Table 3.1. Use current in the x-axis and time in Y-axis.
2) Discussion the special feature for selecting rating of MCB for the protection of the motor.

Discussion and Conclusion:

Interpret the data/findings and determine the extent to which the experiment was successful in complying with the goal that was initially set. Discuss any mistake you might have made while conducting the investigation and describe ways the study could have been improved.

References:

1. "Electric Power Systems: A Conceptual Introduction" by Alexandra Von Meier
2. "Switchgear Protection and Power Systems" by Sunil S Rao