

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

Introduction: In electronics and electrical engineering, a fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby stopping or interrupting the current. It is a sacrificial device; once a fuse has operated it is an open circuit, and must be replaced or rewired, depending on its type. It is essentially a small piece of metal connected in between two terminals mounted on insulated base which forms a series part of the circuit. The objectives of the lab are:

- To be familiarize with rewirable fuses.
- To draw time current characteristics curve.

Theory: A time current curve (TCC) plots the interrupting time of an overcurrent device based on a given current level. These curves are provided by the manufacturers of electrical overcurrent interrupting devices such as fuses and circuit breakers.

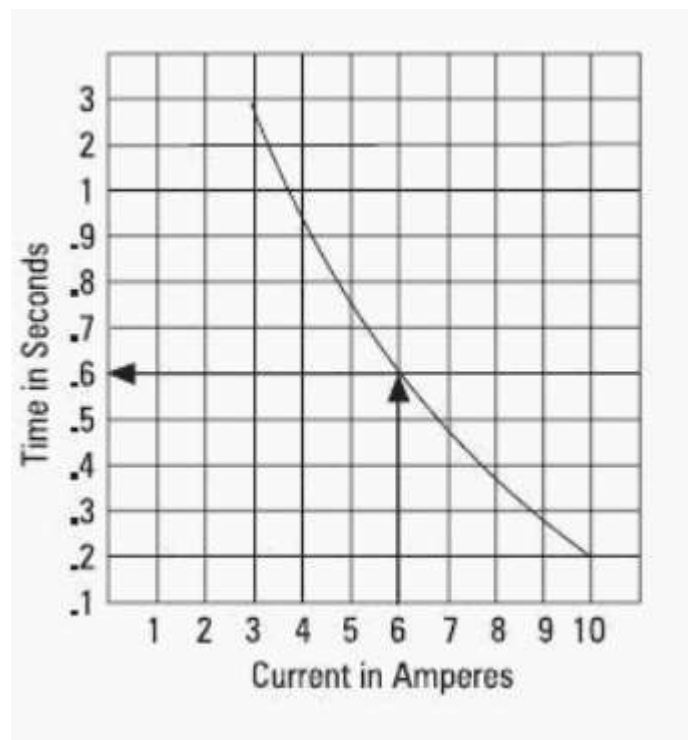


Figure: Time Current Curve (TCC)[1]

To determine how long a breaker will take to trip at a given current, find the level of current on the bottom of the graph. Draw a vertical line to the point where it intersects the curve. Then draw a horizontal line to the left side of the graph and find the time to trip.

Different Types of Fuses –

- DC Fuses.
- AC Fuses.
- Cartridge Fuses.
- D – Type Cartridge Fuse.
- HRC (High Rupturing Capacity) Fuse or Link Type Cartridge Fuse.
- High Voltage Fuses.
- Automotive, Blade Type & Bolted Type Fuses.
- SMD Fuses (Surface Mount Fuse), Chip , Radial, and Lead Fuses.



Figure: Rewireable Fuses[2]

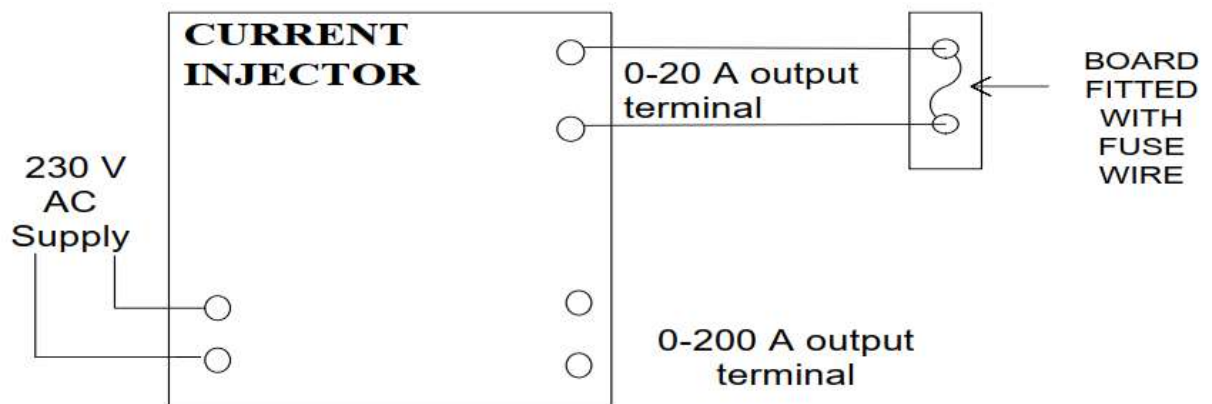


Figure: Experimental setup for TCC

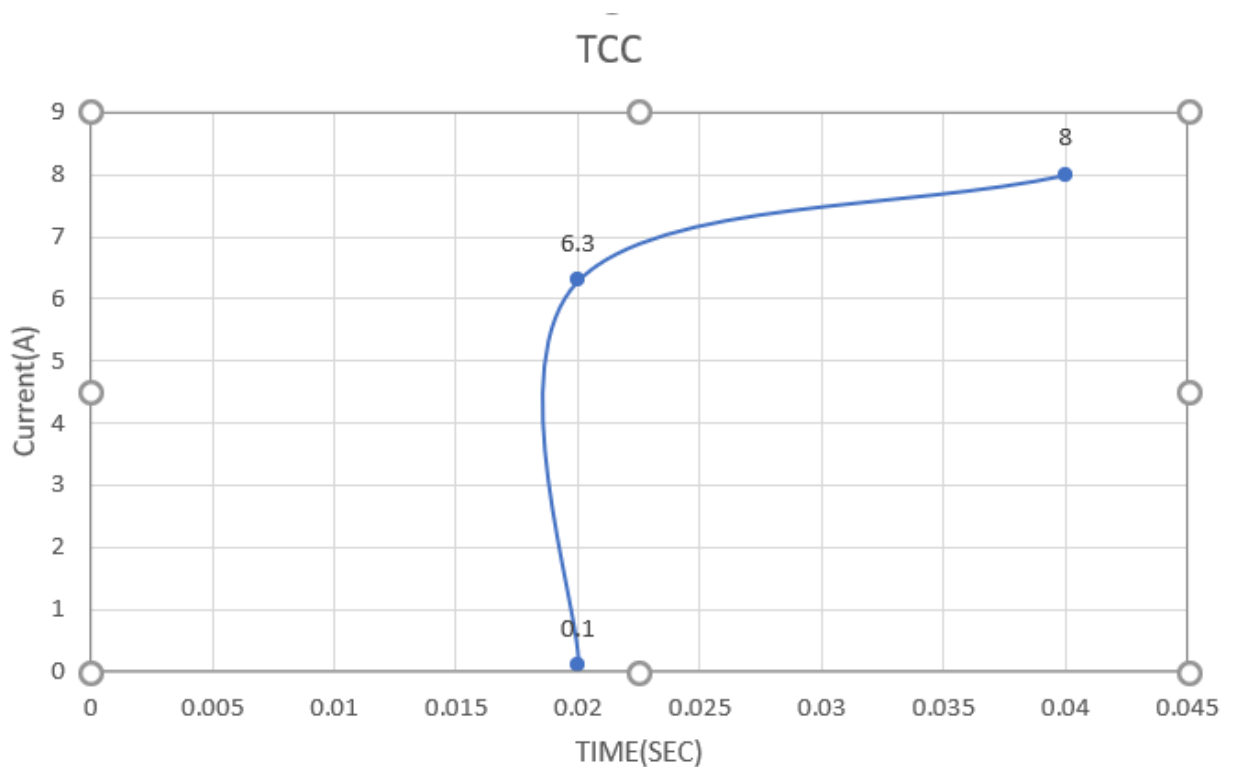
Data Sheet Of Electrical Fuses[3]:

SL. NO	Current (A)	Fuse blow out time (Sec)
01	0.100	0.02
02	6.30	0.02
03	8.00	0.04

Questions for report writing:

1. Draw the TCC curve on a graph paper from the data of table . Use Current in the Y-axis and time in X-axis.

Ans:



2. Discuss the special feature for selecting the fuse rating for the protection of motor.

Ans: The starting current of a motor is usually much higher than the normal current of that motor's full load condition. So for the protection purpose, in case of selecting fuse, the fuse has to be rated 2-3 times the full load of the motor so it does not blow on start. An induction motor will have a starting current of around 6 times FLC.

Discussion: In this lab we learnt about Time Current Characteristics (TCC) and how to draw TCC curve. A time current curve (TCC) plots the interrupting time of an overcurrent device based on a given current level. These curves are provided by the manufacturers of electrical overcurrent interrupting devices such as fuses and circuit breakers. Draw a vertical line to the point where it intersects the curve. Then draw a horizontal line to the left side of the graph and find the time to trip. For example, in this illustration a circuit breaker will trip when current remains at 6 amps for 0.6 seconds. we get some data for current and fuse how time out. then we draw the TTC curve in excel sheet using those data. After getting the graph finally our experiment was done successfully.

References:

- [1.] <https://electrical-engineering-portal.com/time-current-curves>
- [2.] https://www.google.com/search?q=rewireab+fuses.&sxsrf=ALeKk00JcQAnrJQIUWWI4sx9xhZXSk2HYg:1622821864513&source=Inms&tbm=isch&sa=X&ved=2ahUKEwjUg5LGqv7wAhWQb30KHTHwCRMQ_AUoAXoECAEQAw&biw=1536&bih=754#imgsrc=HLo6H1oaayYWmM&imgdii=1bV_N743RMNRdM
- [3] https://m.littelfuse.com/~media/electronics/datasheets/fuses/littelfuse_fuse_217_datasheet.pdf
- [4] Alexandra Von Meier ,“Electric Power Systems: A Conceptual Introduction”
- [5] Sunil S Rao ,“Switchgear Protection and Power Systems