

Project Report

Current Transformer

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Theoretical Background:

Current Transformer:

A Current Transformer (CT) is a current measuring device that is used to safely reproduce a low level current that actually represents a higher current level for the purpose of measuring and protection.

Current transformers, along with voltage or potential transformers, are instrument transformers. Instrument transformers scale the large values of voltage or current to small, standardized values that are easy to handle for measuring instruments and protective relays. The instrument transformers isolate measurement or protection circuits from the high voltage of the primary system. A current transformer provides a secondary current that is accurately proportional to the current flowing in its primary. The current transformer presents a negligible load to the primary circuit.

Current transformers are the current-sensing units of the power system and are used at generating stations, electrical substations, and in industrial and commercial electric power distribution.

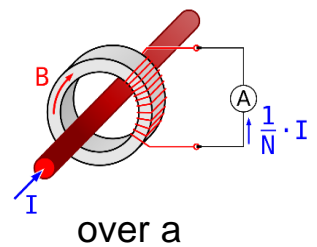
Current Transformers are most commonly

Used for Metering and Protection Purpose in

- Switch Boards
- Panel Boards

Working

The alternating current in the primary produces an alternating magnetic field in the core, which then induces an alternating current in the secondary. The primary circuit is largely unaffected by the insertion of the CT. Accurate current transformers need close coupling between the primary and secondary to ensure that the secondary current is proportional to the primary current over a wide current range. The current in the secondary is the current in the primary (assuming a single turn primary) divided by the number of turns of the secondary.



Current transformers typically consist of a silicon steel ring core wound with many turns of copper wire, as shown in the illustration to the right. The conductor carrying the primary current is passed through the ring. The CT's primary, therefore, consists of a single 'turn'. The primary 'winding' may be a permanent part of the current transformer, i.e., a heavy copper bar to carry current through the core. Window-type current transformers are also common, which can have circuit cables run through the middle of an opening in the core to provide a single-turn primary winding. To assist accuracy, the primary conductor should be centered in the aperture.

Using Ampere's law

"If a magnetic field is integrated around a closed loop of wire, the value of that integral is equal to the net current enclosed by the loop"

CTs are closed loop instruments consisting of magnetic core and a secondary Winding around the core. The primary winding of the CT,

the main loop has the wire with the current and we wish to measure passed through the center of the core. The primary winding that carries the main current is said to have a single loop or winding. The wire produces the magnetic field the derives the current on the secondary winding, which is used as the output of the CT. The current on the secondary winding is proportional to the current flowing through the center of the core.

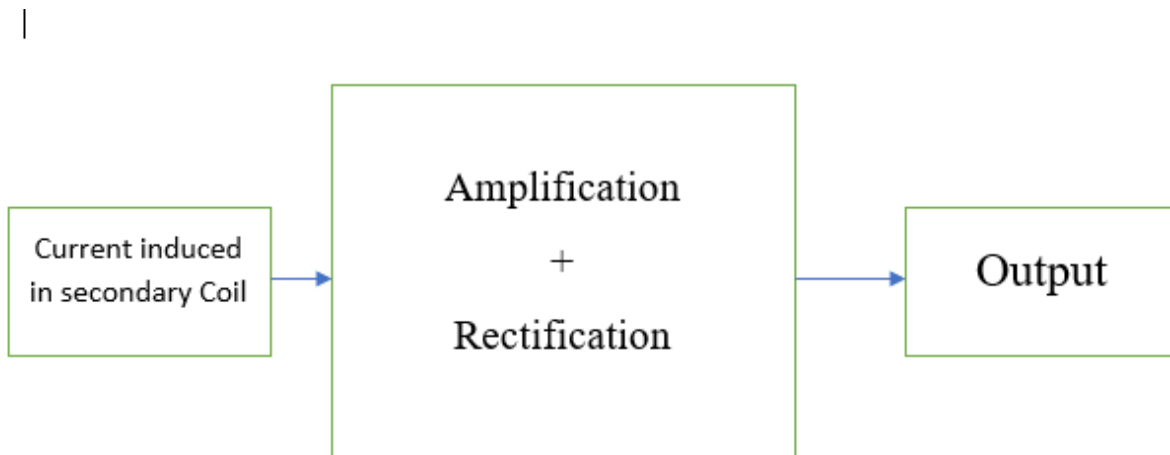
Typically, the secondary rating is 5 amps or 1 amps.

For example:

1000 to 5 rating OR turns ratio of 200 to 1

1000 amps flows through the primary winding and 5 amps through the secondary winding.

Block Diagram



The Ferrite Core being used for the project has following specifications

- Internal Diameter = 13.7 mm
- External Diameter = 28.5 mm
- Height of Coil = 28.57 mm

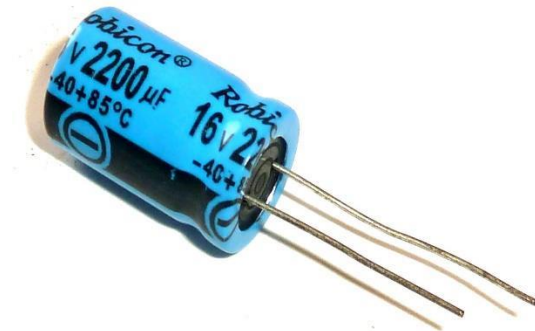
Number of Turns: 200

Components Used:

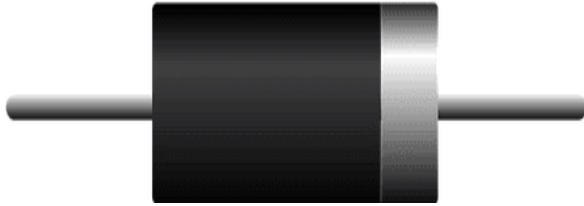
Resistors:



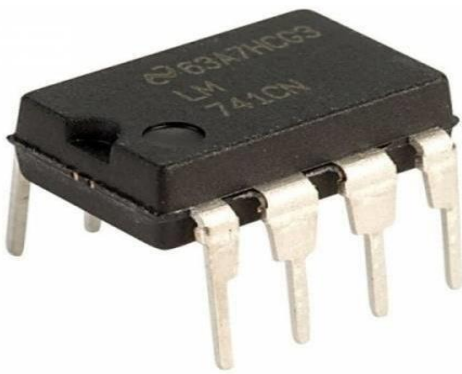
Capacitors:



Diodes:



Op Amps:



Ferrite Core:



100-Watt Bulbs:



Switches:



Simulations:

