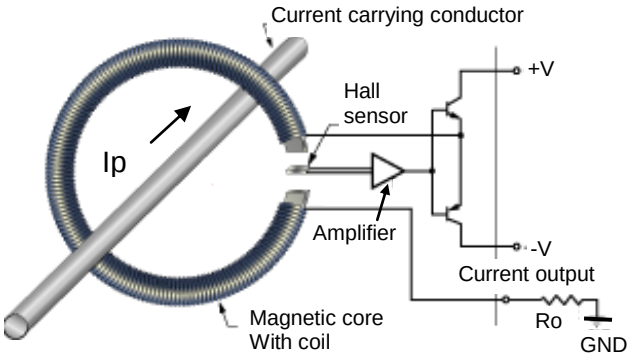
Closed Loop Hall effect current transducers

Operation principle

A closed loop current sensor consists of a Hall sensor mounted in an air gap of a soft magnetic core, a coil wound around the core and a current amplifier. The current carrying conductor placed through the aperture of the sensor produces a magnetic field that is proportionate to the current. This field is concentrated by the core and sensed by the Hall sensor. The Hall sensor is connected to the input of the current amplifier, which drives the coil. The current through the coil produces an opposing magnetic field against the magnetic field generated by the primary current Ip. Thus the magnetic flux in the core is constantly driven to zero. The coil connects the output of the sensor. Therefore the output is a current equal to the primary current divided by the number of turns on the coil. A sensor with a 1000 turn coil provides an output of 1mA per ampere. The current output is converted to a voltage by connecting a resistor to the output of the sensor and ground. The voltage output is scaled by selecting the resistor value.



The magnetic flux created by the primary current Ip is balanced by a complementary flux produced by driving a current through the secondary windings. A hall sensor and associated electronic circuit are used to generate the secondary (compensating) current that is an exact representation of the primary current.

Closed loop current sensors measure dc and ac currents and provide electrical isolation. They offer fast response, high linearity and low temperature drift. The current output of the closed loop sensor is relatively immune to electrical noise. They are the sensor of choice when high accuracy is essential.

Features:

- Wide frequency range
- Good overall accuracy
- Fast response time
- Low temperature drift
- Excellent linearity
- No insertion losses

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