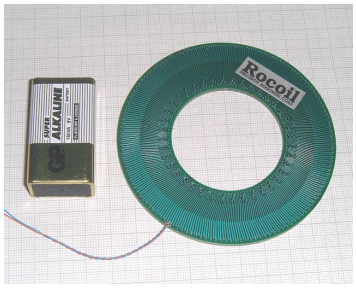
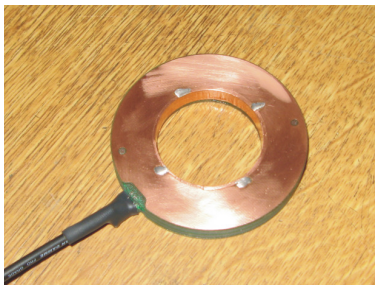
Rocoil® PRINTED CIRCUIT BOARD COILS



Basic Coil



Screened Coil

Three-Phase Coil

FEATURES

- Easily adaptable to different situations.
- Well-suited for bespoke designs.
- Good for quantity production.
- Available in a wide range of sizes as specified by the user.
- Coil winding can be screened to minimise 'noise'.
- Can be used to measure at frequencies from less than 1Hz to more than 100kHz.
- Accuracy 1%.
- Good rejection of external magnetic fields.
- Rugged construction.
- Compact construction.

INTRODUCTION

The Rocoil® Printed Circuit Board (PCB) coils are made using printed circuit techniques with tracks and vias to create a toroidal coil. Once the artwork has been prepared these coils can be produced in large quantities. PCB coils can be provided in a wide range of sizes and are well-suited for bespoke designs. PCB coils can be stacked together and connected in series to increase the output.

With a suitable electronic integrator these coils can be used to measure currents with a resolution as low as a few mA and high currents of greater than 1MA. They provide complete isolation from the circuit being measured and have no effect on the current being measured even for very low-impedance circuits.

INSTALLATION: The coil is threaded on to the conductor to be measured. For best accuracy it is recommended to mount the coil so that it is centred on the conductor and the plane of the coil is perpendicular to the conductor. PCB coils cannot be built as a 'split' version.

It is not recommended that coils are installed or removed from conductors that can carry dangerous voltages whilst they are live.

CALIBRATION: The coil calibration is defined by its mutual inductance. Coils that are supplied without integrators are individually calibrated to give their mutual inductance and the calibration values can be supplied to the user. Coils supplied with integrators are calibrated with the integrator as a pair.

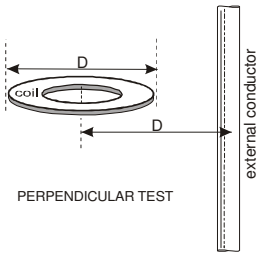
CONNECTIONS: The coils are connected to the integrator by a 'twinax' cable (twisted pair with overall screen). In some cases this is permanently attached to the coil but other options are available depending on the application such as screw connectors or direct connection to an integrator.

INSULATION: Because of the wide range of possible coil configurations we cannot give a general specification for the coil insulation. Insulation requirements are normally discussed with the user.

Coils should not be installed on uninsulated conductors when they are live.

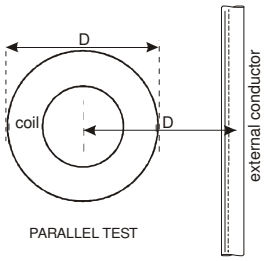
TEMPERATURE RATING: The temperature rating depends on the properties of the PCB material used. For the most common material, FR-4, this is in excess of 100°C.

INFLUENCE OF EXTERNAL MAGNETIC FIELDS: The pick-up from an external conductor is used as a quality check and all coils are tested. The coil is usually placed a distance of one diameter away from the conductor as shown in the figure. The coil is rotated to find the maximum pick-up. Pick-up is expressed as the ratio between the voltage induced by an external conductor to the voltage that would be obtained if the same conductor were threading the coil. The pick-up ratio depends on the distance of the external conductor and its orientation.



Coil Perpendicular to the External Conductor: This is a common configuration for example three phase conductors in the same enclosure. Under these conditions the pick-up ratio is less than 1%.

Coil Parallel to the External Conductor: The pick-up ratio in this orientation is usually less than 1%. The winding design incorporates a special feature so that even with a single coil the pick-up is low. We can also group the coils in pairs to reduce this pick-up even further. The pick-up ratio in this orientation is usually less than 1%.



INFLUENCE OF CONDUCTOR POSITION: If the conductor is moved from the central position by a distance equal to 0.5 x the inner radius the output will change by less than 1%.

FREQUENCY: The low-frequency performance is determined by the design of the integrator. With a suitable integrator these coils can be used to measure at frequencies well below 1Hz (-3dB). The upper frequency limit depends on the coil type and the length of the output lead. As an indication, a coil + integrator should be linear with frequency up to about 100 kHz.

OPEN-CIRCUIT OUTPUT LEADS: The direct output from the coil is very low, typically less than 100mV for 1000A at 50 Hz. There is no danger if the output leads are left open-circuit even when a current is flowing through the coil.