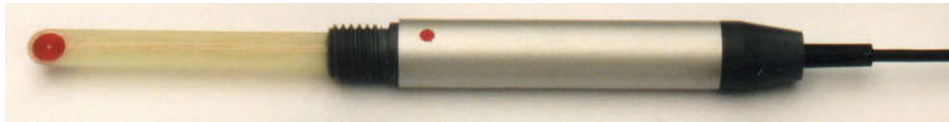


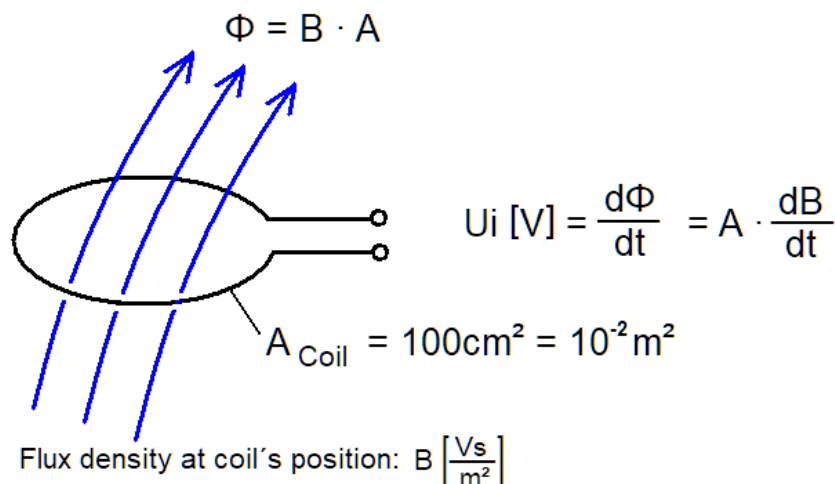
B-Measurement using a Search Coil



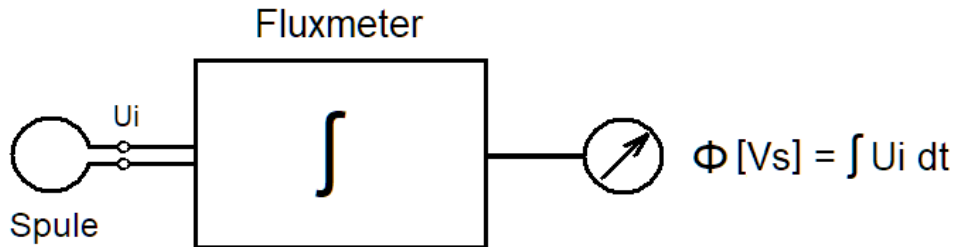
In contrast to Hall-sensors, search coils do not measure the absolute value of field values, but **changes** in field intensity. If absolute values shall be measured, it is necessary to initially place the search coil in sufficiently field-free area, and to set the fluxmeter to zero (reset). This will assign the value „zero“ to field-free condition.

Generally, induction measurements by search coils are linear by principle, while semiconductor-based sensors can be used up to certain B level only; above that level, saturation effects will limit the usability of Hall-sensors etc.

The search coil is evaluating the flux component in coil's axis only, which demands proper orientation of coil axis in direction of flux. Moreover it must taken into consideration that the search coil is averaging the magnetic flux over the area of the coil.



When connecting the search coil to the fluxmeter, which is integrating the induced voltage U_i thus calculating the change of flux $\Delta\Phi$ though the coil, it must be taken care that the fluxmeter input has the correct impedance (usually 10K Ω). The effective area indicated on the search coil is valid only for the nominal input impedance; other input impedance will cause the obtained results to be incorrect.



The equation for determination of B by means of search coil attached to a fluxmeter is

$$B = \frac{\Phi [Vs]}{A [m^2]}$$

In case of a search coil area of 100cm² B calculates as

$$B = \Phi / 100\text{cm}^2 = 100 * \Phi [Vs/m^2]$$

Φ is read on the fluxmeter display. In case of a fluxmeter reading of 1Vs, B would be 100T, in case of a fluxmeter reading of 1mVs, B is 100mT.

If the fluxmeter range selector is set to „E-5“ (which means the display reading is to be multiplied by a factor of 10^{-5} in order to achieve the actual flux), for example a display reading of 1000 is corresponding to a B of 1T:

$$1000\text{digits} \implies 1000 * 10^{-5}Vs = 10^{-2}Vs \implies 1T$$

In this range setting of the fluxmeter, the digits read from the fluxmeter display do directly indicate the induction B. If the fluxmeter is switched to a different range, the „decimal point“ will shift according to the selected range of the fluxmeter.