The invention relates to an apparatus for measuring a magnetic field, with a core (1) having a core material, the magnetization of which can be reversed, and an exciter coil for reversing the magnetization of the core material, wherein the core material, the magnetization of which can be reversed, is in the form of a layer or a plurality of layers (12, 14, 16) arranged at a distance from one another, and the core (10) has a maximum total expansion G, where $2.5 \text{ mm} > G > 0.2 \text{ mm}$, has a length-to-width ratio which is greater than or equal to the value of 20, and has a thickness D, where $2 \text{ um} > D > 0.2 \text{ um}$ . The invention also relates to a corresponding method for measuring a magnetic field.