

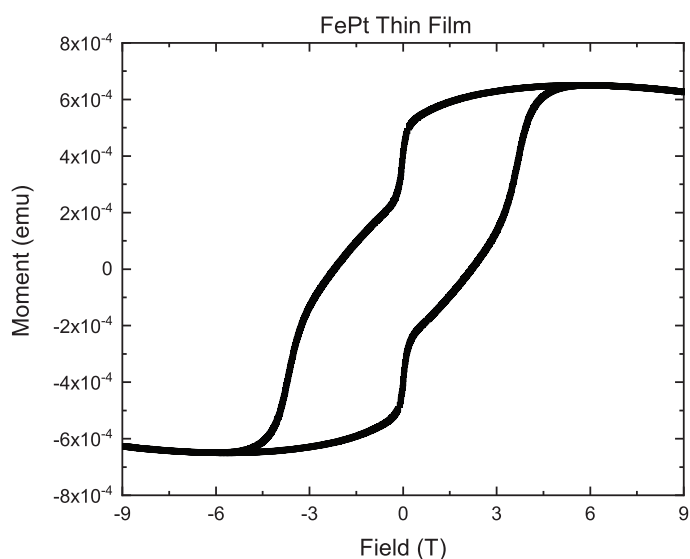
Vibrating Sample Magnetometer (VSM)

DynaCool (D525) / PPMS (P525) VersaLab (V525)

The Vibrating Sample Magnetometer (VSM) option employs a puck-based first-order gradiometer coil set and high-resolution linear transport motor that enables the PPMS to operate as a sensitive magnetometer. The static (DC) magnetic moment of the sample can be measured as a function of temperature or field. With a typical 1 second averaging time per datum, data acquisition rates are comparatively fast. Furthermore, measurements as a function of sweeping the measurement temperature or field are possible. An included set of standard sample holders enable measurements of a wide variety of sample sizes and morphologies, such as: small single crystals, thin films (can be oriented with applied field in- or out-of film plane), sintered polycrystalline pieces, and loose powders.

Key Features

- Lock-in measurement technique isolates sample signal from external mechanical and electronic noise for precise measurement of sample moment
- Linear transport motor enables centering accuracy within ± 0.04 mm
- A temperature sensor integrated within the coil set provides sample thermometry via exchange gas coupling
- Standard sample holders included are a low-background quartz paddle and brass half-tube with quartz spacers and polycarbonate capsules



Room temperature major hysteresis loop of a high anisotropy FePt thin film with an in-plane saturation field of approximately 5 T and a coercivity of 2.2 T. Sample provided by Prof. Kai Liu, Georgetown University.

Vibrating Sample Magnetometer Specifications

(for standard bore in zero field, unless indicated)

Magnetic Moment [m]

| | |
|-----------------------------|--|
| Accuracy: | $\pm 0.5\%$, using 2.8 mm dia. \times 4 mm tall cylinder (shape of included Pd reference) |
| Noise Floor*: | $< 6.0 \cdot 10^{-7}$ emu @ 300 K |
| Additional Relative Noise*: | $3.0 \cdot 10^{-7}$ emu/T or 0.5%, whichever is greater $1.0 \cdot 10^{-6}$ emu/T or 0.5%, whichever is greater (EverCool II) |
| Max Measurable Moment: | m_{max} [emu] = 40/Peak Amplitude [mm] |

Drive Parameters

| | |
|------------------------|--|
| Oscillation Amplitude: | 0.1 to 5 mm peak, 2 mm (typical) |
| Oscillation Frequency: | 10 to 60 Hz, 40 Hz (typical) |
| Averaging Time : | 0.5 to 750 seconds, 1 second (typical) |

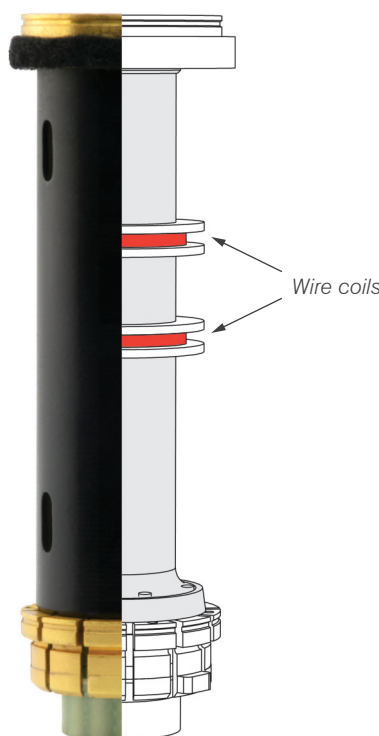
Coil Set Dimensions

| | |
|------------------|--------|
| Bore Diameter: | 6.3 mm |
| Coil Separation: | 9 mm |

Operational Range 1.8 to 400 K; 0 to 16 T

*Parameters are integration-time dependent; stated values are for integration times of 1 second at 40 Hz, 2 mm amplitude excitation. Total observed noise is the sum of the floor and relative components.

Specifications are subject to change without notice.



Schematic view of VSM coil set internal components showing the turns of wire comprising the first-order gradiometer.



Linear Transport Motor