



Model 10 Mk II Vibrating Sample Magnetometer



The Model 10 Mark II VSM is the state of the art in VSM magnetometers. Its sensitivity surpasses the sensitivity of all other commercial vector VSMs and its most typical competitor by a factor 6. Its field range and resolution make it the ideal system both for high and low coercivity materials. The accuracy in the determination of the magnetization vector, together with the high sensitivity, makes this the first VSM that can be a real alternative to a torque magnetometer for anisotropy studies on modern recording materials.

DESCRIPTION

The Model 10 Mark II VSM is a computer-controlled measurement system capable of characterizing the widest variety in magnetic samples. This system was designed from the start to be a vector magnetometer and accomplishes its outstanding vector performance by rotating the electromagnet and keeping the sensor and sample fixed relative to each other so that angular variation in the sensitivity is minimized and can be as much as 15x lower than what is observed in competing systems. The accuracy in the determination of the magnetization vector is better than $\pm 1.5\%$ and $\pm 1.5^\circ$.

In standard vector systems, the sample is typically rotated in a fixed sense coil system so that the sample shape (as seen by the coils) changes with angle when the sample is non rotation symmetric and the sample position changes due to non concentric rotation. This problem is especially prevalent in systems that use a long sample holder.

With averaging, the noise in the vector signal is below $0.5 \mu\text{emu}$, 6x better than the noise level of its most common competitor.

The system always includes a temperature option with a range of 77K to 773K and because the temperature chamber has an inside diameter of 10 mm, it allows samples that have >2 more signal than temperature options in competing systems. This in combination with the low signal noise gives this system an unsurpassed Signal to Noise Ratio.

BENEFITS OF USING the Model 10 VSM

- Noise below $0.5 \mu\text{emu}$ with vector signal detection and temperature option in place
- Highest Accuracy vector measurements
- Field noise as low as 5mOe with optional low noise probe
- Built in temperature control and vector Temperature range 77K to 773K
- Slide mounted sensor arrangement for quick sample changes
- Safe and reliable air-cooled magnet power supply

AIR-COOLED POWER SUPPLY

The magnet power supply is safely cooled by air, eliminating the use of water to cool electronics.

LONG TERM STABILITY

A very accurate feedback system ensures that the Model 10 Mark II VSM is stable and reliable for long run measurements.

EASYVSM SOFTWARE

The software supports all well-known magnetic measurements such as hysteresis and remanence loops, SFD, Delta M and Henkel plots, first order reversal curves, time but also less known measurements such as Angular and AC remanence loops.

Any series of measurements can be run without user intervention using the flexible software. The powerful data analysis software has many options including automatic subtraction of background signals and the calculation of up to 60 different test parameters.

The software research mode allows for the largest flexibility in setting up measurements available on any commercial VSM. The system administrator can customize system access to give your less experienced users access only to those functions they should use.

FLEXIBLE OPTIONS

Temperature control, automatic rotation and Vector coils are always included with the system. Optionally the Model 10 can be equipped with a Magneto Resistance test system.

FULLY AUTOMATED (ROBOTIC SAMPLE LOADING SYSTEM AVAILABLE

This system is also available as an automated measurement system with robotic sample loading under the model name X9. The X9 is often used for production quality control. Please contact our office for more information.

Model 10 VSM Mk II Vibrating Sample Magnetometer - Specifications

Magnetic Field

Maximum Field

For optimal vector performance	2.0 T
With oven/cryostat:	2.2 T
With Vector Option:	2.2 T
With optional High field option	3.1 T

Field Resolution and Noise

Range	Resolution	Noise
32 Gs	0.001 Gs	15 mGs/5 mGs*
320 Gs	0.01 Gs	15 mGs/5 mGs*
3.2 kGs	0.1 Gs	50 mGs/5 mGs*
32 kGs	1 Gs	100 mGs/15 mGs*

*When used with optional low noise field probe

MAGNETIC MOMENT

Dynamic range	0.1 μ emu – 20 emu (extendable to 100 emu)
Signal ranges	1, 2, 5, 10, 20 μ emu – 20 emu can be extended to 100 emu
Accuracy	\pm 1% + noise if sample and calibration standard are equal in shape and size.
Repeatability	\pm 0.5% + noise (Typical: 0.1%) at constant room temperature
Background signal	$< \pm$ 15 μ emu
linearity	
Drift	0.05% RMS of full scale Measured over 48 hours at constant field and room temperature
Noise (0.1 s T.C.)	
1 avg.	$<$ 5 μ emu
100 avg.	0.5 μ emu

INCLUDED WITH SYSTEM

AUTOMATIC ROTATION

Range:	\pm 540 $^\circ$
Resolution:	0.0005 $^\circ$
Accuracy and repeatability:	\pm 0.2 $^\circ$

TEMPERATURE CONTROL

All MicroSense VSMs uniquely offer continuous range temperature control from liquid nitrogen to 1000K, without any changes in hardware.

Switching measurements from room temperature to low or high temperature occurs within seconds thanks to the slide mounted temperature chamber.

Due to a unique all-quartz temperature chamber design with a large ID, the noise with the temperature control system in place is approximately 2 times lower than the noise of any competing system and the achievable signal to Noise Ratio (SNR) is approximately 5 times better.

Range:	77K, 100K-773 K
Resolution:	0.01K
Inside diameter:	10 mm

VECTOR COILS

For simultaneous detection of X and Y Vector components of the magnetic signal.

Optimal maximum field:	2.0 T
Maximum field:	2.2T
Accuracy of vector length and angle:	\pm 1.5 $^\circ$ \pm 1.5%

OPTIONS

EV1- MR MAGNETO RESISTANCE OPTION

Allows the measurement of MR samples as a function of field, temperature, field angle and sample current.

Measurement time: Adjustable from <10 seconds up.

Typical measurement time: 1 or 2 minutes with up 3000-3600 data points per minute

Ohms range:	$<$ 1mOhm to $>$ 1MOhm
Ohms accuracy:	1%
Ohms repeatability:	0.1%
Resolution:	16 bit
Temperature range:	-150 $^\circ$ C – 400 $^\circ$ C
Current ranges	\pm 2mA, \pm 20mA
Current resolution:	$<$ 0.1 μ A

SCALAR HIGH FIELD OPTION

Maximum field: 3.1 T with sample space of 5 mm.

Specifications are subject to change at any time without notice.

For more information on MicroSense VSM systems please visit <http://www.microsense.net/products-vsm.htm>