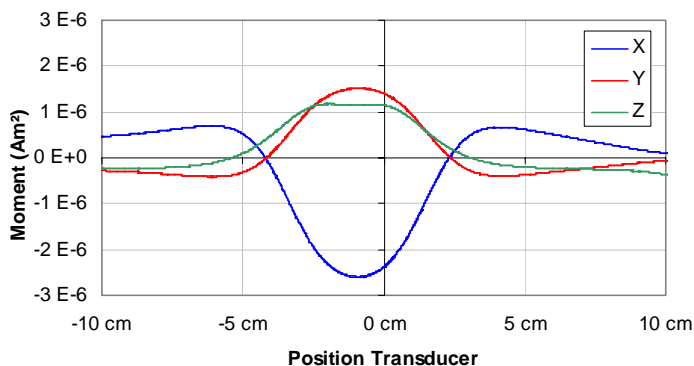


DRM-300 Rock Magnetometer

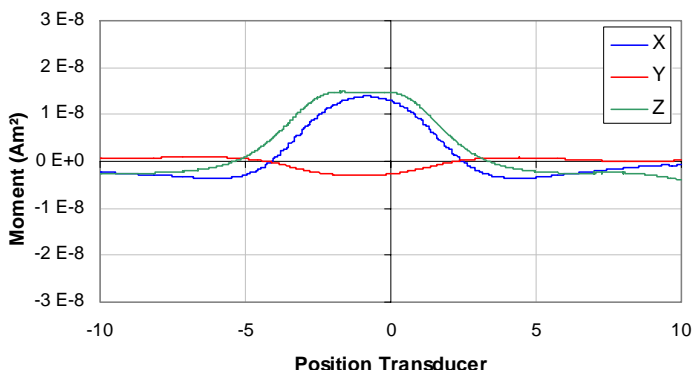
The Tristan model DRM-300 is a compact and easy to use SQUID magnetometer system for measurement of remnant magnetization of geophysical samples. The use of SQUID technology allows unparalleled sensitivity. Closed cycle refrigeration eliminates the need to transfer liquid helium. Its small footprint minimizes needed laboratory space.

Features:

- ◆ Three orthogonal detection coils
- ◆ SQUID detection circuitry
- ◆ 10^{-12} Am² Sensitivity
- ◆ Wide Dynamic Range
- ◆ Room Temperature Bore
- ◆ Closed-cycle 4-Kelvin refrigeration
- ◆ Self-replenishing liquid helium ballast for Quiet Mode operation
- ◆ Automated Sample Insertion Stage
- ◆ Internal Superconducting and mu-metal Magnetic Shields
- ◆ Compact size – small footprint



System response to two different customer supplied samples



DRM-300 Rock Magnetometer (cryocooler compressor not shown)

Tristan's model DRM 300 Rock Magnetometer offers technical enhancements to achieve superior sensitivity and dynamic range without sacrificing reproducibility or ease of use. Superconducting QUantum Interference Devices (SQUIDs) are used to detect and amplify the magnetic moment of samples placed into the sensitive volume of the detection coils. The change in detected magnetization is directly proportional to the magnetic moment of the sample. The detection coils in the model DRM-300 are wound in a Helmholtz-like configuration to provide a region of uniform sensitivity at the center of each coil set. There are three separate detection coil sets configured to simultaneously measure the three orthogonal components (B_x , B_y , B_z) of the induced field generated by the sample when it is inserted into the sensitive region of the detection coils.

A Gifford-McMahon closed cycle refrigerator liquefies gaseous helium to supply the cryogenic environment. The detection coils, SQUID sensors and superconducting shield are kept at operating temperature by thermal contact to a liquid helium ballast reservoir. The clear bore sample tube is kept at room temperature and permits samples as large as 19 mm diameter (larger sample sizes available on special order). A cryogenic temperature controller ensures millikelvin stability of the SQUID sensors. The closed cycle cryocooler is mounted far from sensors to minimize the field along the sample path.

For ultimate sensitivity, the DRM-300 can operate with the cryocooler turned off for periods of more than two days. An optional vibration isolation stand allows the system to continuously operate without significant vibrationally induced noise from the cryocooler compressors and valve motors.

Further reduction of the ambient magnetic field can be achieved by driving the superconducting niobium shield above its transition temperature to remove any trapped magnetic fields in the superconducting shield. A demagnetization circuit is standard with all DRM-300 systems.

Options

Further customization and enhancement for the DRM-300 is possible through the offered options.

◆ Vibration isolation system

The DRM-300 is designed to operate with the cryocooler turned off (for as long as 2-3 days). The detection coils, SQUID sensors and superconducting shield are kept at operating temperature by thermal contact to the liquid helium ballast reservoir. Additional vibration isolation is provided if continuous operation of the cryocooler is desired. The Vibration Isolation Stand (Option 3V) is provided for noise free data acquisition during cryocooler operation. The independently vibration isolated and weighted frame, surrounds the dewar and the mu-metal shields. It has its own independent vibration isolation footpads which rest directly on the floor, independent of the rest of the system.

◆ External Magnetic Shield options

An optional mu-metal shield mounted outside the dewar is offered for further reduction of external noise. Tristan can also supply magnetically shielded rooms or three-axis cancellation coils.

◆ Oven and de-gaussing Stage option

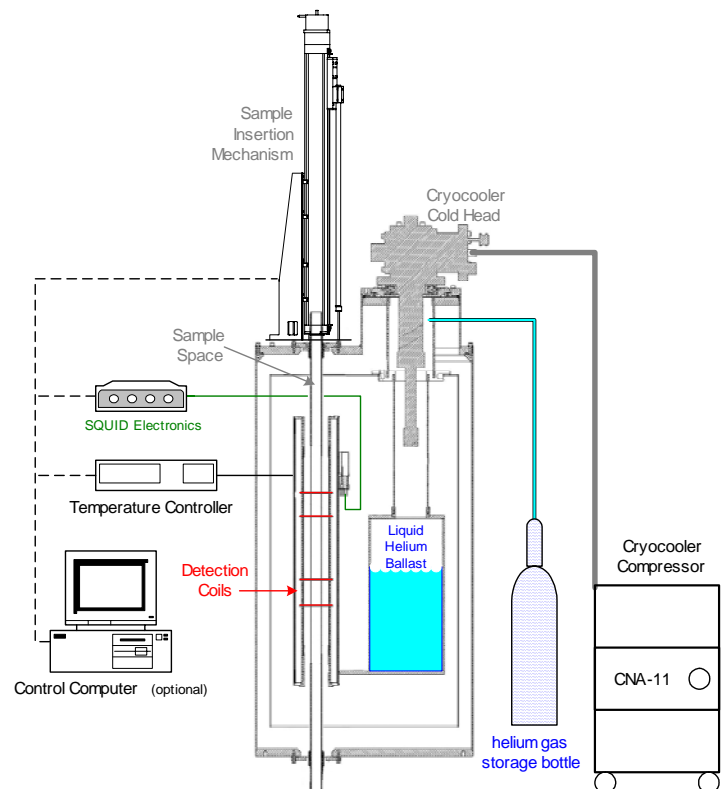
On request, Tristan can supply degaussing systems, microwave heating and/or conventional ovens for sample preparation and handling prior to measurement.

◆ Computer control, data acquisition system and software

A fully automated LabView® based control software for data acquisition and sample handling can be supplied.

System Specifications

SENSOR:	Three Superconducting QUantum Interference Devices (SQUIDs) operating at 4 K
SENSITIVITY:	10^{-12} Am ² /√Hz (10^{-9} emu) white noise
DYNAMIC RANGE:	10^{-5} Am ² (140 dB), higher ranges available on special order
CRYOGEN FILLING:	Not needed – Self-replenishing liquid helium ballast for Quiet Mode Operation utilizes commercial grade helium gas cylinders for the process.
HOLD TIME:	infinite, 2+ days with cryocooler off
SHIELDING:	Internal superconducting and mu-metal magnetic shields
POWER:	100/120/200/220 V _{AC} ; 50/60 Hz; single phase; 1.5 kVA.
DIMENSIONS	43 cm outside diameter 115 cm overall length
WEIGHT:	77 kg (168 lb) magnetometer 75 kg (165 lb) cryocooler compressor
SAMPLE DIAMETER:	19 mm diameter (other diameters available)



DRM-300 schematic (vibration isolation stand not shown)