RM100 Nanotesla Meter



- **0.1 nT resolution in 100,000 nanotesla field**
- **±0.01% basic accuracy traceable to NIST**
- **0.5 ppm/°C stability**
- **±200,000 nanotesla measurement range**
- **Analog output for recording or other purposes**
- **One button ambient field cancellation and measurement**
- **RS232 and 10 base-T Ethernet connectivity for remote programming and data acquisition**
- **Math functions (NULL, Min/Max/Average, peak-to-peak)**
- **Data storage (16384 samples) and plotting capability**
- **Settable upper and lower alarm limits**

Introduction

The RM100 Nanotesla meter is a significantly enhanced replacement for the HSM-2 Station Magnetometer. It is a precision instrument for accurately measuring the intensity of magnetic field components. The instrument can measure variations in the magnetic field intensity from 0.1 nT to 100,000 nT in an ambient field of 100,000 nT. The RM100 is ideally suited for applications including measuring

- Magnetic signatures of vehicles
- Time variation of Earth's field
- Magnetic contamination of materials
- Rock magnetism
- Equipment and satellite dipole moments and stray fields

Unsurpassed Accuracy

The RM100 uses a differential measurement technique employing two subsystems to achieve its high accuracy. The first subsystem is a user controlled field neutralization unit with a dynamic range of ±100,000 nT and a resolution of 0.1 nT. The second is a low noise analog output magnetometer that measures the difference between the ambient and neutralization fields. The neutralizing field and difference field are displayed on a large Vacuum Florescent Display (VFD) on the front panel. The difference field is also provided as an analog voltage through a connector on the back of the chassis. The factory calibration of the neutralization subsystem to ±0.01% is traceable to NIST.

High Stability Neutralization Subsystem

The neutralization subsystem includes a solenoid surrounding the fluxgate sensing element and a computer controlled current source. The coil form material was selected for mechanical characteristics which insure stability of the coil constant. The current source is controlled by a highly linear and stable 18-bit analog-to-digital converter. The resolution of the neutralization field is 1 nT. All components in the neutralizing circuit have been selected for maximum temperature and time stability.

Convenient Controls and Data Display

Measurements and instrument status are displayed on a large graphics vacuum florescent display (VFD). Functions are selected using a 16-button membrane keypad. The bright display allows readings to be viewed in a dark room and from a significant distance.

Analog Output

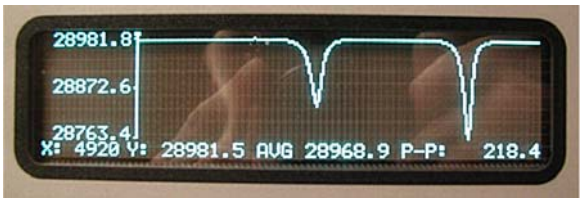
Rear panel terminals provide an analog output of ±10.00 volts dc corresponding to the selected full-scale range, so that field variations about the neutralizing level can be recorded. Front panel controls are used to select the analog output bandwidth and power line rejection filter state. Available bandwidths are dc to 10 Hz, 50 Hz, 100 Hz, 500 Hz or 1000 Hz. The standard power line rejection filter frequency is 60 Hz (50 Hz optional).

Built-in Statistics Functions

The RM100 has built-in capability to compute the average, minimum, maximum and peak-to-peak values of the measurements. This computation can be performed continuously as the data is being collected or only on the data that is stored internally in the RM100 data buffer.



A total of 16,384 data points can be stored in the buffer, which represents a little over 90 minutes of data. The data stored in the buffer can be plotted on the VFD display for immediate viewing and analysis.



Remote Programming and Data acquisition

The functions of the RM100 can be remotely programmed and data transferred through either the RS232 serial port or the 10 base-T Ethernet connection using SCPI command syntax. Baud rates range from 9,600 to 115,200. The Ethernet connection allows the RM100 to be controlled over a LAN or the Internet.

Accuracy Specifications

Function	Range	Resolution	Accuracy	Temp. Co. 0ºC - 50ºC	1000 hrs @25ºC±5ºC
Absolute field	200 µT	0.1 nT	±(0.01% of offset + 0.25% of difference + 1 nT)	See offset and difference specification	See offset and difference specification
Offset field	100 µT	0.1 nT	±(0.01% of reading + 0.2 nT)	±0.5ppm/ºC	±20ppm
Difference field	100 µT 10 µT 1 µT 100 nT	0.1 nT	±(0.25% of reading + 1 nT)	±5.0ppm/ºC	±100ppm
Analog output scale factor	10 Volts/FSR[1]		±1%	±50ppm/ºC	±100ppm
Low pass filter cutoff frequency	10, 50, 100, 500, 1000 Hz		±2% of cutoff frequency	±100ppm/ºC	
Power line reject filter frequency	60 Hz		±1.2 Hz maximum	±100ppm/ºC	
Power line rejection filter attenuation	60 Hz		40 dB minimum		

1 Full scale range

General Specifications

Digital Smoothing	
Type:	Running average
Points per average:	1, 3, 10, 50, 100
Sample rate:	3 samples per second (20 power line cycles @ 60 Hz)
RS232 serial interface	
Connector:	9-pin D female
Baud rates:	9600, 19200, 38400, 57600, 115200
Ethernet	
Connector:	RJ45
Type	10 base-T
Remote programming language:	SCPI (IEEE-488.2) syntax
Supply voltage:	100-240 VAC 50/60 Hz, 1.5A max.
Display:	256x64 dot graphics Vacuum Florescent
Controls:	16-key membrane keypad
Operating environment:	0ºC to 50ºC, 10% to 80% R.H.
Electronics unit	
Dimensions:	264 mm x 257.5 mm x 103 mm
Weight:	2.5 kg (5.5 lbs)
Sensor	
Type:	Single axis fluxgate
Dimensions:	89mm x 33mm x 24mm
Weight:	937 g
Cable length:	50 feet
Warranty:	1 year