Applied Physics Systems

Model 20

MicroMag Magnetometer

Features

- Miniature size: 0.784 inch diameter x 1.395 inches height
- High accuracy over the -40°C to +85°C temperature range
- Higher temperature models available
- High shock and vibration tolerance
- Rugged hermetically sealed packaging
- Low noise level
- Low temperature coeffi cient bias and scale factor

Applications

- Navigation systems
- Inertial guidance systems
- Magnetic anomaly detection
- Electronic compass applications
- Measurement of the Earth's magnetic field

The technology employed in the Applied Physics Systems magnetometer product line is generally referred to as a fluxgate technology. Fluxgate magnetometers employing saturable cores driven by a high frequency carrier parametrically up convert low frequency magnetic field variations to sidebands on the carrier. This approach produces a low noise, high accuracy sensor; noise levels of 0.1 nanotesla RMS/$\sqrt{Hz}$ and an offset drift of less than 1 nanotesla /°C are typical specifications for fluxgate magnetometer systems.

The fluxgate magnetometer electronics consists of a miniaturized 3-axis servo system which nulls magnetic field changes applied to the saturable cores. This design produces a very linear response over the entire dynamic range of the system.

Figure 1 shows the external dimensions of the MicroMag. Specifications are shown in Table 2. The outstanding performance parameters of these systems are the bias and scale factor stability over temperature and time.

Recently there has been speculation on the stability of the Earth's magnetic field. The Earth's magnetic field magnitude is roughly 0.5 Gauss and the MicroMag can be used to measure this with great accuracy. When used as a magnetic compass, the magnetometers can be used to determine the azimuth angle of the system to which they are mounted. Specific compass applications include use in directional drilling and logging systems and use in direction finding equipment. The low noise level of the magnetometers enables magnetic anomaly detection in applications such as locating buried ordinance.

Systems that include the digital interface have internal compensation of the system bias and scale factor over the temperature range of -40°C to +85°C. This internal compensation increases the system accuracy over temperature and eliminates the need for the system user to perform external temperature compensation.

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Table 1. Electrical Connections	
PIN	FUNCTION
1	Z Output
2	Serial In (TTL)
3	+ Voltage In (+5 V)
4	- Voltage In (-5 V)
5	Serial Out (TTL)
6	Ground
7	X Output
8	Y Output

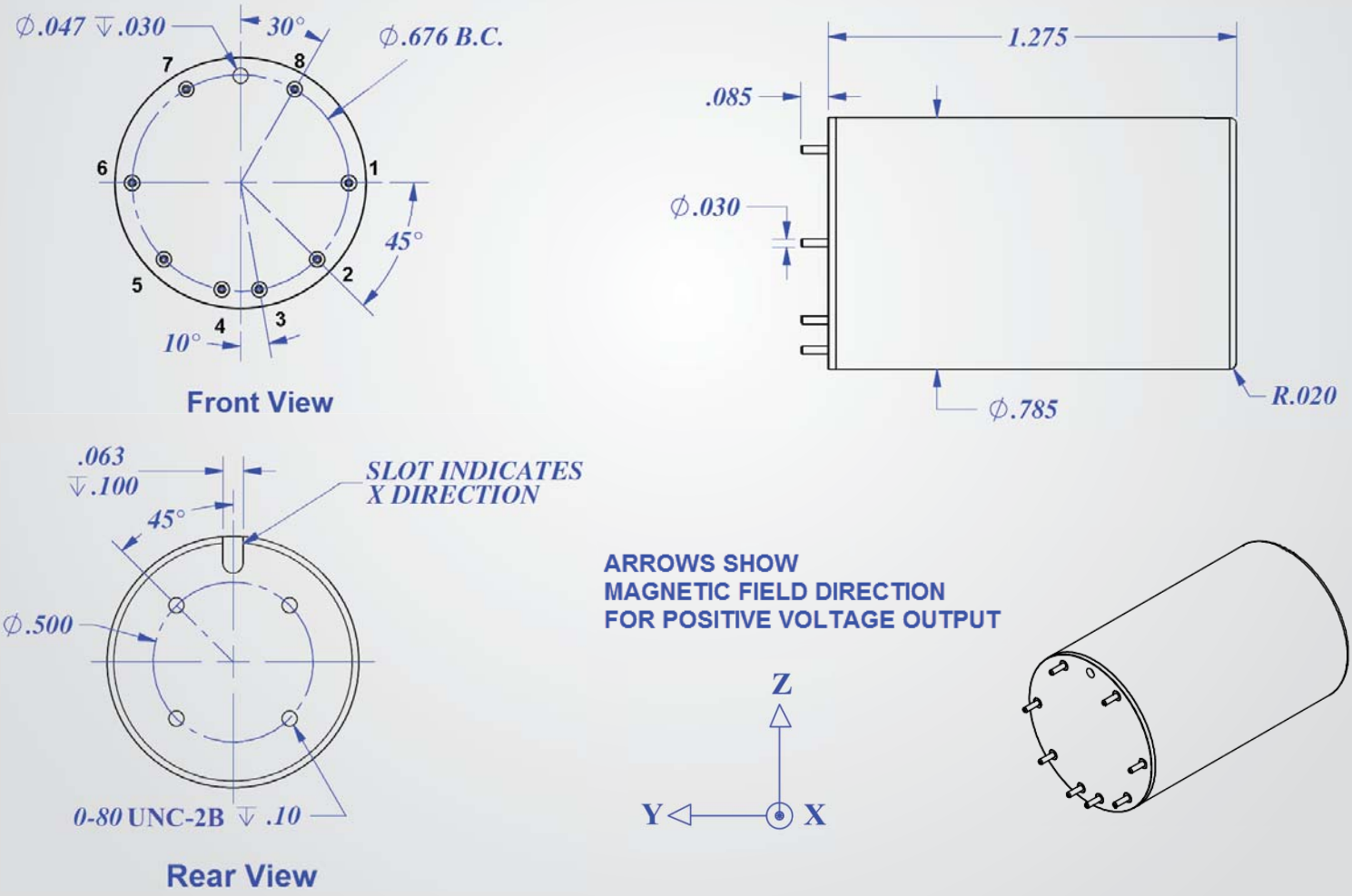

Figure 1. Model 20 MicroMag Magnetometer

Table 2. Magnetometer Specifications	
Operational Temperature	-40°C to +85°C
Scale Factor	
Analog Scale Factor at 25°C	3.000 V/100 microtesla
Temperature Sensitivity of Scale Factor	< 150 ppm/°C
Bias	
Initial Bias at 25 °C	< ±1 microtesla
Temperature Sensitivity of Bias	< ±5 nanotesla/°C
Axis Alignment	< ±2°
Noise Level (white)	< 0.1 nanotesla RMS/$\sqrt{Hz}$
Frequency Response	DC to 1000 Hz flat to ±5%
Linearity	> 0.05% Full Scale
Analog Dynamic Range	1.2 Gauss
Polarity	Positive output for all axes results when field is applied in positive X, Y, and Z directions.
Voltage	+5 V at 26 mA
	-5 V at 15 mA
Weight	30 grams
Shock	1000 gee, 1 millisecond, half sine wave, without bias shift
Vibration	20 gee RMS, random 20 to 200 Hz, 30 minutes
Size (cylindrical shape)	0.784 inch diameter x 1.395 inches height
Packaging	Hermetically sealed nonmagnetic nitronic 50 enclosure

Specifications are subject to change without notice.

Export classification of these magnetometers is under review to determine if they fall within the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR).