
AB300 Three-Axes AC Magnetic Field Sensor

High Sensitivity AC Magnetic Field Sensor

The **AB300** is a low noise, high sensitivity three-axes AC magnetic field sensor available for the measurement of sub radio frequency fields. Because of its innovative design, the **AB300** amplitude response is insensitive to the frequency of the field over its 200 Hz to 50 kHz frequency band. Accuracy at 1 kHz is 0.1 dB, and the amplitude response stays within 2 dB peak-to-peak from 300 Hz to 30 kHz.

The **AB300**'s superior low noise performance is achieved by an optimum matching of the sensor preamplifier noise characteristics with the sensor coil properties. Its amplitude insensitivity to the magnetic field frequency over its bandwidth is accomplished by an innovative low noise current amplifier design.

The basic sensing element is a rod shaped induction coil with a ferromagnetic core. The core characteristics and winding parameters were carefully selected through computer optimization to match the noise characteristics of a custom designed low noise current preamplifier. This circuit topology produces an overall sensor transfer function that resembles a high pass filter with a corner frequency equal to $L/2\pi R$ where L is the coil inductance and R is the coil resistance. Beyond this frequency, the sensor amplitude is directly proportional to the magnetic field magnitude and insensitive to the field's frequency up to the coil's natural frequency.

The preamplifier is integrated with the three orthogonally aligned sensing elements in a rectangular package that shields the coil while allowing the magnetic field to be accurately measured.



Scale factor and frequency response data are provided with each unit including relative amplitude and phase.

The **AB300** output is a high-level signal that can be safely transmitted through a cable connecting it to signal conditioning equipment without the introduction of additional noise. The **AB300PS** power supply was specifically designed by MEDA to power the AB300 and allow access to the analog signals through three BNC connectors.

Features

- ❑ Wide Bandwidth: 200 Hz to >50 kHz.
- ❑ Very Low Noise: $130\text{fT}/\sqrt{\text{Hz}}$ @ 10 kHz.
- ❑ High Accuracy: 0.1 dB @ 1 kHz
- ❑ Response Insensitive to Signal Frequency over its Bandwidth.
- ❑ Low Power: 250 milliwatts nominal.

SPECIFICATIONS

Output

<i>Field Range</i>	2000 nT peak-to-peak
<i>Voltage Range</i>	20 Volts peak-to-peak

Axes

<i>Number of Axes</i>	3 right hand orthogonal
<i>Orthogonality (nominal)</i>	$\pm 1^\circ$

Transfer Function

<i>Scale Factor (nominal)</i>	10 mV/nT
<i>Accuracy</i>	0.1 dB @ 1 kHz
<i>Frequency Response (3dB point)</i>	200 Hz to 50 kHz

Noise (fT/ $\sqrt{\text{Hz}}$)

1 kHz	700
10 kHz	130
20 kHz	115
50 kHz	100

Power Requirements

<i>Input Voltage</i>	24 VDC to 30 VDC
<i>Current Consumption</i>	9 mA nominal

Physical

<i>Size</i>	4.75" L x 4.75" W x 4.0" H
<i>Weight</i>	14.3 oz. (0.404 Kg)
<i>Extension Cable Length</i>	15 feet

