APPENDIX G: INSTRUMENT SPECIFICATIONS

REF TEK – 120 DATA ACQUISITION SYSTEM

REFRACTION TECHNOLOGY INC. – PLANO, TEXAS
(WWW.REFTEK.COM)

SPECIFICATIONS:

Specification	Description
Physical	
Size:	267 x 248 x 184 mm 10.5 x 9.75 x 7.25 in.
Weight:	3.7kg 305 g 8 lbs (2-Channels maximum weight))
Temperature:	-40°C to 60°C operating range.
Environmental:	Operates in 1m of water without leaking for 48 hours. Airtight to 1.0 psi.
Shock:	Remains operational after 1m drop (any corner) onto cement floor.
Connectors	
Line A & Line B:	A pair of identical 10 pin U77/U style connectors. Each connector provides 3 pairs of lines (+): • A (+)/B (-) Receive telemetry data and/or commands • C (+)/D (-) Transmit telemetry data and/or commands • E (+)/F (-) Sync
Power:	PTO7A12-8S style connector. Provides input +12 VDC supplied from battery.
Sensor:	PU283/U style connector. Provides for a direct connection from the AM to the sensor.
Power Requirements	
Battery:	Two 12 volt lead acid battery (7 Ah).
Signal Input	
Input Impedance:	10 megohms, 330pF, differential
Broadband Dynamic Range:	130dB (noise power ratio test @ 125 sample per second [sps])
ADC Type:	Delta-sigma modulation
Sample Rage:	Multiple 50 to 48,000
Gain Settings:	Four – programmable for 1, 4, 16 and 64.

Sensor Input Signal Range:

Gain	24-Bit High Speed A/D		24-Bit Low Speed A/D	
	Actual	Reported	Actual	Reported
1	1.192μV	78.12mV	1.907μV	125.0mV
4	298.0nV	19.53mV	476.8nV	31.25mV
16	74.51nV	4.883mV	119.2nV	7.812mV
64	18.63nV	1.221mV	29.80nV	1.953mV

Data Storage	
Data Size:	32-bit two's compliment.
Base Memory:	128K EPROM 6.5Mb SRAM
Base Capacity:	Better than 1.5 million samples or approximately 3 hours 10 minutes continuous data @ 125 sps.

Specification	Description
AM Telemetry	
Protocol:	Full duplex synchronous data link control (SDLC).
Error Correction:	Packet acknowledge with modulo 8 sliding window.
Speed	3.072Mb/second
Encoding:	Bi-phase pulse = 1, missing pulse = 0
Line Impedance:	100 Ohm
Synchronization	
Timing:	Each AM on-line is timed and synchronized for simultaneous sampling within + 1.50 μsecond.
Protection	
Electrical Protection:	Line A and Line B signals circuits are protect by: • A surge arrestor located on the RT514 board (SS1-14). • A line isolation transformer located on the RT514 board (T1-6) with over-voltage diodes (D1-4) on both sides of each secondary windings.
State-of-Health	
Information Provided:	The AM reports information on battery status, clock setting, gain setting, calibration mode and the communications link.

ACQUISITION PARAMETERS

Acquisition parameters include the sample rate, transmitter frequency and number of samples desired. The operator can also determine whether the AMs calibration signal is activated during data collection. In typical use, the acquisition parameters are set according to the specific application configuration and event type. For each event type, several recording sessions are made, each at a different transmitter frequency and sample rate. The recording period is set based on event type and transmitter frequency. The listing below shows several examples of event type, typical transmitter frequency (Hz), sample rates (with applicable ADC resolution) and the corresponding number of samples (record period).

SENSOR CALIBRATION

The AM can source a 12.5Hz, 50μA signal to the sensor input for measuring the source impedance of the attached sensor. The user can also specify frequency in amplitude of calibration signal.

TELEMETRY CABLE

The telemetry cable is a *Category V* specification cable and is supplied by the customer.

SAMPLE RATES

The following table shows all available sample rates, based on a 12.288 Mhz oscillator. A 24-bit resolution ADC is used for sample rates 48000 through 4800 and a 24-bit resolution ADC is used for sample rates 3200 and below. The correct ADC is selected automatically by the AM, based on the sample rate.

Typically, different sample rates and transmitter frequencies are used in 50 Hz and 60 Hz power environments to minimize AC power effects on the data. In the table, the shaded areas indicate the sample rates typically used in a 60 Hz power environment. A few rates are typically used in both environments.

APPENDIX G: INSTRUMENT SPECIFICATIONS

EMI – ELECTROMAGNETIC INSTRUMENTS INC

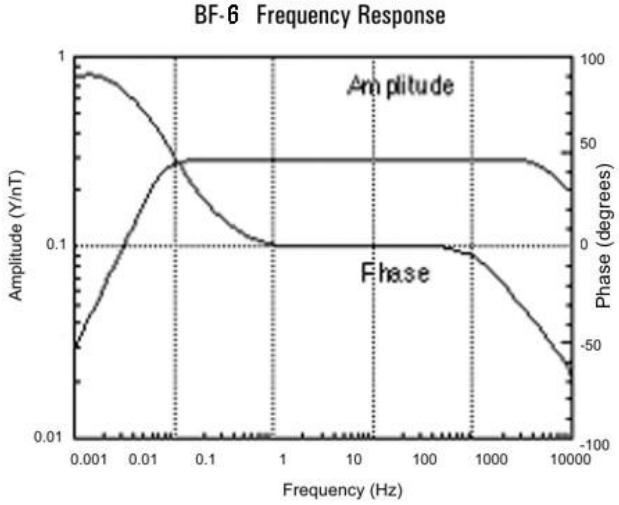
NOW EMI TECHNOLOGY CENTER – SCHLUMBERGER – BERKELEY, CA –
(WWW.EMIINC.COM)

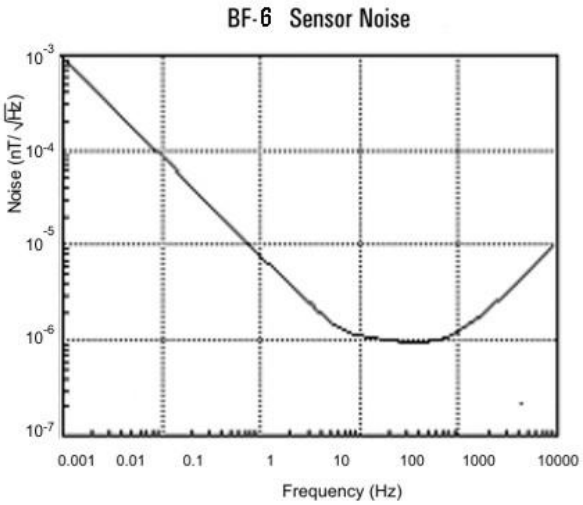
BF-6 Series Magnetic Sensors

SPECIFICATIONS:

BF-6 Magnetic Field Induction Sensor

The BF-6 sensor utilizes a magnetic feedback design to provide a stable flat response over several decades of frequency. The sensors respond as a B field detector over the flat band regions. Both the amplitude and phase responses are highly stable with variations of less than 0.1dB in amplitude and +/- one degree in phase between sensors. For the frequencies below the flat response region, the sensor response is proportional to signal frequency so that the sensor acts as a dB/dt detector. The coil is potted with epoxy and housed inside a rugged impact-resistant ABS tube. A matched low noise preamplifier is connected to the coil in a waterproof case and powered by an external +/- 12V power supply.





Features

- High sensitivity
- Very low noise
- Magnetic feedback design
- Ruggedized and waterproof
- Light weight and compact
- Low power consumption (210 mW)
- Stable phase response

Applications

- Magnetotellurics
- Audiomagnetotellurics
- Controlled-source electromagnetics
- Magnetometric resistivity
- Time domain electromagnetics

Technical Specifications

Performance

- Frequency Range: 1 Hz to -100 kHz or 1 Hz to 25 kHz
- 3 dB frequency corners: 10 Hz, 25 kHz or 10 Hz, 100 kHz
- Sensitivity (flat region): 0.3 V/nT (standard)
- Power consumption: 9mA at +/-12V

Physical

- Housing: High Impact ABS Straight Tube
- Length: 73 cm (29 inches)
- Diameter: 5 cm (2 inches)
- Weight: 1.7 kg (3.7 lbs)
- Connector: 8-pin Tajimi

APPENDIX G: INSTRUMENT SPECIFICATIONS

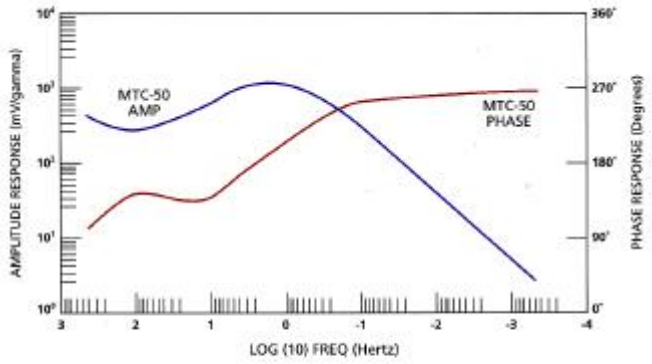
PHOENIX GEOPHYSICS LTD
(WWW.PHOENIX-GEOPHYSICS.COM)

MTC 50 (P50) Series Magnetic Sensors

SPECIFICATIONS:

MTC-50 magnetic sensor coils weigh just over 10 kg, and measure only 141 cm. They provide magnetotelluric data at frequencies between 400 Hz to 0.0002 Hz.

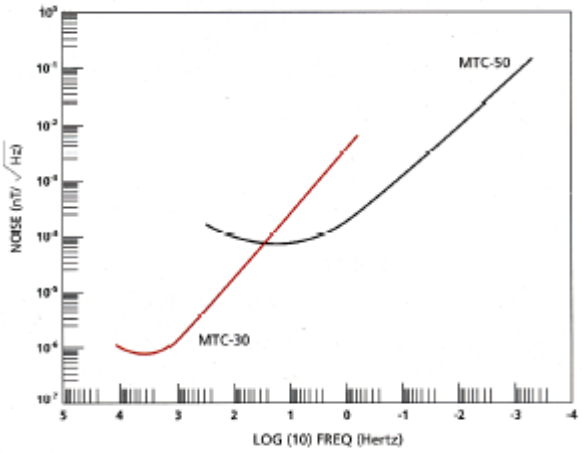
AMPLITUDE AND PHASE RESPONSE MTC-50 SENSOR



Coil model MTC-50

Overall Length	141 cm
Outside Diameter	6.0 cm
Weight	10.5 kg
Frequency Range (for MT)	400 Hz to 0.00002 Hz

TYPICAL SPECTRAL PLOT OF SENSOR NOISE



Technical Specifications

- Overall Length : 141 cm
- Outside Diameter : 6.0 cm
- Weight : 10.5 kg
- Frequency Range (for MT) : 400 Hz to 0.00002 Hz