



KEY BENEFITS

- 18 bits of resolution with 108 dB dynamic range
- Cost-effective solution that can satisfy today's most demanding applications
- Multitasking operating system that allows simultaneous data acquisition and interrogation
- Timing accuracy to 0.5 milliseconds due to synchronized sampling with optional GPS timing system
- Remote alerting capability for system event or auto-diagnostic failure
- Interconnectivity with other Altus family recorders for common triggering and shared GPS (option)
- Common user interface, file format, and support tools with other *Altus* family recorders.

MAJOR APPLICATIONS

- ◆ Structural monitoring arrays
- ◆ Dense arrays two and three dimensional
- ◆ Aftershock study arrays
- ◆ Regional arrays

INTRODUCTION

The *Etna* is a cost-effective Strong Motion Accelerograph designed to meet a wide range of earthquake monitoring applications. Based on Kinemetrics' *Altus* technology, the *Etna* provides superior resolution to meet customer needs in high dynamic range applications, where signal fidelity and data integrity are vital.

The *Etna* was designed to be easy on your budget while still providing those features most requested by end-users. The standard instrument comes equipped with 3 channels, an internal EpiSensor Force Balance Accelerometer and one Flash memory card. In addition, the *Etna* offers several optional features including: PCMCIA storage and communications, networking and GPS timing.

Developed for Microsoft Windows™, our QuickTalk® and QuickLook® software provide a user-friendly environment, making system setup, communications and rapid data analysis quick and easy. With the *Etna*, you can be assured of not only getting high quality, cost-effective instrumentation, but also of receiving Kinemetrics' commitment to the success of your projects for decades to come.

Data Acquisition

Type:	Over sampled Delta Sigma system with 24 bit Digital Signal Processor
Number of channels:	3 Channels
Dynamic range:	108 dB @ 200 sps
Frequency response:	DC to 80 Hz @ 200 sps
Resolution:	18-bit resolution @ 200 sps
Noise:	Less than 8µV RMS
Sampling rate:	100, 200, 250 sps
Input range:	± 2.5V
Chan./chan. skew:	None – Simultaneous Sampling of all Channels
Anti-alias filter:	Brickwall FIR filter. Cut-off at 80% of output Nyquist. 120 dB down at output Nyquist
Real time digital output (Opt):	RS-232 output of digital stream
Calibration type:	Kinematics test sequence

Sensor

Type:	Triaxial EpiSensor Force Balance Accelerometer, Orthogonally Oriented, Internal (Std), External (Opt)
Full scale range:	User selectable at ±0.25g, ±0.5g, ±1g, ±2g or ±4g
Bandwidth:	DC to 200 Hz
Dynamic range:	155 dB+
Calibration & test:	Calibration Coil Functional Test Calibration Coil Response Test

Trigger

Type:	IIR Bandpass filter
Trigger bandwidth:	0.1 Hz – 12.5 Hz
Channel triggering; Trigger, De-trigger:	Independent threshold for all channels
Alarm thresholds:	Selectable from 0.01% to 100% of full scale
Trigger voting:	Internal, external trigger votes with arithmetic combination
Pre-event memory:	60 sec. max for 3 channels @ 200 sps Software selectable in 1 sec. increments
Post-event time:	Software selectable, specified in seconds, 0 to 65,000 sec.

Storage

Type:	2 Fully compliant PCMCIA storage slots (Opt) PCMCIA standard 2.1. Sockets accept Type I, II, III card formats. Type I or II modem
Primary slot:	32 MB Memory Card (minimum). Optional larger cards available
Secondary slot (Opt):	Same options as primary slot for storage media. Accepts Type I or II modem with connectors
Recording capacity:	Approx. 8 minutes per MB on Memory Card, 3 channels Of 24-bit data @ 200 sps

Firmware

Type:	Multitasking operating system supports simultaneous acquisition & interrogation. Boot loader allows remote firmware upgrades
System control:	Configure sample rate, filter type, trigger type and voting, maintains communications and event storage
User interface:	Packetized protocol and simple terminal loop control and data retrieval, via RS-232 interface
Intelligent alerting:	Can initiate communications when an event is detected or if an auto-diagnostic failure occurs
Auto-diagnostics:	System can be configured to continuously check system voltage, temperature, RAM and code integrity and timing system integrity

Timing

Type:	Free running disciplined oscillator (Std); GPS (Opt)
Shared GPS:	Allows a group of interconnected Altus recorders to share one GPS module (option)
GPS (Opt):	Integrates completely with system, providing timing, internal oscillator correction and position information
Timing accuracy:	5 microseconds of UTC. GPS receiver better than 1 millisecond data synchronization of UTC. Power cycling is software controlled
Power consumption:	110mA at 12V (active)

I/O and Display

Type:	I/O Connectors, EMI/RFI and transient protection, I/O drivers and display are provided on a single front panel board
Display:	3 LEDs. Display indicates: Run/Fault, charge, event

Power input:	Mil-Style connector for charge input and external battery
RS-232 interface:	Full RS-232 interface with modem control
Interconnect input (Opt):	Mil-Style connector for IRIG out, IRIG in, Clock sync., 1 pps out, trigger in, trigger out, alarm out, real time digital output (Tx & Rx), ext. 12V out, Relay 1
EMI/RFI protection:	All I/O lines are protected from both EMI/RFI emission and susceptibility problems by ferrite filters and transient suppressors

Communications

RS-232 interface:	Parameter setup, real-time telemetry and event retrieval. Standard.
PCMCIA modem: FTP via Modem:	Remote access, initiated by the user or by the K2. Optional FTP transmission of events via dial-up ISP. Optional

Power Supply

Supplied external charger voltage:	100-250 Vac 50/60 Hz
Charging voltages:	14.9V @ fast charge, 13.8V @ float charge. Temperature compensated for sealed lead acid, gel type batteries
Battery operating range:	11V to 15V
Batteries:	Internal 12V, 6.5Ah battery (Std), 12V, 12Ah battery (Opt), external batter (Opt)
Current drain:	185mA @ 12V (standard configuration)
Power autonomy:	>36 hours (Std), >72 hours with optional internal battery

Housing

Type:	Lexan structural foam housing internally coated with EMI/RFI shielding material, 5/16" aluminum base support for mounting and coupling to sensors
Mounting and leveling:	Single hole for 1/4" stud and three adjustable feet for leveling
Size:	10.1" (256 mm) W x 15.0" (381 mm) L x 7" (178 mm) H
Weight:	20 lbs. (9 Kg) including battery

Support Software

<i>QuickTalk</i> ^{®*} :	Windows-based control and data retrieval program for easy setup and data retrieval by direct connection or modem.
<i>QuickLook</i> ^{®*} :	Windows-based data retrieval program for rapid review of waveforms and event information. Also operates with DOS communication software
<i>Antelope</i> :	Comprehensive commercial network operational and mgmt system for medium and large networks
<i>Earthworm</i> :	Comprehensive public domain network operational and management system for medium and large networks
<i>NMS</i> :	Commercial PC-based network management system for small to medium sized networks via modem or real-time data
<i>SMARTS</i> :	Commercial Open architecture user-extensible real-time data collection and processing software that runs on a variety of computers
<i>PSD</i> :	Commercial Pseudo Spectral Density software for earthquake data analysis
<i>SMA</i> :	Commercial Strong Motion Analyst software for earthquake data analysis and processing
<i>K2COSMOS</i> [*] :	Conversion software from Altus EVT file format to COSMOS v1.20 format
Format Converters [*] :	Provides option to convert and store data in ASCII and other formats. Contact Kinematics for other options.

*No charge

Environment

Operating temperature:	-20° to 70°C
Humidity:	0-100% RH

Because Kinematics continually strives to improve and enhance its products, the specification printed here may be subject to change.

* Microsoft Windows is a trademark of Microsoft Corporation