

# Obsidian

## Next Generation of Web Based, High Dynamic Range, GPS/PTP Ready Accelerographs

Ready for the *right tool* for the job?

The **Obsidian** accelerograph is Kinemetrix's NEW product matched to Kinemetrix's exemplary EpiSensor accelerometer performance. It represents a new paradigm in open-architecture seismic data acquisition systems defining the *World's Next Generation* of seismic products.

It is designed to give you the flexibility required by the earthquake monitoring solutions of tomorrow capturing very-small to very-large earthquake sequences with a single sensor while being the *most versatile* accelerograph of today. No more and no less than you need.

You expect outstanding data fidelity and spectral purity. High accuracy data timing is of course required. But it goes beyond that. There are several standard recorded data formats to select from, or you can add your own. On the fly processing of parametric data using your algorithms. Interface to major data center software packages using *their* protocols. For timing use GPS where it makes sense and/or PTP when several units are connected via Ethernet along with DC power.

And when you're ready to get into Earthquake Early Warning Systems (EEWS), the **Obsidian** is ready too. Balance communications bandwidth and data latency with not one but two mechanisms to deliver *ultra-low* latency data.

Why struggle with limited keypads and hard to read displays when you're usually not there anyway? Access the system using your favorite web browser remotely or locally and wirelessly. Where it makes sense to retrieve data locally, do it with a simple thumb drive without commands or buttons.

And for those whose job it is to maintain the station we developed Streamlined Station Maintenance (SSM) that allows you to use your browser to log maintenance activities such as software updates, site inspections, or battery replacements right on the unit. These logs can be automatically uploaded to your data center for archiving, reducing paper work in the field.

Choose from a suite of built-in Kinemetrix features, add-on packages from trusted providers or expand the capabilities of the system yourself. It's the *open-architecture* seismic data acquisition system!

Quanterra and Kinemetrix data acquisition products provide *data availability* of over 99% in several large networks year after year. Our users will tell you so.



## FEATURES

- 3 +1 sensor channels w/internal EpiSensor triaxial deck
- 24-bit Delta Sigma converter, one per channel
- Matched to Kinemetrix outstanding EpiSensor accelerometer performance
- Built-in GPS/GNSS, built-in PTP
- Record and communicate multiple sample rates
- Multiple data formats and telemetry protocols
- Ultra-Low latency data for Earthquake Early Warning Systems
  - \* 0.1sec data packet
  - \* 0.01sec DFS at 100sps
- Streamlined Station Maintenance (SSM)
- Data offloaded automatically to removable thumb drives connected to a USB host port. Parallel recording (mirroring) data on an external USB thumb drive.
- Wireless communications via cellular modem
- Extensive state-of-health monitoring, including input and system voltages, internal temperature, humidity, communication link diagnostics
- Application Programming Interface (API) to develop your own add-on software modules. You can customize real-time data processing, file formats, stream data using your own protocol, shape data with a custom filter, and so on.
- IP Security through SSH and SSL
- Transient and EMI/RFI protection on all connections
- System Status LEDs
- Rugged aluminum extruded case designed for 1m drop and 1m temporary immersion (IP67)
- Designed for RoHS Compliance and easy re-cycling
- Designed for the lowest Total Cost of Ownership (TCO)

## SPECIFICATIONS

### Channels

Obsidian: 3 +1 sensor channels w/internal sensor  
 Sensor type: Triaxial EpiSensor force balance accelerometer, Orthogonally oriented, Internal  
 Full scale range: User selectable at  $\pm 2g$  or  $\pm 4g$   
 Bandwidth: DC to 200 Hz  
 Dynamic range: 155 dB+  
 Calibration & test: Calibr. Coil Functional Test; Calibr. Coil Response Test  
 Input level: 5Vpp, 10Vpp, 40Vpp Differential Input

### Data Acquisition

Type: Individual 24-bit Delta Sigma converter per channel bandwidth-optimized 32-bit data path  
 Anti-alias filter: Double Precision FIR Filter Causal/Acausal; >140 dB attenuation at output Nyquist  
 Dynamic range: 200 sps ~127 dB (RMS clip to RMS noise - Typical)  
 100 sps ~130 dB (RMS clip to RMS noise - Typical)  
 Frequency response: DC to 80 Hz @ 200 sps  
 Sampling rates: 1, 10, 20, 50, 100, 200, 250, 500, 1000, 2000, 5000 sps  
 Channel skew: None – simultaneous sampling of all channels  
 Acquisition modes: Continuous, triggered, time windows  
 Output data format: 24 bit signed (3 bytes) in user selectable format  
 Parameter calculations: Calculations of key parameters in real-time, including JMA intensity  
 Real time digital output: Ethernet or RS-232 output of digital stream

### Trigger

Type: IIR bandpass filter (three types available)  
 Trigger selection: Independently selected for each channel  
 Threshold trigger: Selectable from 0.01% to 100% of full scale  
 Trigger voting: Internal, external and network trigger votes with arithmetic combination  
 Additional trigger: STA/LTA, Time Window

### Timing

Type: Oscillator digitally locked to GPS/GNSS or PTP; Integrates completely with system, providing timing, internal oscillator correction and position information.  
 Shared timing: 3 Ports for shared timing for multiple local units  
 Accuracy: <1 microseconds of UTC with GPS/GNSS or PTP

### Storage

Data slot: Internal SDHC Card Slot, standard 32 GB  
 System slot: Internal SDHC Card Slot, 4 GB  
 Recording capacity: Approximately 42 kB per channel per minute on Memory Card of 24-bit data @ 200 sps.  
 (33 days of 4x200sps recording on 8GB Data card)  
 SDHC Format: Linux EXT4  
 Data: Offloaded automatically to removable thumb drives connected to a USB host port. Parallel recording (mirroring) data on an external USB thumb drive.

### Communications

Ethernet interface: Real Time Telemetry (Multiple destinations TCP/IP Protocol), Parameter set up, and event retrieval (FTP/SFTP)  
 RS-232 interface: Real Time Telemetry (over modem, radio, etc.), Parameter set up, and event retrieval  
 Modem: Built in modem, Remote access, initiated by user or by the Obsidian  
 Telemetry: Real-time data via DFS, SEEDLink, Earthworm, Antelope compatible ORB server, or Altus SDS protocols.

### Instrument Software

Type: Multi-tasking operating system supports simultaneous acquisition and interrogation; allows remote and automatic firmware upgrades  
 Security: Supports SSH and SSL  
 System control: Configure sample rate, filter type, trigger type and voting, maintains communications and event storage  
 File formats: Kinematics EVT, MiniSEED, SAC, COSMOS, MATLAB, SUDS, SEISAN, ASCII, others optional.  
 Intelligent alerting: Initiate communications when an event is detected or if an auto-diagnostic failure occurs  
 Auto-diagnostics: Continuously check system voltages, temperature, humidity, and timing system integrity  
 Rapid setup: Can be configured from a parameter file  
 System timing: Supports PTP Slave and PTP Master timing (Using Internal GPS as Master clock), NTP and External 1PPS

### I/O and Display

Power input: Mil-style connector for DC power input, external battery connection, Power over Ethernet (Option)  
 Interfaces: 10/100 BaseT Ethernet Port  
 (M12 connectors) 3 x USB 2.0 Host Ports  
 USB 2.0 Device  
 3 x RS-232  
 DFS Port (RS232)  
 Linux Console (RS232)  
 POTS Modem  
 3 x Time/Power Ports (1PPS In/Out, Switched Power)  
 GPS Antenna (TNC)  
 EMI/RFI protection: All I/O lines EMI/RFI and transient protected  
 LED: System, power and event status, Ethernet Link & Data



## SPECIFICATIONS

### Power Supply

Type:	Internal high efficiency switched power supply and battery charger system with extensive SOH outputs
DC input:	9-28 VDC (>15.5VDC for Battery Charger Operation)
External AC/DC:	Universal Input 100-250 VAC 50/60 Hz
Power module:	Output 15.5 VDC
Internal battery charger:	Digitally temperature compensated output for External Valve Regulated Lead Acid (VRLA) batteries with reverse protection and deep discharge recovery.
Fuses:	None. Uses resettable Polyswitch protection
Current drain:	Current drain: 215ma @12V (w/o 4th channel sensor)

### Environment

Operating temp: -20° to 70°C Operation  
Humidity: 0-100% RH (Non-condensing)

### Physical

Size: 13.25" (L) x 7.25"(D) x 6.8"(H)  
Enclosure rating: IP67 Equivalent  
Environmental: RoHS Compliant Unit

### Support Software

File Viewer:	Multiplatform program for rapid review of waveforms and event information.
Antelope:	Comprehensive commercial network operational and management system for medium and large networks
Earthworm:	Comprehensive public domain network operational and management system for medium and large networks
Rock Monitor professional:	Rock network operation and monitoring tool
Rockhound:	Commercial open architecture user-extensible real-time data collection and processing software that runs on a variety of computers
PSD:	Commercial Pseudo Spectral Density software for earthquake data analysis
SMA:	Commercial Strong Motion Analyst software for earthquake data analysis and processing
K2COSMOS:	Conversion software from Altus EVT file format to COSMOS v1.20 format (COSMOS format can also be produced natively from the Obsidian)
Miscellaneous:	Format converters to ASCII and other formats. Web Server for command and control, Optional Software Development Kit and Compilers. Contact Kinemetrics for other options.