KINEMETRICS

Advancement through Innovation

OBSIDIAN 4X-36X

Obsidian 4X/8X/12X/24X/36X

Next Generation of Web Based, High Dynamic Range, GPS/PTP Ready, Multi-Channel Recorders

Ready for the *right tool* for the job?

The **Obsidian 4X/8X** is Kinemetrics' NEW seismic recorder and 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,* being the *most versatile* seismic recorder 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 4X/8X** 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 Kinemetrics 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 Kinemetrics 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 recorder (Obsidian 4X) or 2 x (3+1) sensor channels recorder (Obsidian 8X)
- 24-bit Delta Sigma converter, one per channel
- 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
- Optional Terminal strips for easy sensor connection
- 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)

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SPECIFICATIONS

Channels

Number:	4, 8, 12, 24 and 36
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. USB drives format: FAT32

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:	Kinemetrics 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

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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:	180ma @12V (Obsidian 4X w/o sensors)

Environment

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

Physical

Size: Obsidian 4X: 14" (L) x 5.5" (D) x 6.8" (H)
Obsidian 8X: 19" (L) x 7.5" (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 fi le 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. *No charge

Specifications subject to change without notice

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