

# QUANTERRA

A Division of Kinemetrics

## Q330M+

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### HIGH-RESOLUTION INTEGRATED SEISMIC SYSTEM SUPPORTING CD1.1 PROTOCOL

The Q330M+ is the newest member of the world-standard Q330 family, addressing the special needs of the nuclear treaty verification community. Largely based on the time-proven Q330S+ datalogger, Q330M+ leverages Quanterra's extensive experience in ultra-reliable network-aware seismic systems design.

The Q330M+ combines sampling rates up to 1kHz with a rich protocol library, including CD1.1, IEEE-1588 Precision Time Protocol (PTP), and FIPS-compliant hardware authentication.

The Q330M+ supports real-time data telemetry to several data consumers in parallel, each stream with its own data buffering, and internal, reliable recording on SLC SD card, simultaneously.



## FEATURES

### **Data Packet Authentication**

The Q330M+ includes an internally mounted Spyrus Authenticator device for applications requiring authentication.

### **Webserver for Setup and Configuration**

The Q330M+ runs a webserver to allow the user to perform setup and configuration via any browser, using a friendly GUI.

### **Auxiliary Channel Processor (optional)**

Based on the Quanterra Environmental Processor used in IRIS USArray/TA and GSN stations, the ACP adds 5 16-bit analog inputs and one serial digital interface for environmental and meteorological sensors. The ACP digitizes in phase with the Q330M+ main clock and adds the new channels synchronized to the main data channels.





## SPECIFICATIONS

<b>Channels</b>	3, optionally 6, 24-bit main channels; 6 8-bit auxiliary channels
<b>Dynamic Range (0-7Hz bandwidth)</b>	141dB RMS sine wave 144dB zero-to-peak sine wave 150dB peak-to-peak sine wave
<b>Input Impedance</b>	150 k $\Omega$ differential for active sensors; 2 M $\Omega$ differential at gain $\geq 8$ for passive sensors
<b>Input Range</b>	40Vpp at gain=1
<b>Gain</b>	Selectable per 3-channel group: 1, 2, 4, 8, 16, 32, 64, 128
<b>Digitizer Noise</b>	16dB below NLNM from 0.02 -16Hz used with standard broadband sensors, such as STS-2.5; voltage noise as low as -163dB re 1V <sup>2</sup> /Hz, depending on gain
<b>Filtering</b>	Configurable Linear or Minimum-phase
<b>Sample Rate</b>	1000, 500, 250, 200, 100, 50, 40, 20, 10, 1
<b>Time Accuracy</b>	<1 $\mu$ s when locked to GPS or PTP server
<b>Total Harmonic Distortion</b>	Better than -120dB
<b>Cross-talk</b>	Better than -130dB
<b>Data Storage and Retrieval</b>	PC/MAC/Linux-formatted removable SLC SD card, standard 8GB (up to 32GB possible); optional external USB flash drive for data copying or mirroring, standard 64GB (up to 256GB possible)
<b>Sensor Control</b>	Calibrate: step, low-THD sine wave, MLS or random binary; lock/unlock & re-center
<b>Operational Status</b>	Over 50 State-of-Health channels including temperature, voltages, currents, GPS status, Sensor boom position (6 channels)

<b>Network</b>	Ethernet (10/100BT) Full IP Protocol Stack (Linux)
<b>Authentication</b>	Hardware; supported algorithms: DSA 1024 digital signature and key exchange ECDSA Digital Signature Algorithm
<b>Protocols</b>	CD1.1, Q330 native, SeedLink
<b>Other Ports</b>	1 x USB2.0 2 X CONSOLE PORTS UP TO 115 kbaud 1 x digital I/O for vault intrusion switch
<b>Power</b>	12VDC nominal (9-36VDC operational) Consumption depending on configuration
<b>Physical</b>	Sealed, Aluminum, 18 x 4 x 6 in., 10 lbs., rubber endcaps, externally visible status and fault indicators; rated IP68 (24 hours immersion at 1m depth)
<b>Temperature</b>	Fully specified -20 to +60 $^{\circ}$ C Guaranteed operative -40 to +70 $^{\circ}$ C

Specifications subject to change without notice