Sentinel

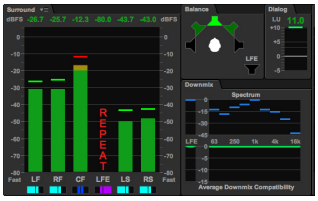
surround sound audio monitor

Broadcast Loudness and QoE Monitoring

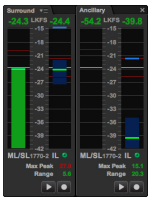
The Qualis Audio Sentinel has all your loudness measurement and logging requirements covered. Moreover, it measures virtually every parameter necessary to ensure optimum audio reaches your viewers. It operates unattended, reducing personnel requirements, and gives instant access to all measurements, whether seconds ago, or months ago.

The Sentinel proves compliance with the CALM Act, and delivers a competitive advantage in improved viewer audio QoE.

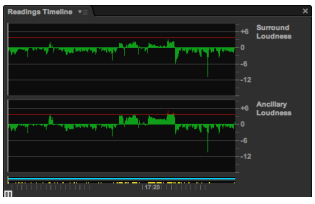
- **CALM Act Loudness Compliance** The Sentinel provides all the measurements and logging needed for FCC comliance. As-run integrated reporting and innovative analytics let you isolate problems and fix them – in transmission, ingest or content creation. Patent-pending ***dual stream™*** technology measures interleaved commercial and program segments simultaneously.
- **Unattended Operation with Alarms** puts an electronic listener and a cyber technician on constant watch, eliminating continuous aural checks by skilled listeners, plus monitoring the technical integrity of the audio stream.
- **Archival Logs** of every measured parameter, at your fingertips. The Sentinel saves 25 hours of log data internally which can be automatically transferred to your long-term storage repository.
- **Loudness and QA Forensics™ Toolbox** not just logs, but comprehensive tools to investigate loudness exceptions and quality-of-service issues. The same displays employed when measuring and reporting errors in real-time are there for analysis of all your logged data.
- **Quantitative Downmix Analysis** identifies stereo and mono downmix issues using patent-pending technology, eliminates the need to monitor or interpret graphical displays, and can generate alarms from objective quality criteria.
- **Comprehensive Metadata** fully displays PCM and Dolby Digital metadata; patent-pending technology detects intra- and interchannel errors and inconsistencies.



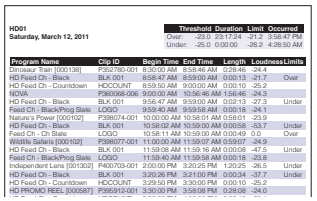
Graphical user interface *displays the comprehensive set of audio measurements performed by the Sentinel. You can view real-time data, and, because all measurements are logged, you can also review data from any point in time.*



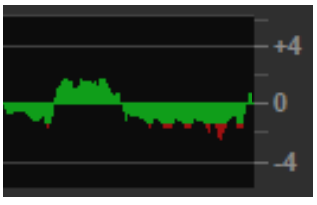
Dual loudness meters *– for surround and either downmix or ancillary programs – show continuous and integrated loudness measurements (ATSC A/85, ITU-R BS.1770-1/2, EBU R128). Gating controls switch between program and interleaved commercial segments and restart measurements at boundaries.*



Readings timeline *lets you move back and forth in time across your entire log archive. Measurement traces make it easy to spot discontinuities and areas of concern. Current position selects the data displayed in the graphical user interface.*



Report generation *summarizes logged data using program and commercial segments from your as-run logs. Generated and distributed automatically, the reports can be customized to data relevant to your compliance or quality metrics.*



Downmix analysis. *Loudness, CALM Act compliance, intelligibility and a lot more can change when your surround broadcast is heard in stereo. The Sentinel measures both formats simultaneously and compares them to alert you to discrepancies.*

Dialog balance *measures CF channel loudness relative to total loudness of other channels, gated based on the presence of CF signal. You can use it to maintain intelligibility during mixing, or to detect mixes without adequate separation.*

Analysis

Surround format	5.1, 5.1+2, 6.1, 7.1
Metering standards	VU, Nordic PPM, BBC PPM, EBU PPM, DIN PPM, proprietary 85 dB range meters
Peak amplitude	True peak responding with 4x interpolation
Dialog balance	CF loudness relative to total loudness of other channels, gating based on presence of signal in CF channel
Downmix compatibility	Computes energy lost during downmixing to both stereo and mono formats. Analysis performed in 1/30th octave resolution, displays L, R, M results in octave bands
Channel balance	Channel loudness relative to loudest channel
LFE analysis	Measures BW, downmix loss
Channel interchange	Detects front/surround reversal by level comparison, detects CF/LFE interchange by bandwidth comparison
Spectral analysis	Measures program energy in octave bands

Loudness analysis

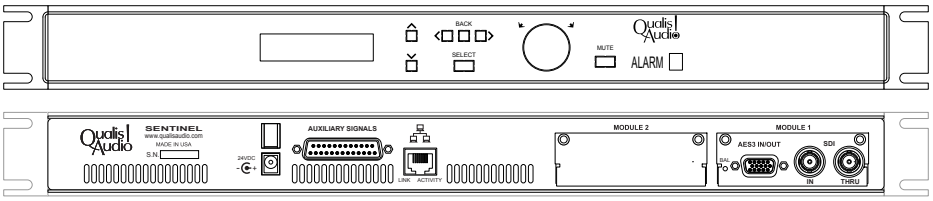
Standards	ATSC A/85; ITU-R BS.1770-1, BS.1770-2; EBU R-128, tech 3341, tech 3342
Sources	primary meter: surround program; secondary meter: downmix or ancillary program
Measurements	Momentary, short-term, integrated loudness, loudness range, maximum true peak, (primary only) downmix loudness differential
Detected errors	Compare to thresholds for integrated loudness, short-term loudness, maximum true peak, (primary only) downmix loudness differential; (primary only, requires opt552) compare dialnorm to target
Classification	Signal may be classified as program or commercial, allowing one meter to continuously monitor a broadcast stream
Duration	Minimum segment 3.2 seconds
Control	Software or auxiliary signal input

Channel analysis

Channel loss	Compares individual channel levels to threshold and duration, automatically adjusts for surround/stereo format
Excessive level	Compares individual channel levels to threshold and duration
Hum detection	Detects stable 50/100/150 Hz or 60/120/180 Hz tones

Digital analysis

Interface	Measures sample rate. Detects loss of lock, parity errors. Detects cross-interface inconsistency.
Data	Detects repeated samples (digital DC), digital clipping. Measures bit activity, active word length. Detects cross channel inconsistency.
Metadata	Analyzes status bit metadata. Detects metadata inconsistency



Other analysis

DC inputs	Compare to min/max values
Temperature	Compare to min/max temperature

Errors & alarms

Error tolerances	Individually configurable error thresholds and duration
Alarms	4 alarms based on configurable selection of error conditions
Alarm delivery	SNMP, email, GPI, audible, visual notifications

AES digital input module

Input format	AES-3 120 Ω balanced or 75 Ω unbalanced
PCM inputs	4 AES-3 in (8 ch.) on 1 DB15HD
Sample rate	32 to 192 kHz, each stream asynchronous to others
Word width	16 to 24 bits
Dolby coded inputs	Up to 8 channels decoded from 1 of 4 streams on 1 DB15HD (requires opt552)
Cables	Unbalanced: VGA to BNC cable; balanced: custom DB15HD to 4 female XLR cable (sep. option)

SDI digital input module

SDI input	SD/HD/3G SDI on BNC
Return loss	Exceeds SMPTE req.
SDI thru	Reclocked SDI input on BNC
AES inputs	4 AES-3 in (8 ch.) on 1 DB15HD, 120 Ω balanced or 75 Ω unbalanced
PCM inputs	4 pairs (8 ch.) from 2 selected groups on SDI input or 4 pairs (8 ch.) from 4 AES-3 in
Sample rate	32 to 192 kHz, each stream asynchronous to others
Word width	16 to 24 bits
Dolby coded inputs	Up to 8 channels decoded from 1 of 4 streams on SDI input (requires opt552)

Analog input module

Connection	8 ch. on 25 pin D-sub, TASCAM format, balanced or unbalanced
Impedance	1 MΩ, each side to ground
Max. input	+28 dBu or +22 dBu, selectable
CMRR	>50 dB to 2 kHz, 10 Ω imbalance
Response	±0.1 dB, 20 Hz to 20 kHz
Crosstalk	>80 dB, 20 Hz to 20 kHz

Auxiliary signals

Connection	25 pin female D-sub
LTC input	Balanced, 22 kΩ, 5Vpp max
Auxiliary inputs	6, 0 to 2.55VDC, unbalanced, 340 ms sampling interval
Control inputs	4, 2 per Loudness meter, 0.6V low, 2.7V high, 5V max input, 40 ms minimum width
Alarm outputs	4, open-collector, 24V/100mA max

Miscellaneous

Network	10BASE-T Ethernet, RJ45 with status LEDs. DHCP or static configuration, NTP time synch.
Chassis	1.75" H (1U) x 17" W x 7" D (8.9 cm x 54.2 cm x 17.8 cm)
Power	24V at 0.5 A max from external adaptor, 100V/120V/240V, 50/60 Hz, 15W
Breakout adapter	DB25 to screw terminals
Documents	printed user manual

Standard Configurations

Sentinel-D	AES Digital Input
Sentinel-S	SD/HD-SDI Digital Input
Sentinel-A	Analog Input
opt552	Dolby-D/E decode

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we're listening

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The Qualis Audio Sentinel hardware and software are subject to multiple pending patents.