Metering Solutions for Broadcast and Production
Eyes on Your Audio

RTW
EYES ON YOUR AUDIO
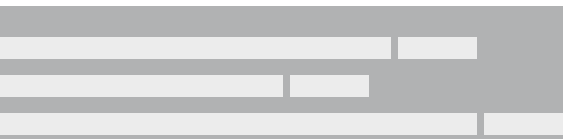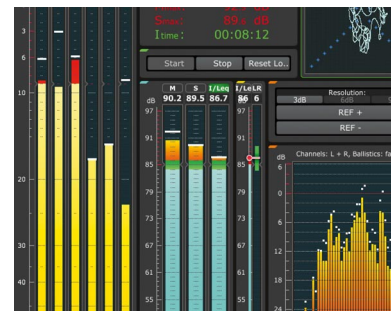
Loudness Analysis
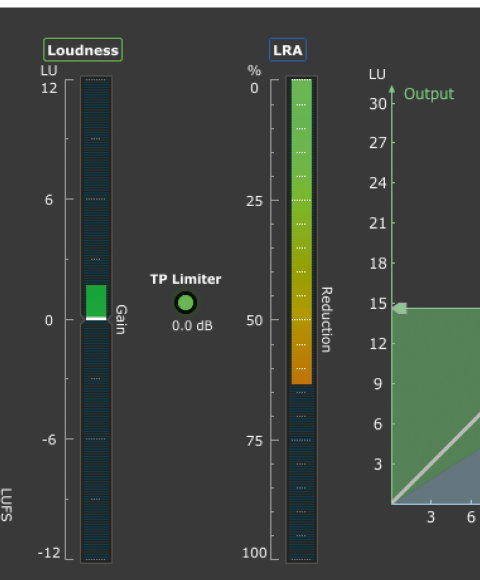
Loudness Analysis and Handling in TV and Radio Broadcast

Since 2012, a reliable and standardized method for evaluating program loudness is the main element in radio and TV production and broadcast. It became necessary in order to avoid abrupt volume level changes when changing different program types and channels. The need to compensate for this by permanently adapting listening levels is one of the common complaints that broadcasters receive from their audience.

Broadcasting and practically the entire global multimedia industry took the opportunity to eliminate the notorious problem of inconsistent loudness. To achieve this, continuous loudness analysis in all steps of the production and distribution chain has been implemented. The current recommendations like ITU (BS.1770 and BS.1771), ATSC (A/85), ARIB, or EBU (R128) provide binding standards for comparing loudness measurements and enabling a global exchange of programs on the basis of unified evaluation criteria.

An important part of these recommendations is the consideration that it is essential to adapt the time constant of the loudness measurement to the application. The evaluation of frequency, measuring of individual channels with short integration time period (production), signal summation with average integration time period (production and broadcast) and programm loudness measuring (broadcast and monitoring) are a few of the requirements for loudness monitoring. To cater for this, EBU for Europe has established "momentary" (M), "short-term" (S) and "integrated" (I) integration times in R128, based on ITU-R BS.1770-4/ 1771-1. These and other parameters are part of the „EBU Mode" to provide comparable loudness measurements. But also other continents took up these loudness values and integrated them into standards with similar specifications.

As an example, a live broadcast from a sports event in surround sound will need short time analysis of loudness in real time to be able to react fast whereas a long term logging of loudness history is needed for distribution at the broadcasting centre.

The RTW instruments featured in this brochure will provide efficient loudness measurement tools fully complying to the EBU, ITU, ATSC, ARIB, AGCOM, OP-59, and CALM Act recommendations. Also loudness measurements for cinema productions acc. to Leq(), TASA, and SAWA standards can be proceeded. On top of this, nearly all products feature a special ‚Custom' mode for users who want to set up their loudness measurement parameters individually, e. g. for non-standardized applications.

Solutions

The RTW TouchMonitor product lines and the software of the RTW Masterclass Plugins series all feature full implementations of the latest loudness standards and recommendations by EBU, ITU, ATSC, ARIB, AGCOM, OP, and CALM Act. The loudness measurement tools available in these products cover broadcast, production and editorial workflows as well as distribution, quality control, and logging. In addition to numerical and graphical loudness level displays for stereo, multichannel and surround signals, the available instruments also include True Peak and TP Max measurements as well as RTW's unique „MagicLRA" for intuitive visualization of the Loudness Range (LRA).

TouchMonitor TM3-3GS   TouchMonitor TM3S   TouchMonitor TM9   Mastering Tools
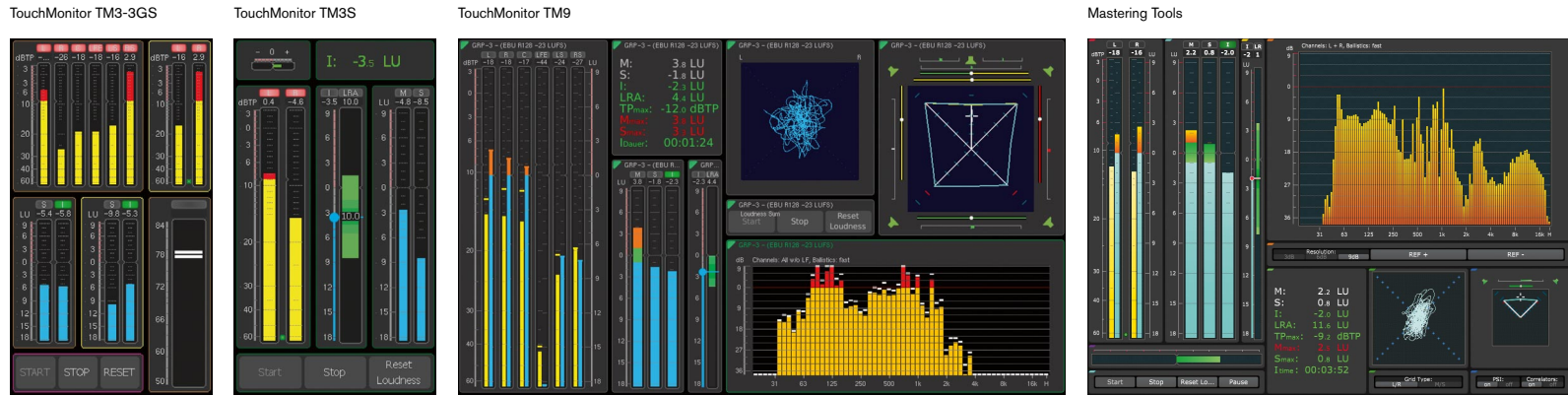
Facts and Figures

- Loudness metering with versatile adjustable parameters acc. to all global standards
- Loudness bargraphs for each channel of mono up to multi-channel and surround signals
- Depending on the standards various selectable absolute and relative loudness scales

- Additional PPM or True Peak bargraphs selectable
- "M" bargraph for the momentary summed loudness of all connected channels with 400 ms integration time
- "S" bargraph for integrated display of short time periods
- "I" bargraph for the loudness value of program loudness
- Loudness Range instrument with „MagicLRA" mode

The Loudness Display

RTW devices and the software can visualize loudness in various ways. For stereo or multichannel sources, the loudness of each single channel and the summed loudness of all channels can be displayed in bargraphs with relative (LU) or absolute (LUFS/LKFS) scales and as numerical values. All lines fully conform to the recommendations including the "EBU mode" for perfect comparability of measuring results. Alternatively, the "Custom" mode allows for individual configuration of all loudness parameters including integration time, gating, scales, and others. As a software option, the TouchMonitor TM7 and TM9 can also use the Radar Meter for circular Loudness display or longitudinal chart.

Loudness-Processing

Beside the measuring tools to meet the demanded loudness values on production and distribution, RTW provides the CLC – Continuous Loudness Control as a tool for the regulation of the loudness of unknown live audio in real time and for the correction of loudness to the defined values of the selected standard keeping the dynamic structure and the intention of the audio signal.

EBU   ITU   ATSC ADVANCED TELEVISION SYSTEMS COMMITTEE   ARIB   AGCOM   OP 59 FreeTV Australia   CALM Act FC Federal Communications Commission   SAWA GLOBAL CINEMA ADVERTISING ASSOCIATION   TASA

Intuitive, Flexible, Freely Configurable

TouchMonitor: Intuitive and flexible audio metering, freely configurable

The comprehensive and modular software concept of the Touch-Monitor devices allows you to purchase just the features you actually require. This puts you in control, defining the functionality of an individual TouchMonitor that suits your needs best. New instruments and functions can be added as software modules (licences) to the device at any time.

The graphical user interface used in the TouchMonitor units is controlled simply by using your finger or a mouse. Instruments can be scaled, randomly positioned and combined in almost every way. Even multiple instruments of the same type, assigned to different input channels and configurations, can be displayed simultaneously.

Features

- Easy and fast touch screen control
- Comfortable onscreen help
- Highly flexible screen layout options with scalable instruments
- Powerful DSP platform for parallel display of multiple instruments
- Up to 16 ch. audio interfacing including analog, AES3 and AES3id (depending on selected hardware version)
- 3G-SDI interface for up to 32 audio input signals (hardware version for TM7, additional option for TM9)
- 32 ch. audio interfaces for Dante™/ST 2110 or Ravenna/AES67/ST 2110 AoIP network connection
- Ethernet/LAN, USB, VGA and GPIO ports
- 7" (TM7/TMR7) or 9" (TM9) touch screen 16 : 9 TFT
- Standard Software for the simultaneous display of up to 4 channels (up to 2 x 2-ch. PPM, TruePeak meter, correlator, global keyboard, gain reduction)

- Modular expandable via software licences (options) with additional instruments and functions:
  - Multichannel mode for the simultaneous display of more than 4 channels (not TMR7) and Surround formats
  - Loudness and True Peak measurements acc. to EBU R128, ITU-R BS.1770-4/1771-1, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act, Leq(), SAWA, TASA; Custom mode, SPL mode, summed and numerical displays, LRA
  - Real Time Analyzer (RTA)
  - Surround Sound Analyzer (SSA) (not TMR7)
  - Loudness Radar Meter (TC electronic®) (not TMR7)
  - RTW Premium PPM with Audio Vectorscope (VSC)
  - Timecode Reader with program loudness recalculation
  - BLITS Analyzer and Generator (not TMR7)
  - Logging Data Server with Chart instrument
  - Immersive Sound Analyzer (not TMR7)

Choose Your Back Panel

TM7 and TM9 are multifunctional units for parallel display of up to 32 audio channels. Depending on the device configuration, the units carry 16-channel audio interfaces for analog, AES3, or AES3id audio signals, a 3G-SDI interface for audio streams, or a 32-channel Dante™ interface for connecting to a Dante™ AoIP network. TMR7 is a special version for radio applications with a specific audio interface providing up to 4 channels AES3 audio via XLR connectors. Available as table-top or OEM devices, the units provide the intuitive GUI with touch screen control and the modular software approach.
Choose your individual device (unit and audio interface) or one of the preconfigured models.

Audio Interfaces for TouchMonitor TM7

HW20711
8 x analog in
4 x AES3 in *
4 x AES3 out *

HW20712
8 x analog in
4 x AES3id in *
4 x AES3id out *

HW20714
8 x AES3 in *
8 x AES3 out *
3G-SDI In/Thru

HW20715
8 x AES3id in *
8 x AES3id out *

HW20717
32 x Dante™/
ST 2110 AoIP

HW20718
32 x Ravenna/
AES67/ST 2110
AoIP

Audio Interface of TouchMonitor TMR7

2 x AES in XLR *
2 x AES out XLR *

Audio Interfaces for TouchMonitor TM9

HW20911°
8 x analog in
4 x AES3 in *
4 x AES3 out *

HW20912°
8 x analog in
4 x AES3id in *
4 x AES3id out *

HW20913°
8 x AES3 in *
8 x AES3 out *

HW20914°
8 x AES3id in *
8 x AES3id out *

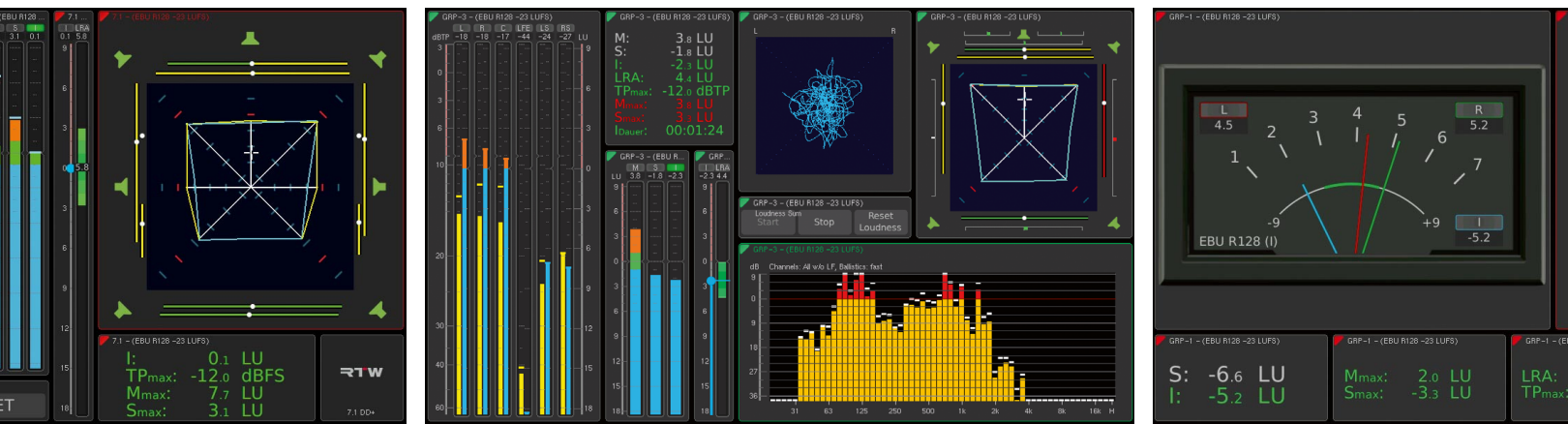**HW20915°**
16 x analog in

HW20917
32 x Dante™/
ST 2110 AoIP

HW20918
32 x Ravenna/
AES67/ST 2110
AoIP

° 3G/HD/SD-SDI interface HW20930 can be added

* One AES3 stream always contains 2 audio channels.

What Tools Do You Need?

TouchMonitor Software Modules (Optional Licences)

A totally modular software concept means that you have to purchase features that you actually require. This puts you in control, defining the functionality of an individual TouchMonitor that suits your needs best. All units come with a basic software package allowing for PPM, TruePeak, and correlation measurements of up to 4 input channels at a time. The PPM supports various analog and digital scale types as well as peak hold, peak memory, and Over indicators. Other or new instruments and functions like Multichannel, Loudness or Surround Sound Analyzer can be added as software modules (licences) to the device at any time, either together with the order of the unit and the selected audio interface, or at a later point in time just by starting the order process from the "Licences" menu of the TM unit.
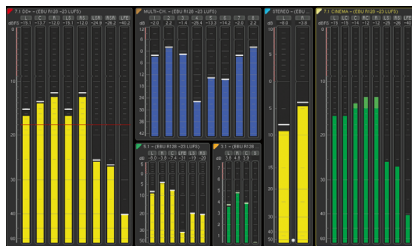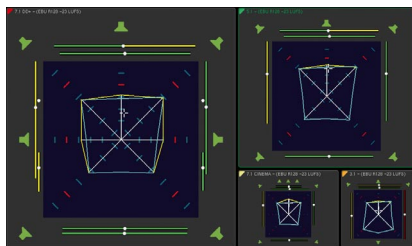

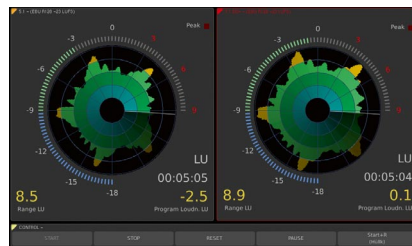SW20001: Multichannel Mode
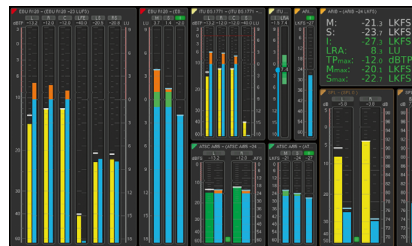
SW20002: Loudness and SPL Display
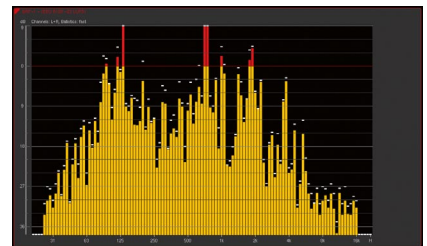
SW20003: RTA - Real Time Analyzer

SW20004: SSA - Surround Sound Analyzer

SW20005: Radar Display

SW20006: RTW Premium-PPM plus Vectorscope
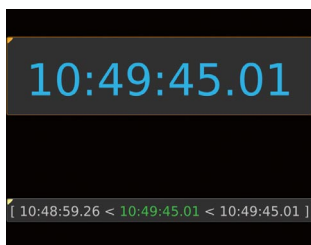
SW20008: TCR - Time Code Reader

SW20013: BLITS - Black & Lane's Ident Tones for Surround

SW20014: Logging Data Server
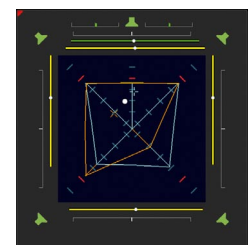
SW20015: Immersive Sound Analyzer

Ask For Customization

TouchMonitor OEM Versions

The TouchMonitor devices are available in sturdy table-top frames with movable table-stand as well as without frame as OEM versions for mounting into individual front panels or even into mixing consoles. Also the seamless integration into the surface of a console is possible. Some of the prominent manufacturers like Lawo, Studer, Calrec, SSL and Stagetec deliver their famous large scale broadcast consoles with customized build-in TouchMonitors.

Loudness Compact, Intuitive, Flexible

TouchMonitor TM3 Smart | TM3-3G Smart

The compact TouchMonitor TM3 units come with interface boxes for audio connection and table-top capacitive 4.3" touch screens for vertical or horizontal use and intuitive preset control. They feature professional entry-level Loudness, True Peak and PPM metering for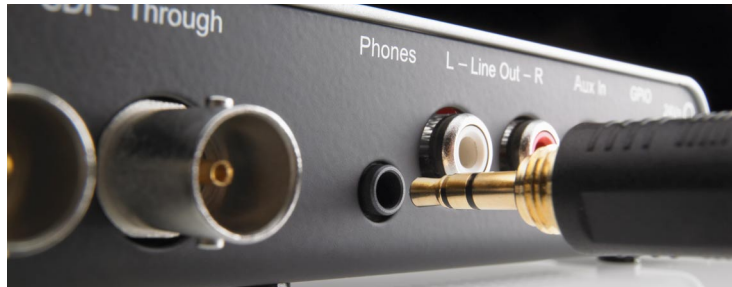 analog and digital audio (TM3 Smart) or 3G-SDI audio with 16-channel deembedder, AES3 outputs and monitor controller (TM3-3G Smart). The Devicer DC1 software allows the selection, configuration and positioning of instruments for individual screen layouts. The devices can also be ordered with mounting adapter for rack-mounting.

Features:

- 4.3" Touch screen for vertical or horizontal use
- Flexible display layout with scalable instruments
- Separate interface box with audio I/O, USB, GPIO
- TM3 Smart: analog or digital Stereo (analog balanced/unbalanced, S/PDIF) or up to 6-channel AES3 operation
- TM3-3G Smart: 8-channel operation for 3G-SDI audio with deembedder
- Loudness measurement acc. to: ITU-R BS.1770-4/1771-1, EBU R128, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act, customer specific
- Single channel and summing loudness bargraphs

- Loudness range (LRA) with "MagicLRA" mode
- PPM, True Peak, SPL, Dialnorm
- Correlation, numerical display
- Preset configuration with Devicer DC1 software for Windows® and Mac OS X®
- TM3 Smart: 6-channel version (stereo, multi-channel, 5.1) with Timecode Reader, Moving Coil, and Chart instruments
- TM3-3G Smart: 8-channel version with independent 16-channel 3G-SDI deembedder with 8 x AES3 out and analog stereo out, Monitoring controller with onscreen level fader, Timecode Reader, Moving Coil, and Chart instruments

Ultra Compact USB Loudness Meter

TM3-Primus

The ultra compact TM3-Primus provides an entry-level model with a full set of easy-to-read high quality instruments for multi-functional loudness measurements (analog, digital, via USB). Its USB Hybrid function with RTW USB Connect plug-in allows direct access to and simultaneous monitoring of audio signals from a DAW or an audio application. TM3-Primus is available as table-top device or in a rack frame for rack-mounting.

Features:

- 4.3" Touch screen for vertical or horizontal use
- Optimized display layout with selectable instruments
- Audio: analog (Stereo, unbalanced), S/PDIF (Stereo), Micro-USB (Stereo, 5.1)
- Micro-USB also used for power supply (USB mains adapter, computer)
- Loudness measurement acc. to: ITU-R BS.1770-4/1771-1, EBU R128, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act
- Summing loudness bargraph for one of the values (M, S, I)
- Loudness range (LRA) with "MagicLRA" mode
- PPM, True Peak, Moving Coil (British, VU, BBC)

- Correlation, numerical display
- Loudness Chart
- 2-channel Audio Vectorscope
- Real Time Analyzer (RTA, 31 bands)
- Monitoring instrument with onscreen level fader
- Downmix for USB Surround signals, output via S/PDIF-Out connector
- USB Hybrid function: Allows in connection with RTW USB Connect software simultaneous monitoring and metering directly from a DAW or an audio application

Best Loudness Metering for DAWs

RTW Loudness Tools | RTW Mastering Tools

RTW's high-quality audio metering and measurement tools are also available as pure software without the need of additional hardware. They can directly be used as easy-to-operate DAW plug-ins or stand-alone applications on Windows® or Mac® OS X based computers. As a means for quality control, the precisely working and easy-to-read instruments ensure compliance with resulting implementation specifications required by TV and radio broadcasters.
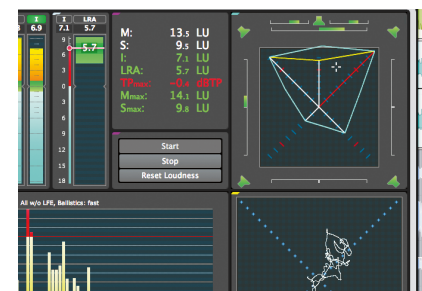
Features:

- DAW plug-in and stand-alone application
- Flexible display layout with scalable instruments
- Up to 8-ch. PPM, TruePeak, and Loudness measurements
- Loudness acc. to ITU-R BS.1770-4/1771-1, EBU R128 s1, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act, Leq(), TASA, SAWA, or Custom mode
- Single channel and summing loudness bargraphs
- Loudness range (LRA) with MagicLRA
- PPM, True Peak, SPL, Stereo Correlator, Numeric
- Selectable function parameters for extra flexibility
- All common plug-in formats for Windows® and Mac® OS X

- iLok copy protection (iLok License Manager and iLok Account required, iLok USB Smart Key recommended, not included)

- RTW Mastering Tools additionally includes:
  - Surround Sound Analyzer
  - Multi-Correlator
  - Audio Vectorscope
  - Real Time Analyzer (RTA), 1/3-, 1/6-, 1/12-octave

Process Loudness Live

CLC – Continuous Loudness Control

Continuous Loudness Control (CLC) features a unique visualization and patented processing algorithm allowing dynamic loudness processing of unknown live audio and audio files to a given loudness value with or without changing the original Loudness Range. CLC further improves the quality of loudness processing with various enhancements like batch processing of audio files,

extended audio format support, a new expert mode, Mmax and Smax limiting, report functions, and optimized presets for e. g. streaming audio. The software can be installed as DAW plug-in and stand-alone application on Windows® and Mac® OS X computers.
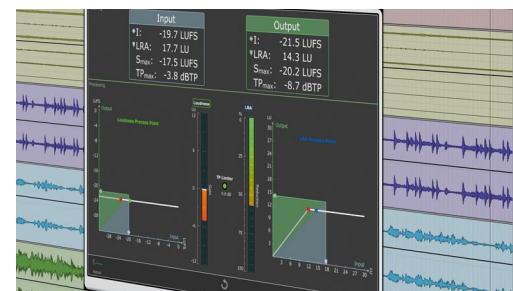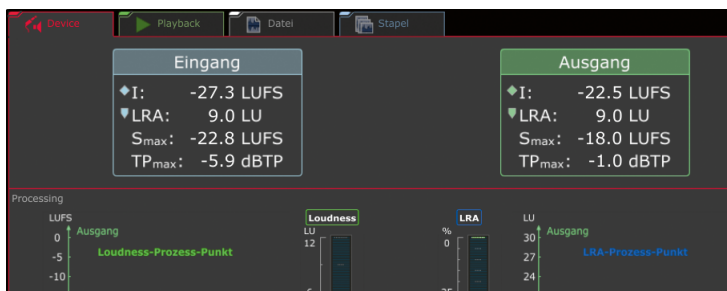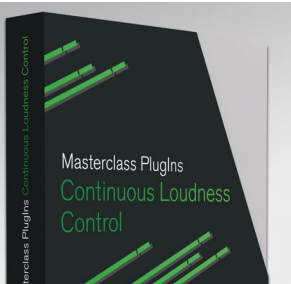
Features:

- ▪ DAW plug-in and stand-alone application
- ▪ Loudness processing of Live audio, DAW audio, and audio files
- ▪ Dynamic Look-ahead Low Latency algorithm
- ▪ Adaptive Morphing technology
- ▪ Loudness processing in real time also of unknown audio material
- ▪ Preservation of the dynamic structure and intention of an audio signal

- ▪ Loudness acc. to ITU-R BS.1770-4/1771-1, EBU R128 s1, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act
- ▪ Definable target for Loudness and Loudness Range
- ▪ Adjustable TP Limiter
- ▪ All common plug-in formats for Windows® and Mac® OS X
- ▪ iLok copy protection (iLok License Manager and iLok Account required, iLok USB Smart Key recommended, not included)

Hardware Overview

Hardware-Model	Table-top / rack-mount	3G-SDI In/ Through	S/PDIF In / Out	Analog In / Out	AES3 In / Out	AES3id In / Out	Ravenna AES67 ST 2110 AoIP	Dante™ ST 2110 AoIP	USB Audio	Max. Channels on Display	Aux In / Phone	Monitoring Controller	Loudness: ITU BS.1770-4/1771-1 EBU R128, ATSC A/85, ARIB, AGCOM, OP-59, CALM Act, Leq(), TASA, SAWA, Custom	Logging / Chart
TM9 series (table-top unit) | TM9 OEM series (without table-top housing)														
Order numbers: 20900 | 20900OEM										all versions				
plus										(not HW20917/18):				
- HW20911	● / ●	option	– / –	8 / –	4 / 4	– / –	–	–	–		– / –	–	●*	●* / ●*
- HW20912	● / ●	option	– / –	8 / –	– / –	4 / 4	–	–	–	2 ch.	– / –	–	●*	●* / ●*
- HW20913	● / ●	option	– / –	– / –	8 / 8	– / –	–	–	–	16 ch.*	– / –	–	●*	●* / ●*
- HW20914	● / ●	option	– / –	– / –	– / –	8 / 8	–	–	–	32 ch.*	– / –	–	●*	●* / ●*
- HW20915	● / ●	option	– / –	16 / –	– / –	– / –	–	–	–	(with 3G-SDI option)	– / –	–	●*	●* / ●*
- HW20917	● / ●	–	– / –	– / –	– / –	– / –	–	32	–	32 ch. AoIP	– / –	–	●*	●* / ●*
- HW20918	● / ●	–	– / –	– / –	– / –	– / –	32	–	–	32 ch. AoIP	– / –	–	●*	●* / ●*
													each also: **Radar***	+ LQL
Preconfigured TM9 Models														
Order numbers:														
TM9-RAV	● / –	–	– / –	– / –	– / –	– / –	32	–	–	32 AoIP	– / –	–	●*	●* / ●*
TM9-Dante	● / –	–	– / –	– / –	– / –	– / –	–	32	–	32 AoIP	– / –	–	●*	●* / ●*
TM9-Video	● / –	●	– / –	– / –	8 / 8	– / –	–	–	–	2 / 48* (with SDI)	– / –	–	●*	●* / ●*
TM9-Studio	● / –	option	– / –	8 / –	4 / 4	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
TM9-AES16	● / –	option	– / –	– / –	8 / 8	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
TM9-BNC	● / –	option	– / –	– / –	– / –	8 / 8	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
													each also: **Radar***	+ LQL
TM7 series (table-top unit) | TM7 OEM series (without table-top housing)														
Order numbers: 20700 | 20700OEM														
plus														
- HW20711	● / ●	–	– / –	8 / –	4 / 4	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
- HW20712	● / ●	–	– / –	8 / –	– / –	4 / 4	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
- HW20714	● / ●	●	– / –	– / –	4 / 4	– / –	–	–	–	2 / 32*	– / –	–	●*	●* / ●*
- HW20714	● / ●	–	– / –	– / –	8 / 8	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
- HW20717	● / ●	–	– / –	– / –	– / –	– / –	–	32	–	32 AoIP	– / –	–	●*	●* / ●*
- HW20718	● / ●	–	– / –	– / –	– / –	– / –	32	–	–	32 AoIP	– / –	–	●*	●* / ●*
													each also: **Radar***	+ LQL
Preconfigured TM7 Models														
Order numbers:														
TM7-RAV	● / –	–	– / –	– / –	– / –	– / –	32	–	–	32 AoIP	– / –	–	●*	●* / ●*
TM7-Dante	● / –	–	– / –	– / –	– / –	– / –	–	32	–	32 AoIP	– / –	–	●*	●* / ●*
TM7-Video	● / –	●	– / –	– / –	4 / 4	– / –	–	–	–	2 / 40* (with SDI)	– / –	–	●*	●* / ●*
TM7-Studio	● / –	–	– / –	8 / –	4 / 4	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
TM7-Rack	– / ●	●	– / –	– / –	4 / 4	– / –	–	–	–	2 / 40* (with SDI)	– / –	–	●*	●* / ●*
TM7-Mount	– / ●	–	– / –	8 / –	4 / 4	– / –	–	–	–	2 / 16*	– / –	–	●*	●* / ●*
													each also: **Radar***	+ LQL
TMR7 (table-top unit) | TMR7OEM (without table-top housing)														
	● / ●	–	– / –	– / –	2 / 2 (XLR)	– / –	–	–	–	4	– / –	–	●*	●* / ●* + LQL
Preconfigured TMR7 Models														
Order numbers:														
TMR7-Radio	● / –	–	– / –	– / –	2 / 2 (XLR)	– / –	–	–	–	4	– / –	–	● (w/o Custom)	– / ●
TMR7-Mount	– / ●	–	– / –	– / –	2 / 2 (XLR)	– / –	–	–	–	4	– / –	–	● (w/o Custom)	– / ●
TM3 Smart series (table-top unit, consisting of display unit and interface box)														
TM3S	–	1 / 1	2 / –	3 / 3	– / –	–	–	–	–	6	– / –	–	●	– / ●
TM3-3GS	●	– / –	– / 2	– / 8	– / –	–	–	–	–	8	1 / 1	(●) (monitor only)	● (w/o Leq(), TASA, SAWA)	– / ●
TM3-Primus (table-top unit)														
	–	1 / 1	2 / –	– / –	– / –	–	–	–	● (2.0, 5.1)	6	– / –	● (monitor via S/PDIF Out)	● (w/o Leq(), TASA, SAWA, Custom)	– / ●

* with corresponding software licence (optional)

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