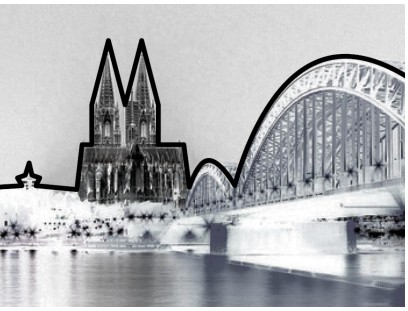
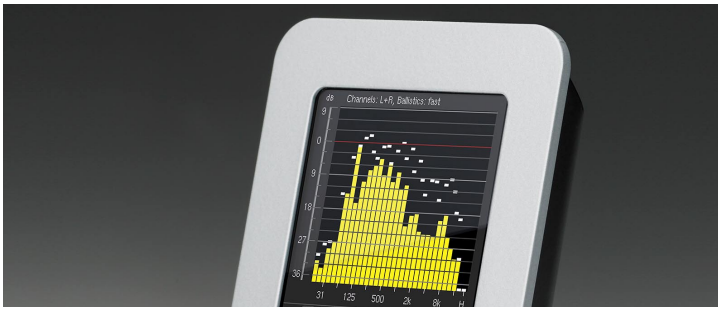
Data Sheet

TM3-Primus





RTW

EYES ON YOUR AUDIO

TM3-Primus

Optimized touch screen layout ▪ analog, digital, USB audio inputs ▪ digital output ▪ Smart software ▪ Loudness according to all relevant standards ▪ LRA ▪ PPM/True Peak ▪ Chart ▪ RTA ▪ Audio Vectorscope ▪ Monitoring ▪ Moving Coil ▪ Correlator

RTW's TM3-Primus is a highly compact and innovative, easy-to-use product, giving music, voice, and multimedia producers everything they need for loudness and audio metering, including frequently used standard instruments and parameters in a high quality unit to meet the demands of a wide variety of applications. Beside the use as a standalone desktop unit including analog and digital audio interfaces, as well as USB audio, TM3-Primus also provides an innovative USB hybrid mode. Metering will be performed right from the DAW via RTW USB Connect plug-in without the need for additional wiring or extensive signal routing. TM3-Primus will process and visualize the information simultaneously to monitoring the audio signal via DAW's audio interface. The graphical user interface used in TM3-Primus units is controlled simply by using your finger. Instruments can be selected and will be combined for an optimized reading. All commonly used parameters are set, just a few need to be adjusted by the user to meet individual requirements.

Start your measurement. TM3-Primus.

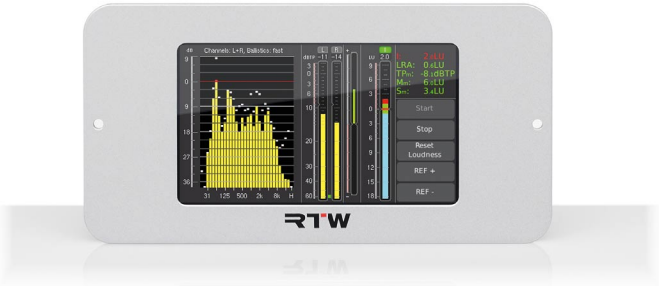
Hardware

TM3-Primus

- Compact unit with full feature set for multifunctional audio measurements (analog, digital, USB audio)
- Table-top unit with display and external USB mains adapter
- 4.3“ capacitive touch screen (272 x 480 pixel)
- Optimized screen layout with selectable instruments
- Analog 2-channel stereo input via unbal. RCA, adjustable from –22 dBu (61 mV) to +24 dBu (12.28 V)
- Digital 2-channel stereo in- and output via S/PDIF (RCA)
- Micro-USB connector for digital audio inputs (stereo, 5.1) and USB power supply (USB mains adapter or PC)
- Loudness metering acc. to EBU R128, ITU-R BS.1770-4/ 1771-1, ATSC A/85, ARIB, OP-59, AGCOM, or CALM Act
- Summing loudness bargraph (M, S, or I selectable)
- Numerical display (M, S, I, LRA, TPmax values)
- Loudness measurement control via onscreen keys
- Loudness Range (LRA) instrument with MagicLRA mode
- Loudness Chart instrument for displaying and analyzing the course of a loudness measurement over time
- PPM & True Peak measurement with standard scales
- Moving Coil instruments (PPM, VU, BBC mode)
- Real Time Analyzer (RTA) displaying the spectral distribution of an audio signal
- Audio Vectorscope (Lissajous display)
- Correlator instrument displaying the phase relationship between the two channels of a stereo signal
- Monitoring controller with onscreen level fader (downmix to S/PDIF out connector)
- USB hybrid function: Simultaneous monitoring and metering, and additional remote control of Start/Stop/Reset function with RTW USB Connect software

TM3-Pri-2U

- 2U panel-mount unit with display, external USB mains adapter, and the same functionality as TM3-Primus



Software

Smart Software Package

With the integrated Smart software package, TM3-Primus is fully equipped. It provides a wide range of RTW's approved loudness and audio metering tools to meet the demands of a wide variety of applications. Beside the signal processing and the control functions this software includes the following instruments:

TP/PPM Bargraph
PPM instrument displaying Peakmeter or TruePeak Meter bargraphs with analog or digital scales and numerical display.

MC - Moving Coil
Moving Coil instrument for the display of needle instruments for 2-channel Stereo with PPM display, VU display, and combined PPM and Loudness display (BBC mode).

Loudness Bar
Loudness Sum instrument for displaying the summed loudness values M, S, or I of a loudness measurement acc. to EBU R128, ITU BS.1770-4/1771-1, ARIB, ATSC A/85, OP-59, AGCOM, CALM Act on a bargraph display.

Numeric Instrument
Loudness Num instrument for the numerical display of relevant values of a Loudness measurement: M, S, I, LRA, TPmax.

Magic LRA
Loudness Range instrument in MagicLRA mode for a graphical representation of loudness variances.

Chart
Loudness Chart instrument for displaying and analyzing the course over time of a loudness measurement directly on the display.

VSC - Vectorscope
2-ch. Audio Vectorscope for displaying the phase relationship between the channels of a channel pair (Lissajous display).

RTA
Real Time Spectrum Analyzer instrument for displaying the spectral content of the input channels using 31 filter bands. Highpass filter for High Band (>20 kHz).

Monitoring
The Monitoring instrument provides a monitoring control function which enables monitoring of displayed audio signals and downmix of USB Surround to S/PDIF Out.

Correlator
Stereo Correlator instrument for displaying the phase relationship between the two channels of a stereo signal and thus its mono compatibility.

Keyboard
Selectable on-screen keys with defined functions for control of loudness measurement in multiple instruments.

Software (continued)

Optional Software

Optional software can be used to expand the fields of application for TM3-Primus.

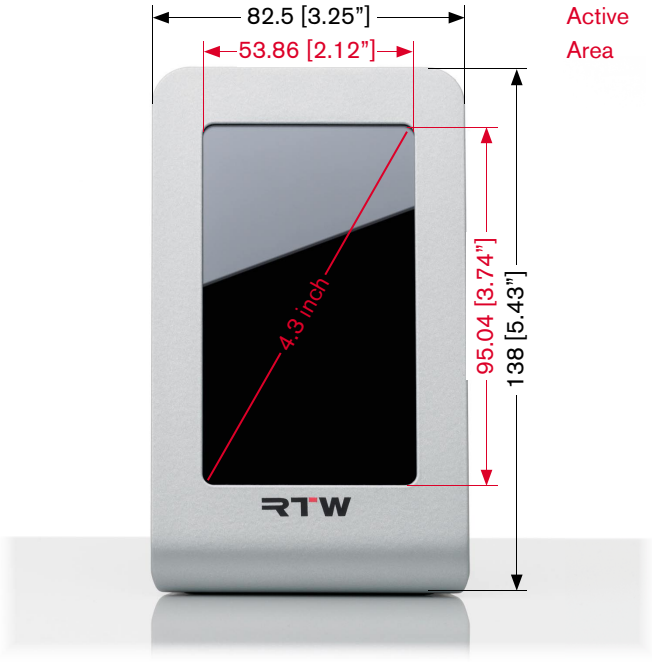
RTW USB Connect (SW50300)

Available free of charge on our web site, the RTW USB Connect software enables a direct connection between a TM3-Primus and a DAW environment as a plug-in. It offers the remote control within the DAW for start/stop/reset or RTA reference to the TM3-Primus. With this software it is no longer necessary to define the TM3-Primus as output device (USB hybrid function). RTW USB connect can also be used as a stand-alone remote control for start/stop/reset or RTA reference to the TM3-Primus.

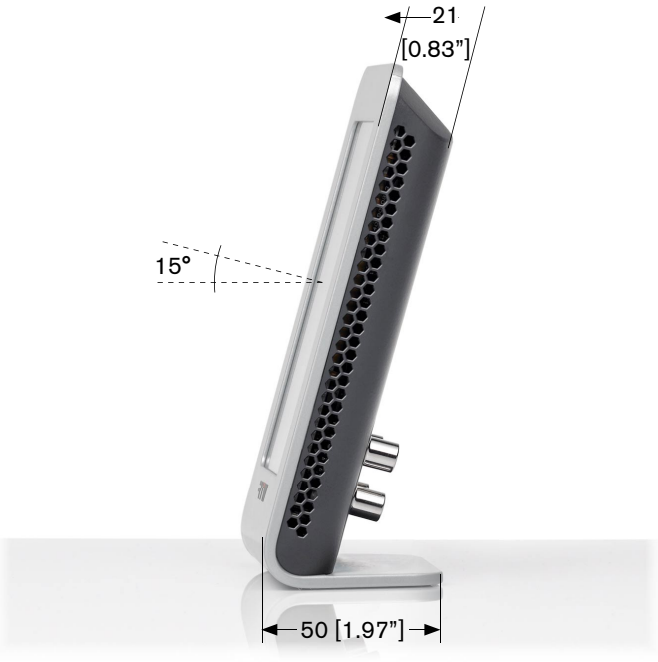
- Monitoring and metering at the same time.
- Plug-in operation for a direct connection between DAW and TM3-Primus via USB Connect.
- Direct access of Stereo or 5.1 audio signals from the DAW without dropping the audio interface.
- No need to define TM3-Primus as standard audio output device in the computer system.
- Remote control of start/stop/reset functions or RTA reference settings (MIDI controls) of the directly connected TM3-Primus via plug-in.
- Stand-alone operation for monitoring and metering of audio signals coming from media players or internet at the same time, and for remote control of start/stop/reset functions or RTW reference settings of TM3-Primus units.
- Sampling rates up to 96 kHz

Dimensions

TM3-Primus Table-top Unit



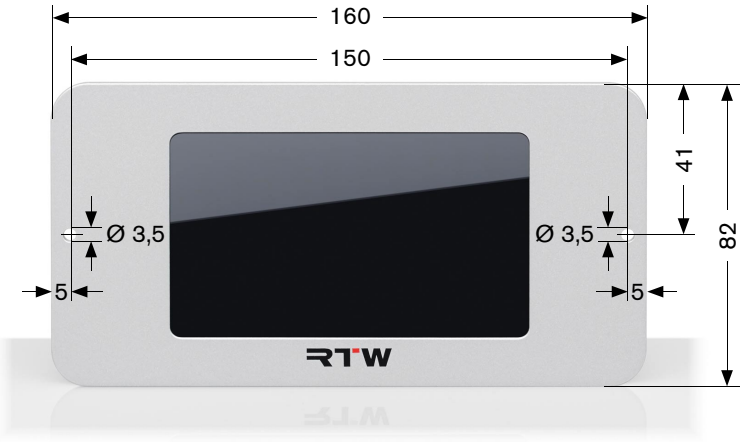
1 | Front view



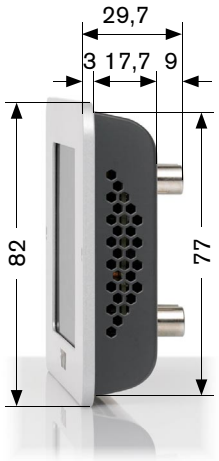
2 | Side view

Dimensions (continued)

TM3-Pri-2U Panel-mount Unit



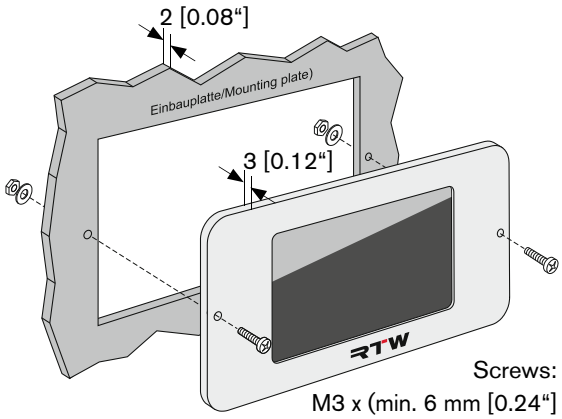
1 | Front view



2 | Side view

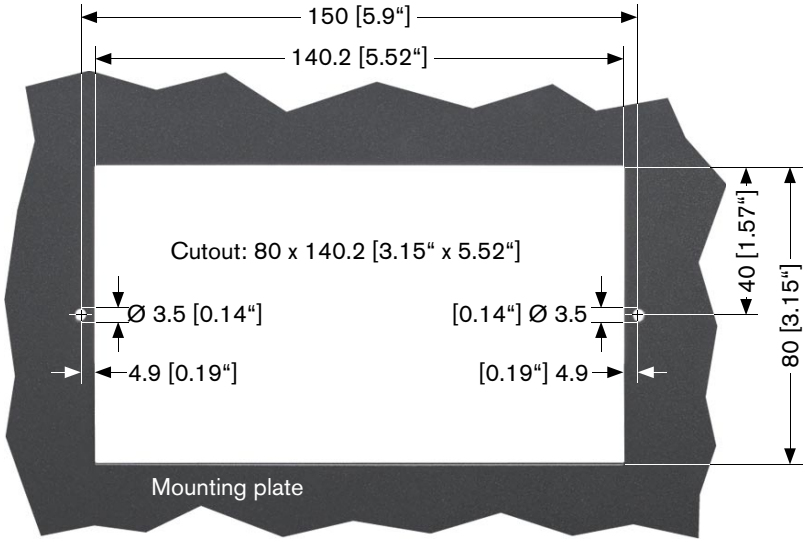
3 | Rear view

Dimensions in mm [inch"]
Common tolerance: ±0,5 mm [±0.02"]



Screws:
M3 x (min. 6 mm [0.24"]
+ thickness of mounting plate)

5 | Diagram of mounting



4 | Cutout of mounting plate

For adequate ventilation of the device after mounting, the mounting plate should have a maximum thickness of 2 mm [0.08"]

Connection

ATTENTION! - TM3-Primus and TM3-Pri-2U can be operated either via connection directly from a computer or via mains adapter. For this, TM3-Primus and TM3-Pri-2U require appropriate USB mains adapters and USB connection cables. RTW recommends the use of the approved USB cables and the approved wide voltage USB power supplys included in the TM3-Primus and TM3-Pri-2U packages.

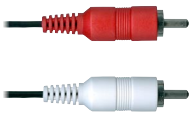
Potentiometers for adjustment of the analog input sensitivity for 0 dB reading (61 mV to 12.28 V)

NOTE – Do not disadjust, if not absolutly necessary.
The unit has been calibrated at RTW and offers software calibration for analog 0 dB adjustment.
Please read chapter "Calibration" in the manual before performing adjustment changes!

Signal lines with RCA connector (3 m maximum) shall have a ferrite core at the end being con-nected to TM3-Primus and TM3-Pri-2U.

Analog In R (RCA, unbal.)

Analog In L (RCA, unbal.)



S/PDIF Out (RCA, unbal.)

S/PDIF In (RCA, unbal.)

The S/PDIF input is permanently terminated with 75 Ω

Shield/Chassis (Pin Assignment RCA connectors)

Signal

USB 2.0 Micro-B for:
- Power supply
- Audio input

(if connected to a computer, a special Primus USB driver is required, see Specifications)

or:
- Power supply only

(if USB mains adapter is used)

The image shows the connectors of TM3-Primus as an example. TM3-Pri-2U's connectors are identical.

It is recommended to use the USB connection cable and USB mains adpater included in the package!

Specifications

System

General

Power requirements:	+5 V DC via USB Micro B connector
Current drain:	400 mA nominal, power-up current is much higher
Display:	Capacitive 4.3" touch screen (272 x 480 pixel)
Connectors:	1 x USB Micro-B; USB 2.0 Full Speed connector for data exchange between computer applications and TM3-Primus, and for power supply via computer or external mains adapter 2 x RCA-F, analog in (unbalanced, adjustable) 1 x RCA-F, S/PDIF in (unbalanced) 1 x RCA-F, S/PDIF out (unbalanced)
Dimensions (W x H x D):	Table-top TM3-Primus: 82.5 x 138 x 50 mm Panel-mount TM3-Pri-2U: 82 x 160 x 29.7 mm
Weight:	approx. 320 g w/o mains adapter
Operating temperature:	+5° to +40° C

Functions

- Operation with one finger (touch sensitive display)
- Optimized screen layout with selectable instruments
- Multiformat PPM/TruePeak for 2-ch. Stereo (analog, digital, PC audio via USB) and 5.1 Surround signals (PC audio via USB)
- Loudness acc. to ITU-R BS.1770-4/1771-1, EBU R128, ATSC A/85, ARIB, OP-59, AGCOM, CALM Act
- Loudness Chart instrument
- Loudness Range instrument (Magic LRA)
- Moving Coil (BR, VU, BBC mode)
- Stereo Correlator
- 1/3-octave spectrum analyzer (RTA)
- 2-channel Audio Vectorscope
- Monitoring (with onscreen level fader)
- Numerical displays
- USB hybrid function: Simultaneous monitoring and metering, and additional remote control of Start/Stop/Reset function with RTW USB Connect software (PlugIn, Stand-alone)

Analog Inputs

Inputs:	2 analog inputs, 2 x RCA-F connectors
Input sensitivity:	–22 dBu (61 mV) to +24 dBu (12.28 V), adjustable via potentiometer (see note below!)
Input calibration RTW:	▪ DIN5: 0 dB reading at +6 dBu (1.55 V) ▪ BR IIa: "6" reading at +8 dBu (1.946 V) (UK) ▪ VU: 0 dB reading at +4 dBu (1.228 V) (US)
Reference Levels:	▪ for analog scales: additionally adjustable in software in steps of 0.1 dB ▪ for digital scales: relation of dBu to 0 dBFS, adjustable in software in steps of 0.1 dB Example: +6 dBu reads –9 dBFS on TP60 scale with +15 dBu/0 dBFS reference setting
Impedance:	> 10 kΩ

NOTE – Please read the manual before adjustment changes are performed. The unit has been calibrated at RTW. All above mentioned analog references will change, when modifying the input sensitivity.

Digital Inputs/Outputs

	1 digital S/PDIF input, RCA-F, unbalanced, permanently terminated with 75 Ω 1 digital S/PDIF ouput, RCA-F
Sampling rates:	28 to 104 kHz, synchronisation to digital input signal

USB Audio Input

(requires USB driver to be installed on Windows® systems, see Accessory)

Inputs:	Readout and processing of first two USB audio data streams
Modes:	2-ch. Stereo, 5.1 Surround
Sampling rates:	28 to 104 kHz, synchronisation to input signal, internal A/D sample rate @ 48 kHz w/o external digital signal present
Output:	via S/PDIF output connector ▪ decoded, unchanged USB audio input signal ▪ decoded with or w/o onscreen level fader controlled USB audio input signal, if Monitoring function is activated

Specifications (continued)

TP/PPM Bargraph

Description: PPM instrument displaying Peakmeter or TruePeak Meter bargraphs with analog or digital scales and numerical display.

PPM instrument

Input sources: analog, digital, USB audio signals

Peakmeter:
- analog, digital: 2-ch. Stereo
- USB: 2-ch. Stereo, 5.1 Surround

Display:
- Bargraph with fixed colors:
  - yellow: normal
  - red: headroom
- Numerical value on top of the bargraph

Analog Peakmeter

Analog scales:
- DIN5: +5 .. -50 dB
- TP60: +3 .. –60 dB
- Nordic: +12 .. -42 dB
- BR IIa: 7 .. 1 (British)
- SMPTE24: +24 .. –30
- NHK

Headroom: beginning (turning red) at:
- 0 dB on DIN5 scale
- –9 dBTP on TP60 scale
- +6 dB on Nordic scale
- "6" on BR IIa scale
- +6 dB on SMPTE24 scale
- 0 dB on NHK scale

Integration time: acc. to standard: Sample (TP60), 20 ms (BR IIa), 10 ms (all others)

Digital Peak-/TruePeakmeter

Word width: 24 bit

Digital scales:
- TP60: +3 .. –60 dB
- Dig60: 0 .. –60 dB
- Nordic: +12 .. -42 dB
- BR IIa: 7 .. 1 (British)
- VU

Headroom: –9 dBFS, beginning (turning red) at:
- –9 dBTP on TP60 scale
- –9 dBFS on Dig60 scale
- +6 dB on Nordic scale
- "6" on BR IIa scale

Integration time (Attack): acc. to standard: Sample (Dig60), 4x over sample (TP60), 10 ms (Nordic), 20 ms (BR IIa)

MC - Moving Coil

Description: Moving Coil instrument for the display of needle instruments for 2-channel Stereo with different modes and scales.

Moving Coil Instrument

Modes: PPM (BR IIa), VU, PPM (BR IIa) + Loudness (L/R + I)

PPM Mode

- Ch. arrangement: Stereo horizontal, Stereo vertical
- Scale: BR IIa: 7..1
- Integration time: 20 ms

VU Mode

- Ch. arrangement: Stereo horizontal, Stereo vertical
- Scale analog: VU (–20 to +3 dB)
- Scale digital: VU Digital (–20 to + 3 dB)
- Lead: 0 dB, adjustable from 0 to 10 dB in steps of 1 dB

PPM + Loudness Mode

- Ch. arrangement: Dual-PPM with additional Loudness display (BBC) for I in one instrument
- Scales:
  - PPM: see above
  - Loudness: +9 to –9 LU fixed (mid of scale corresponds to Target Level)

Loudness Bar/Numeric instrument

Description: Loudness Sum and Loudness Num instruments for displaying the summed loudness values M, S, or I of a loudness measurement acc. to EBU R128, ITU BS.1770-4/1771-1, ARIB, ATSC A/85, OP-59, AGCOM, CALM Act on a bargraph resp. on a numerical display.

Common Loudness Parameters

Loudness Sum display: One Loudness bargraph selectable:
- M bargraph (Momentary - summation of momentary loudness values of all channels for a short span of time)
- S bargraph (Short - loudness summation value of a dynamic time frame)
- I-Bargraph (Integrated - long term loudness value infinite or manual control)
- Onscreen keys for measurement operation: Start, Stop, Reset Loudness

Specifications (continued)

Loudness Num display: M, S, I, TPmax, LRA values, selectable
Weighting filter: K filter acc. to ITU BS.1770
Level settings for summation (channel weighting):
- 0.0 dB (L, R, C)
- +1.5 dB (LS, RS)
- Off (LFE)

TruePeak Over Threshold: –1 dBTP; adjustable from 0 to –4 dBTP in steps of 1 dBTP

EBU R128 Loudness Mode

Target Level:	–23 LUFS; adjustable from –10 to –30 LUFS in steps of 0.5 LUFS
Scale:	EBU+9: +9 .. –18 LU (Loudness Units)
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LUFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±1 LU
Over Sensitivity	–1 dBFS
Over hold time:	1 s

ITU BS.1771 Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ITU+9: +9 .. –18 LU (Loudness Units)
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±2 LU
Over Sensitivity	–2 dBFS
Over hold time:	1 s

ATSC A/85 Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ATSC0: 0 .. –60 LKFS
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±2 LU
Over Sensitivity	–2 dBFS
Over hold time:	1 s

ARIB Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ATSC0: 0 .. –60 LKFS
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±0 LU
Over Sensitivity	–1 dBFS
Over hold time:	1 s

OP-59 Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ATSC0: 0 .. –60 LKFS
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±2 LU
Over Sensitivity	–2 dBFS
Over hold time:	1 s

AGCOM Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ATSC0: 0 .. –60 LKFS
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–8.0 LU
I Tolerance Range:	±0.5 LU
Over Sensitivity	–2 dBFS
Over hold time:	1 s

CALM Loudness Mode

Target Level:	–24 LKFS; adjustable from –10 to –30 LKFS in steps of 0.5 LKFS
Scale:	ATSC0: 0 .. –60 LKFS
M Integration time:	400 ms (SQR)
S Integration Time:	3 s
I Silence Gate:	–70.0 LKFS
I Relative Gate:	–10.0 LU
I Tolerance Range:	±2 LU
Over Sensitivity	–2 dBFS
Over hold time:	1 s

Specifications (continued)

Magic LRA

Description: Loudness Range instrument in MagicLRA mode for a graphical representation of loudness variances.

Loudness Range Instrument (LRA)

Display:	Graphical display of the Loudness Range
Mode:	MagicLRA: dynamic bargraph spreading around a zero-point, changing its color when passing the preset ranges
Scale range:	–10 LU to +10 LU
LRA low range:	5 LU
Comfort zone:	10 LU
LRA high range:	outside the comfort zone
Color:	green, blended in 3 steps from dark to light acc. to low range, comfort zone, high range

Chart

Description: Loudness Chart instrument for displaying and analyzing the course over time of a loudness measurement directly on the display.

Loudness Chart Instrument

Functions:
- Coordinate system displaying a graph with the course over time of one of the measured values TP, M, S, or I
- Relative Gate view switchable
- Adjustable time ranges
- Vertical Integrated bargraph switchable
- Adjustable tolerance levels

Display:
- Course over time of the selected value with color filling or as line
- Tolerance Marker
- Position of the Relative Gate (doubled horizontal line)
- Vertical I bargraph

Colors:
- Fill: Adoption of the corresponding colors of the Loudness Sum instrument
- Line: cyan (M), light red (S), green (I), yellow (TP)
- Tolerance Marker: coordinate system turns to light grey except the corridor defined by the tolerance settings
- Relative Gate: white

Time range presets:	1 m; 1 m, 5 m, 1 h selectable
Time range select:	via preset or onscreen during normal operation
Lower tolerance:	–0.0 LU; tolerance below the Target Level, adjustable from 0 to –6 LU in steps of 0.5 LU
Upper tolerance:	0.0 LU; tolerance above the Target Level, adjustable from 0 to 6 LU in steps of 0.5 LU

VSC - Vectorscope

Description: 2-ch. Audio Vectorscope for displaying the phase relationship between the channels of a channel pair (Lissajous display).

Audio Vectorscope Instrument

Display mode:	2-channel
Inputs:	L/R
AGC:	fast
Grid:	L/R

RTA

Description: Real Time Spectrum Analyzer instrument for displaying the spectral content of the input channels using 31 filter bands. Highpass filter for High Band (>20 kHz).

Real Time Spectrum Analyzer (RTA) Instrument

Functions:
- Peak hold on/off
- Set reference
- Selectable resolution

Input sources:	Stereo pairs
Frequency range:	20 Hz to 20 kHz, highpass filter for High Band (>20 kHz)
Number of bands:	1/3-octave: 31 bands, filter acc. to IEC 225 class 2
Weighting filter:	Linear
Peak hold indicator:	4 s, 2 s, off
Measuring range:	45 dB max.
Resolution:	3, 6, 9 dB
Reference:	0.0 dB; adjustable from 0.0 to 21.0 dB in steps of 1 dB
Integration time (ballistics):	Fast

Monitoring

Description: The Monitoring instrument provides a monitoring control function which enables monitoring of displayed audio signals.

Monitoring Instrument

Functions:
- Monitor level control with onscreen level fader
- Mute, Dim
- Internal Downmix for multichannel monitoring, audio output of monitoring signals via S/PDIF out connector.

Output: Digital 2-ch. Stereo (S/PDIF out, unbal., RCA-F)

Specifications (continued)

Correlator

Description: Stereo Correlator instrument for displaying the phase relationship between the two channels of a stereo signal and thus its mono compatibility.

Correlator Instrument

Display: Bargraph, additional spot indicator between PPM bargraphs
Scale range: –1 r to 0 to +1 r
Standard color setting: red: –1 r to –0.1 r
white: 0 r (–0.1 r to +0.1 r)
green: +0.1 r to +1 r
Attack/release time: 1.0 s/2.5 s

Items of Delivery

TM3-Primus:
- Display unit with 4.3“ touch screen in a table-top case for 2-channel analog or digital stereo audio signals, or stereo and 5.1 USB audio
- USB-A to Micro-USB-B connecting cable, 1.5 m length
- USB mains adapter, manual

Order no.: TM3-Primus

TM3-Pri-2U:
- Display unit with 4.3“ touch screen in a panel-mount case for 2-channel analog or digital stereo audio signals, or stereo and 5.1 USB audio for mounting into mounting plates, front panels, or 19“ environments
- USB-A to Micro-USB-B connecting cable, 1.5 m length
- USB mains adapter, manual

Order no.: TM3-Pri-2U

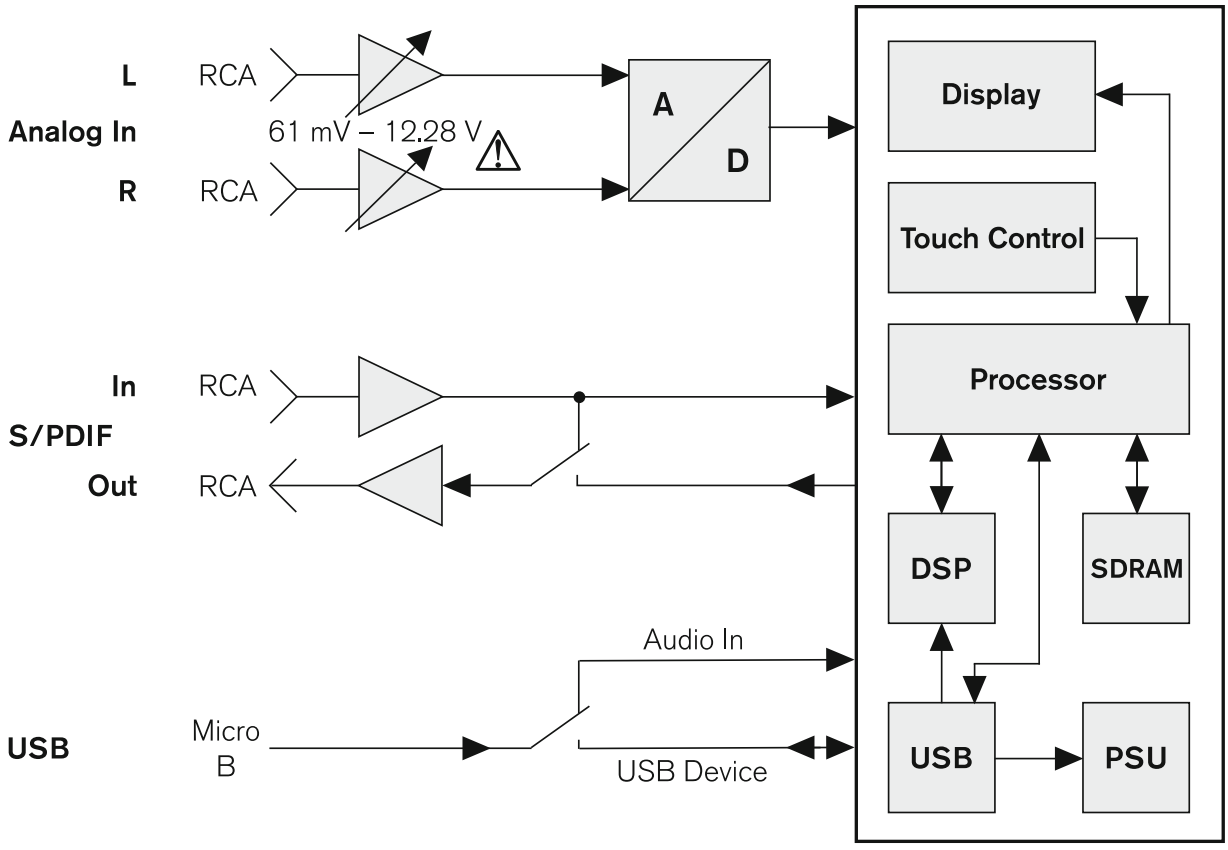
Accessory

USB-Driver: USB-Driver-Software to run TM3-Primus in USB audio input mode also on Windows® systems. Installer available for download at Audio Monitors/ TM3-Primus section of the download area on our website: https://www.rtw.com/en/support/manuals-software-downloads.html

Option

RTW USB Connect: Software (plug-in, stand-alone) for simultaneous monitoring of audio data via USB (from DAW or media players/internet) and metering with TM3-Primus. Remote control of Start/Stop/Reset functions. Installer and instructions available free of charge for download from PC Software/RTW USB Connect section of the download area on our website: https://www.rtw.com/en/support/manuals-software-downloads.html or from RTW USB Connect product page.
(Order no.: SW50300)

Block Diagram



⚠ **Calibrated at RTW. Please refer to manual before readjustment!**

RTW US Corp.
160 Varick St | 3rd Floor | New York NY 10013
Phone: +1 917 796 1474
ussales@rtw.com | www.rtw.com

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