Stereo Loudness Meter

PRODUCT CODE: MSD100C-Loudness

DK - Technologies

MSD100C
MADE IN DENMARK

Features...

- 1 AES3 input

- 2 analogue inputs, transformer balanced

- Accurate loudness matching of audio signals

- Loudness Measurement in accordance with ITU Rec. BS.1770 and BS.1771

- Fast mode for real time control of loudness

- Integration mode for loudness gain setting

- Selectable digital and analogue stereo inputs

- Displays left and right channel loudness as well as the summed loudness

- Numerical display of summed loudness

- Scale in Loudness Units (LU) from −18 dB to +9 dB

- Audio vector oscilloscope and phase correlation meter displays

- Full VGA colour display and VGA output for external display

- Includes wall plug power supply

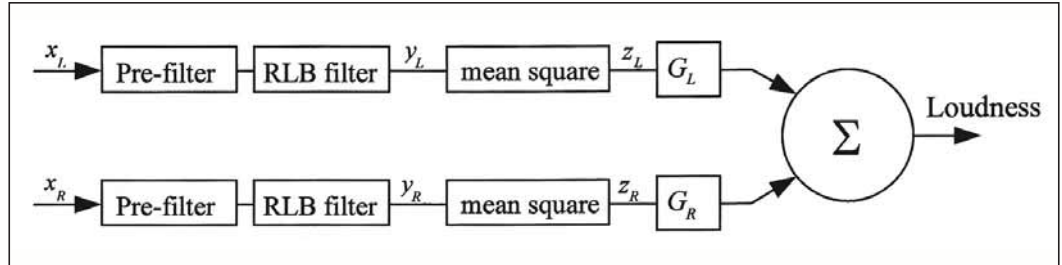**The ITU Recommendation BS.1770 specifies the algorithms to measure audio programme loudness. The MSD100C Stereo Loudness Meter implements these algorithms to display the loudness of the individual audio channels as well as the sum of the left and right signals.**

Different working modes of the meter are selectable, including:
- Fast mode for real time control of loudness.
- Integrating mode for measuring the loudness of a recorded section or the complete recording.
- Gated mode for viewing loudness of audio material with long pauses (e.g. golf matches).

APPLICATIONS

There are many applications, where it is necessary to measure and control the perceived loudness of audio signals. Examples of this include television and radio broadcast applications, where the nature and content of the programme material changes frequently. In these applications the audio content can continually switch between music, speech, and sound effects. Such changes in the content of the programme material can result in significant changes in subjective loudness.

Moreover, various forms of dynamic processing are frequently applied to the signals, which can have significant effect on the perceived loudness of the signal.

The matter of subjective loudness is also of great importance to the music industry and in production of commercials, where dynamic range processing is commonly used to maximize the perceived loudness.

The Next Generation

Stereo Loudness Meter

LOUDNESS MEASUREMENTS

Block diagram of the stereo loudness algorithm based on the ITU rec. BS.1770. The pre-filter increases gain of higher frequencies by 4 dB. The RLB filter is a high pass filter. The gain G is 0 dB for stereo signals

It is well recognized that loudness metering is required for broadcast applications. The algorithm recommended by ITU and implemented in MSD100C-Loudness is based on an extension of the Leq(RLB) algorithm to cover stereo and monophonic audio signals. In this the Leq is an unweighted mean-square measure, while the RLB involves a high-pass frequency weighting curve referred to as the Revised Low-frequency B-curve.

LOUDNESS MEASUREMENT MODES

Loudness is a perceptual property of an audio signal, when it is reproduced acoustically. It is a complex non-linear function of amplitude, frequency and bandwidth.

Current audio level meters measure the level of audio signals expressed as the amplitude of the signal - either the r.m.s. voltage of an electrical signal or the sound pressure of an acoustical signal. This level is an objective property, which is independent of frequency and bandwidth and is measured linearly in volts, if electrical, or Pascals, if acoustical.

For the purpose of broadcasting, loudness can also be measured as an electrical property, assuming a fixed electro-acoustic gain for reproduction. This assumption is the basis for the broadcast loudness meter. The reproduction level, that has been assumed in the home, is 60 dBA, a level found to be typical for television viewing at home.

The MSD100C loudness meter has two main operating modes for different purposes:
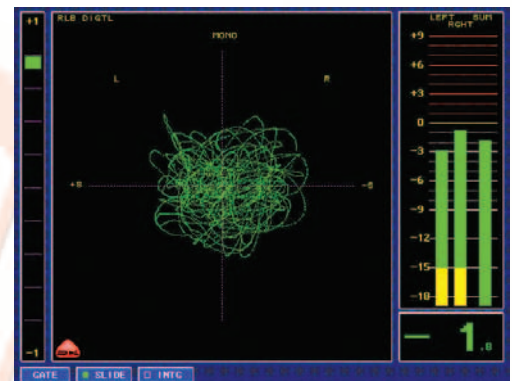- Fast mode for instantaneous monitoring of the loudness level.
- Integrating mode for a single figure overall loudness.
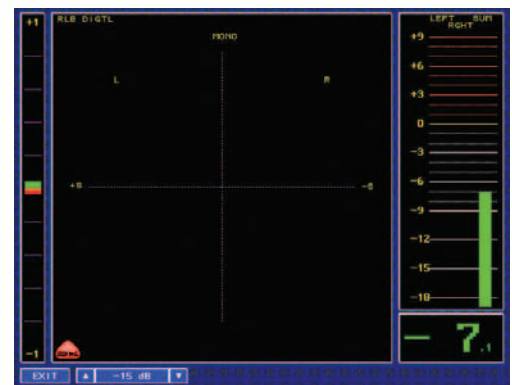
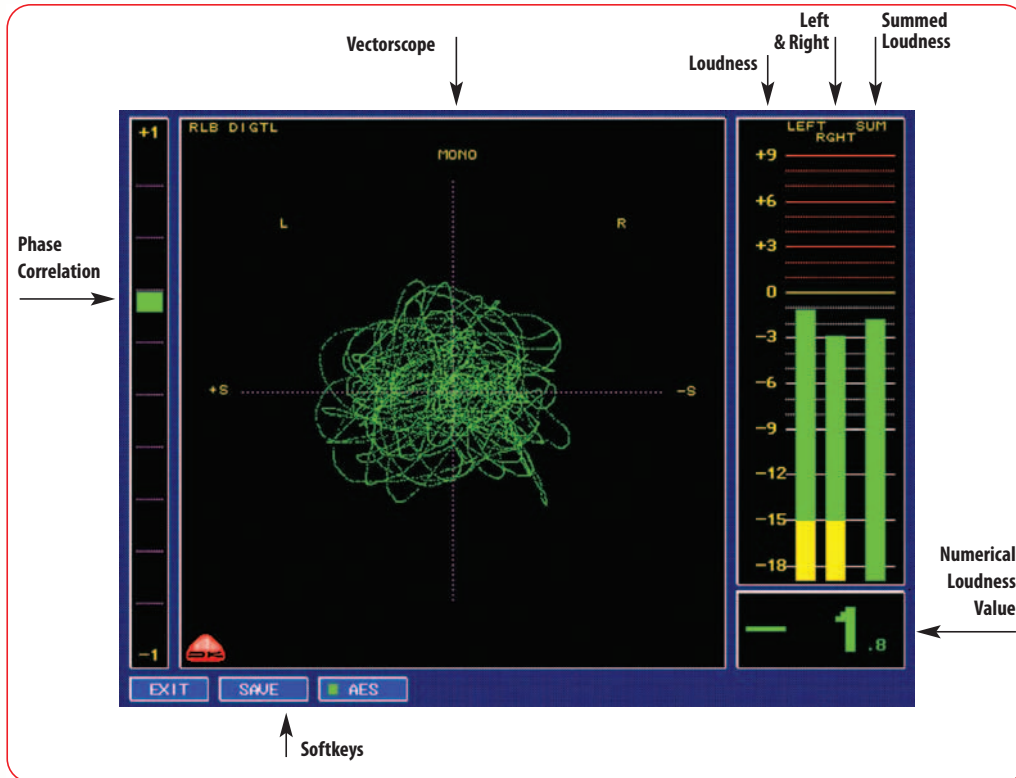*Pauses in the audio can be discriminated in the sum channel loudness. The threshold level is manually set.*
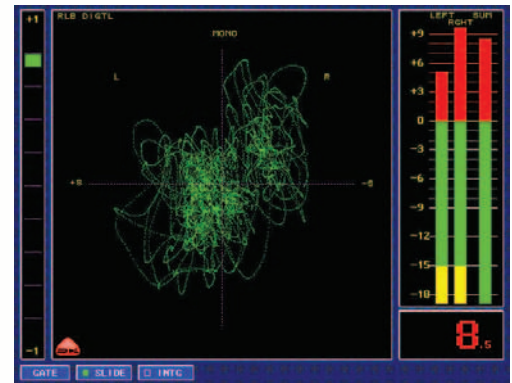
Overload is indicated by the red parts. The colour changes, if the true digital audio level exceeds the threshold of -2 dBFS.

The sum channel can be averaged in a sliding interval of up to 9 seconds. This setting is used to stabilize the loudness reading and allows accurate gain setting.

METER DISPLAY

Vectorscope

Loudness

Left & Right

Summed Loudness

Phase Correlation

Numerical Loudness Value

Softkeys

FAST MODE

The F-mode or fast mode is used in production, post-production and presentation. The programme level should be set so that on typical dialogue the meter displays 0 LU on average.

To properly measure the loudness as a true average the measuring time for the sum channel can be set as a sliding interval with a length between 0 seconds and 9 seconds in 1 second steps.
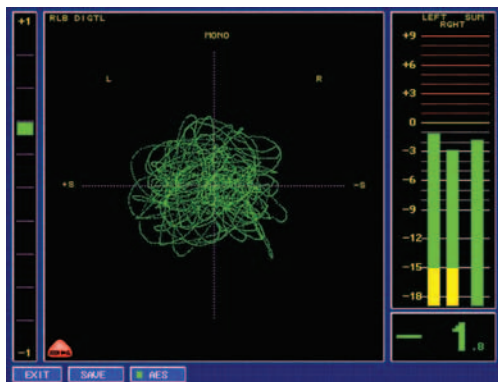
Typical display in fast mode showing left and right channel plus the summed loudness of the stereo signal. Inputs can be AES3 or analogue audio.

INTEGRATION MODE

The I-mode or integration mode is used for quality control, mainly at programme ingestion, programme emission and in post-mortem analysis.

The single number output from this mode allows clear and unambiguous information for loudness matching and gain setting.

This mode makes it easy to secure consistent loudness over different programmes and short sequences.
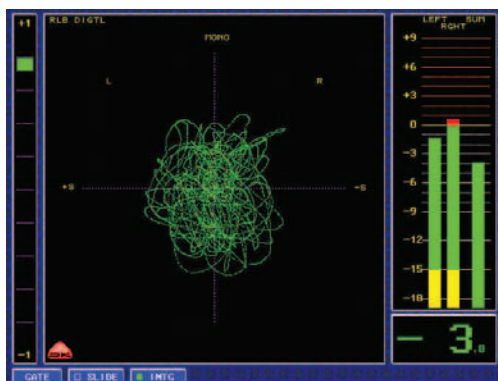
With the integration mode the overall loudness of a recording is retrieved. From this measurement the loudness of different programmes can be matched accurately.

RELATED PRODUCTS

Desktop versions:

MSD100C
Colour display. Pre-configured, analogue and AES3 stereo inputs and outputs. Basic functionality.

MSD200C
Colour display. Pre-configured, analogue and AES3 stereo inputs and outputs. Full functionality including spectrum analysis.

MSD600M++
Modular configuration of inputs in analogue, AES3 & SDI with outputs in analogue and AES3.

Rack mount versions:

PT0200C
Colour display. Pre-configured, analogue and AES3 stereo inputs and outputs. Full functionality including spectrum analysis

PT0600M
Modular configuration of inputs in analogue, AES3 & SDI with outputs in analogue and AES3.

PT0660M
Modular configuration of inputs in analogue, AES3 & SDI with outputs in analogue and AES3. Volume control.

PT0660M-LS
Modular configuration of inputs in analogue, AES3 & SDI with outputs in analogue and AES3. Stereo loudspeakers and volume control.

Stereo Loudness Meter

DK - Technologies

Audio Connector
- 25-pole D-Sub connector
- 1 balanced, analogue stereo input
- 1 AES3 input

Digital Input
- Sample rate: 30 kHz to 100 kHz
- Input sample rate converter
- Default internal sample rate: 48 kHz
- Bit resolution: 24 bits
- Group delay: 1.75 msec
- Passband ripple: ±0.008 dB
- Total harmonic distortion: less than −103 dB at 1 kHz and −1 dBFS
- Dynamic range: larger than 120 dB
- Nominal input impedance: 110 ohm

Analogue Inputs
- Maximum input level: +24 dBm
- Sample rate with internal sync: 48 kHz
- Sample rate with external sync: 32 to 50 kHz
- Bit resolution: 24 bits
- Frequency response: 10 Hz to 21 kHz within 0.3 dB
- Passband ripple: ±0.002 dB
- Dynamic range: more than 103 dB
- Crosstalk between inputs: less than −96 dB
- Signal-to-noise ratio: typical 93 dB relative to −1 dBFS
- Nominal input impedance: larger than 20 kohm

Scales
- Loudness scale: +9 dB to +18 dB LU for bar graph display of L, R, and Sum. ITU BS.1771 Type II display. Numerical display of sum channel, The value of the programme in loudness units (LU) represents the loss or gain in dB that is required to bring the programme to 0 LU.
- Phase Correlation Meter: -1 to +1. A reading of +1 indicates full correlation, while −1 indicates no correlation or out of phase signals.
- Audio Stereo Vectorscope: Mono and S axis with indication of L at 135o and R at 45o.

Loudness
- Reference level digital: -18dBFS at 300 Hz.
- Reference level analogue: -6 dBu to +6 dBu.
- Gate level range rel. to reference level: -6 dB to -63 dB.
- Sliding integration window range: 0 to 9 seconds
- Longtime integration range: 1 year
- Peak indicator threshold: -2 dBFS
- Peak indicator hold time: >0.5 s
- Calibration: ±0.1 dB
- Dynamic response @ 5 kHz burst:
  10 ms: -17 dB
  100 ms: -7 dB
  300 ms: -3 dB
  1000 ms: -0.3 dB
- Return time for 20 dB: 1.7 s

LCD Display Type
- Colour VGA, 640 x 480 pixels
- CCFT Backlight

Utility Connector
- 9-pole D-Sub
- Power input: 12 to 15 V DC
- Programming interface: I2C
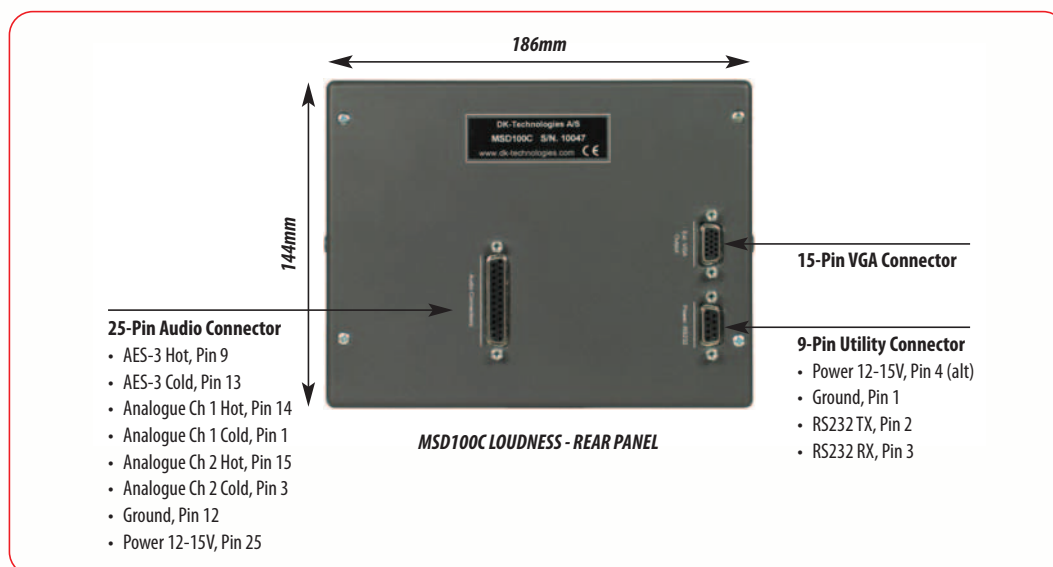- Serial data port: RS-232

VGA Connector
- 15-pole D-Sub
- Signal: Colour VGA, 640 x 480 pixels

Power Supply
- Wall plug version
- Voltage: 100 to 240 V AC
- Frequency: 48 to 62 Hz

Mechanical Data
- Height: 144 mm
- Width: 186 mm
- Depth: 1.2 kg
- Weight: 1.2kg

186mm

144mm

DK-Technologies A/S
MSD100C   S/N. 10047
www.dk-technologies.com

15-Pin VGA Connector

9-Pin Utility Connector
- Power 12-15V, Pin 4 (alt)
- Ground, Pin 1
- RS232 TX, Pin 2
- RS232 RX, Pin 3

25-Pin Audio Connector
- AES-3 Hot, Pin 9
- AES-3 Cold, Pin 13
- Analogue Ch 1 Hot, Pin 14
- Analogue Ch 1 Cold, Pin 1
- Analogue Ch 2 Hot, Pin 15
- Analogue Ch 2 Cold, Pin 3
- Ground, Pin 12
- Power 12-15V, Pin 25

MSD100C LOUDNESS - REAR PANEL

DK - Technologies   WORLDWIDE OFFICES:

www.dk-technologies.com