Operation manual

VisLM

Standardised Loudness Metering Solution

Contents   Page

Introduction

The NUGEN Audio VisLM is a loudness metering system fully compliant with the ITU-R BS.1770/1771 metering standard, EBU R128, ATSC A/85 and several other region specific loudness standards.

VisLM is available in two versions, VisLM-C (compact) and VisLM-H (history). The operation of both versions is broadly the same, although VisLM-H has a number of additional features.

Both versions of VisLM are available in stereo, 5.1 and 7.1 formats. Many plug-in hosts will now accept the surround version on any audio channel, however some require channel specific implementation, so the 2.0 version is supplied for standard stereo
operation in these situations. The surround version will work correctly with track counts from 1.0 up-to 7.1 in hosts that provide this flexibility.

Interface – General layout

The interface is designed to facilitate intuitive operation by grouping similar aspects of operation into distinct zones as shown below. VisLM is highly configurable, with the ability to show/hide many functions and parameters. This manual is illustrated using VisLM-H, and in general will show an expanded interface to allow explanation of all parameters.
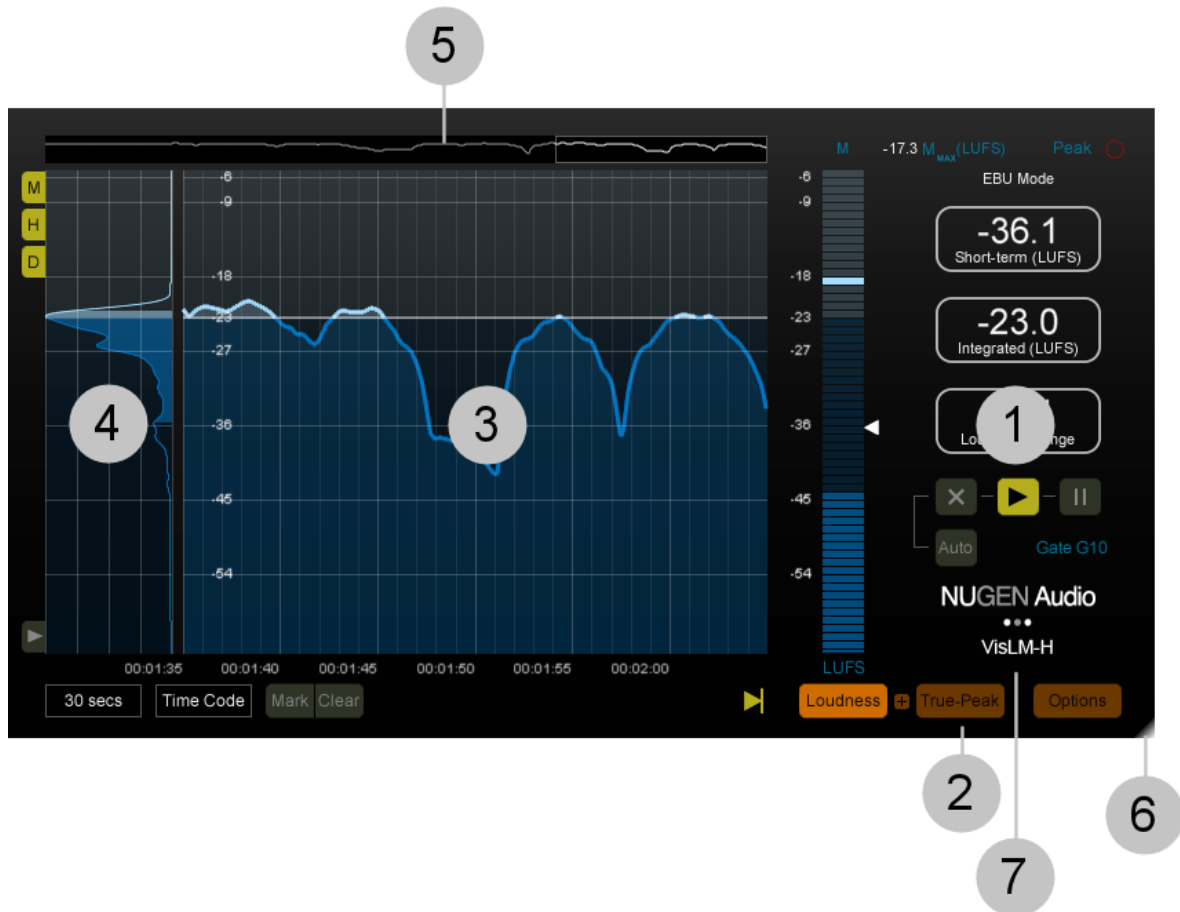

1   **Main display.** The main display area shows the information relevant to the current view setting; the Loudness Meter, True-Peak meter or Options page.

2   **Main display control.** These controls determine what is shown in the main display.
    i)   Loudness   – Loudness Meter
    ii)   True-Peak   – True-Peak Meter
    iii)   Options   – Options panel

3   **Loudness History** (VisLM-H only)**.** The history view presents the historical loudness and true-peak clip values over time.

4   **Loudness distribution (**VisLM-H only)**.** This optional view represents the distribution of loudness measurement within the Integrated loudness measurement.

www.nugenaudio.com

5   **Loudness history Macro View (**VisLM-H only)**.** This optional view shows the overall loudness history stored by the plug-in. This view can be used to rapidly locate areas of specific interest in the main loudness history view.

6   **Resize control** (VisLM-H only)**.** This control is used to resize the interface to a suitable proportion and scale to suit the available screen space and best fit with your workflow.

7   **Plug-in title.** Click to open licensing/credits panel and a direct link to open the plug-in manual (if installed).

Interface – Loudness meter

This section displays the primary Loudness Meter values and controls. The performance and values given in this section of the meter are in accordance with and as defined by ITU-R BS.1770 and/or EBU R128.
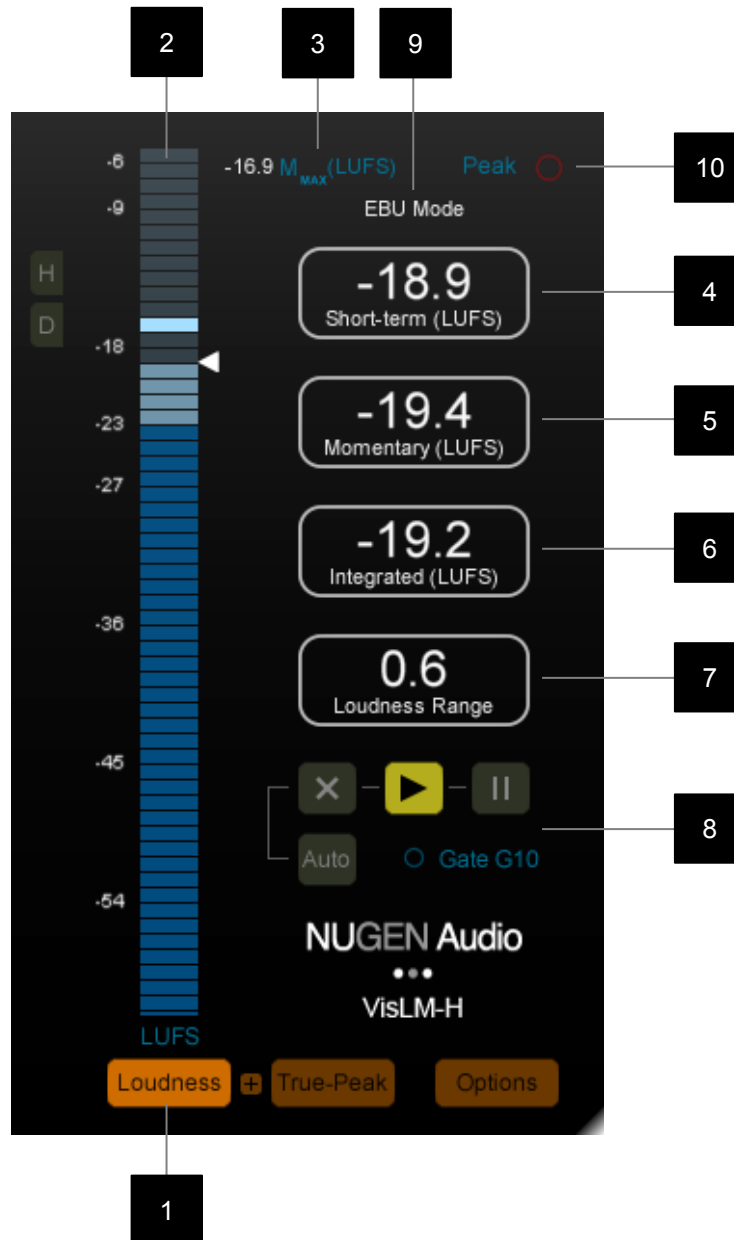
1   **Loudness Meter select.** This control switches the main display to show the Loudness Meter and is mutually exclusive to the True-Peak and Options select controls. The '+' button can be used to open a combined True-Peak and Loudness Meter summary view.

2   **Loudness Bar Meter.** Shows the level of the current audio input in Loudness Units (LU/LUFS) as defined by EBU R128 or ATSC A/85 (LK/LKFS). The meter can show either Momentary (M) or Short-term (S) loudness as a bar meter, with the remaining value indicated by a white arrow marker. It is also

www.nugenaudio.com

possible to configure a split meter, with M/S or S/M meters side-by-side. Clicking the LUFS/LKFS unit marker cycles through the options, or the meters required can be specified directly via the options panel (see below). Various colour splits can also be established using the parameters available in the Loudness Meter options panel.

3   **Momentary (M)/Short-term Loudness (S) Meter Max Value.** This value shows Maximum value of the momentary or short-term loudness meter (click the M_{max} or S_{max} indicator to toggle between the two. Click the numeric value to reset. This value is also reset when the integrated loudness measurement is reset.

4   **Momentary (M) Loudness.** Optional display (see Options panel below). Displays the short-term loudness value as defined by ITU-R BS. 1770. This value may also be indicated by the momentary loudness bar meter or using the white arrow marker next to it depending upon user configuration.

5   **Short-term (S) Loudness.** Displays the short-term loudness value as defined by ITU-R BS. 1770. This value may also be indicated by the momentary loudness bar meter or using the white arrow marker next to it depending upon user configuration.

6   **Integrated Program Loudness (I).** This value displays integrated loudness as described in ITU-R BS.1770 (or as specified by the dialog measurement if this is active) and is controlled using the Integrated loudness functions [8].

7   **Loudness range descriptor (LRA).** This value quantifies the variation in a time-varying loudness measurement and is supplementary to the measure of overall loudness, that is, 'integrated program loudness'.

8   **Integrated Loudness functions.** This group of controls provides access to the Integrated Loudness section of the meter.In some history modes these controls may alter slightly in functionality (see Loudness History modes below).

   Auto. Select to activate/de-activate transport activation of controls. This control is not available in the stand alone version of VisLM.

   Play control. Start/continue the measurement of integrated loudness and LRA simultaneously.

   Pause control. Pause the measurement of integrated loudness and LRA simultaneously.

   X control. Resets all measures. If desired, a strict interpretation of ITU-R B.S. 1771 can be applied where this control resets the measurement of integrated Loudness and LRA only. This is accessed via the options page (click plug-in title to open). May be operated whether the meter is running or paused.

   Gate (Where relevant)**.** The integrated loudness measurement utilises a complex gating function. This indicator lights to give an indication that the

www.nugenaudio.com

gate is potentially active. As the gate may act retrospectively, this is not an exact indicator, but rather gives an indication that gating is likely.

9   **Mode indicator.** This indicator lights to indicate which mode the meter is operating in. It is possible to set VisLM to work specifically to 'EBU Mode', ITU-R BS. 1770, ATSC A/85 and others. It may also be useful to define 'transitional' settings moving toward loudness recommendations. In these situations, where the full definition of a particular standard is not adhered to, the mode indicator will show 'custom'.

Interface – Loudness History & Distribution

This section of the meter is only available in VisLM-H. The loudness history section displays the historical data of the short-term loudness reading (compensated for screen resolution where required). This view is active at all times, irrespective of the main display control settings.
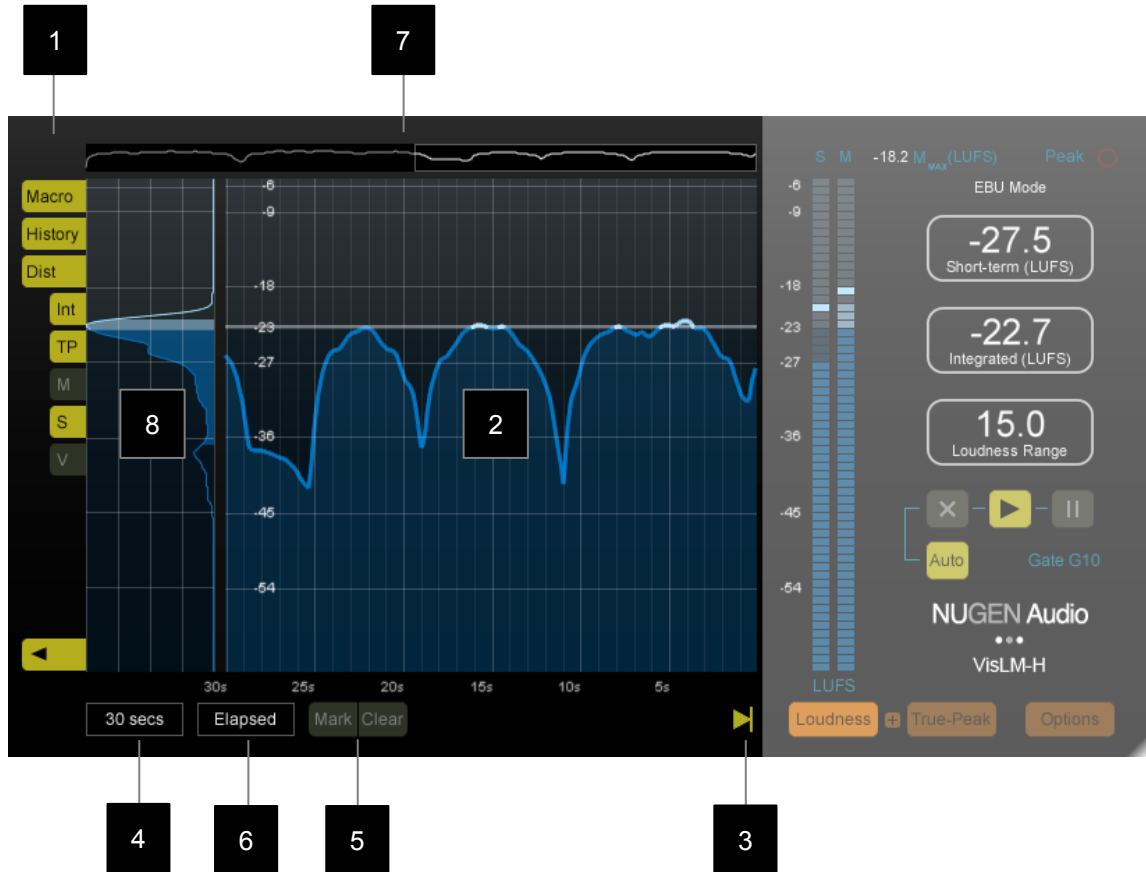
1   **Loudness History view selector tabs.** These controls determine which data is shown in the loudness history.

> **Arrow Control.** The arrow control found at the bottom of the selector tabs is used to expand the tab selectors to reveal further options. Once the desired options have been chosen, the control can be used to minimise the tabs, leaving maximum space available for data presentation.
>
> **Macro / M control.** Used to toggle the history macro display on/off (see below).
>
> **History / H control.** Used to toggle the history display on/off (see below). This causes the plug-in interface to resize. Depending upon your NLE/DAW, the plug-in interface may need to be closed and re-opened in order to resize the plug-in container.
>
> When the tabs are in expanded view (see Arrow Control above), additional options are available.

www.nugenaudio.com

Int. Toggles the Integrated Program loudness indicator on/off in the history display.

TP. Toggles True-peak clip notifications on/off on the history display and history macro view. These are shown on both displays as red dots, indicating the point at which a True-peak clip was detected.

M. Toggles the Momentary loudness trace on/off in the history display.

S. Toggles the Short-term loudness trace on/off in the history display.

Variance. Toggles the Variance envelope on/off in the history display. The variance measure is a sub-value of the loudness range descriptor, and shows the measure of variation in the level over time.

Dist / D control. Used to toggle the loudness distribution display on/off.

2   **Loudness History Inspector View.** This area displays the loudness history traces as determined by the history view selector tabs (see above), compensated for screen resolution where required. The data scrolls building up the view over time. The data for all traces within the loudness history view is continuously calculated and stored irrespective of whether the trace is active or not.

The loudness history inspector view can be scrolled in time by click-dragging left/right.

3   **Loudness history follow control.** This control determines whether the loudness history automatically scrolls, following real-time input, or shows a static view to allow historical inspection. Click to toggle the control on/off.

4   **Loudness History zoom.** Determines the zoom level of the history view, from 10 secs to 24 hours. All data is available until the plug-in is re-set, so it is possible to choose different zoom levels at differing times without loosing data from the view.

5   **Mark|Clear.** Click mark to drop a vertical marker to indicate a specific point of interest in the history view. Click Clear to remove dropped markers.

6   **Time reference.** VisLM-H has three modes of time referencing, each with different capabilities and applications.

System. Chose this option to select a system clock (HH:MM:SS) reference. When system time is selected, the time scale will scroll along with the history inspector view to allow events to correlated with the system clock.

Elapsed. Elapsed time records the loudness at the audio input, scrolling the input to the left as it is received. If the loudness history inspector view is scrolled to view a specific set of data, this will cause the loudness data

www.nugenaudio.com

trace to remain static, and (counter intuitively) the time reference scale will begin to scroll 'backwards' as the data on view is effectively becoming constantly older in the static display.

Time Code. Time code* referencing is only available in the plug-in version of VisLM-H. When the time code reference is selected, loudness data is stored against time-code position. This mode enables the loudness overdub mode (a part of the proprietary NUGEN Audio ReMEM™ technology), the functionality of which is described in detail below.

7   **Loudness Macro Overview.** This view shows a macro overview of the loudness history stored within the plug-in. The rectangular window shows the data currently represented in the history inspector and can be dragged left/right to rapidly locate a specific region in the loudness inspector.

8   **Loudness distribution view.** The loudness distribution shows the distribution of short-term loudness measurements within the integrated loudness calculation. As a result, the graph will only show data if the integrated loudness calculation is active (or paused). The unshaded regions at the extremes of the distribution represent the data that is not incorporated into the LRA calculation.

*Time Code referencing of audio data is dependent upon the support provided to the plug-in via the NLE or DAW host. In some hosts this support is not available or only restricted functionality is available.

Interface – True-peak meter

The true-peak meter displays true-peak values as defined in ITU-R BS.1770. VisLM is available in stereo, 5.1 and 7.1 formats, with the 5.1 & 7.1 formats being able to handle input from mono through to 5.1 surround automatically where the plug-in host facilitates this.
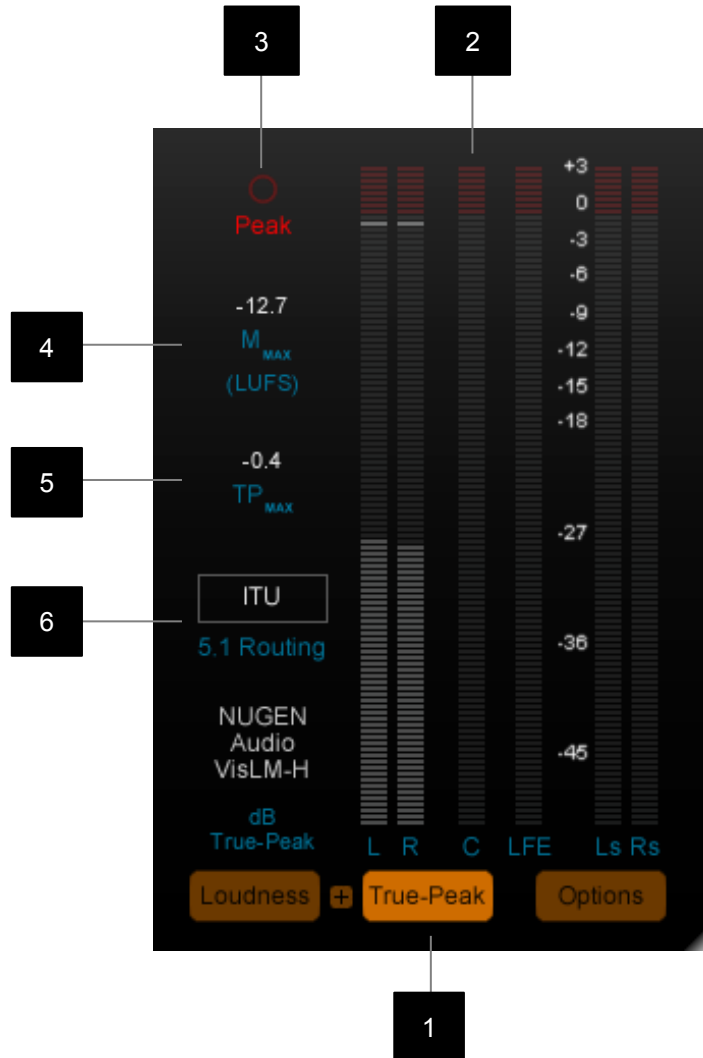
1   **True-peak meter select.** This control opens the true-peak meter in the main display, and is mutually exclusive with the Loudness Meter control (Loudness). To return to using the Loudness Meter in the main display, use the Loudness control. The '+' button can be used to open a combined True-Peak and Loudness Meter summary view.

2   **True-peak level meter.** Shows true-peak audio levels on available input channels from single (mono) input, through to 5.1 (or 7.1) surround. A permanent peak hold bar marks the highest level achieved. Click the meter to reset.

3   **True-Peak overload indicator.** True-Peak overload indicator. This indicator will activate if the true-peak level reaches the level set on the options page, and hold momentarily after the signal has fallen below this threshold so as to be clearly visible when activated.

www.nugenaudio.com

4   Momentary (M)/Short-term Loudness (S) Meter Max Value. This value shows Maximum value of the momentary or short-term loudness meter (click the M_{max} or S_{max} indicator to toggle between the two. Click the numeric value to reset. This value is also reset when the integrated loudness measurement is reset.

5   TPmax. This value gives the maximum reading for the True-peak meter. Click the value to reset.

6   5.1 (& 7.1) Routing. This control determines the routing for multi-channel audio up-to 5.1 or 7.1

==It is important to choose the correct routing, as the Loudness Meter measurement weights individual channels differently.==

5.1 routings available:

DTS: L R Ls Rs C LFE

ITU: L R C LFE Ls Rs

Film: L C R Ls Rs LFE

7.1 routings available:

DTS1:   L C R Ls Rs Lr Rr LFE

DTS2:   L R C LFE Ls Rs Lr Rr

Dolby1:   L C R Ls Rs Lb Rb LFE

Dolby2:   L R C LFE Ls Rs Lb Rb

SDDS1:   L Lc C Rc R Ls Rs LFE

SDDS2:   L R C LFE Ls Rs Lc Rc

Interface – Options panels

The options panels allow for in-depth configuration of the various meter parameters. It is possible to configure the meter in a number of different ways to suit the intended application.

To facilitate detailed configuration, the options available have been grouped into logical tabs as detailed below.

1   **Options select.** This control opens the Options window in the main display, and is mutually exclusive with the Loudness Meter control (Loudness) and True-Peak meter control (True-Peak). To return to using the meters in the main display, select the appropriate control or click the Options button again.

2   **Presets recall.** This control opens the preset browser window. The name of the current preset is shown in the window along side. If the options are later changed from the default preset parameters and a *character will show next to the preset name.

3   **Options tabs.** The options tabs allow access to similarly groups functions to enable rapid navigation to the desired parameter. Click a tab to switch to the associated functions.

www.nugenaudio.com

Options – Preset recall

The preset recall button (see above) is available at the top of the options page, irrespective of the chosen options tab and allows for rapid re-configuration of the entire plug-in in keeping with the guidelines set out in many international and regional standards. It is also possible to set the default opening parameters for the plug-in after detailed user configuration settings have been applied.
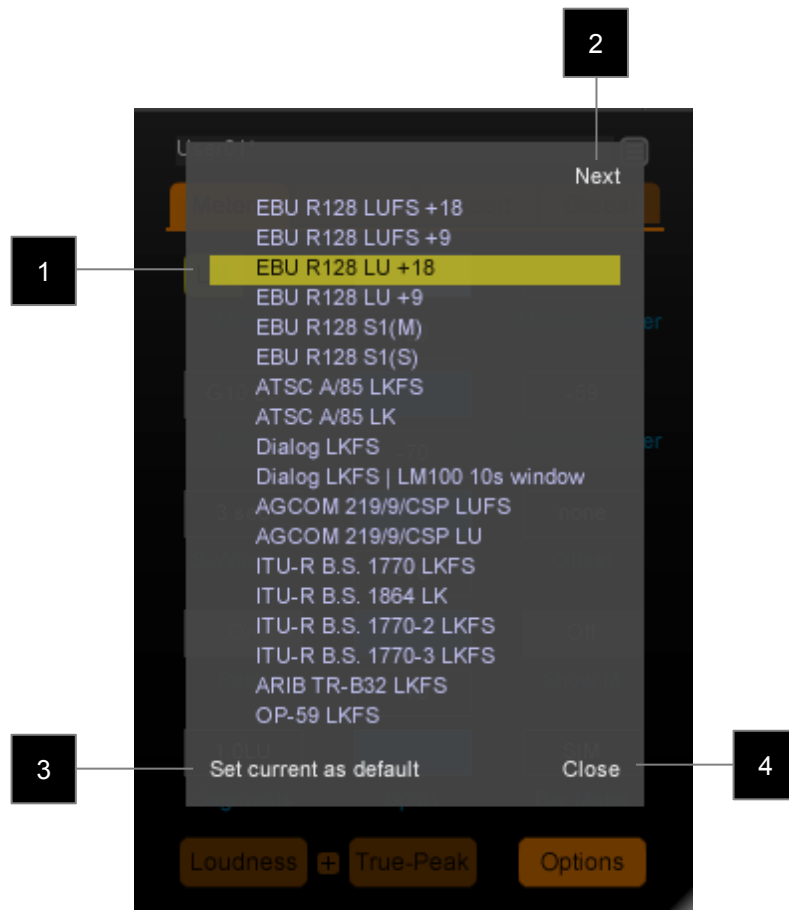
1 **Preset list.** The preset browser opens a list containing many of the international loudness standards which allow immediate configuration of all VisLM settings. There are also illustrative presets which demonstrate some of the more advanced settings available. To select a preset simply mouse-over the preset title in the list, which which will then be highlighted, and click to load the parameters. The preset will be loaded and the preset browser will close.

2 **Next (Previous).** Click next (or previous) to move between pages of presets. These controls only show if the window size of the plug-in is such that the entire list cannot be shown in one screen.

3 **Set current as default.** This option will set the current settings as the default opening settings for all new instances of VisLM.

4 **Close.** Closes the preset browser if no further functions are required.

Options – Meters

The meters tab contains detailed set-up options for both the loudness and True-peak meters.
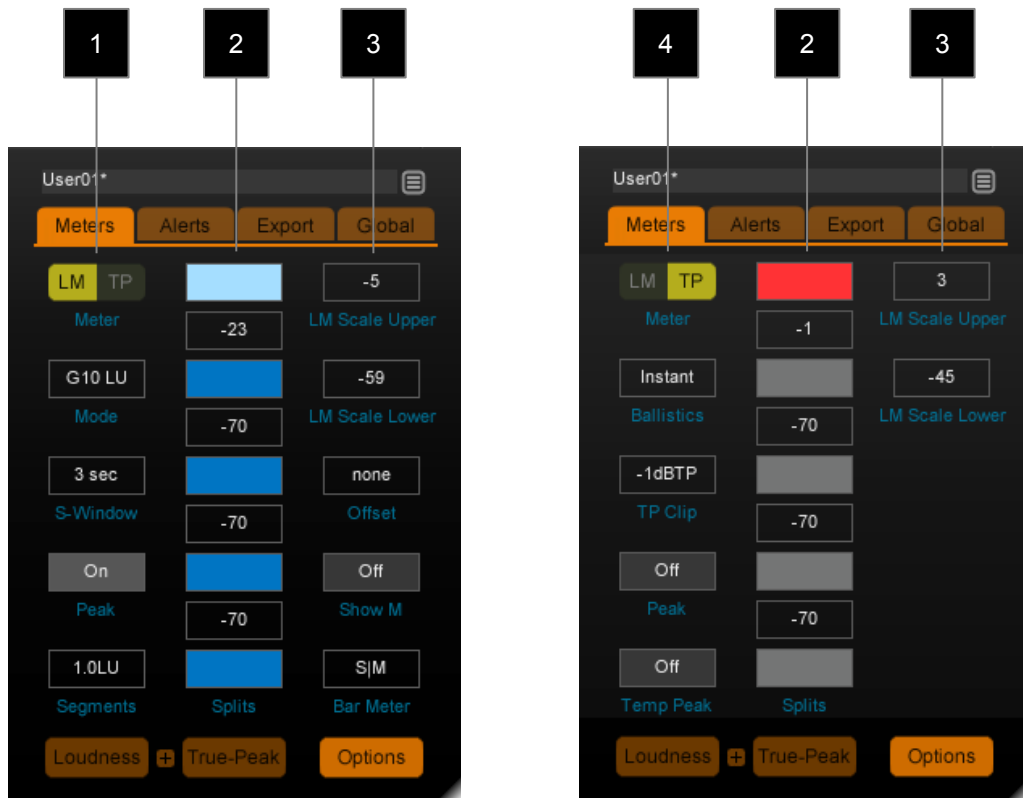
1 LM / TP. These controls toggle the settings between the Loudness Meter (LM) and the True-peak meter (TP). The configuration parameters are broadly similar, with related parameters shown in the same position on both pages.

Mode. This setting defines the underlying mode of operation for the Loudness Meter. Different standards and recommendations define slightly differing algorithms. The mode selector can be used to determine which the Loudness Meter uses to calculate the loudness value.

S-Window. This value is usually set to 3 seconds, as defined by most standards, however there are recommendations which choose a different value, which can be set here if required.

Peak. Turns on the peak hold bars in the loudness bar meters.

Segments. Determines the number of loudness units represented by each segment on the momentary/short-term loudness meter/s.

2 Splits. This section allows the Loudness Meter and True Peak Meter (and meter history – VisLM-H only) to be split into colour banding to facilitate the rapid

assessment of whether loudness readings are falling within specification. The split values (1 to 4) determine the position of the colour boundaries. Click-drag up and down to change the value, or double-click to enter a value directly. To change the colours of the sections, click the swatch to open up the colour picker window. Select LM to define settings for the Loudness Meter, TP for the True-Peak Meter.

3   **LM (TP) Scale Upper / Lower.** Defines the upper and lower boundaries of the loudness meter scales. Depending upon the precise aspect ratio of the meter in practice, the scale may show slightly more than defined there, these are the minimum specifications required.

Offset. This value allows for absolute scale mapping (Full Scale) or mapping of the zero point to some other value, such as target loudness (as in BS. 1771). The EBU target loudness is defined as –23 LUFS = 0 LU, ATSC gives –24 LKFS = 0 LK, although other values can be defined.

Show M. Toggles the Momentary loudness numerical readout on/off. If this is set to 'on' the readout will only be visible in the display if there is sufficient space for it to be displayed. If it does not show, resize the interface vertically to allow it to appear.

Bar Meter. Determines what is shown by the loudness bar meter.

M	Bar meter shows Momentary loudness
S	Bar meter shows Short-term loudness
M|S	Bar meter shows Momentary then Short-term loudness
S|M	Bar meters shows Short-term then Momentary loudness

These options can also be cycled through by clicking the units display (LUFS/LKFS) at the bottom of the bar meters in the loudness display.

4   **LM / TP..** See above.

Ballistics. Sets meter ballistics to recognised standards. The update rate and time window is as defined in EBU R128, this parameter determines the decay time only.

TP Clip. Sets the value at which the true-peak overload indicator lights.

Peak. Turns on the permanent peak hold bars in the loudness bar meters.

Temp peak. Determines the temporary peak-hold time (enter '0' for Off).

Options – Alerts

Alerts can be set to give a visual warning if loudness parameters deviate from desired values for a given amount of time. This can be instantaneous if these are pass/fail criteria, or set to alert after a specific time period if the warning is for guidance only.
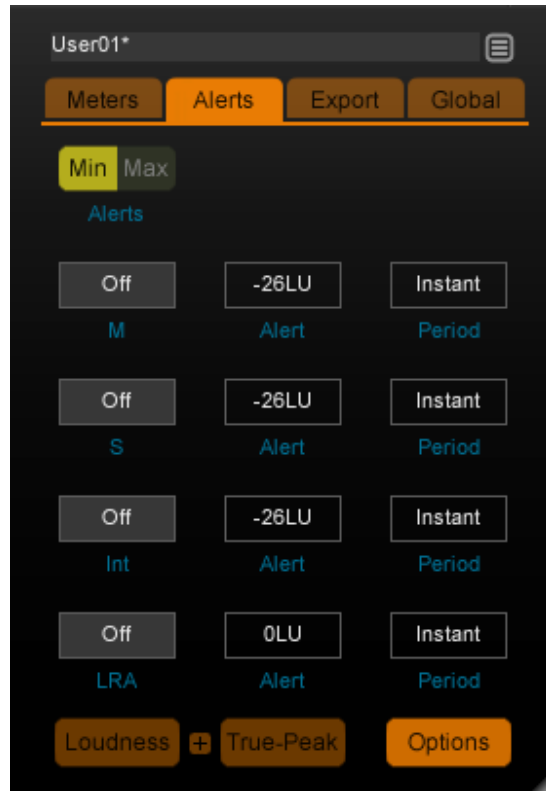
Minimum and Maximum alert levels are set and activated independently for each parameter.

Activation of the functionality is achieved by using the On/Off control. The alert value is is defined in the 'alert' box, and the 'period' control determines how long the short-term loudness can fall beyond this value before an alert is given.

An alert warning is indicated on the loudness meter interface numerical read-out. If a parameter exceeds the alert level, the read-out will change colour to orange text, to indicate an alert has been triggered. Click the loudness value to re-set the alert.

www.nugenaudio.com

Options – Export

The export tab is used to determine what data (if any) is exported by the plug-in during operation. VisLM can export loudness data to both a text file and as automation data for display of loudness data in the timeline.
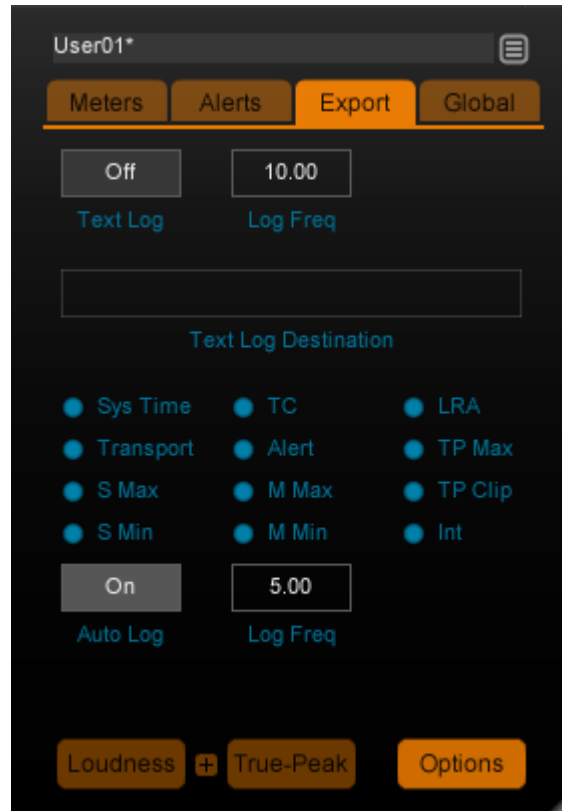

The **Text log** control determines whether text logging is activated. The frequency of data logging is specified as number of seconds between each entry using the **Log Freq** parameter. The file name and path are determined using the text log box. The radio buttons can be used to activate/de-activate data export, and select the values to be included in the file.

Multiple instances of VisLM will export to unique data files. The data is exported as a csv (Comma Separated Value) file, and as such can be readily imported in to common spreadsheet programs for graphing and further analysis.

The **Auto Log** controls toggles on/off the automation logging feature. When active, a series of automation parameters will be generated at the set interval **Log Freq**.

www.nugenaudio.com

Options – Global

The global tab contains parameters affecting the entire plug-in globally.
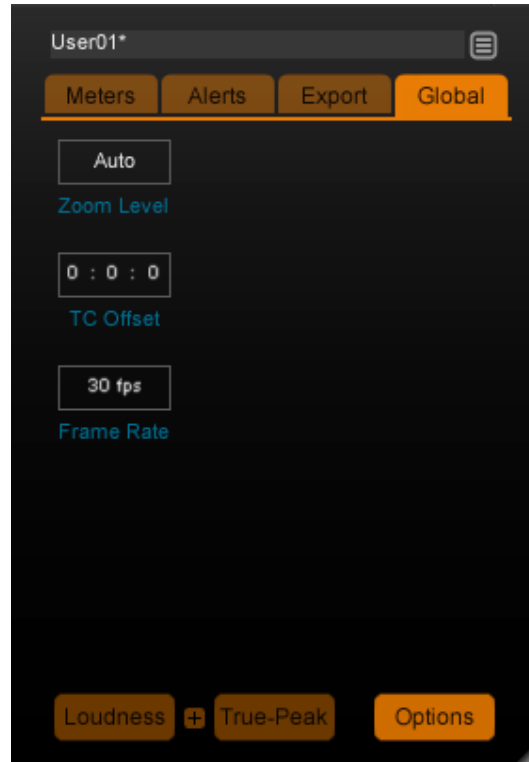
Zoom Level	When the plug-in is resized (VisLM-H only), it is possible to resize the text. Depending upon the reason for resizing this may or may not be desirable. Auto, automatically scales the text depending upon the size and aspect ratio. Regular chooses the standard font size and Large forces the interface to large text view.
TC Offset	If the NLE time-line is offset from zero, this parameter can be used to offset VisLM-H so that time-code positions match the NLE.
Frame Rate	If frame-rate notification is not passed to the plug-in via the NLE, this parameter can be used to ensure sync is properly locked.

Loudness History mode (VisLM-H only)

VisLM-H is capable of recording and displaying the loudness history over time. Depending upon the mode selected, this can be used to investigate the evolution of loudness parameters, exude time periods from the Integrated Program calculation and even overdub discreet audio sections, allowing re-calculation of loudness values without the need to re-play the entire program through the meter.

This section discusses the different history modes and the differing functionality available within each mode.

VisLM-H offers three history modes:

System – Loudness data is logged against real-time system clock information
Elapsed – Loudness data is logged relative to the 'start' of data input
Time Code – Loudness data is logged against Sample/time code reference

In all three modes, the loudness data for each reading is stored irrespective of whether the particular graph view is active, and can be toggled on/off at any time for inspection. The loudness data is saved with the session and will be recalled when the session is re-opened.

In general the operation for each mode is the same. The data is stored over time from left to right, with the screen automatically scrolling as new data is acquired when the loudness history follow control is active (see Interface - Loudness History for detail about the individual controls).

The the time span the history view shows can be increased or decreased using the History Zoom control and the data can be scrolled in the time-line by clicking and dragging left and right.

The History Macro view gives an overview of all the data stored, with the rectangular white box indicating the data currently under inspection in the main window. The rectangular box can be dragged left and right to rapidly locate a specific time window in the main history view.

www.nugenaudio.com

Loudness History mode - System

The System Time reference logs loudness data against the time as measured by the System Clock of the host machine for up to 24 hours. System time is useful for real-time monitoring of live audio feeds.
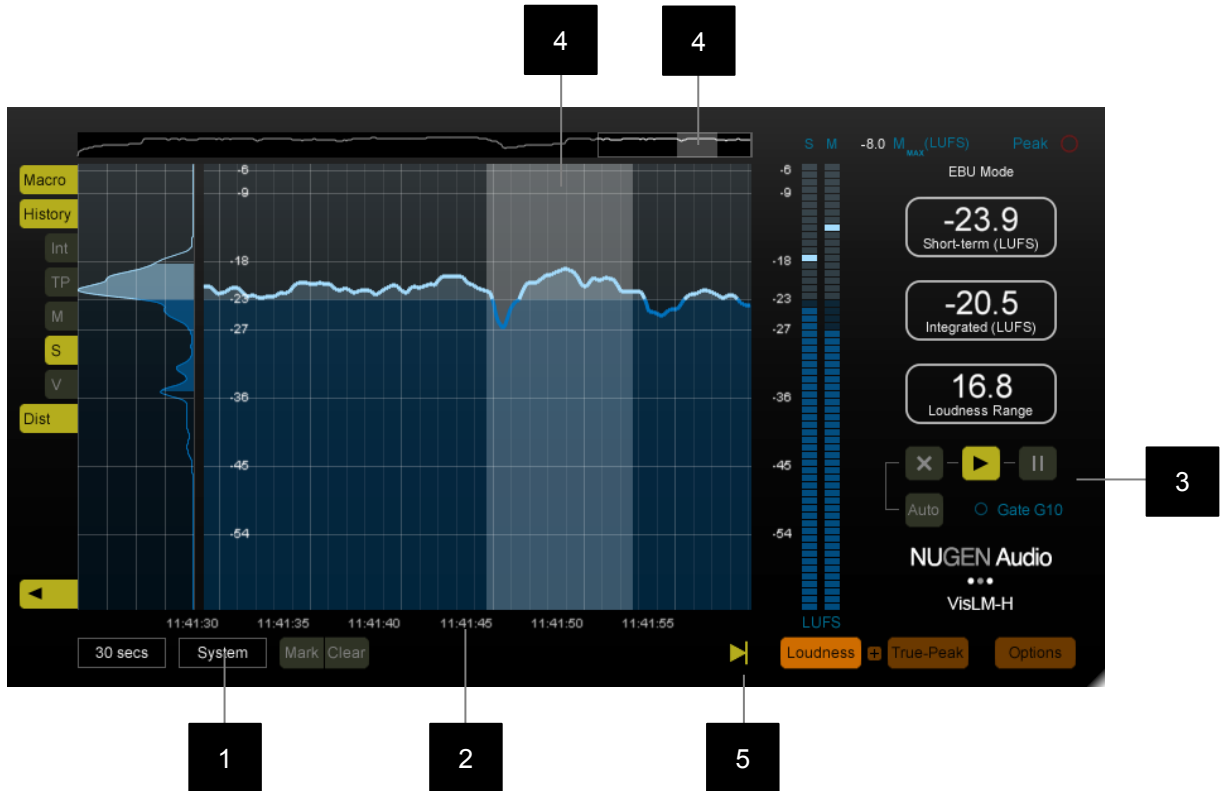
1 **System Time Indicator.** Click to select 'System' from the pop-up box to activate System time mode.

2 **System Time Scale.** In System mode, the loudness history shows the loudness values against a scale indicating the hh:mm:ss that the data was received.

As the system time is an absolute, not a relative value, it is not possible to overdub loudness values in this mode, new data is always recorded and logged at the relevant system time value in the time line.

3 **Transport controls.** In system time, the transport controls can be used to determine how the data is stored and which data is included in the Integrated Program Loudness and LRA calculation.

The 'X' button clears all data, flushing the memory and resetting all loudness parameters.

The 'Auto' button automatically activates the 'X' button, resetting all loudness parameters with the transport control. This can be useful when recording and measuring loudness of discreet audio sections one after the other.

The 'Play' arrow control begins Integrated Program measurement.

www.nugenaudio.com

The 'Pause' control temporarily pauses the Integrated Program measurement and LRA, whilst retaining all data up until that point. Measurement can be restarted by clicking the control again. This feature is useful if for instance, a commercial break inserted into a program is to be excluded from the loudness calculation.

4   When the Integrated Program Loudness and LRA calculation is paused, the data that is exuded from the measurement is shown 'grey' in the loudness history and macro view. The individual Short-term and Momentary loudness traces are still shown, but this data is excluded from the overall Integrated Program Loudness calculation.

5   **History Follow control.** When the history has been scrolled in the main window, the follow control is automatically de-activated. This allows the history window to show the data without scrolling to update to the more recent input. This data is continuously generated whether the view is following the current input or not. To automatically scroll and follow the input, re-activate the control.

Loudness History mode - Elapsed

The Elapsed time reference operates in a similar manner to the System mode except that the incoming loudness data is logged only when it is received, thus the audio loudness as measured over the last hh:mm:ss is shown. This mode is useful when moving around the time-line, playing in numerous sections to measure an over-all Integrated Program Loudness value. It can also be used as a simple alternative to other modes, when measuring sections of audio, using the Auto control to reset the measurement automatically.
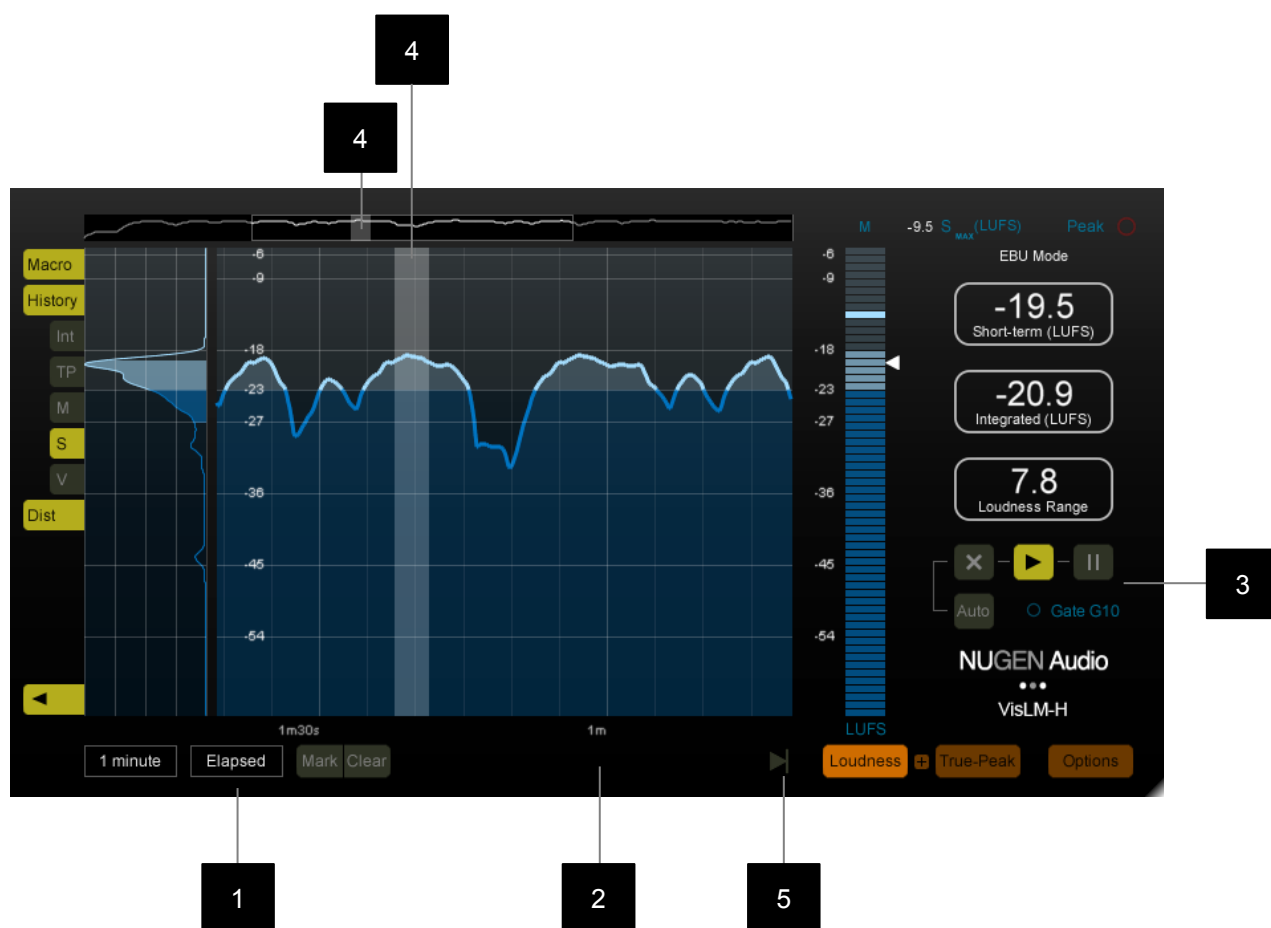
1   Elapsed Time Indicator. Click to select 'Elapsed' from the pop-up box to activate Elapsed time mode.

2   Elapsed Time Scale. In Elapsed mode, the loudness history shows the loudness values against a scale indicating the hh:mm:ss since the data was received.

　It is not possible to overdub loudness values in this mode, new data is always appended and logged subsequent to measurements previously taken.

3   Transport controls. In elapsed time, the transport controls can be used to determine how the data is stored and which data is included in the Integrated Program Loudness and LRA calculation.

The 'X' button clears all data, flushing the memory and resetting all loudness parameters, beginning a fresh set of data.

The 'Auto' button automatically activates the 'X' button, resetting all loudness parameters with the transport control. This can be useful when recording and measuring loudness of discreet audio sections one after the other.

The 'Play' arrow control begins Integrated Program measurement.

The 'Pause' control temporarily pauses the Integrated Program measurement and LRA, whilst retaining all data up until that point. Measurement can be restarted by clicking the control again. This feature is useful if for instance, a commercial break inserted into a program is to be excluded from the loudness calculation.

4   When the Integrated Program Loudness and LRA calculation is paused, the data that is excluded from the measurement is shown 'grey' in the loudness history and macro view. The individual Short-term and Momentary loudness traces are still shown, but this data is excluded from the overall Integrated Program Loudness calculation.

5   **History Follow control.** When the history has been scrolled in the main window, the follow control is automatically de-activated. This allows the history window to show the data without scrolling to update to the more recent input. This data is continuously generated whenever input is received, whether the view is following the current input or not. To automatically scroll and follow the input, re-activate the control.

Note. If the history view has been scrolled to show data recorded in the past, and new data is still being received, the time-scale will appear to scroll 'backwards'. Because new data is still being added to the time-line, this is in fact correctly representing the data, even if it may seem counter intuitive at first. The data in view, is now falling further and further into the past as new data is added and the time elapsed since it's recording is increasing.

Loudness History mode – Time Code

The Time Code reference is only available in the Plug-in version of VisLM-H and then only when the DAW/NLE supports time-code referenced audio data in it's plug-in architecture.

In Time-code mode, loudness measurements are logged by the plug-in with Time Code referencing. This means that the plug-in knows precisely where the data belongs in the time-line and enables the ability to overdub small sections of audio that have changed in the loudness history to immediately re-calculate the overall Integrated Program Loudness without having to re-measure all of the audio again.

1   **Time Code Indicator.** Click to select 'Time Code' from the pop-up box to activate Time Code mode.

2   **Time Code Scale.** In Time Code mode, the loudness history shows the loudness values against a scale indicating the time code hh:mm:ss that the data was received.

As all time-code position data refers to a unique point in the time line, it is possible to overdub loudness values in this mode. If new data is received for a time-code position it will be written to that position, allowing overdubs of new audio data to be made after an edit. All remaining data is retained, and so a new Integrated Loudness and LRA calculation will be produced after the overdub.

3   **Transport controls.** In Time Code mode, the transport control behaviour is slightly different to other modes.

www.nugenaudio.com

The 'X' button clears all data, flushing the memory and resetting all loudness parameters.

The 'Auto' button automatically activates the 'X' button, resetting all loudness parameters with the transport control. This can be useful when recording and measuring loudness of discreet audio sections one after the other.

The 'Play' arrow control begins Integrated Program measurement. In Time Code mode this control is always active, as all the data received forms part of the measurement.

The 'Pause' is not available in Time-code mode. All loudness data generated is included in the Integrated Program Loudness and LRA calculation. If a specific set of data is not to be included, then simply avoid playing this section of audio into the plug-in.

4 As loudness is measured, the loudness profile is built up in the history view. In Time code mode it is possible to move the transport in the time line and play audio from any position. The audio is measured in the correct Time Code position in the history view.

Any sections of the time-line where audio has not been received are highlighted in grey, showing that the plug-in has yet to receive data for this region.

5 **Overdub Pre-roll.** If audio has previously been received for a section of Time Code, VisLM-H will perform a loudness overdub when new audio is played ie. after an edit.

In order to correctly update all the loudness information during an overdub, VisLM-H needs to 'tie-in' the audio either side of the over-dub for a default of 3 seconds (the Short-term loudness calculation uses a short-term sliding window of 3 seconds in order to determine a value). The simplest way to automate this is to set the pre-roll functionality of the NLE/DAW to 3 seconds, so that any edit position automatically plays in this 'tie-in' section.

If an audio overdub begins without the initial tie-in, this will be highlighted by a pink region as shown and an earlier play position will need to be chosen to generate the tie-in data.

Once the audio is locked to a recognised set of loudness measurements, the overdub data will be written, overwriting previous loudness measurements. When the end of the overdub is reached, VisLM-H will then seek to tie-in the end of the section with 3 seconds of recognised readings. Once this has finished, the overall Integrated Program Loudness will be shown for the entire data-set.

Note: Some NLE/DAW hosts also rapidly fade in audio at play re-start. This functionality should either be disabled or set to a minimum. It is also wothy noting that many FX plug-ins require a 'lead time' to reach a stable reference position eg. Delay and reverbs are echoing audio previously received. In this case a longer pre-roll may be required. It is also possible that a plug-in will not in fact reproduce audio in the same way each time ie. There is a random element involved. In this case, an over-dub would not be possible without first rendering the plug-in in order to give the same loudness reference for each pass.

6   History Follow control. When the history has been scrolled in the main window, the follow control is automatically de-activated. This allows the history window to show the data without scrolling to update to the more recent input. This data is continuously generated whether the view is following the current input or not. To automatically scroll and follow the input, re-activate the control.

Stand Alone application

VisLM is also available as a stand-alone application for Win/OSX in addition to the plug-in versions.

The stand-alone application is designed to monitor the ASIO Audio Input/s of the machine it is installed on, turning it into a free-standing, independent loudness meter.

==Note: Within Windows and OSX, there is no option to route the *Audio Output* directly into a secondary application, the VisLM application can only monitor the *Audio Input*. 3rd Party products are available to add this functionality if required.==

The functionality of the VisLM application is exactly as that of the plug-in with the addition of a number of menu items.

File: Load settings…
               Save Settings
               Save Settings as…
               Quit

Settings: Change audio device settings   Select the device for audio input
               Show channel routing matrix   Allows for detailed input config.
               Open on system start-up   Opens VisLM-H on start

About   Opens credits, licensing and de-authorisation window.

Calibration and test tones

Whilst VisLM needs no specific calibration or set-up when used with-in a DAW , in situations where external audio paths are used to transfer audio to the host machine, it can be useful to check that the signal path is transmitting the data without accidental filtering or attenuation (using a digital connection is recommended to reduce/eliminate these potential complications).

Both the ITU and EBU provide test tone specifications for checking meter compliance, calibration and set-up and these are listed below.

ITU-R BS. 1770/1 Test Tone
If a 0 dB FS 1 kHz sine wave is input to the left, centre, or right channel input, the indicated loudness will equal –3.01 LKFS

EBU Tech Doc 3341 (EBU R128 meter)		
	Test Signal	Expected response (and tolerance)
1	Stereo sine wave, 1000 Hz, -23.0 dBFS (per-channel peak level); signal applied in phase to both channels simultaneous; 20 s duration	M, S, I = -23.0 ±0.1 LUFS M, S, I = 0.0 ±0.1 LU
2	As #1 at -33.0 dBFS	M, S, I = -33.0 ±0.1 LUFS M, S, I = -10.0 ±0.1 LU
3	As #1, preceded by 20 s of -40 dBFS stereo sine wave, and followed by 20 s of -	I = -23.0 ±0.1 LUFS I = 0.0 ±0.1 LU

	40 dBFS stereo sine wave	
4	As #3, preceded by 20 s of -75 dBFS stereo sine wave, and followed by 20 s of -75 dBFS stereo sine wave	I = -23.0 ±0.1 LUFS I = 0.0 ±0.1 LU
5	As #3, but with the levels of the 3 tones at -26 dBFS, -20 dBFS and -26 dBFS, respectively	I = -23.0 ±0.1 LUFS I = 0.0 ±0.1 LU
6	5.0 channel sine wave, 1000 Hz, 20 s duration, with per-channel peak levels as follows: -28.0 dBFS in L and R -24.0 dBFS in C -30.0 dBFS in Ls and Rs	I = -23.0 ±0.1 LUFS I = 0.0 ±0.1 LU

Loudness metering in practice.

VisLM provides Loudness Metering to several defined standards, and can be tailored to suit many specific situations using the many options available.

A good starting point is to select a Preset using the preset selections available via the options page. The preset will select an algorithm that meets the specification of the recommendations of the standard referred to in the title. This will set up VisLM to give readings that can be used to meet the production requirements of the standard selected. A description of some of these settings is given below.

Preset	Description
ATSC A/85 LKFS	Full scale loudness meter to 0 LKFS Gated algorithm (G10) ITU-R B.S. True Peak Metering Over at –2dBTP
ATSC A/85 LK	Relative scale loudness meter off-set to 0 = -24 LKFS Gated algorithm (G10) ITU-R B.S. True Peak Metering Over at –2dBTP
EBU R128 LUFS +9	Full scale loudness 'EBU Mode' meter to 0 LUFS Gated algorithm (G10) EBU +9 Scale True Peak Metering Over at –1dBTP
EBU R128 LUFS +18	Full scale loudness 'EBU Mode' meter to 0 LUFS Gated algorithm (G10) EBU +18 Scale True Peak Metering Over at –1dBTP
EBU R128 LU +9	Relative scale loudness meter off-set to 0 = -23 LUFS Gated algorithm (G10) EBU +9 Scale True Peak Metering Over at –1dBTP
EBU R128 LU +18	Relative scale loudness meter off-set to 0 = -23 LUFS Gated algorithm (G10) EBU +18 Scale True Peak Metering Over at –1dBTP
AGCOM 219/9/CSP LUFS	Full scale loudness meter to 0 LUFS Gated algorithm (G8) ITU-R B.S. True Peak Metering Over at –2dBTP
AGCOM 219/9/CSP LU	Relative scale loudness meter off-set to 0 = -24 LUFS Gated algorithm (G8) True Peak Metering Over at –2dBTP
ITU-R B.S. 1770/1 LKFS	Full scale loudness meter to 0 LKFS Un-gated algorithm ITU-R B.S. 1771 Scale True Peak Metering Over at –2dBTP
ITU-R B.S. 1770-2 LKFS	Full scale loudness Gated algorithm (G10) ITU-R B.S. 1771 Scale True Peak Metering Over at –2dBTP
ITU-R B.S. 1864 LK	Relative scale loudness meter off-set to 0 = -24 LK Un-gated algorithm ITU-R B.S. 1771 Scale True Peak Metering Over at –2dBTP
ARIB TR-B32	Full scale loudness Gated algorithm (G10) ITU-R B.S. 1771 Scale True Peak Metering Over at –1dBTP

Taking Measurements and meeting loudness requirements

The loudness requirements for different companies and institutions vary, so the guidelines below are supplied as background reading and to introduce the principles involved.

Choosing the underlying loudness standard.

VisLM is capable of meeting several loudness standards. All these standards are based on the definition of loudness measurement as defined in ITU-R B.S. 1770. Using this standard measurement of other recommendations such as EBU-R 128 and ATSC A/85 have been produced. Before making loudness measurements with the intention of meeting loudness delivery specifications it is important to choose the correct standard. Many of these are included as presets, others can be established using the parameters on the options page.

For more general loudness investigations, where no specific mode of operation is defined, any of the standard presets will give useful results.

Momentary Loudness.

This value is a rapid changing measure of the loudness at a point in time. It is generally used to aid mixing by ear and for spotting brief peaks and troughs that might otherwise go undetected. As the value changes rapidly, it is represented using the bar meter to facilitate easy reading. The maximum value reached M_{max} is also indicated. This can be reset by clicking the readout.

Momentary Loudness can be specified for short-form loudness measurements, where the LRA reading is not appropriate. It is not usual for Momentary and Short-term loudness maxima to be specified simultaneously.

Short-term Loudness.

Short-term loudness is a measure of the loudness over a longer time period than the momentary value and is a good measure of how the loudness of the audio is perceived over time. By default, the loudness history display (VisLM-H) displays the historical value of short-term loudness.

Preferred Short-term Loudness ranges are often (although not always) detailed within in loudness requirement delivery specifications. Eg. Short-term Loudness values within –32 and –22 LKFS are preferred, or Short-term Loudness values are not to exceed –20 LKFS. Using the colour splits and/or the alerts settings, VisLM can be configured to show these ranges clearly so that any deviation beyond is easily picked up (see Fig. 1 & 2)

Momentary Loudness may also be specified for short-form loudness measurements, where the LRA reading is not appropriate. It is not usual for Momentary and Short-term loudness maxima to be specified simultaneously.

Integrated Loudness.

Integrated Loudness is a single value of loudness that defines the 'average loudness' of an entire section of audio. This value is used for the purposes of loudness

normalisation, allowing sequential sections of audio to be matched, ensuring loudness consistency throughout station programming.

The Integrated Loudness for a program or section is measured either by measuring the entire section of audio, or in some specifications, by measuring a carefully selected 'anchor' section.

The integrated loudness value is usually given in loudness requirement delivery specifications. A single value is given eg. The programme material shall have an integrated loudness value of –23.0 LUFS.

Again, using the colour splits, VisLM can be configured to show the target loudness clearly so that the audio spread around this value can be seen easily (see Fig. 1 & 2)

Loudness Range (LRA).

Loudness Range is a measure of the variation of loudness measurement of a section of audio, and is measured along side the Integrated Loudness value. The LRA value can be used in helping to determine whether dynamic treatment of the audio is required.

Note:

The LRA measurement is very sensitive when used to measure very short sections of audio.

"It is noted that measurement of very short programmes, where leading or trailing silence is included, or of programmes consisting, for example, of isolated utterances, could result in misleadingly high values of LRA." EBU tech doc 3342, section 3.1

To measure LRA consistently, the following should be taken into consideration:

1. Begin measurement away from the 'start' point of the DAW sequence. This is because some DAW's rapidly ramp up the level of the audio in order to avoid clicks when starting audio in the middle of a file.

2. The measurement should be paused immediately after the audio clip has ended to avoid the following silence being taken into account.

Variance.

The Variance envelope shown in the loudness history section of VisLM-H is a subvalue of the loudness range descriptor, and shows the measure of variation in the Short-term loudness over time.

www.nugenaudio.com

Fig 1. VisLM-H showing a preferred 'green zone' Short-term Loudness range, with a target loudness of –24 LKFS defined by a change in shading.

Fig 2. VisLM-H showing a 'green zone' Short-term Loudness range, with a no-go zone highlighted in red.

Reporting a problem.

If you encounter a problem with any of NUGEN Audio's products, please let us know, to help us improve them.

Please email NUGEN Audio at **support@nugenaudio.com** giving a clear explanation of the problem. Please state how frequently you've experienced the problem. If there are any particular steps you need to go through to see the problem, please detail these.

Please also state your operating system, and the rough specs for your machine (e.g.- CPU speed, RAM) - in Windows XP you can get this information by right-clicking "My Computer" and selecting properties.

Please be patient with any problems you may experience, particularly with products at a beta stage of release. At NUGEN Audio we take problems with our software seriously, and will endeavour to correct them as quickly as possible.

Version History

2.0 Initial release