ISL

How to license your NUGEN Audio product

Contents

Introduction

The NUGEN Audio ISL inter-sample True-Peak limiter is designed for the control of peak levels in audio signals from mono through to 7.1.4 (ISLₛₜ - stereo only) Unlike traditional approaches to limiting, ISL offers a true brick-wall solution, measuring inter-sample peaks and allowing the user to define the True-Peak Limit of the audio output (rather than the more traditional threshold control at which limiting begins to take effect).

ISL uses the standardised True-Peak algorithms of ITU-R B.S. 1770 and related standards (including Apple afclip as specified in the Mastered for iTunesTM format) and is suitable for the control of audio for Post Production and Broadcast applications. True-Peak limiting can also be used to ensure that down-stream Codecs (mp3, AAC etc.) do not introduce distortion into the signal.

Whilst ISL has been designed for the transparent limiting of relatively dynamic high quality audio, it can also be used to hard limit and reduce dynamic range considerably if this is required.

Note: Throughout this manual, the illustrations refer to ISL. ISLₛₜ is identical in most respects, except it is limited to mono and stereo input/output. Where surround configurations and features are discussed these are not available in ISLₛₜ.

Interface

General Layout

The interface is designed to facilitate intuitive operation by following a logical flow from left to right, grouping similar aspects of operation into distinct zones as shown below.
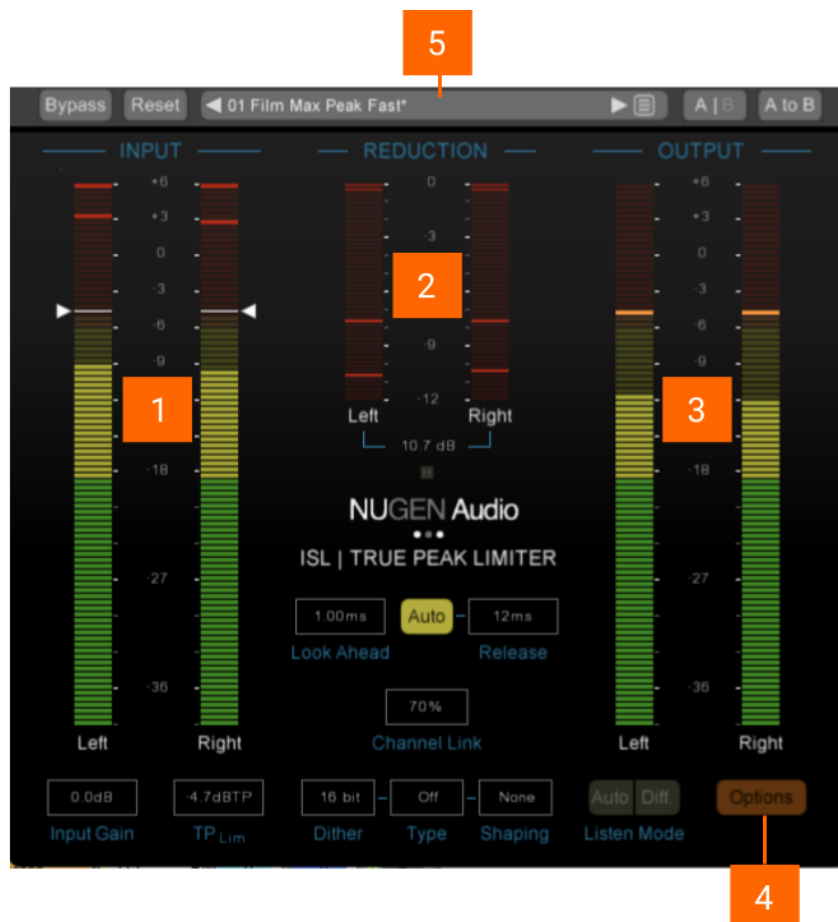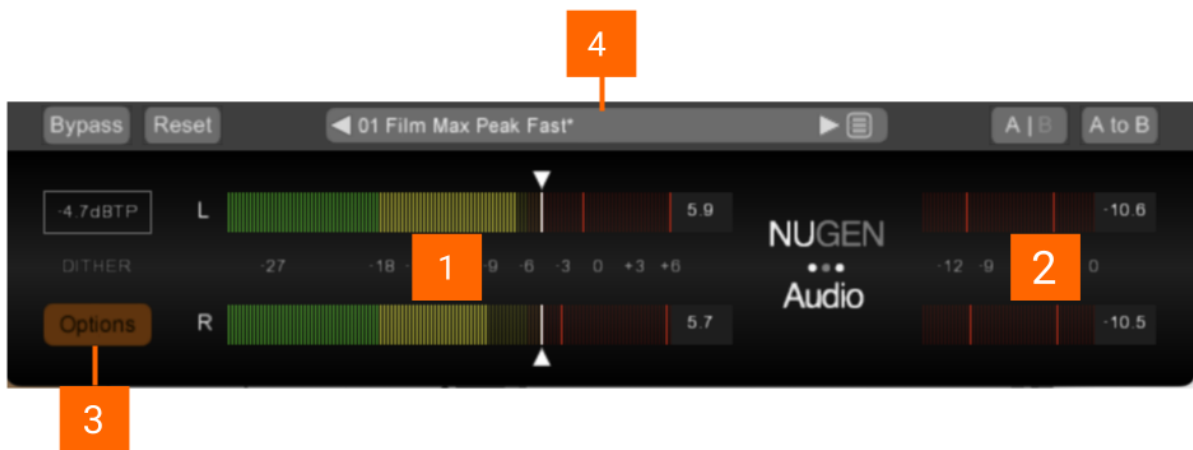

1   Input metering and adjustment.

2   Gain reduction and processing options.

3   Output metering and listen mode controls.

4   Detailed set-up options.

5   Utility control zone.

Compact Mode

A compact interface is also provided. This view enables a minimal foot print mode, reducing the ISL interface to displaying essential metering and parameters only. The controls are illustrated in the remainder of the manual using the main interface, however the functionality remains the same when compact mode is active, even if a particular function is no longer directly accessible from the interface in this mode.

The compact interface is enabled via the 'Compact' on/off toggle switch in the Options panel, accessed by clicking the 'Options' button on the main interface

| 1 | Input metering and adjustment. |
2	Gain reduction and processing options.
3	Detailed set-up options.
4	Utility control zone.

Input Metering and Adjustment

This section provides a view of the True-Peak input levels (dBTP). Depending upon the version chosen and the audio track this will be shown in a stereo, 5.1, 7.1, 7.1.2 or 7.1.4 configuration (ISLsᴛ - stereo only)

1   **Input level meters.** Depending upon the configuration, ISL will show stereo input, 5.1, 7.1, 7.1.2 or 7.1.4 metering. The level is shown in dBTP (True-Peak decibels) and can be used to give a standard compliant reading of the incoming audio signal. It is possible to configure the colour and peak hold settings in the options panel. If the input level exceeds the range of the meter the peak hold marker will flash until reset. Click the meter to reset levels.

2   **Input gain adjustment.** This parameter can be used to increase or reduce the input level of the incoming audio signal. Click and drag the mouse up or down to adjust the value. It is also possible to double click and enter a target value directly. Alternatively the arrows on the level meter may be dragged up/down to set the value visually.

Gain Reduction and Processing Options

This section provides a view of the True-Peak input levels (dBTP). Depending upon the version chosen and the audio track this will be shown in a stereo, 5.1, 7.1, 7.1.2 or 7.1.4 configuration (ISL_ST - stereo only)
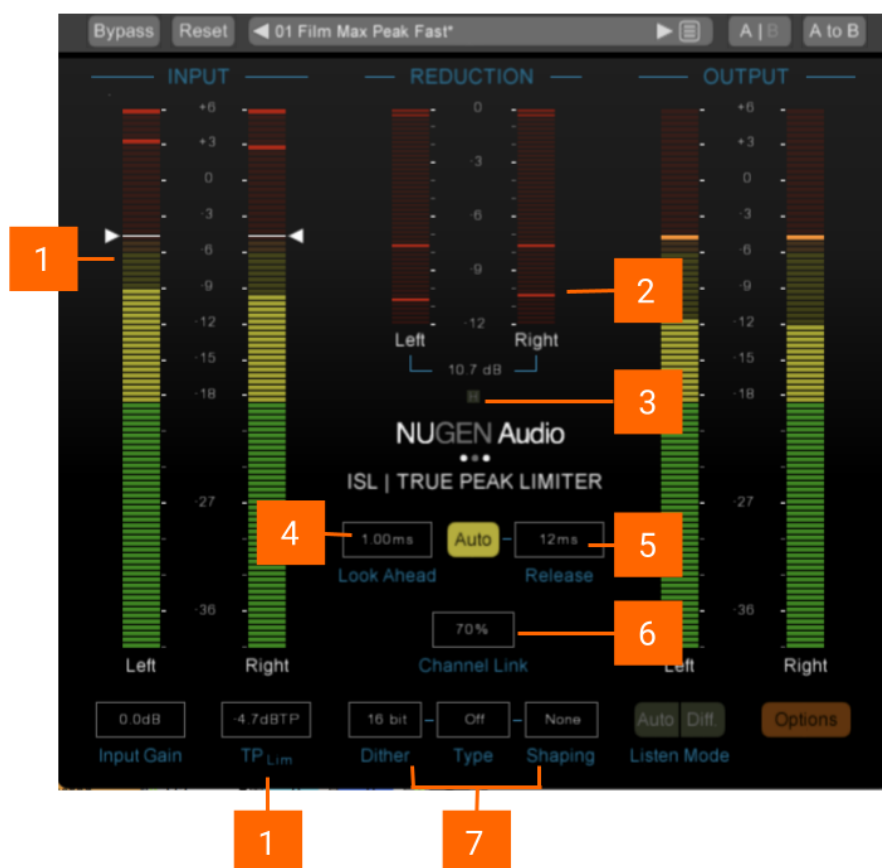
1   **TPLim.** This parameter sets the True-Peak limit (in dBTP) for the audio signal. Click and drag the mouse up or down to adjust the value. It is also possible to double click and enter a target value directly. This parameter alone will ensure compliance with TP requirements of current loudness standards.

        TPLim is also indicated on the input level meters by a white line and marked with the two arrow controls. These can be dragged up/down as an alternative method of determining the TPLim value.

2   **Gain reduction meters.** Depending upon the configuration, ISL will show stereo input 5.1, 7.1, 7.1.2 or 7.1.4 metering (ISL_ST - Stereo only). The level shown in dBTP. If the gain reduction level exceeds the range of the meter, the peak hold marker will flash until reset. Click the meter to reset levels.

        Below the meter the maximum gain reduction applied is shown in dBTP, which is also reset if the meter is clicked.

3   **Alternative gain reduction metering.** This view is activated using the small 'H' button (History) below the maximum gain reduction value. When active, an alternative view showing the gain reduction history (maximum reduction on all channels.)

This scrolling history shows input level in grey, and the gain reduction applied in red. This visualisation can be useful to see how much gain is being applied over time, which can be difficult to assess using standard reduction metering. The effect of the look ahead and release controls can also be examined.

This view also provides two additional meters 'S' (Steering) and 'D' Ducking. These meters give an indication and dB value of the steering and ducking intro duced into the signal due to the action of the limiter and can be helpful when determining the amount of Channel linking to apply across the individual limiters (see below)

Steering meter (S). Steering is a by-product of the action of limiting a stereo or surround signal using independently acting limiters. If two fully independent limiters are applied to a stereo signal for instance (one to the Left channel and one to the Right channel), and one side triggers the limiter the other will remain unaffected. This causes a gain reduction in that channel, but not in the other, and so the perceived centre of the image 'steers' away from the original position. The Steering meter indicates the amount of steering introduce by the limiter and is affected by the Channel linking control (see below).

Ducking meter (D). Ducking is the inverse effect of steering. If two linked limiters are applied to a stereo signal, again one on the left and one on the right, and one side triggers the limiter, because the limiters are linked, both sides will experience equal gain reduction. This avoid the issue of steering, however, the second channel will be limited unnecessarily as it's level would not have reached a point at which the limiter would have been triggered were it not for the channel linking. The Ducking meter indicates the amount of ducking introduced by the limiter and is affected by the Channel linking control (see below).

4   **Look ahead.** The look ahead parameter is used to allow ISL to look at the incoming audio in advance of applying processing which allows it to calculate the amount of gain reduction that will be required to meet the TPLim criteria. Lower values tend to preserve transients better, but very low values can increase

the risk of audible side-effects as the time available to respond to the incoming signal is reduced.

5   **Release.**   The release value determines how rapidly the limiter returns to zero gain reduction after the need for reduction is no longer present. The need for gain reduction is determined by the current level and influenced by the levels foreseen by the look-ahead section of the limiter.

Auto release. This control analyses the incoming audio signal for low frequency content and automatically extends the 'hold' time of the limiter to ensure a full wavelength passes before the release cycle is activated. This allows the use of shorter release times than might usually be employed, whilst ensuring that harmonic distortion is not introduced when low-frequencies trigger gain reduction.

6   **Channel link.** ISL uses a series of fully independent limiters, one for each audio channel. The Channel Link control can be used to control how independently these can behave. 0% allows each audio channel to be operated on in isolation. A value of 100% will cause all channels to receive the gain reduction of the channel with the highest input level. Values in-between can be used to vary the degree of dependence.

When ISL is used in 5.1, 7.1, 7.1.2 or 7.1.4 mode (not available with ISLsт), an additional Centre Channel control is available. This control allows independent linking of the Centre channel. When this is set to 100% the Centre channel is fully linked to the behavior of the other channels, when this is set to 0% the Centre channel is fully independent of the other channels.

The relative independence of the limiters affects the amount of Steering and Ducking introduced when the limiter is active (see above).

In general if directional information is not important, or an effect of dispersed sound is strong, steering is preferable to unnecessary ducking of the channels, however, if positional cues are important, then some ducking may be preferable. This is further complicated in a surround sound set-up where the dominant centre channel can drive unwanted ducking in the side channels, the Centre channel can therefore be set to a relatively high independence separately from the other channels to avoid dialogue for instance, driving ducking in the sides.

7   **Dither section.** Dither is an optional process, usually applied immediately before audio undergoes bit-depth reduction. The process adds dither 'noise' to mitigate quantisation errors and artifacts during the bit-depth reduction process. Necessity, the dither must be decorrelated (unrelated to the input audio) and applied after all other processing has taken place. In a True-peak compliance situation there is a risk that this could result in the inadvertent introduction of post-processing a True-peak fail. To avoid this, when the dither algorithm is engaged ISL 2 automatically makes a power-compensated adjustment to TPmax ensuring that true peak compliance violations are not accidentally introduced in

the final output dither stage as might potentially be the case when engaging traditional post-TPmax dither functions.

Type. This setting governs the type of dither applied.

Off. Disables dither, no processing applied.

RPDF, TPDF, GPDF (Rectangular/Triangular/Gaussian Probability Distribution Function). The three types of dither available are referred to by the probability distribution functions used to generate the white noise used in the process, from RPDF (simple, low processor overhead) to GPDF (more complex, higher processor load), with TPDF often chosen as a reasonable trade-off between the two. As each channel receives an individually de-correlated dither, CPU overhead may become a consideration in surround sound applications where multiple instances are in use.

Dither. Defines the target bit-depth for the audio after bit depth reduction. (24/20/18/16bit).

Shaping. Determines the type of noise shaping applied, if any. Noise shaping is a modifier applied to shape the spectral energy of the quantisation error. This is used to push the quantisation error into frequencies that are better masked either by the audio in question or the perception characteristics of human hearing. The effect is to lower the level or error and noise in exposed frequencies. Which type of shaping is appropriate will depend upon the audio in question, proposed playback system and listening environment.

NB. If any further processing is expected/possible, noise shaping should not be applied as additional processing can over-accentuate the effect, resulting in audible noise artefacts.

None. No noise shaping applied.

Nyq. Reduces the overall noise floor, but increases noise above 17kHz.

**Psy 1.** Uses a simple psycho-acoustic curve to reduce noise in frequencies human hearing is sensitive to.

Psy 2. Uses a more complex (at the expense of increased CPU load) psycho-acoustic curve to reduce noise in frequencies human hearing is sensitive to.

Note: In compact interface mode dither activity is shown by a yellow 'DITHER' indicator. Clicking the indicator opens up a dither parameter panel.

NB: Dither is not available in the 7.1.2 or 7.1.4 configurations of ISL.

Output Metering and Listen Mode

This section provides a view of the True-Peak input levels (dBTP). Depending upon the version chosen and the audio track this will be shown in a stereo, 5.1, 7.1, 7.1.2 or 7.1.4 configuration (ISL$_{ST}$ – stereo only).
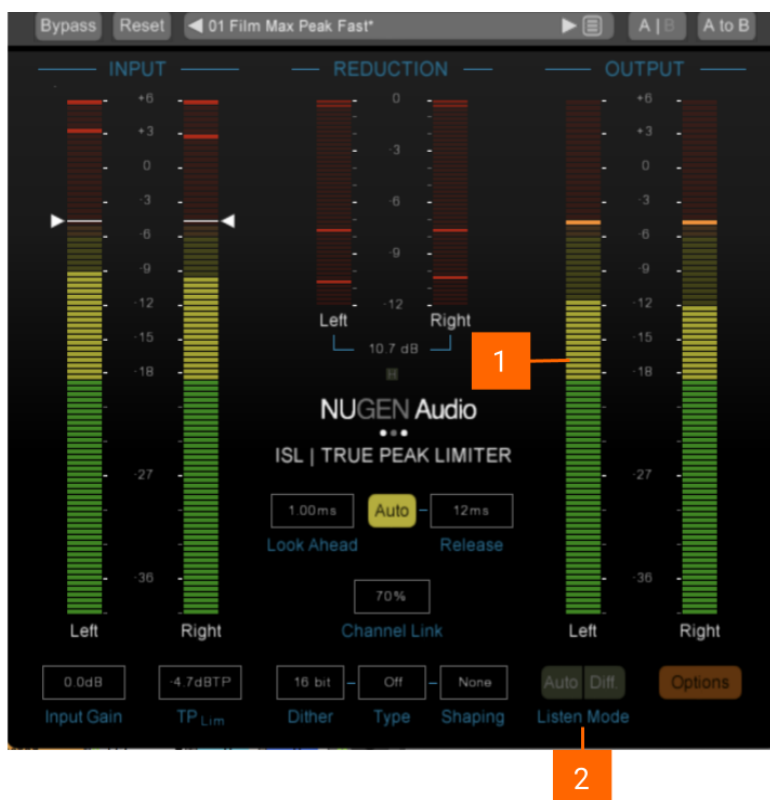

1   **Output level meters.** Depending upon the configuration, ISL will show stereo output, 5.1, 7.1, 7.1.2 or 7.1.4 metering. The level is shown in dBTP (True-Peak decibels) and can be used to give a standard compliant reading of the outgoing audio signal. It is possible to configure the colour and peak hold settings in the options panel. If the output level exceeds the range of the meter, the peak-hold marker will flash until reset. Click the meter to reset levels

2   **Listen mode.** Auto automatically adjusts the output for the input gain applied in the input section. This allows the user to bypass the plug-in and compare the effect of the limiter without the gain section apparent at the output. The Diff (Difference) parameter can be used to switch the output into 'difference' mode. In difference mode ISL allows the user to listen to the difference between the input and the output ie. the gain reduction applied. This can be extremely useful or highlighting changes when fine tuning parameters (eg. The limiter release time) and for checking the processing when a particularly transparent solution is required.

> **Note:** both listen modes affect the output and are designed to aid user adjustment and should not be active during mixdown.

Set-up Options

This section provides access to a number of parameters affecting the look, feel and underlying algorithm of ISL. The options panel is opened by clicking the Options button on the main interface.
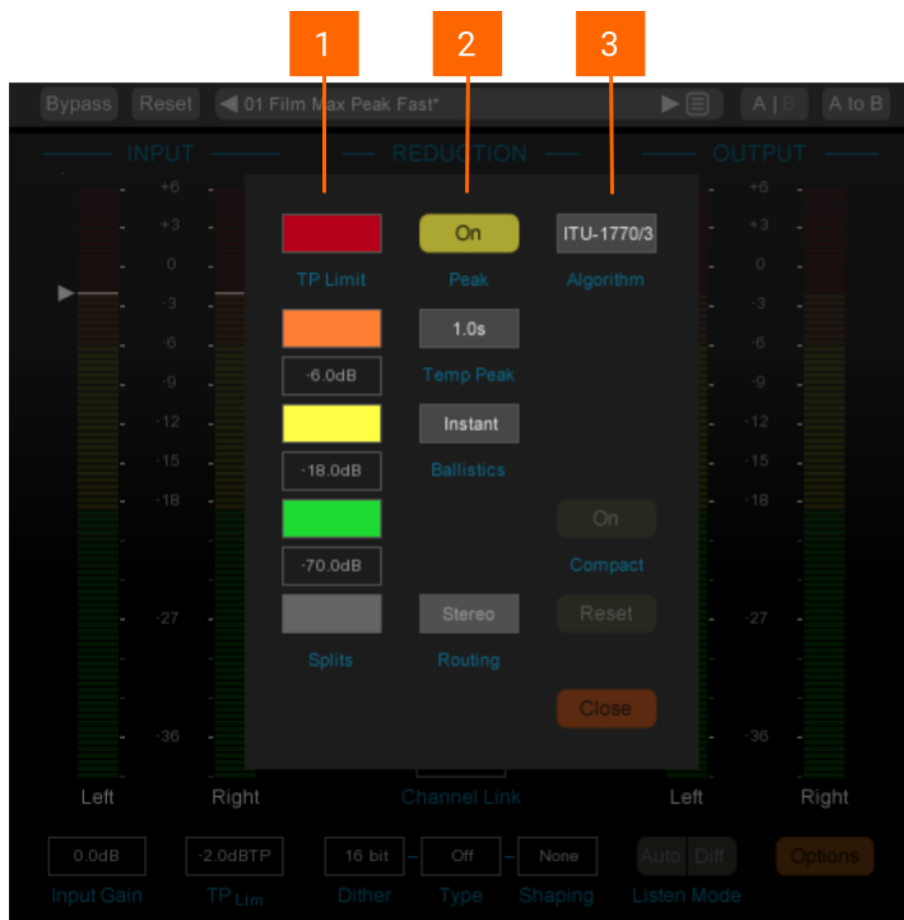
1   **Splits.** This section allows the level meters to be split into colour banding to facilitate the rapid assessment of whether readings are falling within desired ranges or not.

2   **Peak.** The peak control toggles the peak-hold feature on/off.

      Temp Peak. The temp peak control toggles the temporary peak-hold feature. Click+drag up/down to change the hold time, or double click to enter a value (0 for Off).

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

Routing. The routing control displays the channel routing within ISL. This will either show 'stereo' for mono or stereo operation or give a routing configuration for audio channel routing beyond stereo (ISL_ST- stereo only). Click the box to select from the different options where available.

3 **Algorithm.** Choose from the ITU-R B.S 1770 true-peak algorithm or the afclip algorithm as specified in the Apple Mastered for iTunesTM format.

Compact. Toggles the compact interface on/off.

Reset. Resets the meter to its initial configuration.

Close. Closes the options panel.

Utility Controls

ISL supports a number of standard utility controls. These may be duplicated in some instances within the host DAW, however the controls within the plug-in will operate 'in place' to provide seamless audio performance.
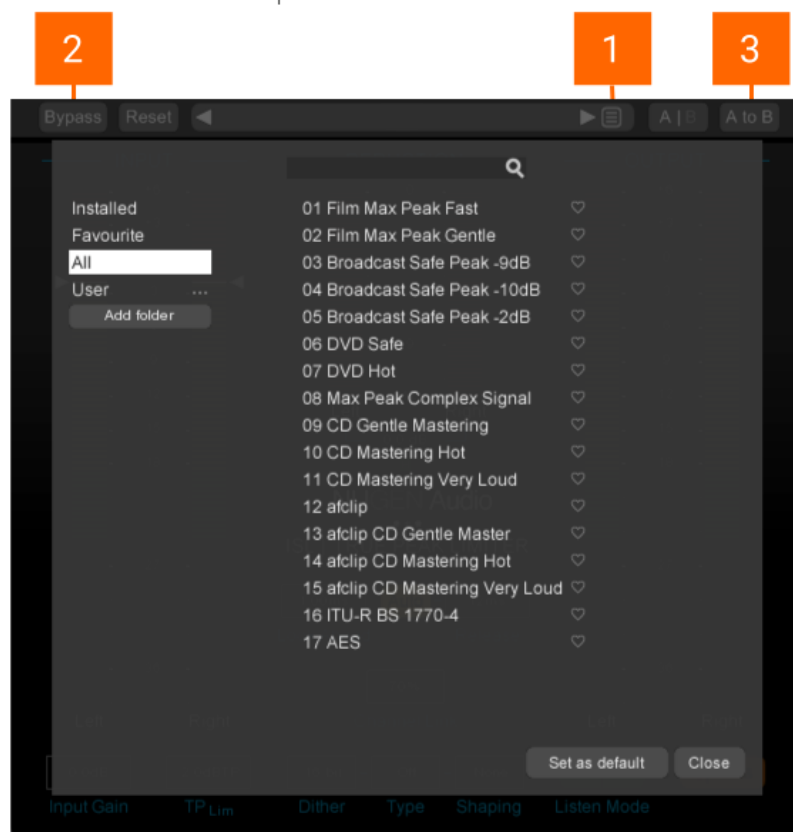
1   **Preset Browser.** Click to open preset browser window to select presets from list. Use arrows to move through presets in order.

2   **Bypass.** In-place bypass mode, preserving PDC to avoid re-lock issues.

3   **A | B.** Switch between temporary sessions A and B memories to compare two sets of settings.

     A to B (or B to A). Transfers current settings in the direction indicated, overwriting those currently in the destination memory.

General Functions

Holding down control (Ctrl) and clicking a control will return the control to the default position (Win) or double click a control (OSX). Holding down shift whilst moving a control will allow fine adjustment to be made.

Reporting a Problem

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

You can email the NUGEN Audio support team at support@nugenaudio.com.

To make it easier for use to resolve the issue you are seeing:

· Please give a clear explanation of the problem, including any steps required to reproduce it if appropriate.
· Please state how frequently you've experienced the problem.
· Please supply details of the system you are using, in particular:
    · The operating system (Windows/Mac OS) and version.
    · Host application and version.
    · CPU speed and RAM available.

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 endeavor to correct them as quickly as possible.

Version History

2.0   Initial release

2 .1   ISLₛₜ, ISLₛₜ DSP and ISL DSP versions released

2.5   New presets

2.6   Avid Venue version released

2.7   True-peak, power-compensated dither option added

2.8   7.1.2 configuration
                Added 24 bit dither option

2.9   Fixed support for running in Mac OS Catalina and above
                Removed VST2, RTAS, and 32-bit versions

2.10   Added 7.1.4 support
                Apple Silicon native support
                Link to feedback form in menu

Notes:

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