# GainMatch

"I think everybody needs this or a similar tool. I use it on every project now, and it's very helpful. Makes me decide quickly what plugins to get rid of."


## VIDEO TUTORIAL

https://youtu.be/cMZm4n4IDAw (5 uses for the GainMatch plugin)
https://youtu.be/h5D4OK2VQGc (what's new in v.1.1)
https://youtu.be/Zj_3TiRX_3M (what's new in v.1.2)
https://youtu.be/rDxuAPGh7-w (what's new in v.1.4)

## IN SHORT

This is a gain knob "with a twist". There are two basic modes of operation:

A. With two instances: matching "Before" <->"After" loudness.
B. With one instance: matching to a desired target level (RMS or Peak)

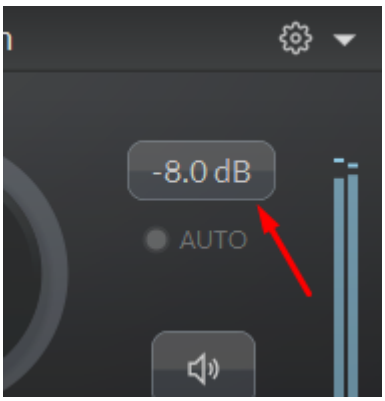
There's a meter/button for manual gain-matching and an "Auto" mode for "hands-free". "Listen before" button allows you to easily compare before/after signals and even mix them.

There are different ways you can use GainMatch, as described below.

## A. BEFORE-AFTER

1. Put one instance of "GainMatch" before your chain of plugins, one after.
   *Note that new instances automatically set themselves to "Before" or "After".*

2. Play some audio. In the "After" instance you have a "Compensate" button that after a while will show you the level difference. Click on it to compensate for the difference.

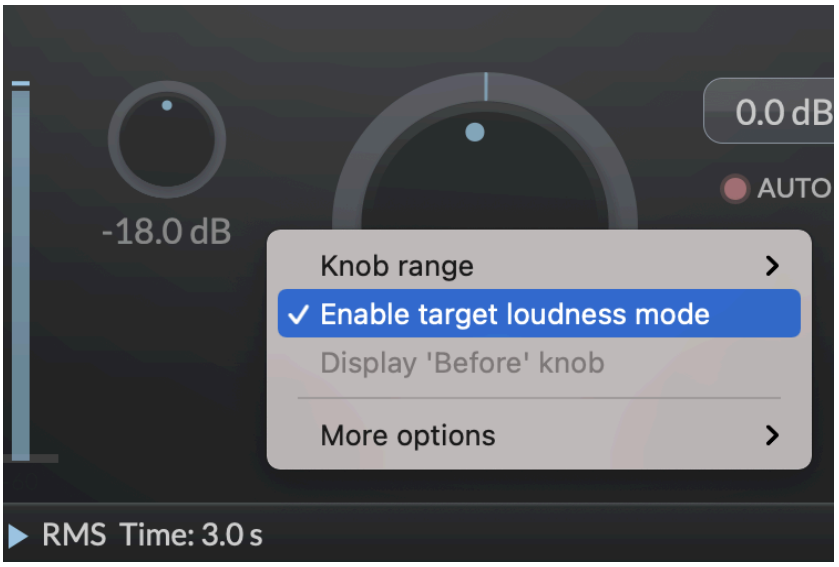



   *You can now bypass all inserts in your DAW and compare before/after with the same level or use the "Listen before" button in the plugin (the speaker icon).*

3. Click on the "AUTO" to enable smooth gain riding. It will be engaged only when the gain difference is greater than "gain tolerance" (+-1 dB by default). When enabled, you'll see a cog icon near AUTO to change tolerance and limit.

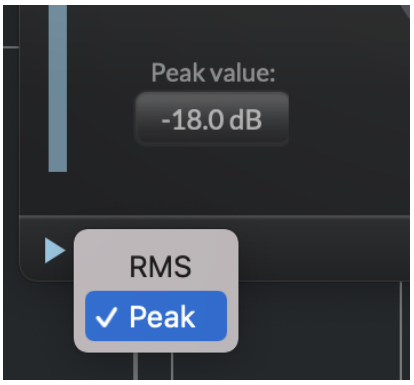
## B. MATCHING TARGET LEVEL

Right-click and select "Enable target loudness mode".



You'll see a knob on the left to set the desired loudness level. Now you're comparing your audio to this level (like if your "before" plugin would always say "loudness is -18", but this time you don't need the "before" plugin). Note that this is an average loudness, not the peak levels. Click on the "Compensate" button or enable "AUTO" mode to match the desired level.

Clicking on "RMS" you can switch it to "Peak" mode




In this mode you can use GainMatch as a real-time "normalizer", matching your highest peak to the target peak value you set.

## USAGE SCENARIOS

1. Mixing or mastering: compare before/after with the same level and quickly get rid of unnecessary plugins. Make your mixes sound better with less processing. Don't let the loudness difference fool you.
2. Use "Listen before" mix control to make wet-dry balances of a chain of plugins.
3. Use reverse linking of "before" and "after" gain. Add input gain while decreasing output to test your compressor or saturation plugins.
4. Balancing recorded tracks: say you have two guitars panned hard left and right, one was recorded slightly louder. Make them perfectly balanced in one click.
5. Use "auto" mode for smooth gain riding with a "gain tolerance" setting to enable operation only on significant volume changes. Free your hands to adjust other plugins while keeping overall loudness the same.
6. Use the plugin as a meter: see how much louder the signal becomes, and adjust the processing plugin's output gain. You can remove GainMatch after that.
7. Set target loudness and adjust your signal before processing. Process your guitar or bass tracks with the same loudness across the whole album.
   and you can come up with more uses...

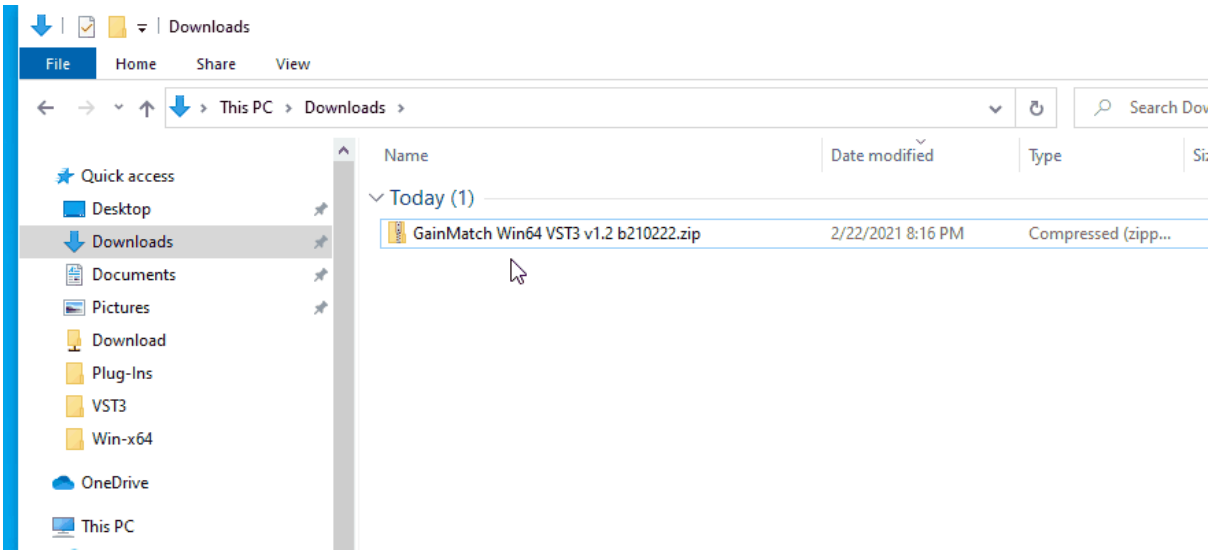
# INSTALLATION

### Notes on updating from version < 1.12:

In version 1.12 the plugin was renamed from LM GainMatch to GainMatch.
You need to **remove an old LM GainMatch** before installing the new version.
The safe way is this: 1) remove LM GainMatch 2) restart the DAW 3) install GainMatch 4) restart the DAW

### Installing on Windows:

Extract all files. Drag the "GainMatch" folder onto the "VST3 folder" link (or "AAX folder").

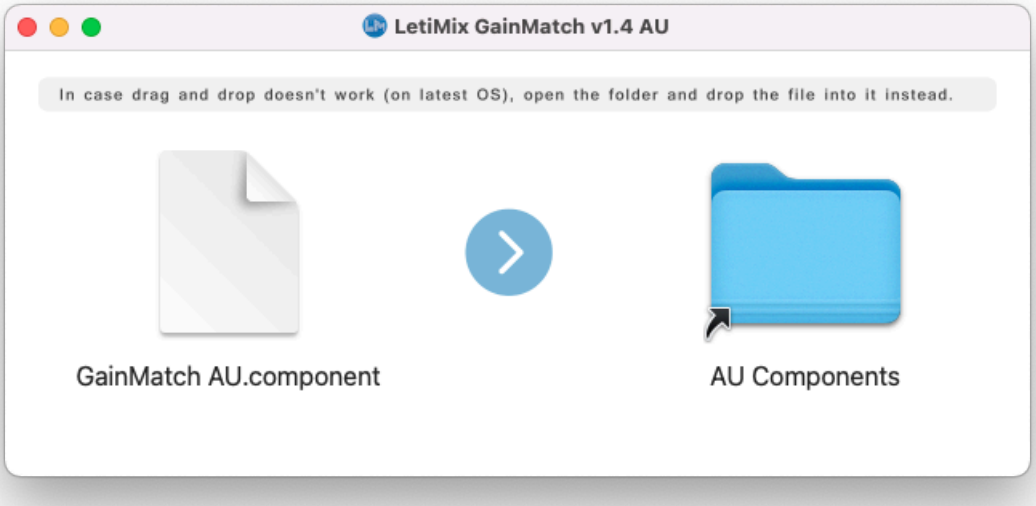



In case dragging over the folder link doesn't work, manually copy "GainMatch" into:
**C:\Program Files\Common Files\VST3** (for VST3)
or **C:\Program Files\Common Files\Avid\Audio\Plug-ins** (for AAX)
*If you're installing the Win32 version of a plugin on Windows 64bit (to use in 32bit host/DAW), the paths will be C:\Program Files (x86)\Common Files\VST3 or C:\Program Files (x86)\Common Files\Avid\Audio\Plug-ins*

### Installing on Mac:

Open DMG and drag the file to the folder.
If drag-and-drop doesn't work normally (security issues since Mojave/Catalina), hold the file over the folder icon until it blinks and drop the file into the opened folder.

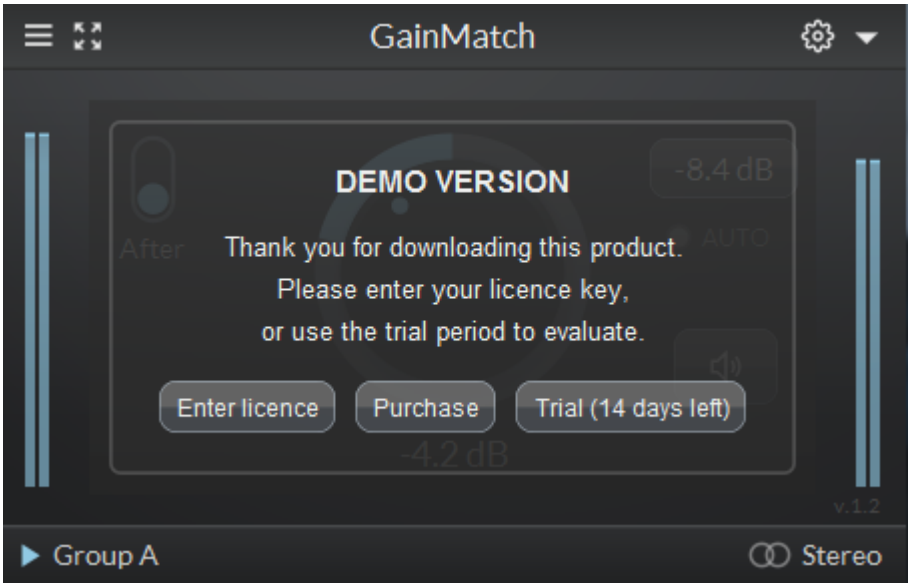
Alternatively, double-click the folder and when it opens, drag the file there.




AU into **/Library/Audio/Plug-Ins/Components**
VST3 into **/Library/Audio/Plug-Ins/VST3**
AAX into **/Library/Application Support/Avid/Audio/Plug-Ins (AAX)**

## LICENSE AND TRIAL

You can use this plugin for 14 days with a fully functional trial.




When in trial mode, you'll see a "key" icon that you can use to enter the license code.

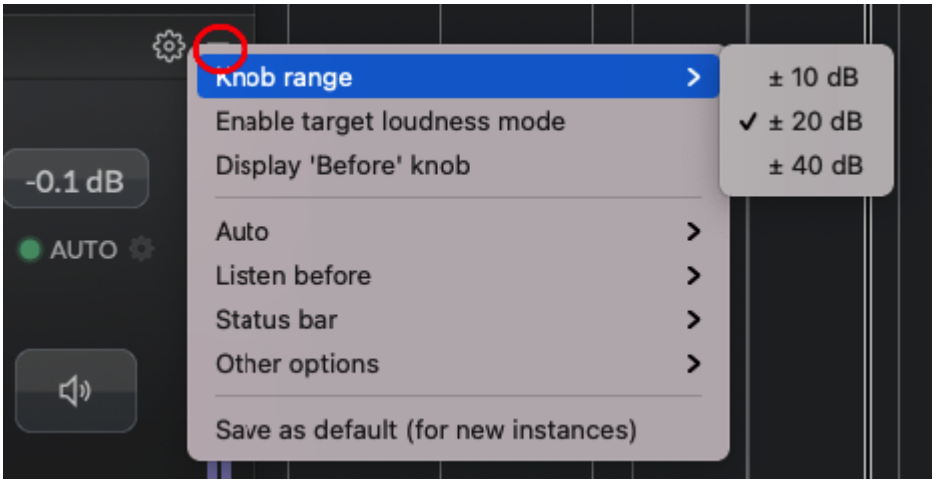

The license permits you to use this plugin on all of your computers.

## USER INTERFACE

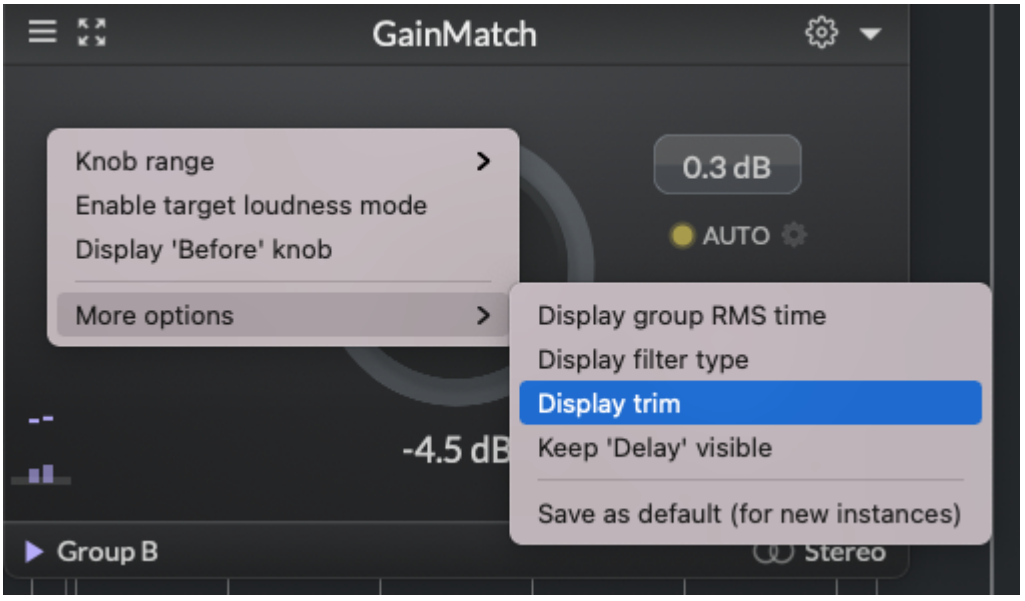
- **Right-click** on any control (or press 'D' hovering it) to reset it to the "default" value. Some controls also may have a context menu on right-click.
- **Double-click** to enter the value
- Mouse-over and use **mouse wheel** or **arrow keys** for adjusting in "steps". Hold **Shift** for fine adjustments.

## GLOBAL / LOCAL SETTINGS

To access **local options** (settings of the current instance) use the **dropdown menu** icon in the top right corner.

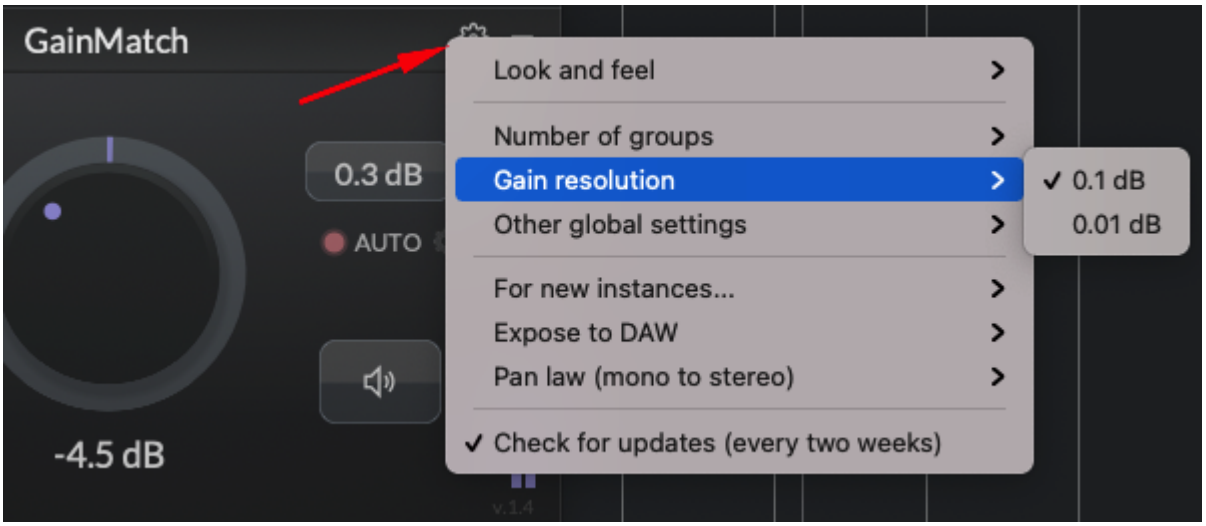



Alternatively, you can access the most useful options by **right-clicking on empty space**.



If you want to set local options to all new instances use "Save as default (for new instances)" (alternatively you can select the default options individually in Global Preferences -> For new instances...).

To access **Global Preferences** you can click on the **Cog icon** in the toolbar or Shift+Right-click on empty space.




The Global Preferences affect all instances. Some of them are applied immediately (like Look and feel, Expose to DAW or Pan law), some require project reload (when changing the number of groups or gain resolution), some affect only new instances (For new instances...)

## THEMES

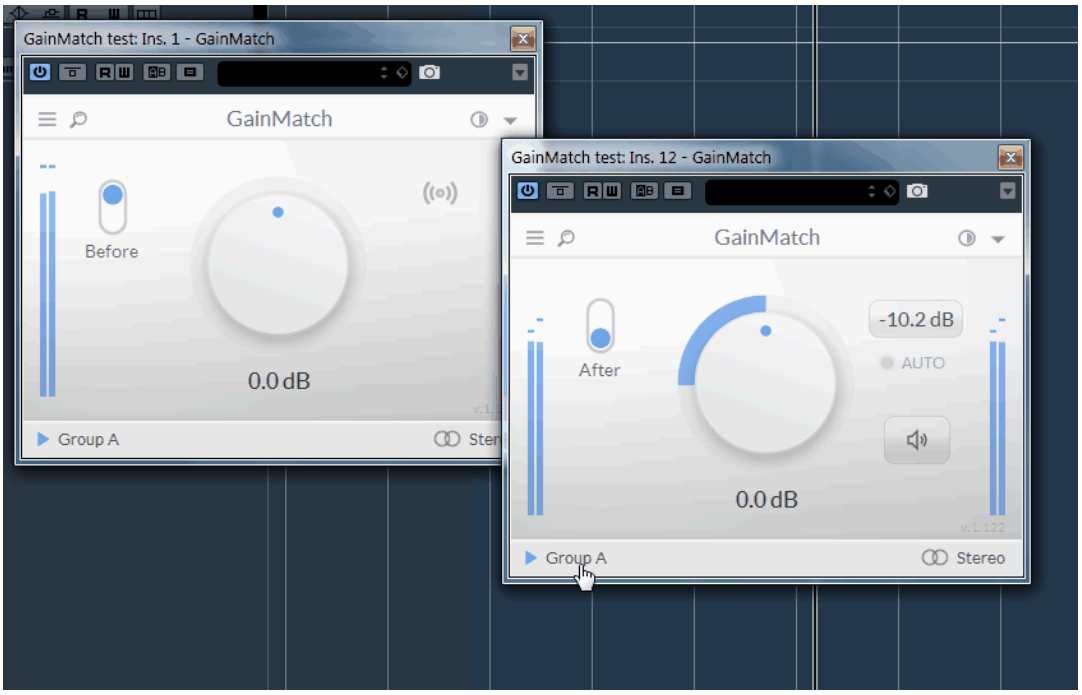
There is a **dark** and a **light theme** of a plugin.
You can choose one from Global Preferences > Look and feel.

## CHANNELS


The plugin can operate in "Stereo", "Left", "Right", "Mid" and "Side" modes. For example, you can adjust the gain of the right channel while measuring the left. This way, you can easily fix the levels of hard-panned guitars or backing vocals on a stereo track.

## GROUPS

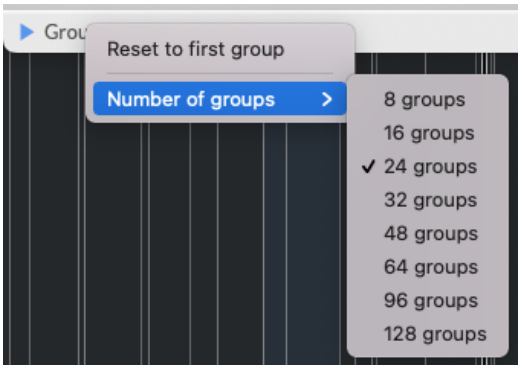
You can set instances to use the same group by dragging the "Group" name.




There are up to 128 groups available (24 by default) for using this plugin on multiple tracks. Each group can have one "Sender" (aka Before) and one "Receiver" (aka After). If there is more than one sender ('Before') in the group, you'll see a warning.

** Note, that if you insert a plugin in "Before" mode and then duplicate it, the new instance will switch itself to "After" mode. If you duplicate this plugin another time, it'll set itself to "Before" again but select the next free group. If you add multiple new instances on several tracks at once (depending on the DAW possibilites), they'll be all set to "Before" or "After" accordingly. You can customize this behavior in the Global Preferences -> For new instances -> ... .*

You can select the number of groups in the Global Preferences, or right-clicking on Groups.




** Note, that the more groups you use, the higher is the usage of resources (RAM mostly). So if you want the fastest opening time and smallest RAM usage, use 8 groups. Don't use the 128 groups option, unless you really need it. Usually 24 groups is the optimum.*

## NEUTRAL MODE

When the plugin is in "Neutral" mode (not Before or After), it acts as simple volume control and doesn't perform any loudness calculation or audio sending, which saves CPU.

*The instances also bypass loudness calculation (to save CPU) when there's no corresponding 'Sender' or 'Receiver' on that group, or when 'Receiver' GUI is closed (except for AUTO mode).*

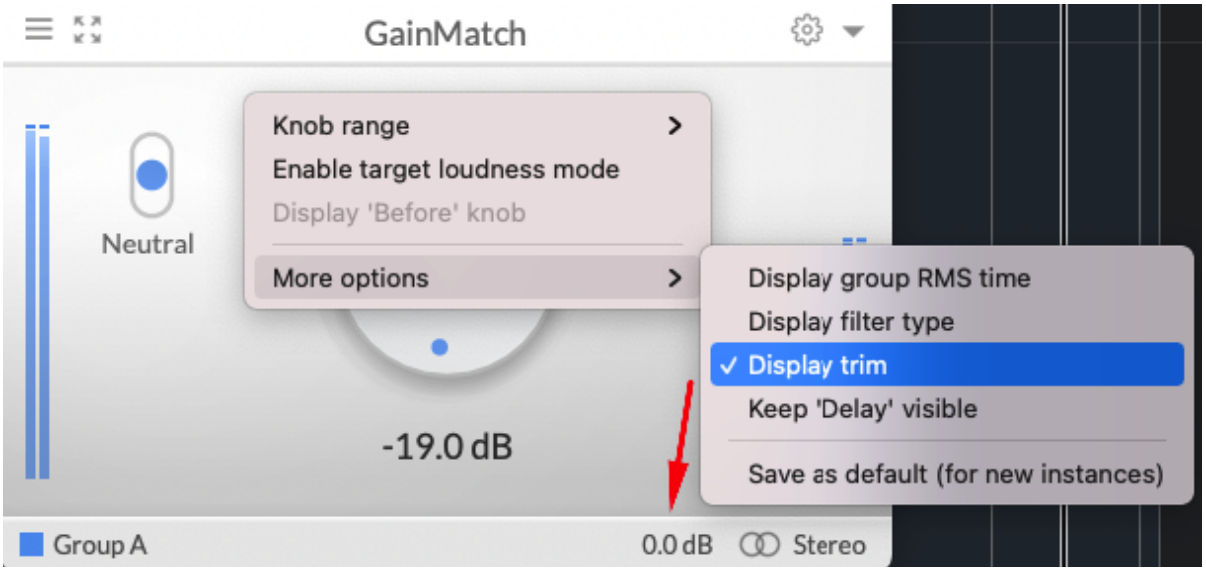
When the plugin is doing loudness calculation, there's a "play" triangle near the Group name


If there is no pair in the group for the current 'Before' of 'After' instance, it goes to 'Neutral' mode in 45 seconds (this option can be disabled in Global Preferences -> Other global settings). This way you can for example remove the "Before" plugin when you don't need it and "After" will also free that group after a while, becoming just a Neutral gain knob.

## KNOB RANGE AND TRIM

By default, the central knob controls gain in the +-20 dB range. The options menu allows selecting ranges +-10 dB and +-40 dB.

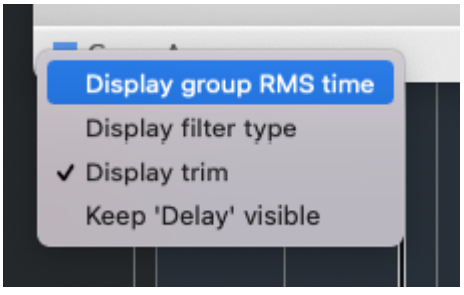
You can additionally enable the "Trim" control from the options menu which allows you to add another +-150 dB of gain.




The main Gain knob parameter is limited to +-40 dB for making automation curves not too small in the DAW. The Trim is added to have more control over gain when required.

## STATUS BAR ITEMS

There is a fast way to display and hide optional status bar items. Click on the bottom left icon in the status bar (triangle or square left to the group name).



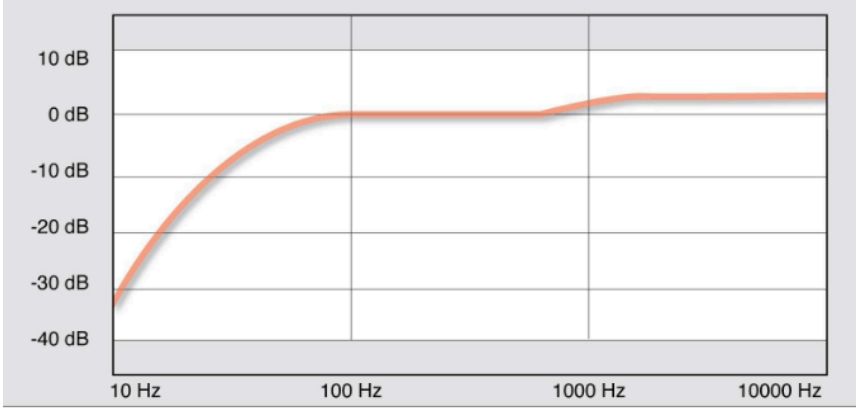
## RMS TIME AND FILTER TYPE

By default, the RMS time (the averaging time for loudness calculation) is set to 2 sec. You can change it from 0.5 sec to 10 sec when the time indicator is displayed. The RMS time is set for the group so that both Sender and Receiver in that group do calculations identically.

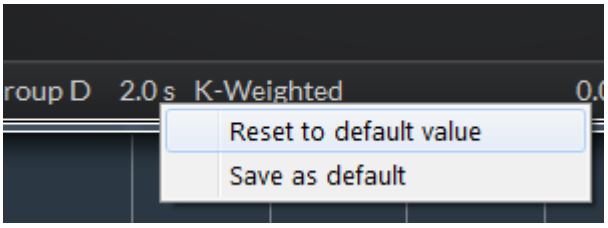
*If you enable "Target loudness mode" there is another control for RMS time, which is independent from the group.*

If you enable "Display filter type" you'll be able to select "Flat" or "K-Weighted" (default). This means that the signal is not processed (Flat) or filtered before measuring.

K-Weighted filter curve looks approximately like this (it's used by default):




** If you're interested in how the filtered (K-Weighted) signal sounds, you can Ctrl+Shift+Right-click (opens expert settings menu) and select "Listen to filtered signal".*

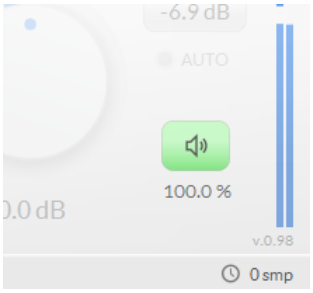



If you right-click on RMS time or filter type you can save the current value as default. It's also saved when you use "Save as default (for new instances)" from the Options menu.

As already mentioned, RMS and filter types for "Before-After" mode and for "Target loudness more" are independent.

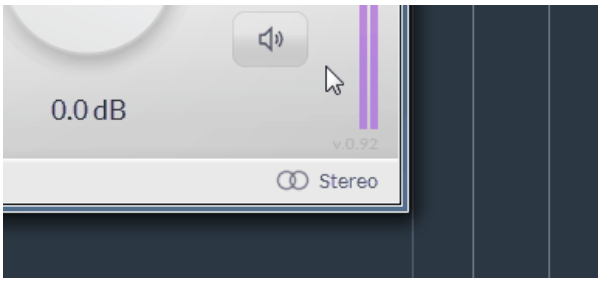
## LISTEN BEFORE

The "Listen before" button (with the loudspeaker icon) lets you listen to the audio input of the "Before" plugin.




When enabled (green), there's a mix control under this button which defines how much of the "before" signal you hear. This way you can mix "before" with "after".
*You can drag the value up/down, double-click to enter manually, or right-click to reset.*

As some inserts may introduce delay, while "listening before" there may be a shift in the audio. For such cases, there's a delay control on the bottom right corner (by default it's shown instead of "channels" when "Listen before" is enabled). You can set the delay manually (in samples) or click on the "clock" icon to auto-detect delay.

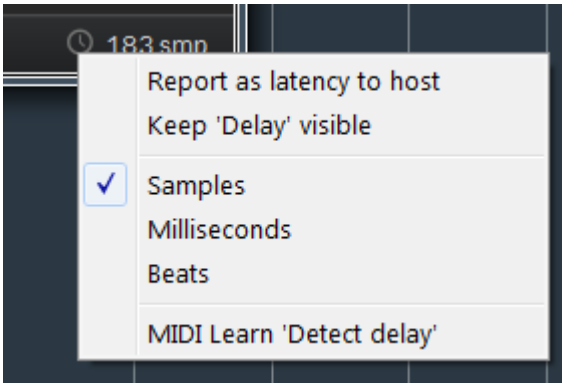



(When "Listen before" is active, other controls are grayed out and disabled, but if the MIX knob is not at 100% you can also adjust the gain of current instance)

Tiny crossfades are applied when switching "Listen" modes to eliminate possible clicks.

## DELAY DETECTION

If you right-click on the "Clock" icon you can see the Delay Detection options.




The option "Report delay to host" can be useful in different situations. For example if you're using GainMatch **on different tracks** to send audio from one track to another. If you experience dropouts In "Receiver" you can increase the delay (optimally set it multiples of your ASIO buffer size) and optionally enable "report delay to host" so that this instance is auto-compensated by the host and audio is aligned. However, this usage is *experimental*.

You can also use this option to fake a delay to compensate for the plugins that do not report the delay properly.

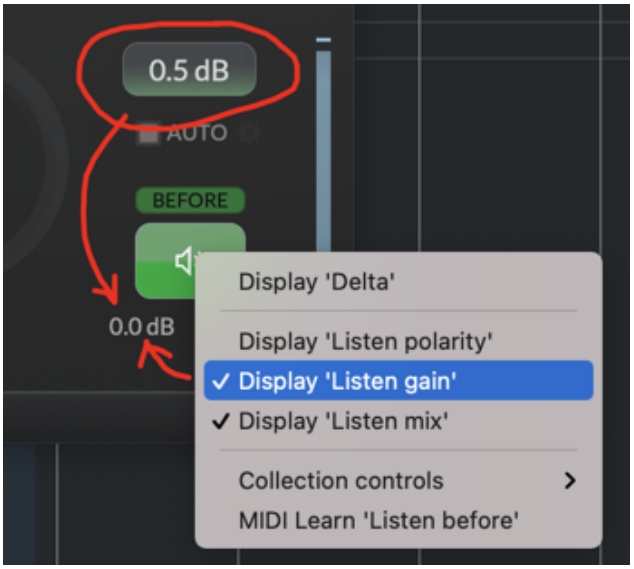
"Keep delay visible" makes delay controls available not only in "Listen before" mode.

You can choose units for displaying delay: samples, milliseconds, or beats (depending on the BPM of your project). Milliseconds and beats are converted to samples.

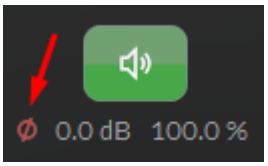
## ADJUST LISTEN GAIN AND POLARITY

If you right-click on the "Listen before" button you can display "Listen gain" control.
With this, you can change the level of the "before" signal that you hear. When it's displayed, the "Compensate" button and "AUTO" are also displayed and are applied to this "Listen gain" control (instead of the main Gain knob).

It allows you to match the "before" loudness to the "after" so that you can easily compare finished mixes without changing the balance. However, it may be a reason for clipping, esp. on the master bus.

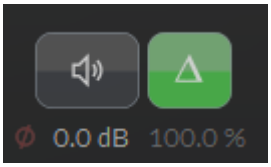



"Listen polarity" shows and toggles the polarity of the "listen before" signal. If the indicator is red, the polarity is flipped. The polarity is auto-detected when detecting delay. The correct polarity allows the "Delta" mode to work properly.



## LISTEN TO DELTA

If you select "Display 'Delta'" from the options menu, or **shift-click on the Listen Before** button, you'll be able to use the "Delta" mode. It inverts the polarity of the before signal and sums it with the after, so you can hear the difference.



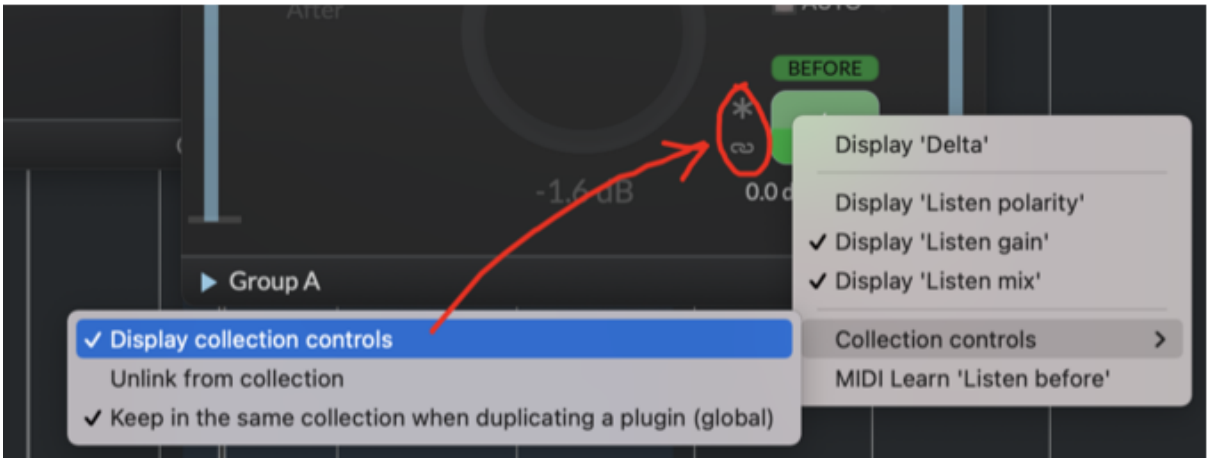

This way you can hear what your EQ is doing to the signal (it's like a "solo band" mode in some EQs) or what exactly your limiter/compressor is taking away.

For the best 'delta' results, the before and after signal should have the same level and phase/polarity, so make sure to perform delay detection. Also, the "AUTO" enabled (for example for "Listen Before" mode) helps.

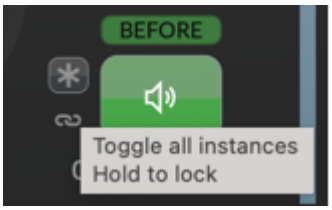
## COLLECTIVE LISTEN BEFORE

GainMatch can simultaneously toggle "Listen before" or "Delta" on multiple tracks. You can toggle all "Listen before" in the project using Ctrl+Click on "Listen before". Alternatively you can link some GainMatches into a "Collection" (dragging the "Listen before" button to another instance) and toggle that collection using Alt+Click.

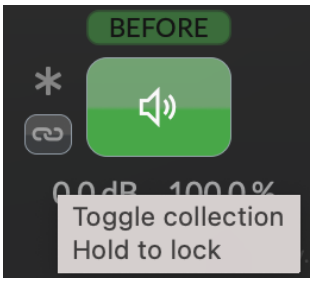
For ease of use you can display dedicated "collection controls".



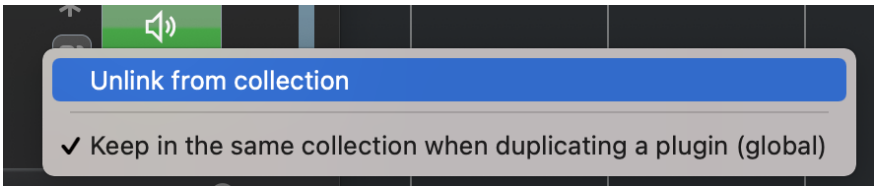
The top (asterisk) button toggle all instances in project.



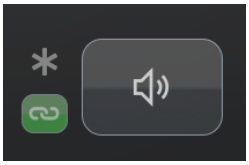

The bottom (link) button toggles all instances in the current collection. You can make a collection by dragging the "Listen before" button onto another instance(s).




You can unlink an instance from the collection using the right-click on the "link" button.




If you click and hold you can "lock" desired collective mode so that pressing "Listen before" or "Delta" will also toggle that globally (or for the current collection).



## AUTO MODE

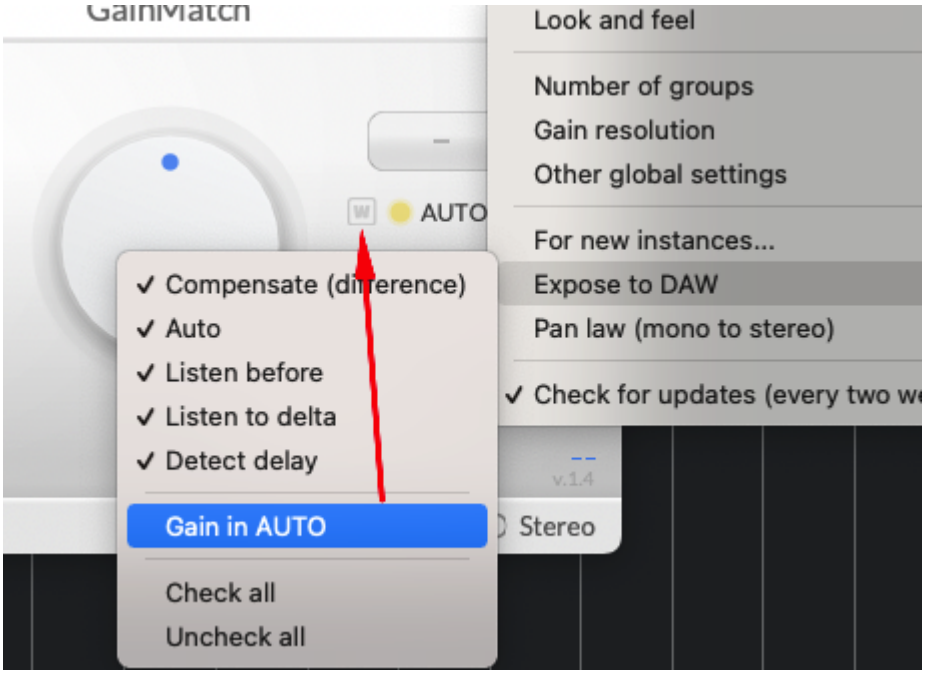
Click on the "AUTO" switch to turn it on. The green LED means that AUTO is on, but idle. If the gain difference is bigger than the "gain tolerance" then the AUTO LED becomes red and the plugin actively adjusts the gain (you'll see the knob slowly rotating).


*By the way, you can enable "Write" automation and record gain adjustments in your DAW. This way you can safely render it later (AUTO works in real time and while rendering you better turn it off).*

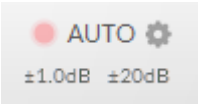
### Note on writing automation:

*When this option is enabled: "Global Preferences -> Expose to DAW -> Gain in AUTO", then the Gain parameter is always seen by DAW in AUTO mode and its changes can be written in the automation lane and are usually visible in the DAW history.*

*However, sometimes this behavior is undesirable. For example you want to use undo on another plugin, but GainMatch's AUTO Gain changes are written to the DAW history and get in the way of the undo operation. To solve this you can uncheck the option "Gain in AUTO". Then you'll see a "W" icon/button near the "AUTO" switch to enable exposing/writing gain automation only when you need to.*



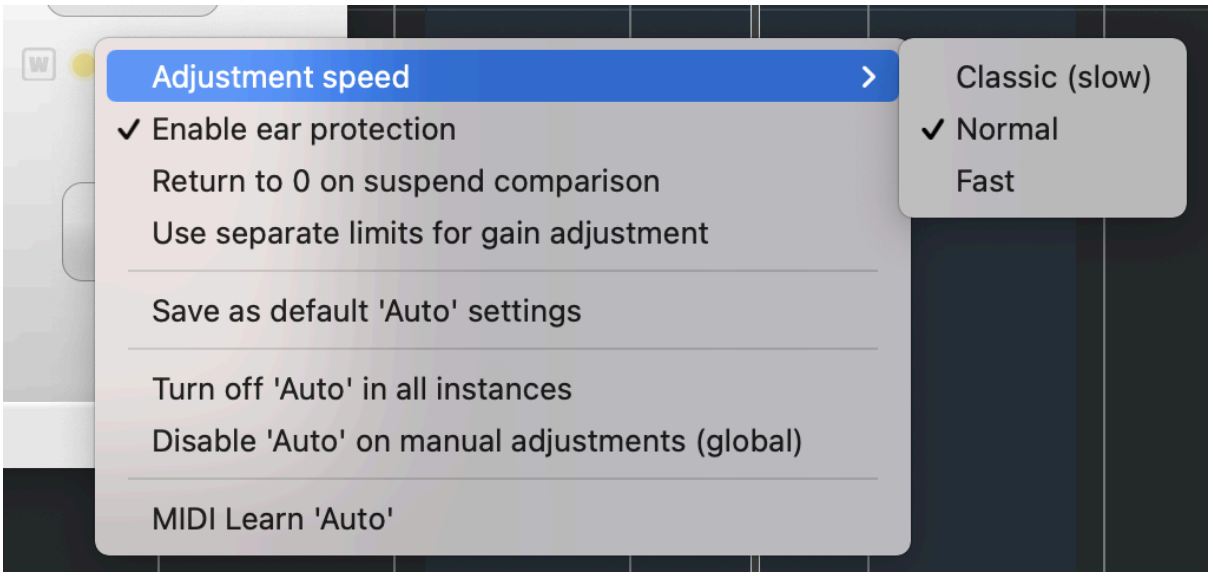

### AUTO setttings




Clicking on a little "cog" icon near AUTO reveals settings: the left value is gain tolerance (the amount of gain difference that makes AUTO active). The right value is the maximum value of gain that AUTO can apply.

When the AUTO LED is yellow, it means that the input signal is too low, and "suspend comparison" is activated (read below).

If you right-click the AUTO control, you'll see the options:

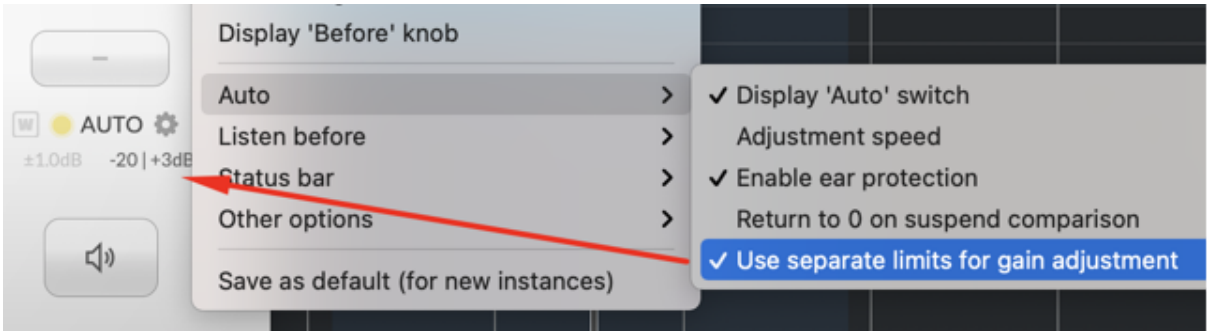



**"Adjustment speed"** allows you to control how fast the AUTO is. It depends on the RMS time to calculate its speed (RMS time defines how fast GainMatch recalculates the loudness). So *Classic (slow)* means twice RMS time, *Normal* means equal to RMS time, and *Fast* means half RMS time. Minimum auto time is limited to 1 second, so you can get good results for example with RMS time set to 2s and Adjustment speed set to Fast.
Also the bigger the gain difference, the faster AUTO performs.

**"Ear protection"** tries to internally suppress/smooth big loudness spikes, when AUTO adds a lot of gain (say when you were tuning some plugin in between and the signal was temporarily quiet, and then you turn off that plugin and signal jumps up in level). When "Ear protection" is active you'll see an "Ear" icon near the gain knob value.

**"Return to 0 on suspend comparison"** does what it says - if there's no signal (or it's very low), AUTO waits for 1 second and turns gain to 0 dB. Can be useful in some (rare) cases.

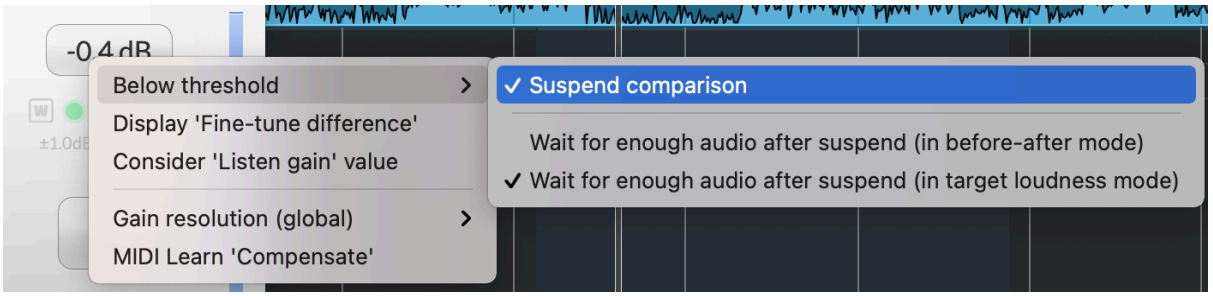
**"Use separate limits for gain adjustment"** allows you to set negative and positive auto limits independently. This way you can have AUTO adjustments ranging (for example) from -20 to +10 dB, or from -30 dB to +3dB, etc.



"**Turn off 'Auto' in all instances**" makes sure all GainMatches in the project are in manual mode, which saves CPU and prevents accidental gain changes.

## SUSPEND COMPARISON

You can enable this option from the Options or by right-clicking on the "Compensate" button.



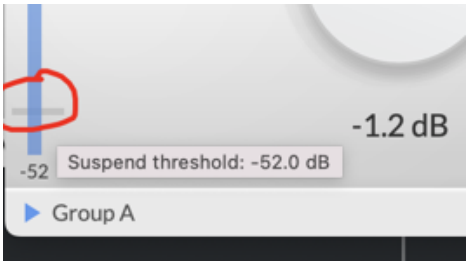

It is useful when you're in AUTO mode and your track has silent areas.

By default when "Suspend comparison" is enabled and the signal is very low, the plugin will not perform any activity (will not compare levels, cause the signal is too low, and will not adjust the gain in the AUTO mode).

However, if you enable "Return to 0 on suspend comparison" (from the Auto menu), it can turn gain to 0dB when the signal is low or missing.

On some material (like sparse drums) you may find that suspend comparison is being enabled too often, so you may want to turn it off on this track or adjust the threshold.

By default the threshold for "suspend comparison" is set to -60 db, and you can adjust it using a little slider on the left level meter.




**"Wait for enough audio after suspend ... "** means that after silence/suspending, when the signal has a normal level again, the plugin will wait for the RMS time (2 seconds by default) to collect enough information before performing any adjustments. This option is very useful in Target loudness mode, and if you're comparing *different* audio tracks in Before-After mode.

## FINE-TUNE (DIFFERENCE CORRECTION)

If you feel that the auto-adjustment makes the After signal too soft (or too loud) you can manually adjust it using this option. Increase "Fine-tune" value to make After louder.


The range is in fact +-60 dB so you can use it for a wider range of tasks, like "make 'After' 30 dB louder than `Before`".

## CONSIDER "LISTEN GAIN"

This option is useful in some rare cases, when you want the difference to take "Listen gain" value into consideration. For example you use two GainMatches on the master bus and increase the "Listen gain" to some point (until it's clipping) to make the "Before" signal louder. With this option enabled the "After" signal will be adjusted with the difference that is taking that "Listen gain" value into consideration. When it is enabled, AUTO for 'Listen before' is hidden and disabled.

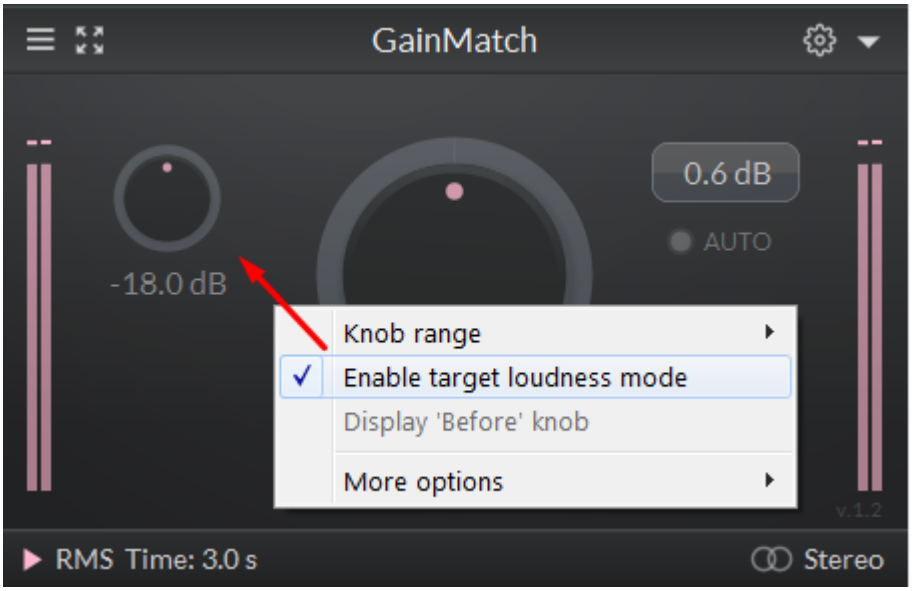
## "BEFORE" KNOB

You can display this knob from the right-click menu.
This way you can change the "before" gain from the "after" instance.

Click on the "link" icon to enable reverse linking of knobs. It can be useful to give more input gain to compressors or saturation plugins while decreasing the output.

When the instances are linked, you'll see the "link" icon in both Before and After instances, clicking on it will unlink them.

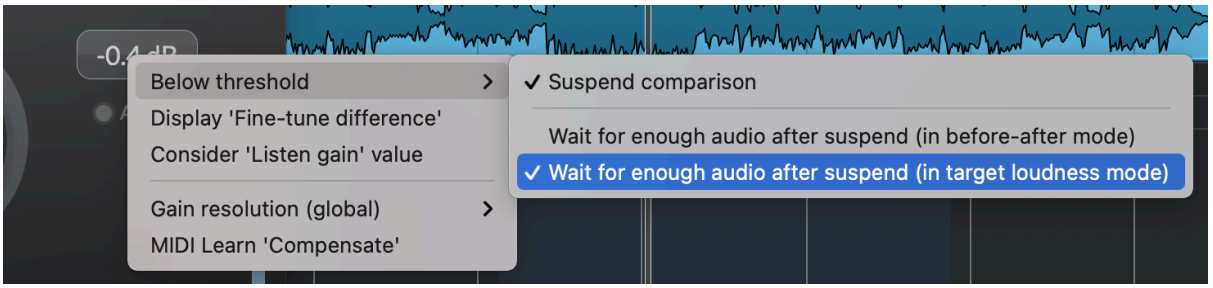
## TARGET LOUDNESS MODE



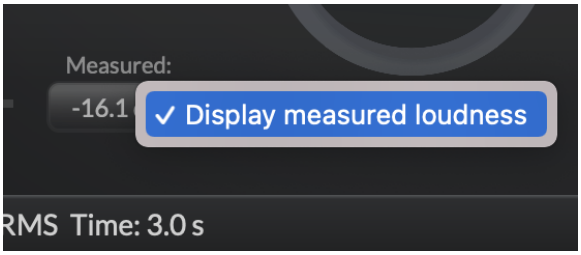

This mode (right-click to enable it) allows you to use only one instance of the plugin, setting the reference level manually. It can be useful, for example, to set your recorded bass/guitar tracks to approximately the same loudness before processing them with your typical chain of plugins.

You'll also see the "Time" indicator to change RMS averaging time used for level calculation. You may want to increase that to make measurements more "static".

If you're in AUTO mode, and your track has silent areas, after the signal returns back, the plugin will wait for 2-3 seconds (or whatever RMS time you set) before suggesting a new difference value. This option prevents jumping in loudness after silent pieces. Can be enabled from the menu:

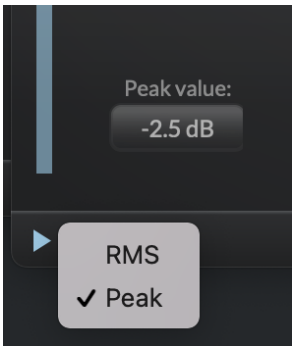


For debugging Target Loudness Mode behavior you can right-click in the lower-left corner and select "display measured loudness":




## TARGET PEAK MODE

You can switch RMS to Peak mode.

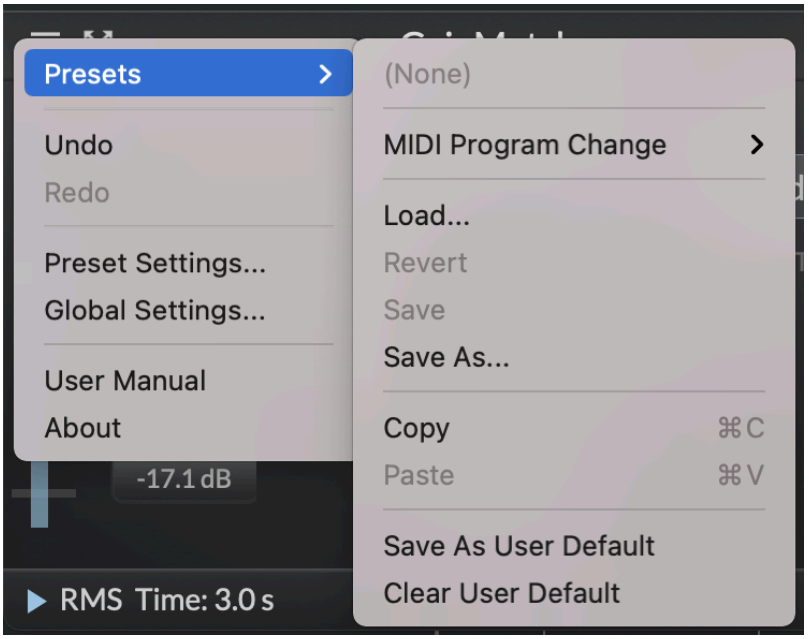


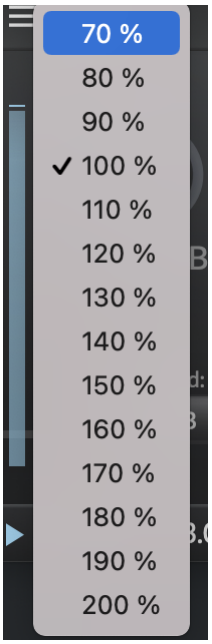

In this mode, GainMatch will measure the highest peak value and adjust the gain so that it matches the Target value you set. If AUTO is enabled, you can change the Target value and see how the Peak value follows.

The Peak Value is measured after the Gain knob. Clicking on Peak value resets it.

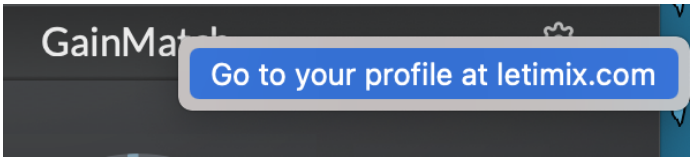
## TOP MENU

From the toolbar, you can access the main menu for saving/loading presets, undo-redo operations, scaling the plugin window (70-200%), accessing global and local settings.



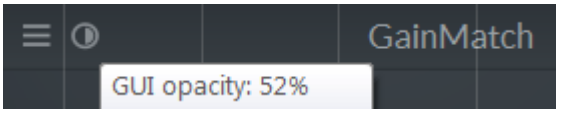




If you want to save your "Scaling" setting for all the future instances, use "Save As User Default" from this presets menu.



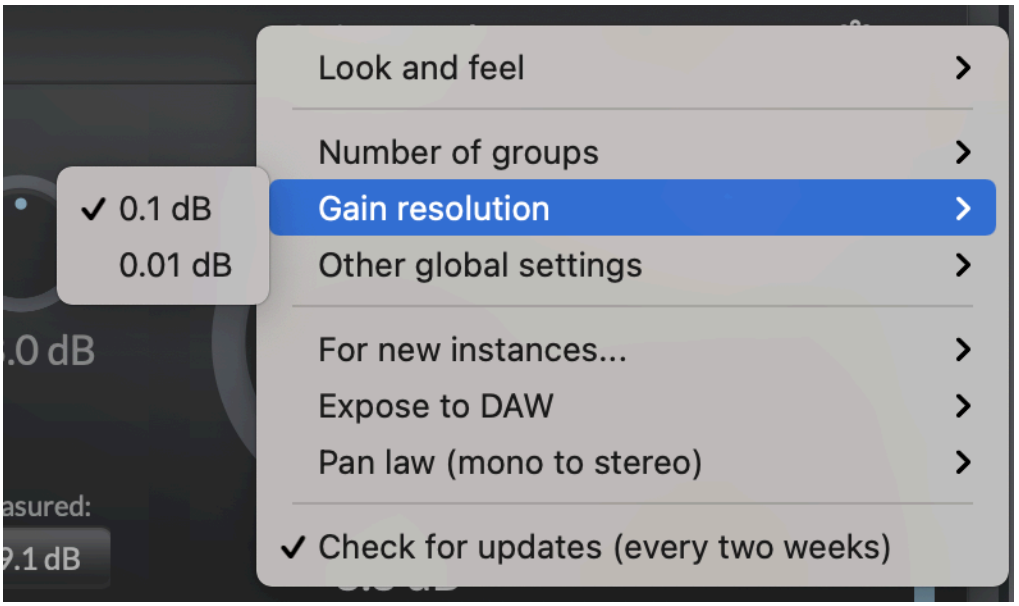

Clicking on the plugin title gives quick access to your profile at letimix.com, where you can check your registration information and get the latest updates and discounts.

If you right-click on the "Scaling" icon, you can change it to "Opacity" icon to make the plugin semi-transparent.



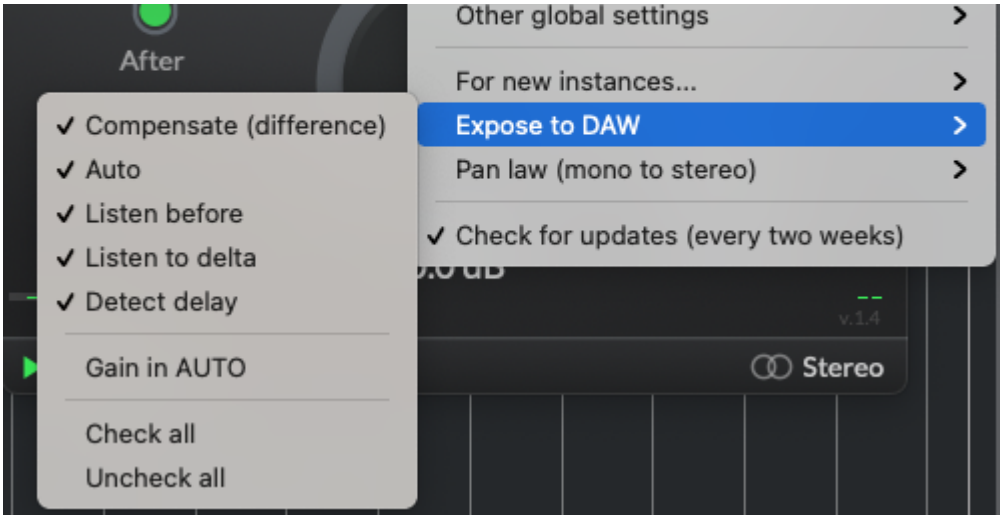
## NOTES ON SOME OTHER OPTIONS

You can find more options in the Global Preferences and Local Options menu.




**Gain resolution** allows switching from 0.1 dB to 0.01 dB resolution (requires project reload). Recommended resolution is 0.1 dB (it's easier for AUTO to settle down).

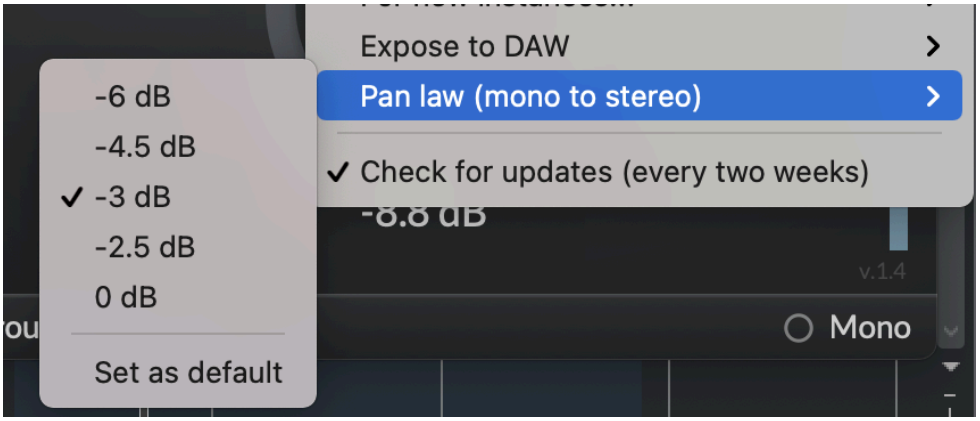
**Expose to DAW** allows hiding or exposing some controls to DAW history and automation.




If you don't expose them to DAW you won't be able to automate them or use generic MIDI CC assignments/quick controls, but at the same time they won't be affecting your DAW's history or automation.  You can right-click  these controls and choose "MIDI Learn" to assign a midi-note for controlling these parameters from a MIDI controller, even when it's hidden from the DAW (if your DAW supports routing midi signal to the plugin). Holding "Shift" while clicking MIDI Learn will "unlearn" it.

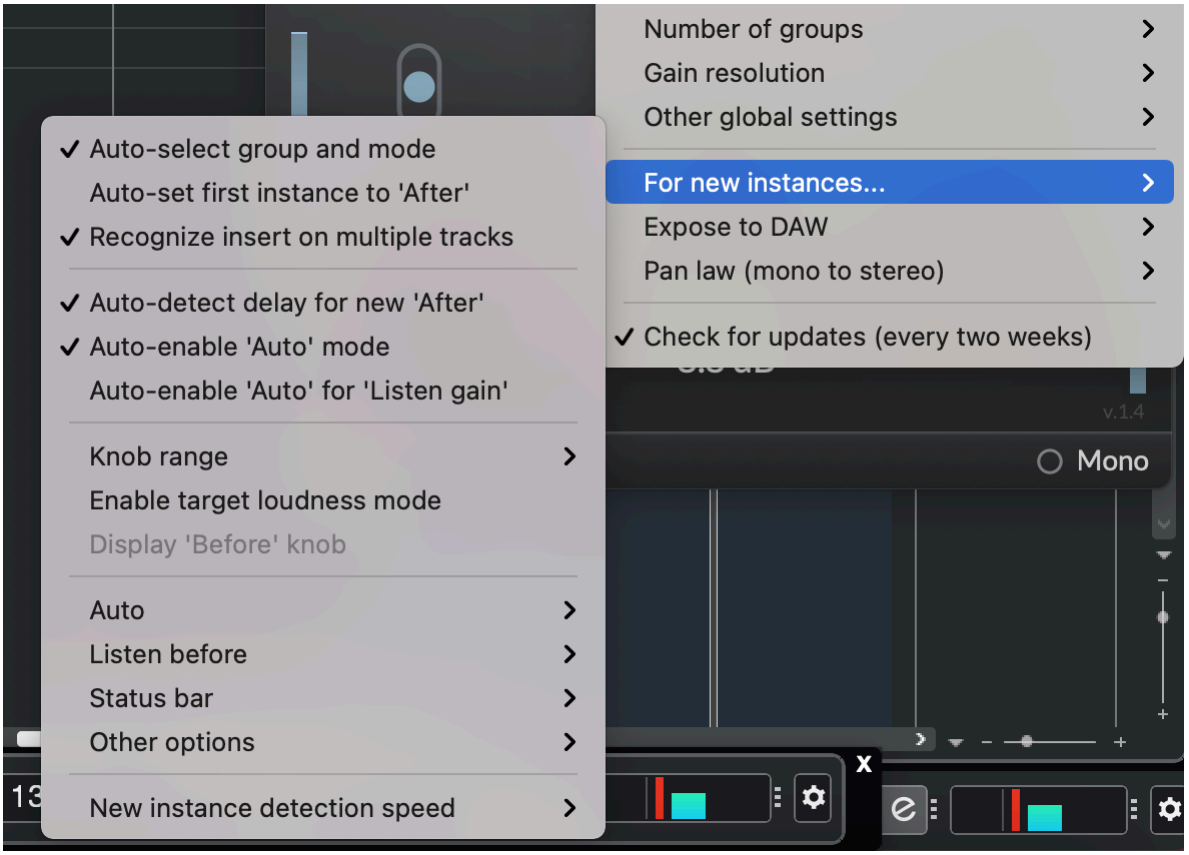
Suboption "Expose to DAW -> **Gain in AUTO**" was explained in the AUTO mode chapter. Basically unchecking it allows you to hide the "Gain" parameter from the DAW when using AUTO mode, so that it doesn't fill your DAW's history and allows easy undo on other plugins.

**Pan law (mono to stereo)**




It affects how the plugin works in mono-to-stereo configuration (some DAWs like Pro Tools support this). If you choose the correct Pan Law you'll be able to compare audio even when "Before" is mono and "After" is Stereo (or vice versa). Pan Law is saved for the project, if you choose "Set as default" it will be applied to all new projects as well.

Most of the settings "For new instances" are self-explanatory.

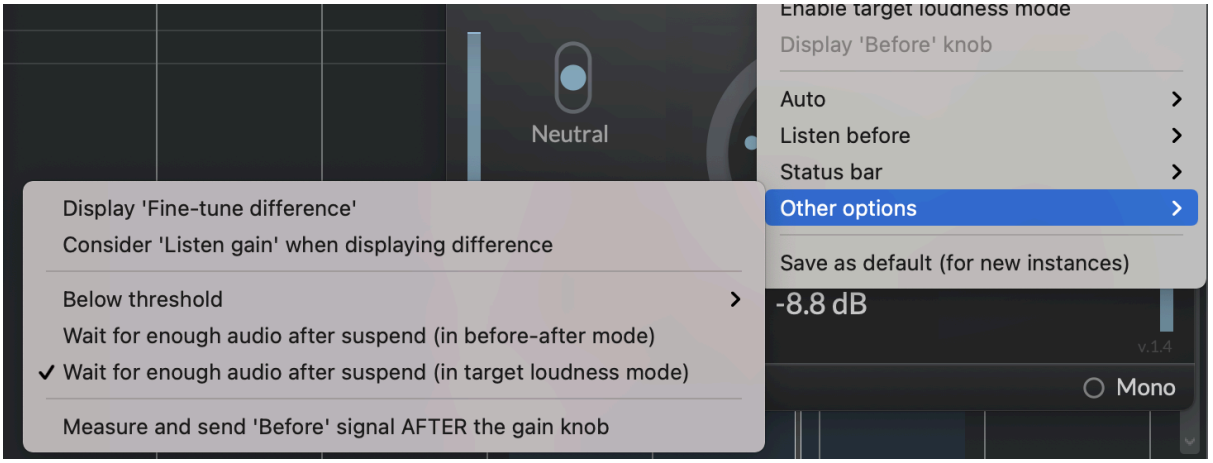


**Auto-set first instance to "After"** can be nice if you first insert the "After" plugin, which opens the GUI (as it does in Cubase), and then drag/duplicate it to "Before" without opening the GUI. So you have to do less closing/opening GUIs, though it might be less intuitive.

**"Recognize insert on multiple tracks"** is useful when you want to insert several instances in a row and make them all "Before" (or "After") but with different groups. It depends on the DAW. If the plugin detects that it's repeatedly inserted within a short amount of time (3 seconds by default) it assumes it's inserted on multiple tracks at once and instead of choosing "Before" - "After" for each next instance, it chooses "Before" or "After" for all instances inserted in one go.

**New instance detection speed** is a time after which the plugin decides whether it's a new inserted instance or a copied/moved instance from another track. For new instances (or duplicated instances) it selects a new mode/group and for old (moved) instances it doesn't change anything. If after moving to another slot/track your plugin changes group or mode, increase this to "Slow".

In the local options menu you can find some more interesting settings:




**Measure and send "Before" signal AFTER the gain knob** switches the calculation and audio sending behavior of the "Before" instance. By default the signal in the "Before" instance is measured and sent on the input (prior to Gain knob). This is good for testing compressors or saturation plugins between "Before" and "After", because you can add more gain in Before, so that After will auto-adjust back. In other scenarios you may want to measure loudness (and send audio) after the gain knob (for example during the mastering), this option allows you to do that.

## TECHNICAL INFORMATION

The plugin is doing loudness measurement using RMS calculation of K-Weighted signal averaging the last 2 seconds of audio (these are the default settings). By default, the level is measured on the input of "before" plugin and on the output of "after".

AU and VST3 versions support the Apple Silicon processors natively (since v.1.3).
*If you need GainMatch for 32-bit Mac DAWs, use GainMatch 1.22 and older.*

The DSP part is written in C++. The GUI is written in KUIML. Based on Blue Cat Audio Plug'n Script framework and LM Skin by Letimix.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