

# Manual

DENSITY MKII



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# 1 Introduction

## 1.1. License

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## 1.2. Installation

Requirements:

- Win32 compatible system with SSE2 instruction set support
- Tested and known to work in many VST compatible hosts

Put the “DensitymkII.dll” file contained in this archive in the VST Plug-In folder of your host.

**Note:** The old version of *Density* and this new *Density mkII* can be used in parallel in your host (they do have both different Plug-In name and ID). However, the old version is no longer supported.

## 1.3. Overarching topics

**Warning:** Lower your listening volume while operating the Plug-In to avoid hearing damage or damage of speakers or any other equipment.

Usage tips:

- Use the MAKEUP knob to level the outgoing audio and for handy A/B comparisons
- Level your audio input to the Plug-In to around 0dbFS to perform easy and best inside the plug
- Use <ctrl> + mouse left click on a knob or switch to restore default position
- Use <shift> + mouse left click on a knob to fine adjust values
- Use this Plug-In as an insert effect in any mono or stereo channel of your VST host

## 1.4. Credits

Visual concept by Patrick Barca, [www.suxesiv.ch](http://www.suxesiv.ch) – thanks again, mate!

Many thanks to Christian Budde for his famous Plug-In analyzer.

# 2 Jump Start

## 2.1. Overview

*Density mkII* – smooth and versatile dynamic processing on the stereo bus.



This device ain't modeled after any specific outboard gear but rather incorporates some proven dynamic shaping approaches from the past, combined in a seamless fashion with some much more modern concepts in audio processing - the best of both worlds. *Density mkII* was primarily designed to work in a typical stereo audio group mixing situation or while summing and to glue all things together in a rather unobtrusive way. Yet it's capable of signal colouring but in a subtle and pleasant way and also can perform quiet different tasks very versatile.

### At a glance

- perform ultra smooth 2bus compression
- master difficult to handle audio dynamics

- manage mid/side dynamic processing in a true two channel layout
- apply dynamic range adjustments easily

### **Plug-in specification**

- Win32 / VST compatible
- state-of-the-art digital signal processing
- zero latency processing, no phase alterations
- performance crucial parts are written in assembler
- completely SSE2 optimized

### **Getting the most out of it**

Please read the following chapters to get the most out of this device. See and learn especially on how to:

- see some effective tips on getting the most out of (boring) presets
- focus the actual gain reduction by simply limit the actual dynamic range of the compressor
- explore the exciting limiter mode which gives incredible dynamic control even on difficult audio sources and can master some typical leveling amp tasks
- see and hear how the RELAX feature retains punch in your mix
- use mid/side processing to your advantage and obtain smooth and balanced stereo mixes
- learn some cool tricks to make mid/side compression really easy by using the side-chain 'unlink' feature and other shortcuts

## 2.2. Quick reference



Large knobs:

RANGE – adjusts the actual gain reduction range from 100% (right) to around 5% (left most)

DRIVE – increases the gain of the audio signal in the side-chain path

TIMING – selects six different attack/release time combinations

MAKEUP – increases the audio level after compression

Small screws:

LINK – links the two channels in the side-chain path

DRY/WET – mixes compressed and uncompressed signal

STRICT/RELAX – the more to the right the more the timing parameters are relaxed

Switches:

ON/OFF – basic on/off operation

FILTER/OFF – turns the filter in the side-chain path on or off

INT/EXT – feeds the side-chain input signal from internal or external channels

COMP/LIM – switches between the two basic compression modes

LR/STEREO/MS – selects the channel operation and internal encoding

Meters:

VU – displays signal levels after DRIVE

GR – displays amount of gain reduction

### 2.3. Basic operation and advice

Use this Plug-In as an insert effect in any stereo or mono channel of your VST host. It can be operated both as a mono or as a stereo Plug-In. The best performance is obtained if the Plug-In is applied to a true stereo channel audio.

Assure the POWER switch is in ON position (power indicator is lighting). If the indicator is grey click on the switch until it's lightning. This toggles the overall Plug-In operation (on/off).



Level your incoming audio so the needle of the VU style metering in the left section of the Plug-In clearly shows some movement. Dial in amounts of the 'DRIVE' knob to apply further compression effects to your audio.

Apply different compression timing constants just by using the TIMING dial. P1 offers fastest attack and release speed and P6 is slowest.

Check both compression modes: COMP and LIM. They both offer different and exciting dynamic shaping possibilities. Don't see LIM just as an ordinary signal limiter and you'll get rewarded.



Use the MAKEUP knob to adjust the overall output volume as needed and for handy A/B testing at equal volume levels.

### 2.4. Some quick tips on using and adjusting the presets

Explore the presets but always adjust them to your current mixing situation:

- Always adjust the DRIVE parameter to your current track or mix so that the actual applied gain reduction / gain riding actually matches the specific needs.
- Always adjust the MAKEUP parameter to your current mix for equal loudness situations during A/B listening.
- Special mid/side processing presets are labeled with M/S in it's name.
- 'NY' intends special parallel compression in 'New York' style.
- 'LA' refers to leveling amp task presets with longish exponential release curves and variable soft-knee curves – don't miss them out, they are excellent for e. g. vocal group tracks or mixes with overall large volume level changes over time.
- If a certain preset/setting alters the stereo image perception too much: Check and adjust the LINK screw, which in most cases does the job. If not, engage M/S mode for further tweaking the stereo image perception.

# 3 Reference

## 3.1. Compression modes

Beside the COMP compression mode, *Density mkII* offers a way cool limiting mode: LIM. Don't relate this to some brickwall limiter designs or such a like but just see this as another creative and powerful dynamic shaping option with different topology and sound.



While the COMP mode offers a rather hard-knee compression transfer curve with a gentle ratio between around 2:1 and 4:1 (and in feedback topology), the LIM mode works in feed-forward topology and features a super soft variable knee design transfer curve where ratio increases over input gain (respectively DRIVE) until infinity in a stepless fashion.

On top of that the attack times in LIM mode are ten times faster by default.

Both modes are roughly matched output level wise. Depending on audio material and actual gain reduction applied, this needs to be manually adjusted.

## 3.2. Dynamic range control

*Density mkII* features a specific control to limit the actual applied amount of gain reduction. Turning RANGE to right-most position leaves the gain reduction unaltered. Tuning it to 12-o-clock position limits GR to about -12dB maximum and leftmost is (almost) zero. One can check the effect instantly with the GR meter to the right.



**Note:** If there is no GR happening below lets say -12dB then the RANGE knob (obviously) does not have any effect until it's dialed in clearly to be on the right side of the middle mark.

**Note:** If heavy gain reduction occurs constantly over time and the dynamic range is limited overall below that, then this typically imply that there is no gain riding going to occur anymore. The audio signal is just lowered to a constant level by the compressor (which is probably not wanted). Raise the RANGE control then or lower DRIVE until actual gain riding occurs.

### 3.3. Attack and release time behaviour

The TIMING parameter provides different fixed attack/release time combinations as follows (all values are specified in milliseconds):

	Attack (COMP)	Attack (LIM)	Release
<b>P1</b>	2	0.2	300
<b>P2</b>	2	0.2	800
<b>P3</b>	4	0.4	1000
<b>P4</b>	4	0.4	2000
<b>P5</b>	5	0.5	3000
<b>P6</b>	8	0.8	5000

However the **attack times** can be relaxed by dialing in the STRICT-RELAX screw between the TIMING knobs turning it from left to right. This then introduces program-dependent timing adjustments on both channels. This concept is basically introduced to achieve more flexibility on the the rather short default attack timings and thus can preserve the audio materials punch in some bus compression situations.



#### Using this to your advantage:

If there is more peak catching performance needed in your mixing situation then set the dial to STRICT. This is cool e. g. to achieve a consistent dynamic response on difficult audio material such as recordings of strummed string guitars, acoustic bass or so, and this works not only but especially well when the compressor operation is set to LIM mode.

If your audio needs more punch or if too much distortion is already introduced by compression (might be observed as bass implosion or unpleasant audible distortion on some sensitive material) then just relax the timing constants by turning the dial to RELAX.

#### Why is there a fixed TIMING control but not some traditional ATT/REL behaviour?

There are several reasons for that. The first is “simplicity” in the overall operation but this is getting much more important while working in M/S mode. Adjusting time parameters in M/S mode is pretty much tricky and is more easily done with **just one** TIMING parameter per channel. The overall strict or relaxed timing behaviour is then simply adjusted with the (global) STRICT-RELAX dial which applies now to both

channels. As an added sugar, this appears to be a sometimes **excellent target** in respect to host **automation**: If you are in the need to adjust and treat the actual timing behaviour differently over a whole track it's now sufficient and very convenient in most cases to just automate the STRICT-RELAX parameter (and not a bunch of channel individual parameters)! Try this trick for sophisticated automated gain-riding over a whole track e. g. for (group) vocal tracks (or anything else with difficult dynamic levels)!

### 3.4. Dual channel processing modes

*Density mkII* offers three different modes on how the two channels processing is overall managed:



- L/R – the device behaves as a dual mono device where the knobs for each channel can be operated independently. The upper channel is the left signal and the bottom channel is the right one.
- STEREO – normal stereo operation where all (channel specific) knobs are linked.
- M/S – the device behaves as a dual mono device where the knobs for each channel can be operated independently but internally the audio is transcoded into a mid/side signal. This way the upper channel maintains the mid signal now and the lower channel operates the side signal. After compression the signal is decoded back into a standard stereo signal.

**Note:** Please note that selecting the channel processing mode is independent from internal audio signal linking in the side-chain path (see next chapter)!

### 3.5. Side-chain processing

#### Linking

This is done with the LINK screw below the RANGE knob and always computes the actual side-chain signal for each channel in the following way (independent of any compression or channel operation mode):



- In 0% position both channels are unlinked and so each channels side-chain input triggers just the very same channel and not the other.
- In 100% position both channels are linked by adding their side-chain signal (and thus taking the mid part aka the mono content) and triggers now both channel compressors the same way.
- Both positions can be blended in a seamless / stepless fashion.

**Tip:** When starting with M/S compression make sure to start with 100% linked mode since this is easier to control and to start with. In advanced M/S compression situations set linking to 0%.

## Filtering

Specially designed for ultra smooth bus compression *Density mkII* features a fixed shaped filter for filtering the side-chain signal. The filter shape resembles the design from some classics and slightly reduces low frequency content while gently featuring the HF. It can be activated with a switch to the bottom-right. In some cases this might not fit the actual mixing situation where a different filter design is needed – use the external side-chain input in this case and perform your very own and individual filter treatments upfront the side-chain inputs.

**Tip:** Use this filter to further avoid pumping effects during compression.



## External

Switching the side-chain input from INT to EXT selects the Plug-Ins audio channels 3 and 4 as the source to obtain the input to calculate the compression information.

**Important:** Make sure that there is an appropriate audio feed into those channels when switching to external side-chain otherwise no compression is going to happen at all!

**Tip:** Use the side-chain routing from the kick-drum or bass audio source to achieve those desired pumping effects. De-activate the internal side-chain filter then.

## 3.6. M/S compression handling

If you would love to have a simpler way to sophisticated mid/side compression here are some tips:

- Make sure LINK is set to 100% first.
- Start setting up the compressor in STEREO mode and dial in what you normally would do w/o having a M/S option on board.
- Now switch to M/S.
- Slightly lower the LINK screw (to around 3-o-clock position or so) to obtain some nicely enliven sound (true stereo input signal required).
- Alternatively to or in combination with the last step try to increase the DRIVE on the side signal and compensate the level drop with the sides MAKEUP dial, so the side signal gets more compression. Use this for easy and consistent stereo width enhancements.

**Tip:** If you would like to dig into more sophisticated mid/side compression techniques make sure to unlink (LINK 0%) both channels so the side-chain triggering becomes channel independent!



**Example:** Depending on the mix situation it might be necessary or desired to have different compression timings available on the mid opposed to the side channel compressor. This leads sometimes to an inconsistent overall loudness performance between both channels or to too much asymmetric dynamic response. In *Density mkII* this can easily be overcome by the dynamic range control which is provided by the RANGE knobs and is available per channel. Just limit the actual applied gain reductions for both channels to a similar or appropriate amount so that the resulting compression behaviour appears more consistent between both channels.

**Important:** To take advantage of this dynamic range limiting technique in M/S mode it is necessary to set LINK to 0% (or nearby) since otherwise just the RANGE setting from the mid channel would be taken into account for both channels.

### 3.7. Dry/Wet mixing

Dry/Wet mixing is a common technique mostly used when the signal is really heavy compressed but then afterwards the uncompressed (dry) signal gets mixed back in. In *Density mkII* this is achieved just by adjusting the DRY/WET dial and while doing so everything remains phase consistent.





# 4 Addendum

## 4.1. Known issues

The *Density mkII* audio Plug-In is currently not compatible with older SSE (SSE1) type CPU's. There is at least SSE2 required.

## 4.2. Troubleshooting

WTF, there is absolutely no compression going to happen on the compressors output signal? So what to do now? Don't panic, be cool and just check (in the following order):

- Is the compressors power light on?
- Check the “DRY/WET” mixer screw and turn it clockwise.
- Check if SC input is set to INT. When set to EXT make sure that there is significant audio actually feed to the external side-chain input of the compressor.
- Check the RANGE knobs: Turn them clockwise (to the right) so that the GR meter shows actual gain reduction.
- Check the DRIVE knobs: Turn them clockwise (to the right) so that the GR meter shows actual gain reduction.



## 4.3. Further information

Refer to my Blog at <http://varietyofsound.wordpress.com> for some additional information and updates on this Plug-In or to leave a note concerning certain issues.

Peace,  
Herbert

