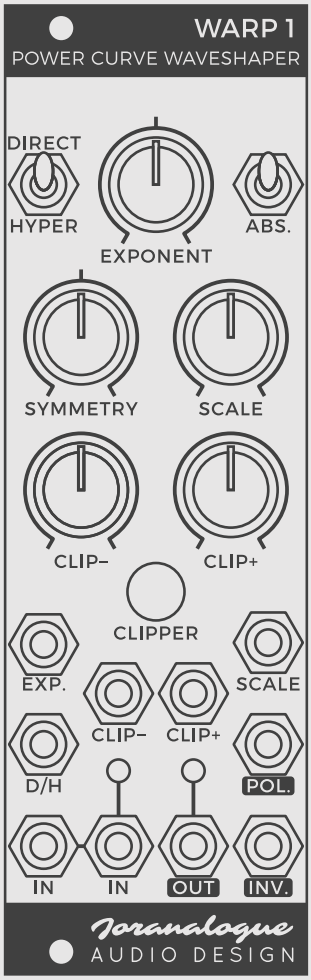
WARP 1

USER MANUAL



Joranalogue
AUDIO DESIGN

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INTRODUCTION

Warp 1 is a new breed of analogue waveshaper. Rather than being based on the inherent properties of transistors and diodes, it precisely implements a mathematical relationship between input and output, governed by a variable power function.

Like a beam of light travelling through a lens, straight waveform segments are bent into 'hollow-sounding' concave or 'driven-sounding' convex curves. The degree of curvature is determined by the exponent control, while the scale parameter determines the 'depth' of the curving action.

A precision clipper on the output adds adjustable clamping of the positive and negative parts of the waveform. In conjunction with the absolute value switch, this allows Warp 1 to be used as a half or full wave rectifier: useful for limiting CV ranges, or as an audio octave-up effect.

Flipping the mode switch from 'direct' into the 'hyper' setting exposes Warp 1's dark side, where its exponent turns negative and the outputs resemble hyperbolic curves. Dual summed inputs, an inverted signal output and a polarity comparator gate output round out Warp 1's signal processing capabilities.

From subtle timbral colouring to wild hyperbolic distortion, Warp 1 provides a level of control that's unprecedented in waveshapers, combining meaningful parameters, clear LED indication, complete voltage control and DC to supersonic operation.

CONTENTS

In the Warp 1 box, you'll find:

- → Product card, stating serial number and production batch.
- → Fold-out signal flow and front panel diagram.
- → 16-to-10-pin Eurorack power cable.
- → Mounting hardware: four black M3 x 6 mm hex screws, four black nylon washers and a hex key.
- → The Warp 1 module itself, in a protective, reusable cotton bag.

If any of these items are missing, please contact your dealer or support@joranalogue.com.

INSTALLATION

Before installation, make sure your Eurorack system has been powered down for at least 10 minutes and is placed horizontally on a stable surface.

Locate a free spot in your system in which to mount your module. First plug the included power cable between the module and a free output header on the power distribution board or cable.

Keep an eye on the polarity: the red stripe on the cable, denoting the –12 V power voltage, should always point towards the bottom of the module: 'red stripe down'. All our modules are equipped with keyed headers, which makes it impossible to plug them in the wrong way around.

Also pay attention to the polarity of the cable on the power distribution side. Contact the manufacturer of your rack in case you are uncertain.

Even if the polarity ends up reversed, this will not damage your module. However, this may not be true for modules of other brands.

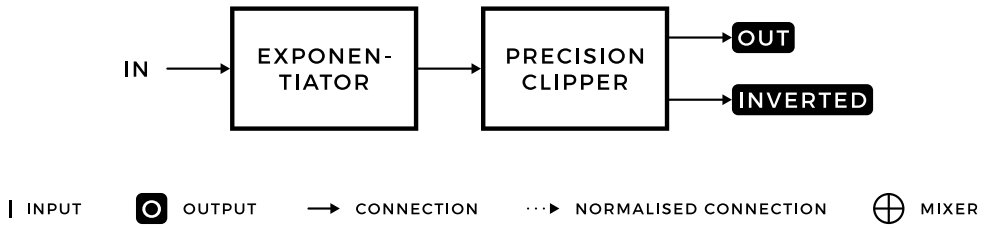
Next, it's time to screw your module in place. Included with your module, you'll find a set of M3 screws and nylon washers.

Place the nylon washers onto the screw threads, and using the supplied 2.5 mm hex key, fasten the screw/washer combo onto the rack rails, through the module's front panel. If your case uses sliding nuts, you'll need to position them first. Repeat until all screws are in place; always use all the supplied screws to install a module.

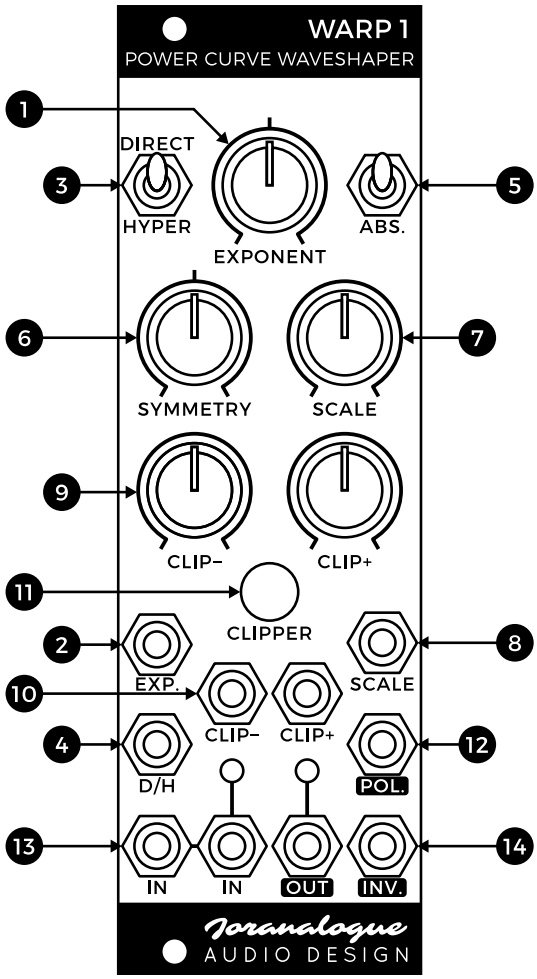
Note that some racks might use a different thread than the supplied M3 screws, or the rails might be recessed too deep for the supplied screws to fit. In this case, you'll need to source third-party screws matching your rack.

Now you can power up your rack and enjoy your new module!

SIGNAL FLOW



CONTROLS & CONNECTIONS



1 EXPONENT KNOB

Warp 1 uses analogue computing techniques to perform the following power function on an input signal 'x':

$$f(x) = sign(x) \times scale \times \left(\frac{|x|}{scale}\right)^{exponent}$$

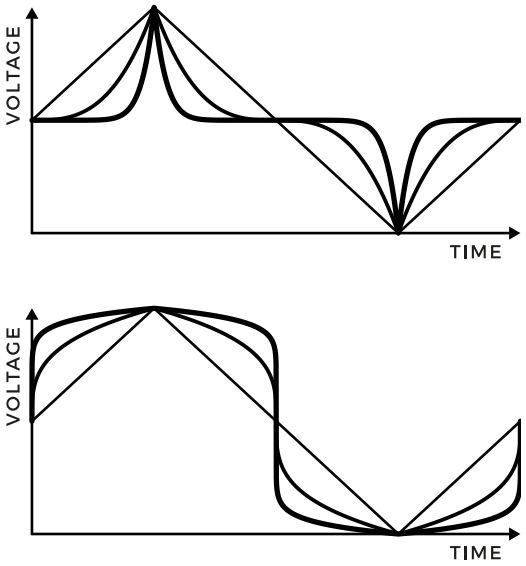
The exponent parameter can be adjusted in a logarithmic fashion. The knob ranges from 10, to 1 in the centre, on to 0.1 fully clockwise.

When the knob is centred and the direct/hyper switch is set to direct mode, the exponent is 1 and the formula can be simplified to *f(x) = x*. In other words: the input signal is passed unchanged.

Turning the knob to the left shapes linear waveforms into concave curves. Sonically, this is reminiscent of crossover distortion: the signal lingers around 0 V, producing a progressively thinner sound as the knob is adjusted further to the left.

Turning the knob to the right causes the signal's tops to be flattened, like a soft clipping overdrive/distortion circuit, but with enhanced amplitude control. Linear waves become convex curves. Going further clockwise, the 'drive' is increased until the signal starts to resemble a square wave.

The following diagram shows the waveshaping effect on a standard triangle wave at concave (exponent values of 10 and 3), as well as convex (exponent 0.3 and 0.1) settings.



2 EXPONENT CV INPUT

The exponent parameter can be modulated through this CV input in a logarithmic fashion, at –1 decade per 5 V. In other words, each 5 V increase in CV will make the exponent 10 times smaller.

While this parameter is limited to 10 on one end, exponents smaller than 0.1, beyond the knob's range, can be reached through external modulation.

3 DIRECT/HYPER SWITCH

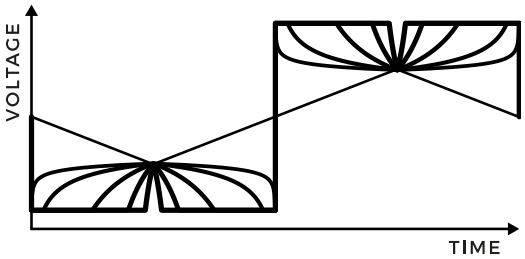
This switch sets the polarity of the exponent. In direct mode, the exponent is always positive. This creates a clear waveshaping progression from 'thin', to normal, to 'driven', as the exponent parameter is swept.

Flipping the switch to hyper mode makes the exponent negative. The exponent knob will then range from –10 to –0.1.

This results in a hyperbolic-like transfer function. At most settings, the output will become much louder, and sharp output swings are created as the input signal goes through zero.

In this setting, extreme waveforms are easily created, and at no setting does the output resemble the original input signal, as can be shown on the plots below (exponent values –10, –3, –1, –0.3 and –0.1), which also show the module's output clipper in action.

Clipping in this mode is inevitable, as the waveshaping function approaches positive or negative infinity around input values of 0 V.



4 DIRECT/HYPER GATE INPUT

The exponent polarity can be inverted under gate control through this input. A 'high' gate will flip the mode that the direct/hyper switch is currently set to.

This gate input is uniquely designed to be driven reliably even from weak, slow, bipolar signals. It features Schmitt action, with a +2 V low and +3 V high logic threshold.

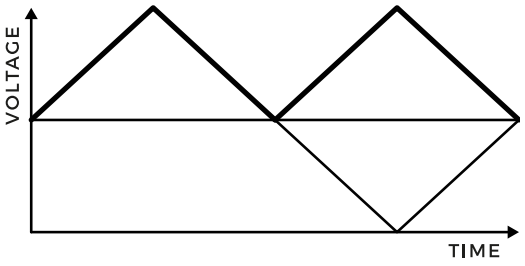
5 ABSOLUTE VALUE SWITCH

The output can be made positive-only by enabling this switch. The effect is like a full wave rectifier, as negative signal excursions are inverted to make them positive.

When absolute value mode is enabled, this simplifies the waveshaping formula to:

$$f(x) = scale \times \left(\frac{|x|}{scale}\right)^{exponent}$$

On a triangle input waveform, the effect is that of an octave-up effect, as shown by the following diagram.



6 SYMMETRY KNOB

The symmetry knob adds a manually variable DC offset to the signal inputs, ranging from –5 V to +5 V. This can be used to achieve asymmetric waveshaping, by turning it away from the centre position.

This knob can also be used re-centre the waveshaper if there already is a DC offset present in the input signal(s).

7 SCALE KNOB

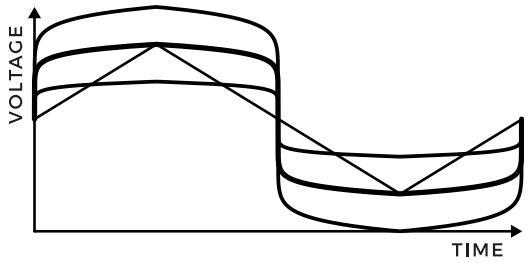
The scale knob introduces a scaling factor to the waveshaper's operation. It has a range of 0 V to 10 V.

For most signals, it is recommended to keep this knob in the centre region. If a standard 10 V_{pp} input signal is applied, which peaks at –5 V and +5 V, a centred scale knob (5 V) will keep the output amplitude constant for any value of the exponent in direct mode.

In a mathematical sense, this parameter sets the positive and negative intersection points, where the output voltage is equal to the input voltage, regardless of the exponent value.

At extreme scale settings, the output amplitude will vary wildly as the exponent parameter is adjusted.

The diagram below shows the output waveform at an exponent value of 0.1, at three different scale levels.



8 SCALE CV INPUT

This CV input is used to modulate the scaling factor. While negative voltages are supported, the final scaling factor, as determined by the knob and CV input, is restricted to positive values only.

This input can be used to control the output amplitude, much like a VCA—but, keep in mind that both the direction and the amount of amplitude modulation available, depend on the current exponent value.

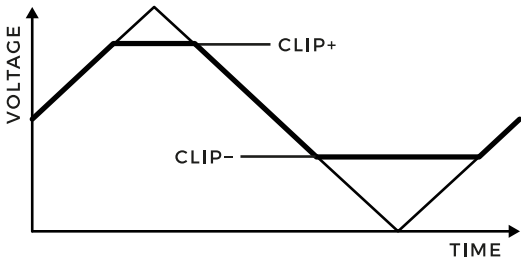
9 CLIPPING LEVEL KNOBS

The waveshaper's output is equipped with a precision clipping circuit. This is useful to keep the output signal within a reasonable range, especially in the more extreme settings.

The positive and negative portions of the signal are independently clipped at adjustable boundary levels. The negative clip knob has a range of –10 V to 0 V, while the positive knob ranges between 0 V and +10 V.

With the exponent parameter set to 1, Warp 1 can be used as a dedicated precision clipper module.

Note that when the absolute value switch is enabled, the output voltage cannot go below 0 V, so negative clipping will never occur.



10 CLIPPING LEVEL CV INPUTS

Use these CV inputs to modulate the output clipping boundaries.

Note that these boundaries can never cross 0 V: taking into account both knob settings and CVs, the final negative clipping voltage will always be negative, and the positive clipping voltage will always be positive.

11 CLIPPER LED

This indicator shows the status of the output clipper in real-time. It lights up blue when the output voltage is clipped at the negative boundary, red at the positive boundary and white when no clipping occurs.

The LED will turn off when both clip levels are at 0 V, indicating that the output is fully muted.

12 POLARITY GATE OUTPUT

This output represents the polarity of the waveshaper's current combined input voltage, consisting of the sum of both input sockets and the symmetry knob.

The output will alternate between +5 V for positive input voltages and 0 V for negative input voltages.

The resulting signal may be used for polarity detection of CV signals, or as a square/pulse sound source at audio frequencies.

13 SIGNAL INPUTS AND LED

Connect the signal(s) to be shaped here. These identical inputs are mixed together, which can simplify certain patches as it often removes the need for a separate mixer module.

As the entire signal path is DC-coupled, control voltages (CVs) as well as audio signals can be processed. These two signal types can even be combined, for variable symmetry audio waveshaping.

The LED shows the real-time combined input voltage, lighting up red for positive and blue for negative.

14 SIGNAL OUTPUTS AND LED

The final shaped and clipped waveform is available via these output sockets. Two outputs are available simultaneously: a regular version and an inverted copy.

The LED above the main output shows the real-time output voltage, lighting up red for positive and blue for negative.

PATCH IDEAS

Coming soon!

SPECIFICATIONS

MODULE FORMAT

Doepfer A-100 'Eurorack' compatible
3 U, 8 HP, 30 mm deep (including power cable)
Milled 2 mm aluminium front panel with non-erasable graphics

MAXIMUM CURRENT DRAW

+12 V: 65 mA
–12 V: 60 mA

POWER PROTECTION

Reverse polarity (MOSFET)

I/O IMPEDANCE

All inputs: 100 kΩ
Polarity output: 1 kΩ
Waveshaping outputs: 0 Ω (impedance compensated)

OUTER DIMENSIONS

128.5 x 50.5 x 43 mm (H x W x D)

MASS

Module: 115 g
Inc. packaging and accessories: 190 g

SUPPORT

As all Joranalogue Audio Design products, Warp 1 is designed, manufactured, and tested with the highest standards, to provide the performance and reliability music professionals expect.

In case your module isn't functioning as it should, make sure to check your Eurorack power supply and all connections first.

If the problem persists, contact your dealer, or send an email to support@joranalogue.com. Please mention your serial number, which can be found on the product card or on the module's rear side.

ACKNOWLEDGEMENTS

With compliments to the following fine people,
who helped to make Warp 1 a reality!

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version 2025-09-22

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https://joranalogue.com/

LAB GRADE
SYNTHESIS.

EST. 2016
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BELGIUM