INTRODUCTION

Modulation is the core concept of modular synthesis: parameters changing over time, adding movement and musical interest to what would otherwise be merely static sounds. Being able to control the amplitude of signals throughout a patch is therefore essential, and one can never have too many voltage controlled amplifiers (VCAs).

Designed as a fully-featured modulation hub for Eurorack synthesisers, Morph 4 takes the basic concept of the multi-VCA module to the next level.

Four linear amplitude modulators are controlled by a master 'morph' parameter. The response of each modulator to this parameter is completely variable, both manually and under voltage control, and can be overridden if desired. Each response is triangular, with the 'position' parameter setting the maximum point along the morph axis, while 'span' determines the width of the triangle's base.

In addition to separate signal inputs and outputs, a variety of combined outputs is available as well: A+B, C+D, add (unity gain) and averaging mixes, and instantaneous minimum and maximum. Input normalisation makes it easy to send the same signal to multiple modulators, while output and modulator response LEDs provide essential visual feedback.

The combination of master control, fully flexible modulators and multiple combined outputs creates a module truly embodying the spirit of 'patch programmable' modular synthesis. Use Morph 4 as a voltage controlled mixer, dual crossfader, dual panner, interpolating scanner, interpolating distributor, quad VCA, quadraphonic controller, slope modifier, rectifier, complex waveshaper or something in between any of those—the choice is yours.

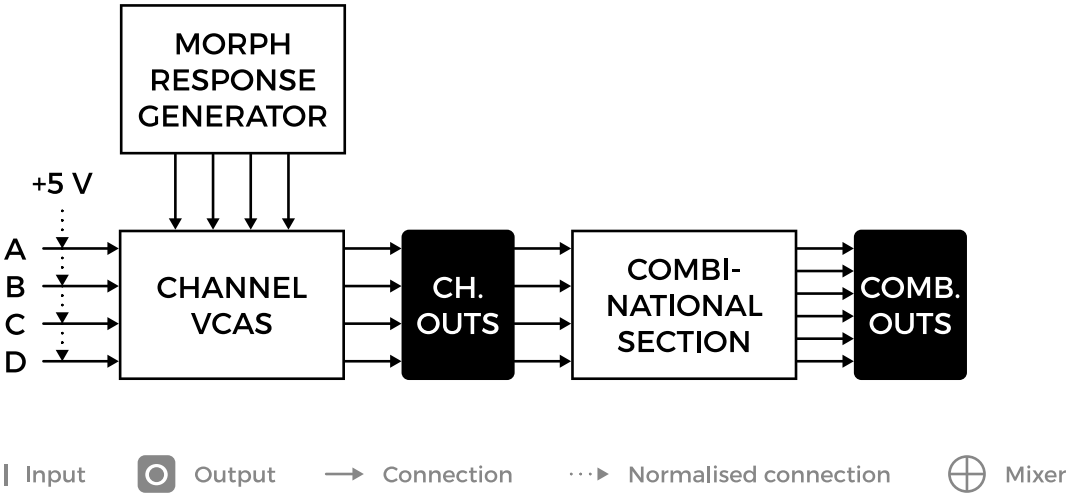
CONTENTS

In the Morph 4 box, you'll find:

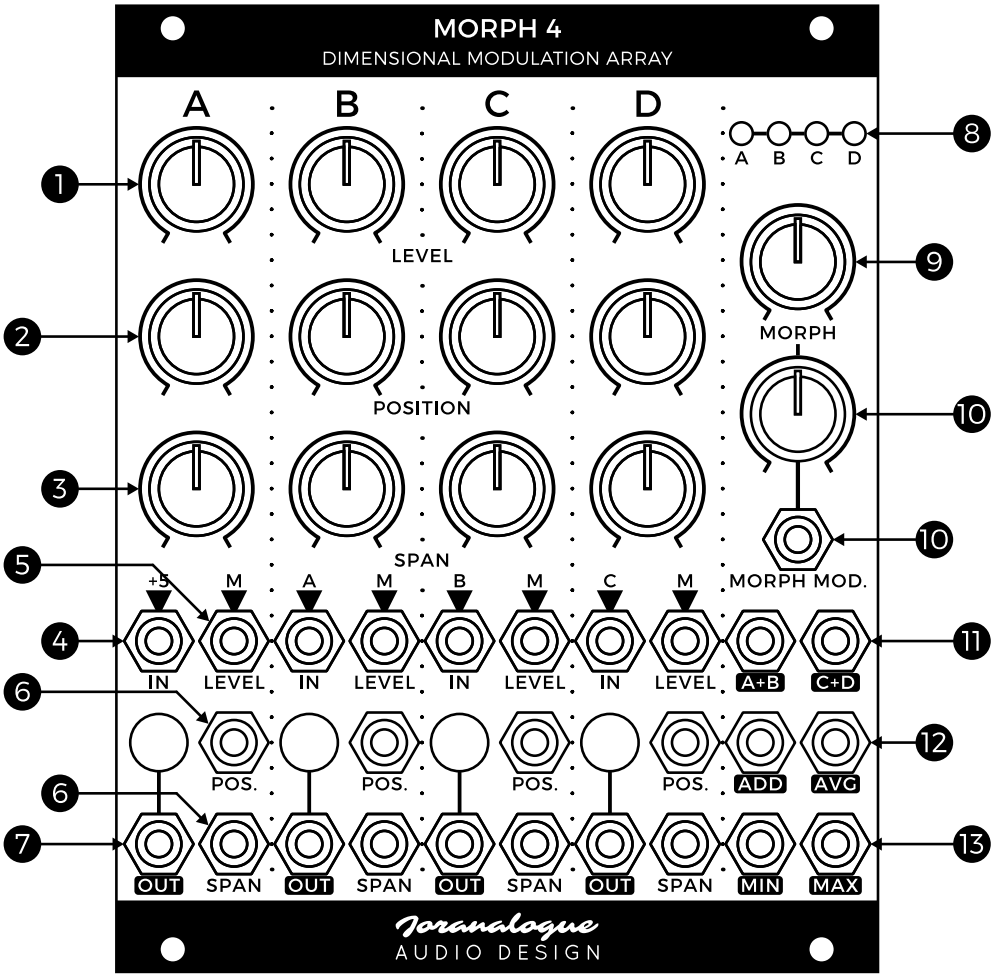
- Product card, stating serial number and production batch.
- 16-to-10-pin Eurorack power cable.
- Mounting hardware: two black M3 x 6 mm hex screws, two black nylon washers and a hex key.
- The Morph 4 module itself, in a protective cotton bag.

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

SIGNAL FLOW



CONTROLS & CONNECTIONS



1 LEVEL KNOBS

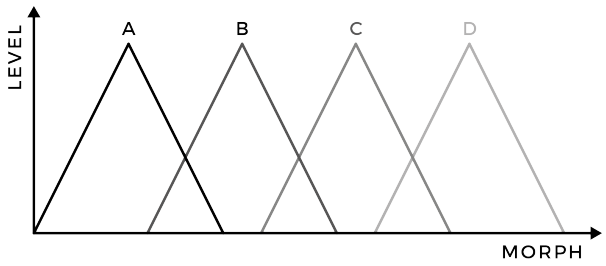
The level knobs are control voltage (CV) attenuators for the modulator level inputs, determining the gain for each modulator.

2 POSITION KNOBS

Each modulator by default responds to the morph parameter in a triangular fashion. The position parameter sets the location of the triangle's peak in relation to the morph axis. For example, if a position knob is set to the centre position, that modulator will reach its peak response when the morph knob is centred as well (assuming no level CV is applied).

3 SPAN KNOBS

The width of the base for each modulator's morph response triangle is set by the span parameter. For example, a small span means the modulator will be fully closed for most morph values, except for a small range around the peak position.



4 SIGNAL INPUTS

Connect your input signals to these sockets. Input A has a +5 V normal, making it easy to use Morph 4 to generate rather than process signals. All other inputs are normalised from the preceding one (A into B, B into C and C into D), as indicated on the front panel using triangles, so the same signal can be sent through multiple modulators. Any kind of signal can be used: audio, CV or gate/trigger.

5 LEVEL INPUTS

The level CV inputs provide linear voltage control over the modulators. With the attenuator at maximum, the response is 0 (−∞ dB) at 0 V, and unity gain (0 dB) at +5 V. They can be made to amplify when more than +5 V of CV is applied.

By default, these sockets are driven from the triangular morph responses generated for each modulator from its position and span parameters. Plugging a socket into one of them allows the corresponding modulator to be controlled directly instead, overriding the morph functionality.

6 POSITION AND SPAN INPUTS

Any voltage applied to one of these sockets is added to the position/span set using the corresponding modulator's knob.

7 SIGNAL OUTPUTS AND LEDS

The modulated signals are available directly from these output sockets.

The LEDs show the real-time output voltages, lighting up red for positive and blue for negative.

8 LEVEL LEDS

These LEDs visualise the incoming level CV for each channel, determined either by the morph, position and span parameters or the signal applied directly to the level socket, before any attenuation by the corresponding level knob.

9 MORPH KNOB

The morph parameter is a kind of 'macro control', affecting all channels simultaneously (except channels where the level CV input is in use). How the channels respond to different morph levels depends entirely on their position and span settings.

10 MORPH MODULATION INPUT AND KNOB

External modulation of the morph parameter is possible using this input socket and polariser knob. While the manual knob range is 0 to +5 V, corresponding to the range of the channel position knobs, external modulation can move the morph value outside this range if desired.

11 SUMMING OUTPUTS

Two sub-mix outputs are available: one combining channels A and B, and another combining C and D. These are typically used for (stereo) crossfading applications.

12 ADDER/AVERAGER OUTPUTS

These additional mixing outputs combine all channels, useful for voltage controlled mixing and scanning. They only differ in gain.

The adder output simply adds up all channel output voltages at unity gain, most useful when processing low-level signals.

The averager on the other hand lowers gain by 12 dB, avoiding clipping when processing stronger signals.

13 MINIMUM/MAXIMUM OUTPUTS

The minimum and maximum output voltage levels of the four channels are continuously computed by analogue circuitry and made available from these output sockets. They can create surprising results for a wide variety of input signals.

PATCH IDEAS

HALF-WAVE/FULL-WAVE RECTIFICATION

The minimum/maximum outputs can be used to separate out the positive and negative portions of a signal (half-wave rectification). Apply your signal to channel B, set to maximum level, while setting all other level controls to their minimum settings. 'Disable' morphing by setting the positions fully counter-clockwise, spans clockwise and morph itself counter-clockwise.

The minimum socket outputs the input signal's negative excursions, while the positive parts are available from the maximum socket. Increase the channel A level to move the 'separation line' from 0 to +5 V, or provide an input signal to modulate it.

For full-wave rectification, apply an inverted copy of the signal to channel C and set its level knob to maximum as well.

WAVESHAPER

Rather than using the channels directly, plug an audio signal into the morph input socket. As channel A includes a +5 V input normal, various new, often highly complex waveforms will be made available from the mixing outputs, as determined by the chosen input signal, morph knob settings and the various level, position and span parameters.

Not limited to audio use, this same technique can be used to turn a simple CV source into an advanced modulator. For bipolar output signals, apply a constant –5 V to signal input C.

QUAD WINDOW COMPARATOR

With a low frequency or audio signal driving the morph section and no other input signals applied, it is possible to use Morph 4 as a quad window comparator. Simply use the triangular output waveforms from the four channels to directly drive gate and/or trigger inputs throughout your system.

For each channel, 'position' sets the window's centre, while 'span' determines the size. Experiment with using the mixing outputs as well, and modulation of the parameters. You may need to process the output signals through regular comparators first to drive certain inputs reliably.

SYNCHRONISED VCAS

Within certain patches, it may be useful to have an array of synchronised VCAs, all processing different signals yet controlled by the same CV source. The morph feature can be used to provide this functionality.

To achieve this, set all position and span knobs to their maximum settings, and the morph knob to minimum. Patch the signal inputs and outputs as required. Then connect your CV to the morph modulation input and use the corresponding knob to set the sensitivity. At maximum sensitivity, each channel will be fully attenuated at 0 V and provide unity gain at +5 V. If your control signal exceeds this, lower the sensitivity to match. Note that the responses are still triangular, so pushing beyond the unity gain point will result in attenuation.

SPECIFICATIONS

MODULE FORMAT

Doepfer A-100 'Eurorack' compatible module
3 U, 20 HP, 30 mm deep (inc. power cable)
Milled 2 mm aluminium front panel with non-erasable graphics

MAXIMUM CURRENT DRAW

+12 V: 110 mA
–12 V: 110 mA

POWER PROTECTION

Reverse polarity (MOSFET)

I/O IMPEDANCE

All inputs: 100 kΩ
All outputs: 0 Ω (compensated)

OUTER DIMENSIONS (H X W X D)

128.5 x 101.3 x 43 mm

MASS

Module: 240 g
Including packaging and accessories: 315 g

SUPPORT

As all Joranalogue Audio Design products, Morph 4 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.

REVISION HISTORY

Revision D: revised VCAs to ensure they fully close at a level CV of 0 V.

Revision C: no functional changes.

Revision B: initial release.

With compliments to the following fine people,
who helped to make Morph 4 a reality!

Ben ‘DivKid’ Wilson Björn Jauss

Boris Uytterhaegen Gregory Delabelle

Jan D’Hooghe Janus Coorevits

Jérémy Bocquet Jeroen De Pessemier

Lieven Stockx Marcin Staniszewski

Quincas ‘Synth DiY Guy’ Moreira Sebastiaan Tulkens

Morph 4 User Manual
version 2023-11-04

21st Century Analogue Synthesis—Made in Belgium

Joranalogue
AUDIO DESIGN

info@joranalogue.com
https://joranalogue.com/