

# DIMENSION MK3

## WAVETABLE PROCESSOR



USER MANUAL V4.00 RO

# ZIQAL





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# INTRODUCTION

The history of wavetable synthesis can be traced back to the 1970s, when the technique was first developed by Wolfgang Palm for his company PPG. One of the first commercial implementations of wavetable synthesis was the PPG Wave synthesizer, which was introduced in 1981.

Since then, a large variety of hardware and software synthesizers using wavetable techniques have been developed. From the legendary PPG to the Access Virus, Serum Massive and Omnisphere; a wild range of possibilities within the world of synthesised audio have been opened up thanks to wavetable synthesis!

Embedding a modern, high-performance CPU, we have been able to develop the latest wavetable synthesis algorithms in a never seen before compact form factor for eurorack. This is the Ziqal Dimension.

Matching the highest wavetable resolution standards and providing compatibility with popular wavetable formats standards like Serum and Vital, the Dimension benefits from a large and easily available collection of wavetables. Its high level of compatibility allows users to import wavetables created from computer software environment directly into the eurorack ecosystem.

On top of this, the high-performance CPU allows the reproduction of up to 24 simultaneous wavetable oscillators. These oscillators, depending on the active configuration, can be used to create chords, unisons, dual oscillator output, LFOs, or even full 4 voice polyphony. The secondary output, if not used to output a stereo audio signal, can be configured and used as an LFO output, secondary oscillator output, MIDI converter utility outputting CVs, CC, Clock and much, much more...

However, that's not all! The Dimension MK3 also features internal VCAs, ADSRs, VCFs, wavetable real-time warping and transformation, a note quantizer, multi-dimensional wavetable morphing and even more besides that!

This guide to Dimension covers the operations for features present in firmware version 4.0.



# SPECIFICATIONS

## ELECTRICAL

Power supply	+12V ▶ 100 mA
	-12V ▶ 15 mA

## MECHANICAL

Size	10 HP
Depth	25 mm

## OUTPUTS

Sampling rate	44.1 kHz
Bits depth	32-bits

## AUDIO ENGINE

Bit depth	32-bits floating point
Sampling rate	44.1 kHz

## INPUTS

CV Input range	-3V ▶ 7V
FM Input range	+/- 8 V
A, B & NAV input range	+/- 8 V

MIDI / SYNC	Compatible with A, B & C TRS-MIDI types
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*(When MIDI is no activated, MIDI/SYNC input accept GATES/TRIGS)*

## MEMORY

Internal	▶ 128 patches ▶ 25 wavetables ▶ User preferences
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External	Micro SD Card
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## INTERFACE

TFT Display	16bit colours TFT
Rotary encoder	High resolution
Micro SD Card reader	FAT and FAT32 formats compatible
3 Macro controls <b>A, B &amp; NAV</b>	(1 Knob + 1 Attenuator + 1 CV) each



# INSTALLATION

For safety reasons, turn off or remove the power supply from your case before installing the module. Make sure your system power supply has enough power to support the entire system for proper module operation. Connect the module to your case and use the provided 10pin flat power cable to connect the Dimension to your power supply rail. Before turning on your system, ensure that the module is properly connected.

When you power on your system, the Dimension module will display the following information sequentially:

- ZIQAL Logo
- Firmware version: FW x.xxx
- Hardware version: HW x.xxx
- Calibration status: OK

To ensure that your firmware is up to date, visit [www.ziqal.com/support](http://www.ziqal.com/support) and compare the displayed firmware versions to the latest versions available on the website. New firmware with bug fixes and new features is regularly released so don't miss it out. If you encounter an issue or have any suggestions for new features for our future firmware releases, you can submit a message through the contact form on our website at [www.ziqal.com/contact](http://www.ziqal.com/contact).



# BASIC OPERATIONS

On the main display you will find the following items:

- The active wavetable oscillator waveform
- 3 vu-meters<sup>1</sup> displaying actives macro control values A B and NAV
- The root frequency or note



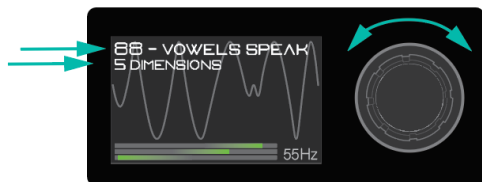
The main display allows you to perform three actions:

- Enter the edit menu and edit the current patch or configure the DIMENSION
- Browse through patches stored in memory
- Save the current patch

## BROWSE PATCHES

From the main display, simply turn the encoder left or right to start browsing patches from the internal memory.

To avoid unintentional patch changes during play, the first encoders move is ignored and will only display active patch names and information.



<sup>1</sup> Vu-meters values = sums of pots position + CV Input \* Attenuators





The information text displayed when browsing patch are from top to bottom:

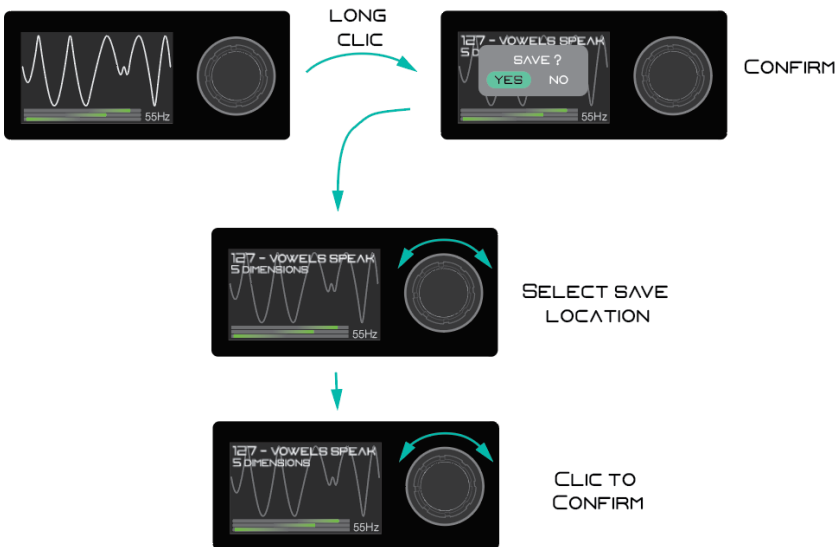
- 1 – The patch name
- 2 – The wavetable name<sup>2</sup>

To quit the browsing mode, and select the displayed patch, click the encoder.

## SAVE PATCHES

To save a patch, from the main display

1. click and hold the encoder until a popup asks you for save confirmation.
2. Confirm or cancel to exit
3. Select memory save location 1 to 128
4. Click to confirm



<sup>2</sup> If your patch uses more than 1 wavetable, the wavetable name will not be shown but the number of wavetables used in the patch.



# MEMORY

## SESSION

### PATCH MEMORY

PATCH 001

PATCH 002

PATCH 003



PATCH 128

### WAVETABLE POOL



WAVETABLE 01

WAVETABLE 02

WAVETABLE 03



WAVETABLE 25

### CONFIGURATION



## PATCH

A patch is a preset and can be recalled at any time. The Dimension can store up to 128 patches<sup>3</sup>. Each patch uses one or several wavetables from the wavetable pool.

When a patch is saved, its pitch tuning and macro potentiometers position will be saved within the patch. This way, you will find the exact same patch configuration and sound when you recall the patch. When you reload the patch, all macro and pitch potentiometers will have no effect until you move them to the value that was saved within the patch. Macro control's VU-meters when locked will display the saved value in red when they are locked.

## SESSION

The overall internal Dimension memory is called a Session. A session can be saved or loaded from the front panel micro-SD card at any time. This way you can back up a project and start a new one from scratch and return to the previous one when needed.

A Session is divided into 3 parts: "Patch memory, Wavetable pool and Configuration"

### PATCH MEMORY

The dimension can store up to 128 different patch configurations and these patches can be recalled at any time.

Patch parameters, when modified, are not automatically saved into memory. This way, you will not overwrite your patch presets unintentionally.

### WAVETABLE POOL

You can store up to 25 wavetables into the wavetable memory pool. A wavetable present in the memory pool can be used freely in any of the 128 patches.

Keep in mind that if a wavetable from the pool is replaced by another one, all patches using this wavetable will be impacted.

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<sup>3</sup> See *BASIC OPERATION* section on how to save and browse patches.



## CONFIGURATION

Configuration parameters are set globally and automatically saved within module memory after modification. Configuration parameters include user preferences and output modes (Stereo, Dual, LFO, MIDI...).

## SAVE/LOAD SESSION

To save the Dimension active Session and backup your Dimension on the SD Card:

- Go into the CONFIG menu and click "Save session"
- Click edit to enter a name for your session and Click save or Click save directly if you are happy with the actual name.
- The Dimension will back up its memory into a folder on SD card caller ". /Session".

To load a previously saved session

- Go into the CONFIG menu and Click "Load session"
- Select one of the available sessions on the SD Card from the list.
- The Dimension will load 128 patches, 25 wavetables and configuration from the session.

As the Dimension has to load/save 128 presets and 25 wavetables, loading and saving session can take between 1 and 3 minutes to complete.

Session files are stored in a folder at the root directory of the micro-SD Card called ". sessions". To import sessions files from external sources, save the session file you want to import into this folder.



# MICRO-SD CARD

## FILE FORMAT

The Dimension is delivered including a Micro-SD card containing a collection of useful wavetables to begin your journey into wavetable synthesis. As your wavetable collection will grow you will probably want to use other Micro-SD card and extend your storage capabilities.

In order to be compatible with the Dimension, any Micro-SD card should be formatted in FAT or FAT32 format. Please use the software “**SD Memory Card formatter**” available at the following address to format your card to the correct format.

<https://www.sdcard.org/downloads/formatter/>

The maximal memory card size supported by the Dimension is 32 Gigabytes. <sup>4</sup>

## WAVETABLE STORAGE

You can organize and store your wavetable collection file and folders as you wish. The Dimension features a fast file browser allowing you to easily browse your wavetable collection. See “Load wavetable” section for more information.

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<sup>4</sup> A higher capacity card may be used if you format it to FAT32 format. But the total available storage will not exceed 32GB.



# PATCH EDIT

This chapter will cover all patch parameters that can be edited within the edit menus. Parameters that are marked with an asterisk (\*) can be assigned to macro controls.

## NAVIGATION

NAV

UNI

FILT

VCA

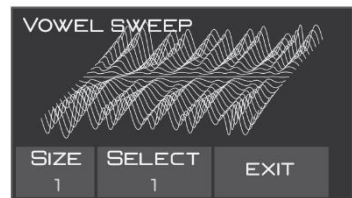
WARP

VOICES

### CLASSIC MORPHING

The navigation section settings allow you to edit how your patch morphs through your wavetable(s). If the size setting is set to 1, morphing will be done in one dimension, similar to a classic wavetable synthesizer. The select entry will allow you to choose which of the 25 wavetables within the pool is used in your patch.

In this example, you can see that the patch we are editing uses a wavetable named "Vowel sweep," which is present in the wavetable memory slot 1 (select = 1).



The NAV macro control is assigned by default to the wavetable morphing position.

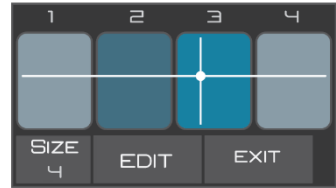
### MULTI-DIMENSIONAL MORPHING

If the size setting is set to a value greater than 1, as shown in the example below, it means that your patch will not only morph between waveforms within a wavetable but also between different wavetables at the same time in an additional dimension. The "edit" button allows you to configure which wavetables your patch will morph between, and the "Size" parameter sets up how many wavetables will be used in parallel for morphing.

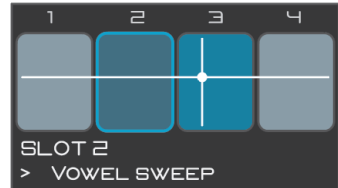
In the following example, the size is set to 4, so 4 wavetables will be used in parallel. The four squares represent the four wavetables, and a cross allows you to visualize the exact morphing position within the 4 wavetables.



The vertical cursor position indicates the position within the wavetable, and the horizontal position shows the morphing position between the four different wavetables.



Clicking the "edit" button will allow you to configure and choose which wavetables are selected for morphing and their order.



To select a wavetable for a slot, select, then click on the desired slot and then choose one of the 25 wavetables from the pool. The number above the slot indicates which of the 25 wavetables from the wavetable memory pool is assigned to the slot.

By default, the NAV macro controls the vertical position within the wavetable and the B macro is assigned by default to the horizontal morphing position between wavetables.



# UNISON

NAV UNI **FILT** VCA WARP VOICES

The following parameters are available within the Unison edit menu:

VOICES 24	DETUNE 35%	SPREAD 75%	MIX 50 %	SYNC OFF	EXIT
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## VOICES

Select how many voices are used for the unison.

If patch is configured in monophonic mode, this parameter can go from 1 (no unison) to 24 voices

If the patch is configured in polyphonic mode or chord mode, this parameter is limited to a maximum of 6 voices as the 24 voices will be shared within the polyphony or chord.

## DETUNE \*

Set the amount of detune between voices.

At 0% all voices are tuned to the same frequency, which will sound as if no unison were present.

If set to 100%, half of the voices are set one octave higher, and the other half one octave lower.

At 50%, voices are frequency spread uniformly between +1 and -1 octave.

## SPREAD \*

Spread controls how unison voices are panned over the stereo field. At 0%, all voices are in the stereo centre and balanced equally. At 100% even unison voices are output left and odd unison voices are output right. If the total amount of voices is an odd number, the centre voice will always remain in the middle of the stereo field.





Spread controls is only visible when the module is configured in stereo mode.

## MIX \*

Mix control how unison voices are mixed together.

## SYNC

If sync is set to random, all of the unison voices phases will be reset to a random position when a note event is detected.

If MIDI is activated, note events are detected when MIDI notes are received on the select channel. If MIDI is not activated, trig or gate are detected at TRIG input.



## FILTER

NAV UNI **FILT** VCA WARP VOICES

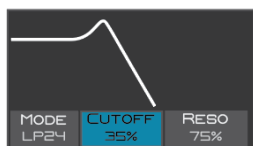
This menu will only be available if filters are enabled in the configuration menu. When activated, 1 stereo filter will be set up in series with each voice. A dedicated ADSR envelope will also be available to internally control the filter cutoff. Please see the drawing below for an architecture overview where filters and VCA are activated.

When VCA and VCF are activated, the Dimension will operate as a complete, classic architecture synthesizer in only 10HP!

The following parameters are available within the VCF edit menu.

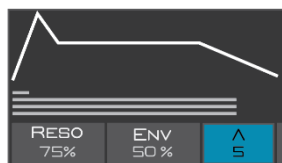
MODE	CUTOFF	RESO	ENV	Λ	D	S	R	EXIT
LP24	35%	75%	50 %	5	10	20	45	

When editing filter parameters, the display will show the current frequency response of the filter.



When filter envelope parameters are edited, the display shows the envelope response curve. You will also see lines on display representing the actual envelope amplitude value.

Here is an example where filter envelope attack is edited while voice 1 envelope is in attack phase while voice 2, 3 and 4 filter envelope phases are in release stage.



+



## MODE

Filter mode can be set to:

- Lowpass 24 pole “LP24”
- Bandpass 24 pole “BP24”
- High pass 24 pole “LP24”

## CUTOFF\*

Controls the cutoff frequency of the filter

## RESO\*

Controls the filter resonance amount. Please be careful with this parameter as setting it at high value will make the filter self-oscillate and that can result in high amplitude and frequency sounds AKA WATCH YOUR BASSBINS!

## ENV\*

Controls the envelope depth amount to the filter cutoff

## $\Lambda^*$ , $D^*$ , $S^*$ , $R^*$

ADSR envelope attack, decay, sustain and release controls.



## VCA

NAV UNI FILT **VCA** WARP VOICES

This menu will only be available if VCA is activated in the configuration menu.

When activated a stereo VCA will be created in series with all of the voice outputs allowing you to use the Dimension as a full synthesizer voice. See voice architecture overview in the preceding chapter.

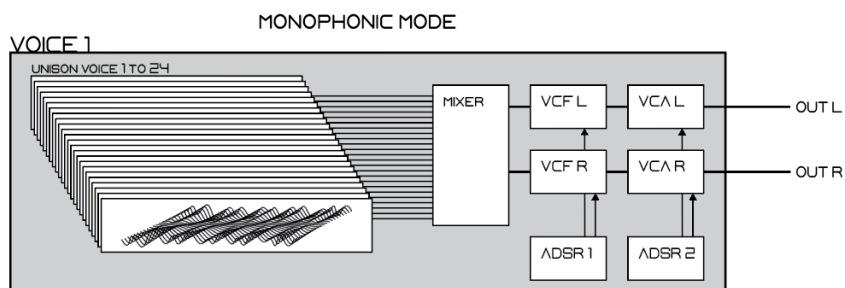
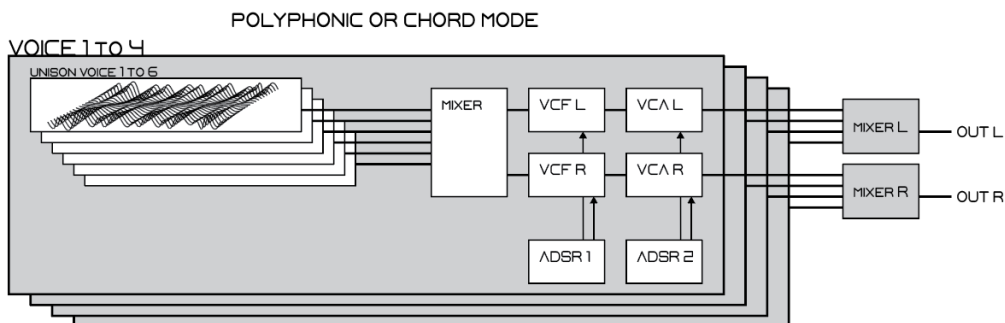
A\*, D\*, S\*, R\*

ADSR envelope attack, decay, sustain and release controls



## VOICE ARCHITECTURE OVERVIEW

he following diagram shows an overview of the internal Dimension architecture when VCAs and/or FILTERs are activated.





# WARP

NAV

UNI

FILT

VCA

WARP

VOICES

This is where you control warp and real time waveform transformation algorithms. When activated the warp processor will transform, bend, twist or fold your wavetable output.

## MODE

The following warp algorithms are available.

- Bend
- Squeeze
- Stretch
- Rubber
- Mirror
- PWM
- Folding
- Distort
- Sync
- Sync env
- Bits

## CONTROL\*

Controls the warp algorithm. Depending on the selected warp algorithm, this parameter will control the bend, squeeze, stretch, PWM etc... amount.



## VOICES

NAV UNI FILT VCA WARP VOICES

Dimension can simultaneously output up to 24 oscillators. Depending on the selected configuration these oscillators can be organised as unisons, chords, or even create a full polyphonic voice!

Go into **MAIN MENU > VOICES** to select desired voice mode.

### MONO MODE

is the default mode and will make the dimension output a single voice. In this mode all 24 voices are left available for the unison engine.

### CHORD MODE

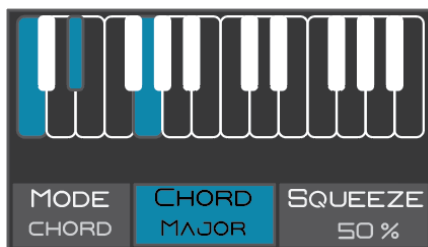
Chord mode lets you program a chord that will be pitched according to cv input or MIDI note input if activated. In this mode CV input is not quantized and scaled so it makes it possible to produce nice glissando chords by controlling the module frequency by CV.

As chords produced in chord mode are of a maximum of four notes, The 24 voices are split between the four notes making 6 oscillators available for unison.

In chord mode the following chord types are available:

- Minor, Major, Augmented, Diminished 7th and Major 7th.

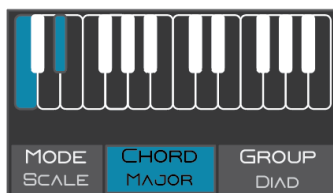
The squeeze parameter will let you detune the chord. When squeeze = 0, the chord is not modified and will sound correct. When Squeeze is set to 100% all chords' notes will be squeezed to the root note. An example of the squeeze parameter in practice would be to produce the "THX Deep note sound".





## SCALE MODE

Chord mode lets you program a chord that will be scaled according to cv input or MIDI notes input. Scales mode will quantize cv input to output scaled chords. The scale mode generates correct and accurate chord progressions.



As chords produced in scale mode are of a maximum of four notes, available oscillators per Unison is 6.

In scale mode following chord modes are available:

- Minor, Major, Dorian, Phrygian, Lydian, Mixolydian, Arabic

The group parameters have the following possibilities:

- Root<sup>5</sup>, Dyad, Triad, 5<sup>th</sup>, 7<sup>th</sup>, Tetrad

## POLY MODE

This mode lets you use and control four voices independently like a polyphonic synthesizer. If MIDI is activated, Dimension will assign the four voices to play midi notes sequentially as any polyphonic synthesizer would do.

If MIDI is not activated, CV input will be sampled when a positive gate/trig edge is detected on the TRIG input and a voice assigned and pitched according to the sampled input CV. This configuration allows you to virtually play and control the four voices with only one CV and GATE/TRIG pair.

If VCA is not activated the Dimension in POLY MODE will behave like a drone oscillator. To fully enjoy the polyphonic capability's internals VCAs and ADSRs can be activated (See patch section for more information).

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<sup>5</sup> When Group is set to « Root », Dimension will process CV as a monophonic note scaler. As only the Root note will be outputted.



# AUX MODES

The Dimension can operate in different output configuration modes. The selected aux mode will impact what is available at the Dimension R/Aux outputs.

You can select the following output configuration:

- **Stereo**
- **Dual** output
- Mono output (L/MAIN) plus **LFO** (R)
- Mono output (L/MAIN) plus **MIDI** control voltage, clocks and more on (R)

To select L/AUX output mode, select the desired mode in:

CONFIG ► AUX ► AUX MODE

## STEREO MODE

In stereo mode, L & R output a stereo audio signal. The internal 24 oscillators are configurable as chord and/or unison and oscillators can be panned on the stereo to produce a huge stereo unison voice!

Configuration of the voice panning is done from the unison (**UNI**) menu.



## DUAL MODE<sup>6</sup>

Selecting dual mode will make the Dimension take one of the four voices to output a secondary waveform at a different frequency on R/AUX. Dual mode is particularly useful for example to produce a SUB oscillator.

When in dual mode the main screen is split in two parts. The displays top waveform A is output on the main output and bottom waveform B is output on the Aux output.

### NAVIGATION CONTROL

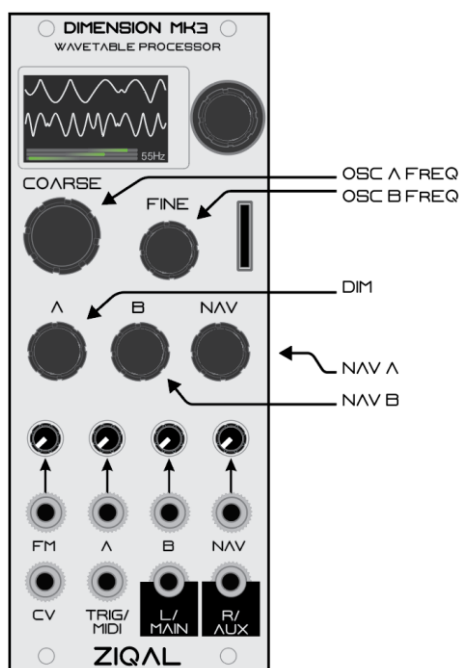
In Dual mode NAV macro is assigned to wavetable A morphing and A Macro to wavetable B morphing. The Navigation dimension size is limited to 1 for wavetable B. Wavetable A navigation size can be setup normally and macro control B is default assigned to parallel wavetable navigation

### VOICE DISTRIBUTION

One of the four available voices is used for the secondary oscillator, meaning that oscillator A will be limited to 3 voices for chords and polyphony.

### EDITION

In Dual mode, the edit menu will show a secondary menu to edit oscillator B parameters for Unison, filter, etc.



<sup>6</sup> The polyphonic voice mode is not available in Dual mode in the current firmware version. This feature will be unlocked in a future firmware update.



## LFO MODE

LFO mode converts the Dimension L/AUX secondary output into a wavetable LFO. LFO mode is very similar to Dual mode except that the frequency of the secondary oscillator will drop below audio rate to LFO frequency range..

When LFO mode is selected for Aux output, the A macro control is assigned to LFO morphing and the tune potentiometer allows you tune the LFO rate. In this mode the menu will also show up a new LFO menu entry. In this menu, you will be able to assign one of the 25 available wavetables in the pool for LFO.

The Sync parameter enables you to set up the LFO frequency to synchronise to a MIDI clock received by the module. If sync is active then the tune potentiometer will not control the LFO frequency but a clock divider ratio.

In LFO mode the secondary output waveform period range can vary from 10 milliseconds to 5 minutes.

## MIDI UTILITY MODE

This mode, introduced in the firmware version 3.0, turns the Aux output into a midi converter utility. The Dimension will convert MIDI messages received on its MIDI input to the Aux output.

### TYPE

The type parameter allows you to select what type of MIDI message will be converted. The following options are available.

- CV, Gate, Trig, CC, Bend, Wheel, Clock

### CC

When CC is selected you will be also be able to select a Control change number from 0 to 119. The output range when CC is selected is 0 to 8V.

### CLOCK

When clock is selected you will be able to select the number of pulses per quarter note the output will produce.

24, 12, 1,  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ,  $\frac{1}{16}$



# LOAD WAVETABLES

Loading wavetables is quick and easy! The DIMENSION memory is capable of storing up to 25 wavetables in its memory.

## LOAD A WAVETABLE

*> Insert a micro-SD card filled with your favourite wavetables into your DIMENSION*

*> enter the main menu and select **SD**.*

*> Navigate to the wavetable directory location you want to load and click it.*

*> Select one of the 25 available pool's memory slots to load the wavetable.*

Et voilà! The wavetable is now available in any of the 128 patches!

## WAVETABLE FORMAT

Wavetables should be a .wav file containing from 1 to 256 waveforms maximum. Each of these tables/waveforms are made of 2048 samples. The .wav file format must be 16bit mono or 32bit mono.

Dimension Wavetable format is fully compatible with Serum and Vital wavetables formats. You can use any Serum or Vital wavetable library and directly use them within the Dimension. To import one of these wavetables just fill the Dimension Micro-SD Card et voila.

## CREATE YOUR OWN WAVETABLE

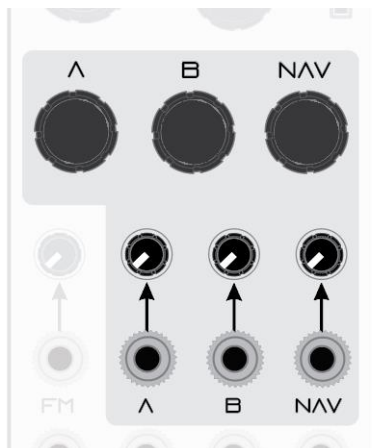
Please be aware that the Dimension will not let you create a wavetable from scratch. However, you will find there are many great existing tools to generate your own wavetable on most computers



# MACRO CONTROLS

Macro controls are very important in the Dimension! They will unlock your wavetables' power by allowing you to control all of its parameters with voltage control.

The DIMENSION features 3 macros controls: **A**, **B** & **NAV**. Macro controls consist of a control potentiometer and a cv input followed by an attenuator.



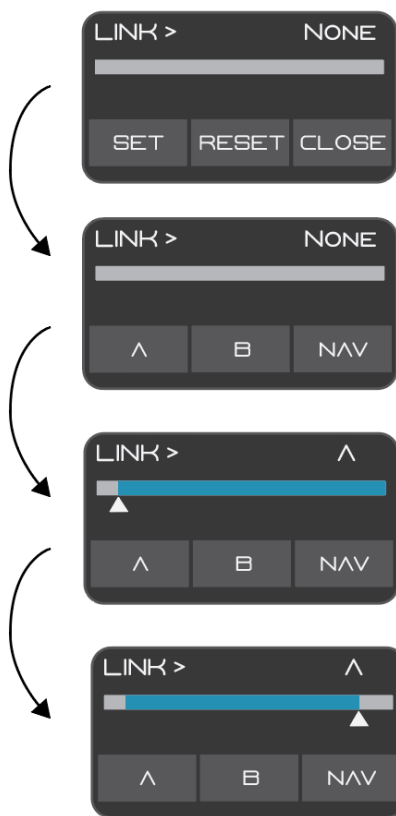
Macros can be assigned to any number of internal parameters allowing you to control one or several parameters at once with one macro.

The NAV (for Navigation) control is always assigned to main wavetable morphing by default. Depending on the modules configuration, A and B macros may have default assignments.



## ASSIGNING A MACRO

Assigning a macro control to an internal parameter is simple. Navigate through the menu and select the parameter you want to assign the macro. Long push the encoder to open the assign menu to the selected parameter.



The first line of information shows you if the parameter is already assigned or not to a Macro. To assign a macro to the parameter please click 'set'. To remove an already assign parameter please click 'reset'.

Select the Macro you want to control the parameter with.

Set the range on which the macro control will affect the parameter by setting the minimum value.

Set the range on which the macro control will affect the parameter by setting the maximum value.

You can assign a macro to as many parameters as you desire within your patch. It is also possible to assign a reverse range effect.



# CONFIG MENU

You will find the following items in the configuration menu. Any change made to the Dimension configuration is automatically saved in the session memory. If a session is loaded from the SD-Card the session configuration will be loaded as well.

## PATCH

### RENAME

This is the place where you can give a name to your patch.

### INIT

Click INIT button will initialise your patch to default.

### NAVIGATION MODE

Here you can choose if your patch wavetable navigation will be smoothly morphed or jump from wavetable waveform to waveform without morphing.

### ANTI-ALIASING

You can choose here to lower or even totally bypass the anti-aliasing algorithm. If you choose to do this then please be prepared for alien sounds!!!

## AUX

### AUX MODE

Here you can select the R/AUX output function. You can select between these options:

Stereo, Dual, LFO, MIDI

See “Aux modes” section for more information about Aux modes operations

## VCA ENVELOPE

Activate or deactivate internal VCA and its ADSR envelope

## FILTER

Activate or deactivate internal VCF and its ADSR envelope





## MIDI

### MIDI CHANNEL

If this parameter is set to « OFF », the TRIG/MIDI input will operate as a logical input and receive TRIG, GATES. However, if the Channel is set to a MIDI Channel or to «ALL» then the Dimension will receive Midi messages on the corresponding midi channel.

### PITCH BEND RANGE

Set the MIDI Bend MIDI message range from 1 to 36 semi tones.

## POOL

Clicking here will display the wavetable pool memory content.

## SAVE/LOAD SESSION

To backup your entire Dimension memory on the Micro-SD card click save. To load a previously saved session from micro-SD Card click load and follow the instructions on screen.

## CUSTOMIZE

### DISPLAY BRIGHTNESS

Sets the display brightness

### DISPLAY INFO

Configures the main display to show frequency information on the bottom left or a note tuner.

### FINE TUNE RANGE

Sets the fine tune potentiometer range from 2 semi tones to 3 octaves.



# FIRMWARE UPDATE

1 - Go to the dimension webpage [www.zigal.com/support](http://www.zigal.com/support) and download the last Dimension firmware release.

2 - Unzip the content of the downloaded archive onto the root directory of your micro-SD Card

*( ensure no other firmware is already present on the micro-SD Card)*

3 - Power OFF the Dimension and insert the SD Card into card reader

4 - Turn ON power to the module while continuing to keep the encoder button pressed. The screen will start blinking slowly indicating it is searching a firmware on the SD Card. When the display begins to start flashing fast or displaying a blue progress bar please release the encoder<sup>7</sup>.

5 - Wait until the module finishes its update. When finished, the Dimension will reboot itself automatically.

!!! Do not power off the module until the full module update is complete !!!

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<sup>7</sup> It is very important to release the encoder before the module reboots after its update. If the encoder is pressed when the Dimension display the firmware version at boot, the module will reset all its presets.





This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes and/or modifications not approved by ZIQAL could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference radio communications.



This device meets the requirements of the following standards:

- Test n° 00 to 09 - CISPR 32 / EN 55032 - Radiated emission Immunity
- Test n° 16 - IEC / EN 61000-4-2 13
- Test n° 10 to 15 - IEC / EN 61000-4-3

