

# VERMONA modular



## fourMulator – Owner's Manual

## Introduction

Do you really need four LFO units in single module? Let's "fourMulate" it like this: You cannot really have enough LFOs, can you? Even a classic synthesizer easily offers four targets for LFO modulations. To name a few: vibrato, pulse width, the filter's cutoff frequency and tremolo. In a modular synthesizer there are even significantly more options. Now add the options deriving from a combination of multiple LFOs to create interaction between the units to make these applications more thrilling.

We could have simply named this module Quad-LFO. However, this felt too boring on the one hand and it wouldn't describe the fourMulator's full feature-set on the other. Its four sync able, phase-variable and CV-controllable LFOs are able to create trigger-sequences that can be varied in real time thanks to a comfortable user interface. fourMulator acts as a modulation- as well as clock-central and is capable of being your new clock-reference for your modular synthesizer.

The VERMONA team

Erlbach/Vogtland, Germany

# Important Safety Information

1. Read these instructions.
2. Keep these instructions. Always include these instructions when passing the product on to third parties.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Only clean the product when it is not connected to the mains power supply. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, when the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
16. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

17. Do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
18. The mains plug of the power supply cord shall remain readily accessible.

### **Installation**

- Ensure that the room in which you use this product is wired in accordance with the local electrical code and checked by a qualified inspector.
- Only use this product indoors.
- Do not install the product in hot, humid, or excessively dusty locations, in direct sunlight or in locations where it is exposed to externally generated vibrations.
- Do not place burning objects (e.g. candles) on top of or near the product.
- If condensation has formed on the product, e.g. because it was moved from a cold environment to a warm one, allow the product to acclimatize to room temperature before using it.
- Do not overload wall outlets and extension cables as this may result in fire and electric shock.

# Table of Contents

<b>1 Introduction</b> .....	<b>2</b>
<b>2 Important Safety Information</b> .....	<b>3</b>
<b>3 Table of Contents</b> .....	<b>5</b>
<b>4 Getting Startet</b> .....	<b>6</b>
4.1. Setup.....	6
<b>5 A fourMulator - what is it?</b> .....	<b>8</b>
5.1. Technical data .....	8
<b>6 Connections and Controls</b> .....	<b>9</b>
6.1. Control elements of the four modulators .....	9
6.2. Inputs and Outputs.....	13
6.3. Control elements of the clock-generator (CLK).....	13
6.4. Further connections.....	14
<b>7 Using the fourMulator</b> .....	<b>15</b>
7.1. Reciprocal modulations .....	15
7.2. Clock yourself .....	16
7.3. Where to send the trigger-sequence? .....	16
7.4. Soft Edges.....	17
<b>8 Technical Data</b> .....	<b>17</b>
<b>9 Declaration of Conformity</b> .....	<b>18</b>

## Getting Startet

To ensure top quality, we carefully inspected the module before packaging. Nevertheless, the unit could have been damaged during transportation. Therefore, we ask you to take a serious look at the module when unpacking. Do not hesitate to contact us, should there be anything unusual with the unit or its packaging.

You should find the following items in the box:

- the fourMulator module
- a system bus connector cable (compatible to Doepfer's A100, TipTop Audio Zeus and others)
- four rack screws 3x6mm
- four flat washers 3mm
- four patch chords (2x15cm, 2x30cm)
- this manual

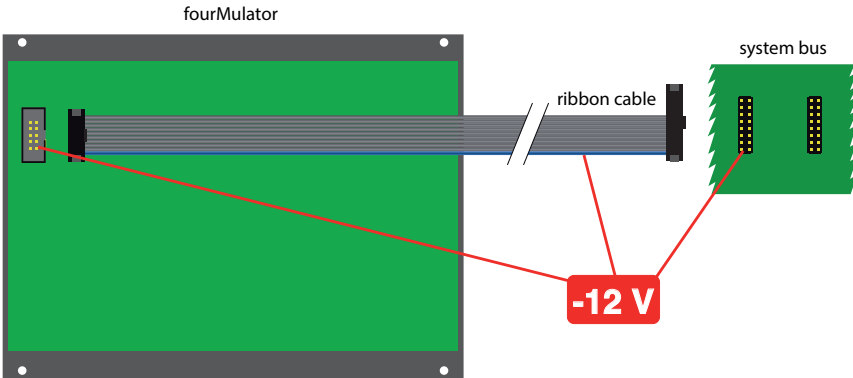
## Setup

The fourMulator was designed to work in modular synthesizer systems using the common euro rack format. Its power supply, connectors and dimensions match the specifications of Doepfer's A100 modular synthesizer system and compatible units. To mount the module into your system's frame, carry out the following steps:

1. **Switch off the power-supply. Safety first: Remove the detachable power cable from your frame** - it is possible that you accidentally touch the internal power transformer.
2. Connect the supplied ribbon-cable to the module's rear. The corresponding plug socket is protected against reverse polarity. The ribbon-cable will only fit in one direction.
3. Connect the ribbon-cable's other side to an empty plug-socket of your frame's system bus. Make sure the color coded side of the cable points downwards (-12V)!

### ATTENTION

Connecting the ribbon-cable with reverse polarity can lead to damage of your module when powering the system!



Picture 1: Connecting the fourMulator to the system bus

4. Mount the fourMulator to your modular frame. The unit requires a width of 34 HP (horizontal pitch) and is rack-mounted with the four supplied screws.

**NOTE**

To protect the unit's surface of scratches, use the supplied flat plastic washers.

5. Reconnect the power chord to your frame and switch on the power-supply. The module is now ready to work. The four green LEDs for the four LFOs as well as both red clock LEDs will now blink according to the set tempo values.

Learn how to connect the different in- and outputs to the other modules of your system in the next chapters of this manual.

## A fourMulator – what is it?

Simply described, Vermona's fourMulator is a quadruple LFO, with all LFO units (modulators) being able to run freely or synchronized to each other. All four LFOs are equipped equally with one exception: LFO 1 can only act as sync reference to the other three LFOs, while these may act as sync reference or being synced to their left counterparts.

In addition, fourMulator offers a clock/trigger section. Using this, the unit can be synced to other clock sources, e.g. an analogue sequencer, or may act as a sync reference. Furthermore, the unit's user definable and editable trigger-sequence is a perfect partner to a variety of gate dependent modules.

### Technical data

The fourMulator has been designed to work with almost any available module. For those with deeper interest, here are a few specifications for newcomers and experts.

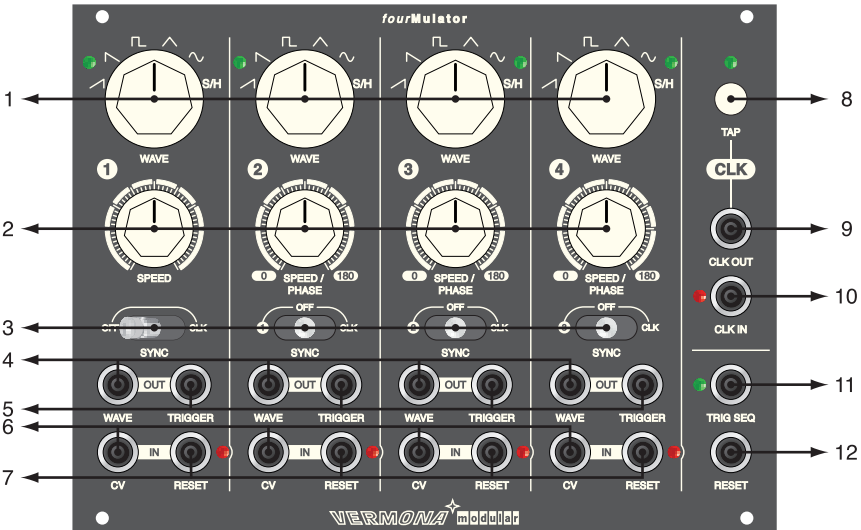
fourMulator outputs CV-voltages with a range between +5 and -5 volts, a total range of 10 volts. Note that some modules are not designed to handle negative voltages. In this case, only the positive voltage will affect the controlled function. There are also CV-inputs, e.g. for cutoff control of certain filters, that work within a range of 0 to 10 volts. Although the total range is identical, the fourMulator's LFOs cannot sweep the full range. In these cases, using an offset generator is helpful, such as Doepfer's A-183-2.

Triggers and clock impulses are output with 12 volts with positive slope and 50ms duration. This specification is accepted by almost all available modules that accept gate signals, e.g. envelopes, switches, reset-inputs for LFOs, start/stop inputs for sequencers etc.

The reset and clock inputs accept signals ranging between 3,5 and 12 volts.



# Connections and Controls



Picture 2: Controls and Connectors of the fourMulator

## Control elements of the four modulators

The LFOs/modulators in the fourMulator are built identically. The corresponding identical functions are only described once, while the differences in synchronization and phase shift are described separately.

### (1) WAVE selector

The six-stage WAVE knob selects the desired wave form. Available are ascending saw tooth (↗), descending saw tooth (↘), square (▭), triangle (△), sine (∩) and random (S/H = sample & hold).

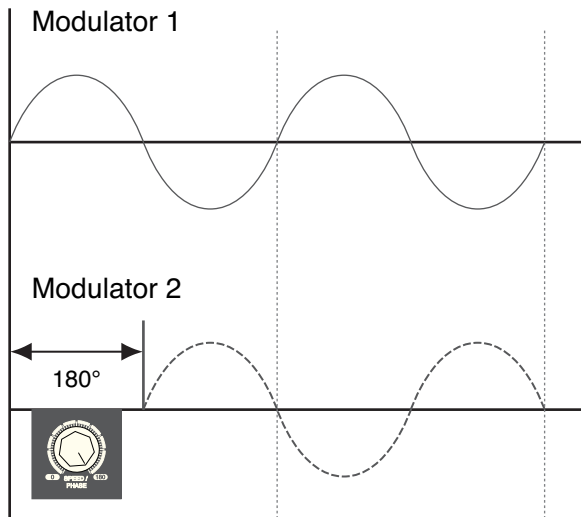
#### NOTE

Switching between wave forms will not interrupt the amplitude. The wave form will not be reset but directly take over the current value.

## (2) SPEED- and SPEED/PHASE controls

The SPEED control adjusts the modulators' speed. SPEED covers a range from approx. 0.05Hz to 100Hz. Therefore, modulations with audible frequencies are only possible within limits. The fourModulator's focus within the sub audio range is intended because higher frequencies would not make sense for use of the unit as clock-/trigger-generator or for reciprocal modulations.

For modulator 1, the SPEED control is limited to this function. For modulators 2, 3 and 4, this control can also shift the phase of the selected wave form when being synchronized to the left neighboring unit (SYNC switch set to left position, see "(3) SYNC-switch", page 11). Here, the LFO being synchronized runs with the same speed as the reference LFO. Use SPEED/PHASE to adjust the phase of the wave for the synchronized LFO between 0° and 180°, shifting the wave form's start-point



Picture 3: Phase Shift

SPEED and SPEED/PHASE offer a third control function. With SYNC set to the CLK position (Clock), the controls set the clock division in respect to the incoming clock signal. Find more details in "(3) SYNC-switch" on page 11.

The tempo is displayed using the corresponding LEDs for every SPEED control. With every commencing new wave-form-cycle, the LED will be lit.

For modulators being synchronized and being shifted in phase, the LED flash with the same tempo but with a corresponding delay.

### (3) SYNC-switch

The SYNC switch offers three positions: OFF, SYNC and CLK (Clock).

#### NOTE

Modulator 1 only offers OFF and CLK positions since it can only be used as a sync reference but cannot be synchronized itself.

#### OFF

The modulator runs at the speed set with the corresponding SPEED control.

#### SYNC (indicated by the numbers ❶, ❷ and ❸)

The modulator is synchronized to its left counterpart. It follows the clock-reference's speed. By this, multiple modulators can be varied in frequency at once using the SPEED control of the modulator acting as clock-reference. In sync-mode, SPEED controls the phase of the synchronized modulator (see "(2) SPEED- and SPEED/PHASE controls", page 10).

#### NOTE

It is possible, to synchronize two or even three modulators with modulator 1 by setting the adjacent sections to sync. Also, modulators 1 and 2 as well as modulators 3 and 4 can be used as independent synced pairs.

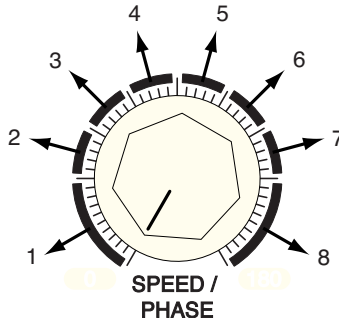
#### CLK

The modulator is either synchronized to an internal or external clock signal (see chapter 2.3). Use SPEED- or SPEED/PHASE to select one of eight available clock division settings, i.e. the modulators' speed will only move within a clock related grid.

Neither the internal clock nor an external signal is predefined. A clock can work with any resolution, e.g. with 4, 16 or 96 impulses per

bar. Therefore, the clock division needs to be regarded relatively to this base.

With a clock signal based upon quarter impulses, the eight available click divisions equal the following values (as indicated on the outer ring of the control):



Picture 4: Clock Divider

- |    |               |  |
|----|---------------|--|
| 1. | 1/1 note =    | a quarter of the speed of the incoming clock |
| 2. | 1/2 note =    | half the speed of the incoming clock         |
| 3. | 1/4 note =    | the speed of the incoming clock              |
| 4. | 1/4 triplet = |  |
| 5. | 1/8 note =    | twice the speed of the incoming clock        |
| 6. | 1/8 triplet = |  |
| 7. | 1/16 note =   | four times the speed of the incoming clock   |
| 8. | 1/32 note =   | eight times the speed of the incoming clock  |

## Inputs and Outputs

Each modulator offers four jacks to be connected to other modules.

### (4) WAVE

This jack outputs the selected wave form. Connect this output to a CV-input of any module. Typical applications would be modulations of a filter's cutoff frequency, an oscillator's pulse width or an oscillator's pitch.

### (5) TRIGGER

This jack outputs a trigger signal with the start of new wave form cycle, allowing to trigger modules such as envelopes, electronic switches or sequencers.

### (6) CV

This input allows connecting a positive or negative control voltage (+5 volts to -5 volts) to modulate the modulator's frequency. With SYNC or CLK being active for the respective modulator, this CV will modulate the phase shift or the clock division. The control voltage is added respectively subtracted from the current SPEED/PHASE value. However, it is not possible to exceed a frequency of approx. 100Hz.

### (7) RESET

This input allows connecting a gate/trigger signal that immediately resets the wave form to its start point. With the modulation speed matched to a song tempo, sending reset commands every bar, allow to achieve long term beat-synchronized modulations.

## Control elements of the clock-generator (CLK)

The clock-generator allows synchronizing fourMulator to other clock-dependent modules, such as step-sequencers. fourMulator can either work as beat reference or follow an external reference in sync.

### (8) TAP button

Use this button to set the tempo for fourMulator's internal clock. A tempo change will occur after tapping the button four times. For predictable results, tap in a constant rhythm.

## (9) Clock output (CLK OUT)

This jack outputs the clock signal. It can be connected to modules such as step-sequencers, clock dividers or sequential switches.

## (10) Clock input (CLK IN)

This jack allows feeding an external clock signal into the fourModulator. With this input being used, the internal clock is automatically disconnected from the modulators. By setting the SYNC switch to CLK, the external clock will be used.

### NOTE

The internal clock remains. By removing the cable from CLK IN, the internal clock regains control using the previous tempo. This tempo setting will only be lost when switching of or powering down the system.

## Further connections

### (11) Trigger–sequence output (TRIG SEQ)

The trigger-sequence being available on this output is a deduction of the trigger-signals of all synchronized modulators. At least one of the modulators 2, 3 or 4 needs to be externally synchronized for the trigger-sequence to be active. Modulator 1 can run freely or being set to CLK. With multiple modulators being synchronized, the corresponding trigger-signals are combined with respect to the selected clock division factors. This might sound abstract, but is logic. Please consult the overview in chapter 1.3 for help. Otherwise, the proof of the pudding is in the eating. Here, a little practice is more helpful than a detailed description.

### (12) Global Reset–Input (RESET)

By using this input, all wave form of all modulators can be reset with a single trigger/gate-signal. Note that each modulator that uses its dedicated reset-input will not be reflected by the global reset.

## Using the fourMulator

fourMulator can act as a control- and clock-central. However, this only makes sense in combination with other modules. The following sections offer a few helpful suggestions for using the fourMulator.

### Reciprocal modulations

LFOs run statically. This might be desirable for some applications, while for others this behavior appears lifeless. Because of their ability to be CV-controlled, the LFOs in the fourMulator can act more organic. To do so, create a modulation between two modulators and vice versa, the so called cross-modulation.

Use multiples to duplicate the wave outputs of both modulators. This is necessary because you will need to address the modulation target (filter frequency, pitch) as well as the other modulator. A multiple with two or three separated sections is recommend (Doepfer A-180, Intellijel Buffered Multiple, WMD Buffered Multiple).

Patch one output into an attenuator (dedicated modules: Doepfer A-183-1, Intellijel TriAtt, Malekko 8NU8R or use simple VCAs/mixers). The attenuators are necessary, to adjust the amount of cross-modulation. Now, patch the attenuator's output to the CV-input of the other modulator:

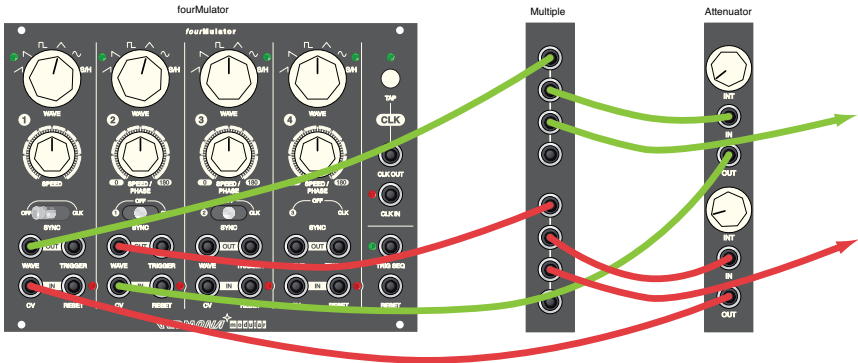
WAVE 1 > Multiples 1 > Attenuator 1 > CV IN 2

WAVE 2 > Multiples 2 > Attenuator 2 > CV IN 1

Add another patch chord per modulator to connect the multiple-output to the modulation target. The resulting modulation is more complex than a common CV-controlled speed modulation that also runs periodically.

Essential for this setup is the right amount of modulation depths and the modulators' speed settings. (Note that the modulators must not be synchronized). Start experimenting by using a triangle wave form. However, other wave forms also lead to interesting results.

The same setup can also be used, with either modulators or at least modulator 2 being switched to CLK. Here, not the frequency but the clock division (siehe "(3) SYNC-switch", Seite 11) is modulated. The resulting modulation is not as complex but it will grant you with predictable rhythmic patterns instead.



Picture 5: Patch Example - Crossmodulation

## Clock yourself

fourMulator offers the possibility to enter the clock tempo using the TAP button. However, continuous tempo changes using a control are still possible. To do so, simply connect the TRIGGER output of a modulator to CLK IN. Now, the modulator serves as clock-reference where the speed can be manually controlled using the corresponding SPEED knob. An interesting option: The speed can be specifically modulated using the CV input. Obviously, you may use another modulator to do so. However, multiple CV-sources can serve for this application, such as Theremin antennas, step-sequencers, envelopes etc.

## Where to send the trigger-sequence?

The trigger-sequence is a unique feature of the fourMulator. But what is it good for?

A simple application would be triggering a filter envelope, which no longer triggered by keystrokes but with a certain rhythm.

Apart from that, the trigger-sequence can control all kinds of logic modules. Anywhere a straight clock-signal can be used, the trigger-sequence can apply a rhythmic sequence of impulses to expand the receiving modules' possibilities.

Instead of patch examples, here is a list of modules that may be used meaningful in combination with fourMulator:

- 4ms Pedals: Rotating Clock Divider, Shuffling Clock Multiplier
- Analogue Systems: RS150 Sequential Switch



- Doepfer: A-150/A-151/A-152 Switches, A-160 Clock Divider, A-161 Clock Sequencer
- Intellijel Designs:  $\mu$ Step-sequencer
- Make Noise: Brains
- The Harvest Man: Stillson Hammer
- ... as well as Drum/Percussion modules by MFB, Analogue Solutions, Tip Top Audio, Cwejman

## Soft Edges

Jumping value changes are typical for sample & hold modulations. In some cases, these changes are too abrupt. Here, the use of a slew-limiter (e.g. Doepfer A-170, Analogue Systems RS-350) can be a good corrective when patched to the WAVE output. Value jumps are now attenuated and with careful use, you can even achieve an organic sounding vibrato sounding more natural than a typical sine wave LFO.

A slew-limiter is also useful in combination with square waves. It turns the curve into a trapezoid wave form which is advantageous when creating tremolo effects.

## Technical Data

- Dimensions: 3 rack units/ 34HP
- Power consumption: max. 100 mA
- Connections (3.5mm TS)
- WAVE OUT: -5 to +5 volts
- Trigger impulses (CLK OUT, TRIGGER): 50ms, 12V
- CV IN: -5 to +5 volts
- min. input voltage RESET: +4V
- Frequency range: 0,05 Hz - 100 Hz

## Declaration of Conformity

We declare under our sole responsibility that this product is in conformity with the following standards or standardization documents in attention of operation conditions and installation arrangements acc. to operating manual:

EN61000-3-2, EN 61000-3-3, EN 55013, EN 55020, EN 60065 according to the provisions of the regulations 2004/108/EG and 2006/95/EG.



HDB electronic GmbH  
Badesteig 20  
08265 Erlbach  
GERMANY

Phone: +49 37422 40 27 0  
Fax: +49 37422 40 27 29  
Email: [info@vermona.com](mailto:info@vermona.com)  
Web: <http://www.vermona.com>