FLAME

X-4 QUAD ENVELOPE VCA
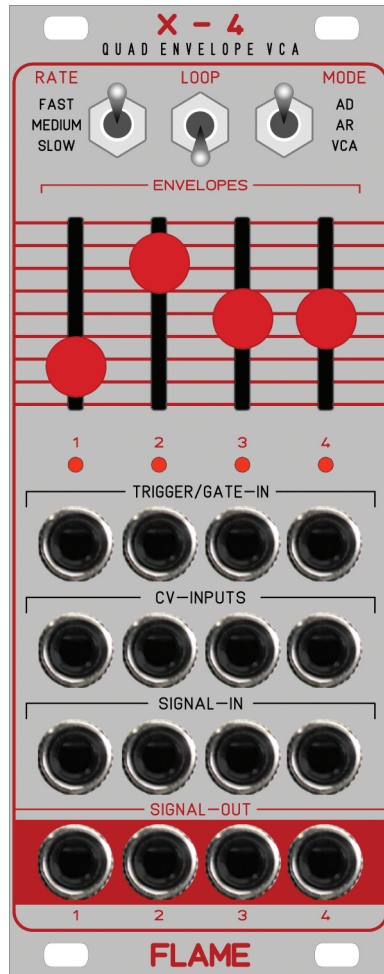
MANUAL

Version 1.00

Contents

1. Short description

The FLAME "X-4" is a compact, multifunctional quad envelope/VCA module, which combines four AD/AR envelopes and four separate VCAs in a very small space (10HP). The module is a supplement for quad VCO's (e.g. FLAME "4VOX") and expands it by four VCAs and envelopes in the smallest space. Each channel can be used separately as an AD/AR envelope generator with VCA, or just as a VCA.

There are 3 operating modes:
AD: four separate attack/decay envelopes on four VCA channels (oneshot per trigger)
AR: four separate attack/release envelopes on four VCA channels (per gate)
VCA: four CV controllable separate VCAs

A RATE switch is available for three ranges (1.5ms to 14 seconds). The envelope shape is set morphing with the sliders (can also be controlled via CV). The envelope can also be looped (gated AD/AR envelope loop).

2. Hardware / Connections

2.1 Connection to the modular system (Doepfer bus)

The module is delivered with a connected ribbon cable for the Doepfer bus. The red lead marks -12 volt. Connecting the module please note the right polarity!

If the module is poled accidentally wrong safety diodes avoid the immediate destruction of the module but further damages cannot be excepted.

So please pay attention: Check the connection various times before switching on!
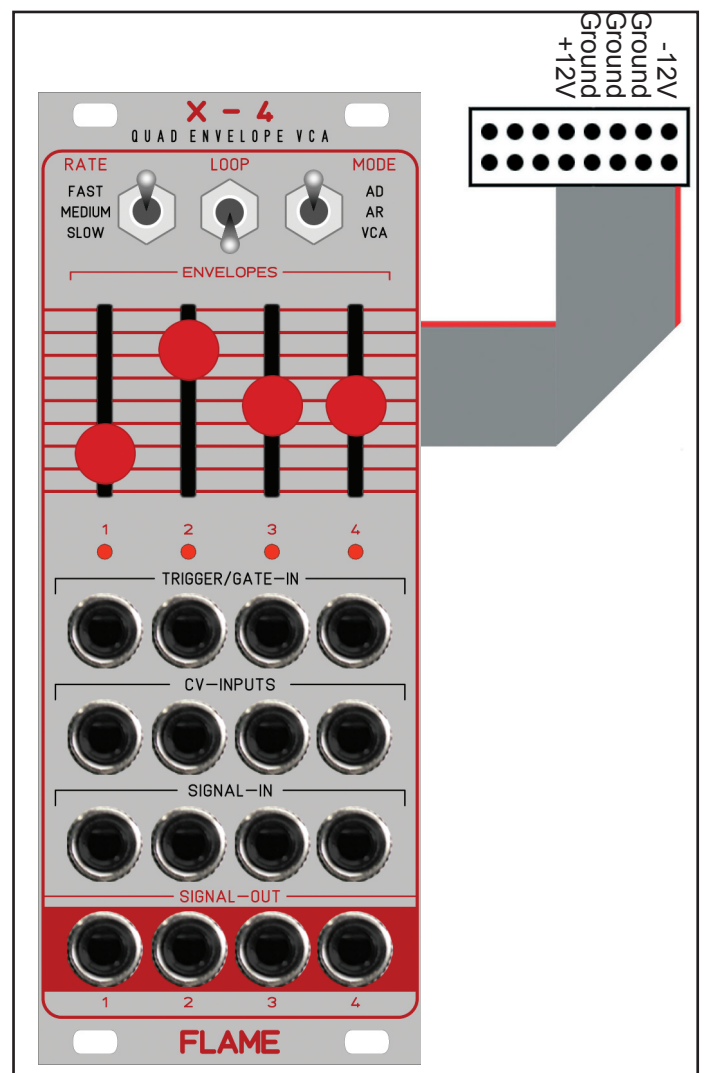
2.2 Modul overview

❶ Switch RATE (Envelope speed)

❷ Switch MODE (operating modes)

❸ Switch LOOP on/off

❹ Slider

❺ Trigger/Gate LEDs

❻ Trigger/Gate Inputs (0/5V)

❼ CV Inputs (0..+5V)

❽ Audio/Signal Inputs (+/-5V)

❾ Audio/Signal Outputs (+/-5V)
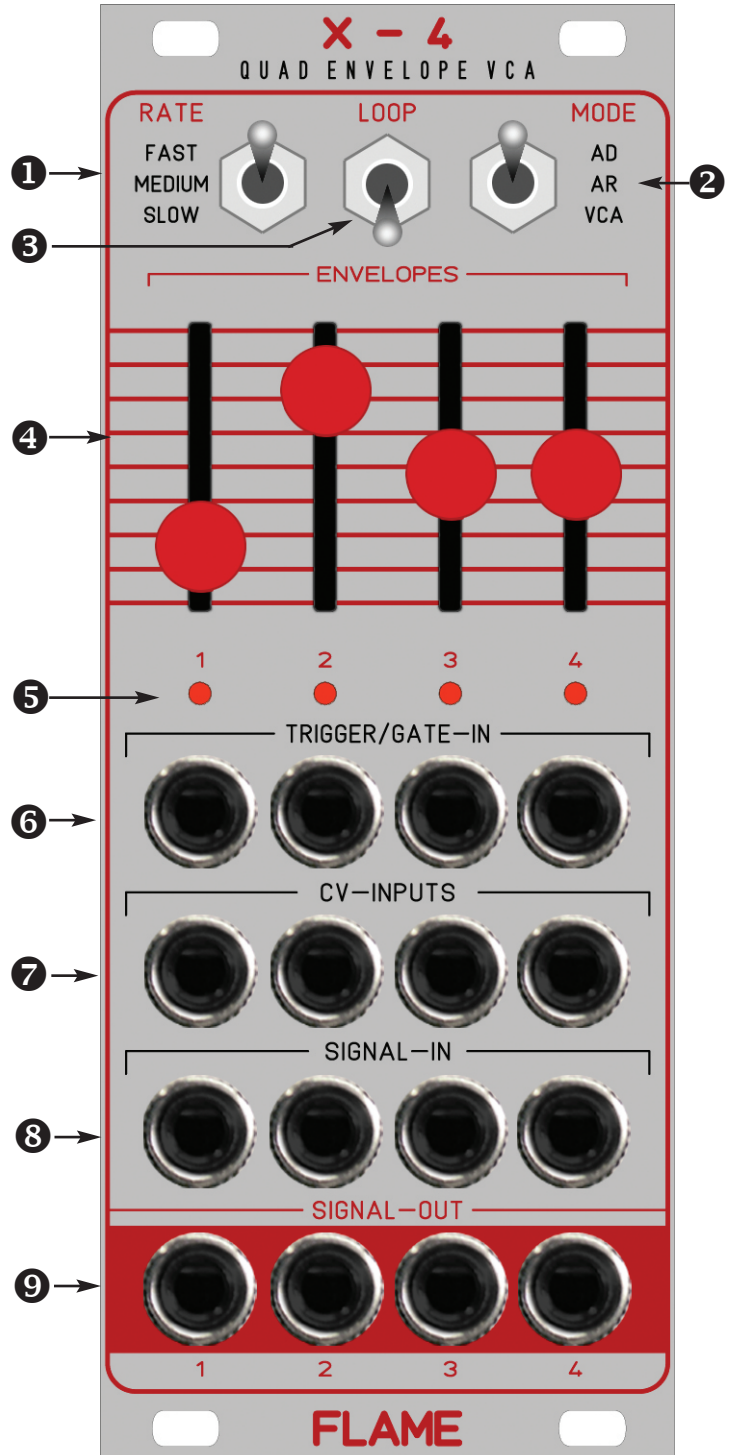
2.3 Module backside

On the back of the module, next to the connection for the Doepfer ribbon cable (power supply) and the processor programming connection (please do not use), there are four holes with the VCA offset controls. With these trimmers, the offset voltage of the VCA outputs is calibrated to zero volts (at a zero volt input level). The module is delivered calibrated, but can be readjusted manually if necessary.

All you need is a voltmeter, which is connected to the signal output of the channel. Set the mode to VCA and the slider to zero (position all the way down). Then use the channel trimmer to adjust the output voltage to around zero volts.
(Values around plus/minus 5mV should be sufficient.)

4 Offset trimmers ➤
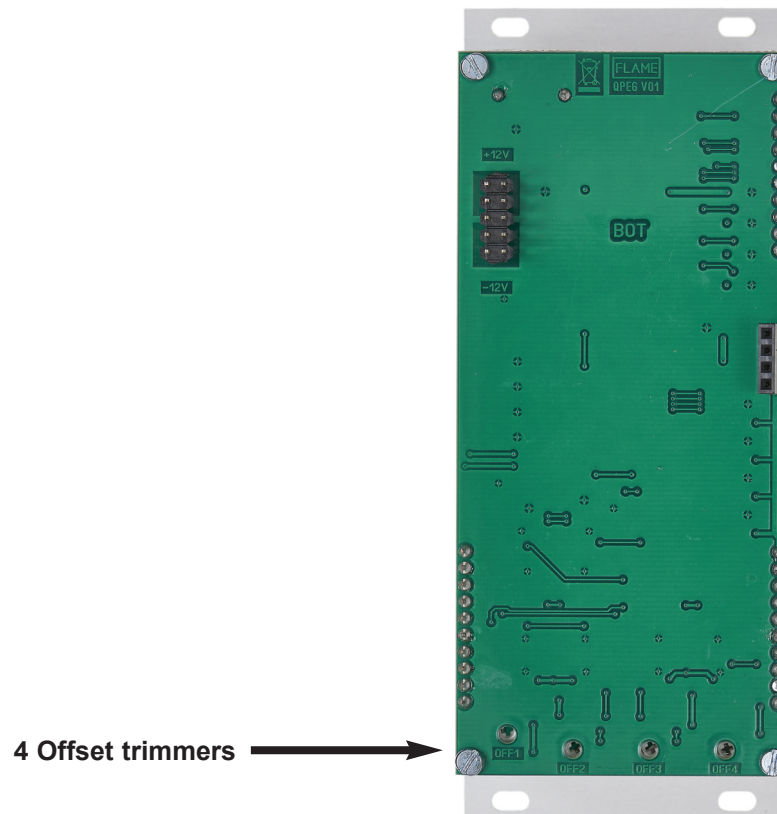
3. Handling

3.1 MODE (operating modes)

The module includes four independent analogue VCAs and four simple digital AD/AR envelopes. There are three different operating modes, which can be selected with the MODE switch: two different envelope modes (AD and AR), as well as a mode VCA, with which you can use the VCAs separately without the internal envelopes.

MODE overview:

AD   VCAs with attack/decay envelope control (via trigger)
AR   VCAs with attack/release envelope control (via GATE)
**VCA** separately controllable VCAs (internal envelopes are inactive)

Comment:
The selected mode always applies to all four channels together. For example, you cannot use channel 1 with AR envelope and channel 2 with AD envelope at the same time.

The envelope shape of the channels is set with the sliders in the AD+AR modes. In VCA mode, the sliders work as VCA controls.

The function of the slider can also be done via CV. If a cable is plugged into the CV input, the sliders serve as an attenuator for the voltage at the CV input.

The trigger/gate inputs are normalized. Is there e.g. only one cable in the input of channel 1, then all four channels are triggered simultaneously by the trigger/gate input 1.
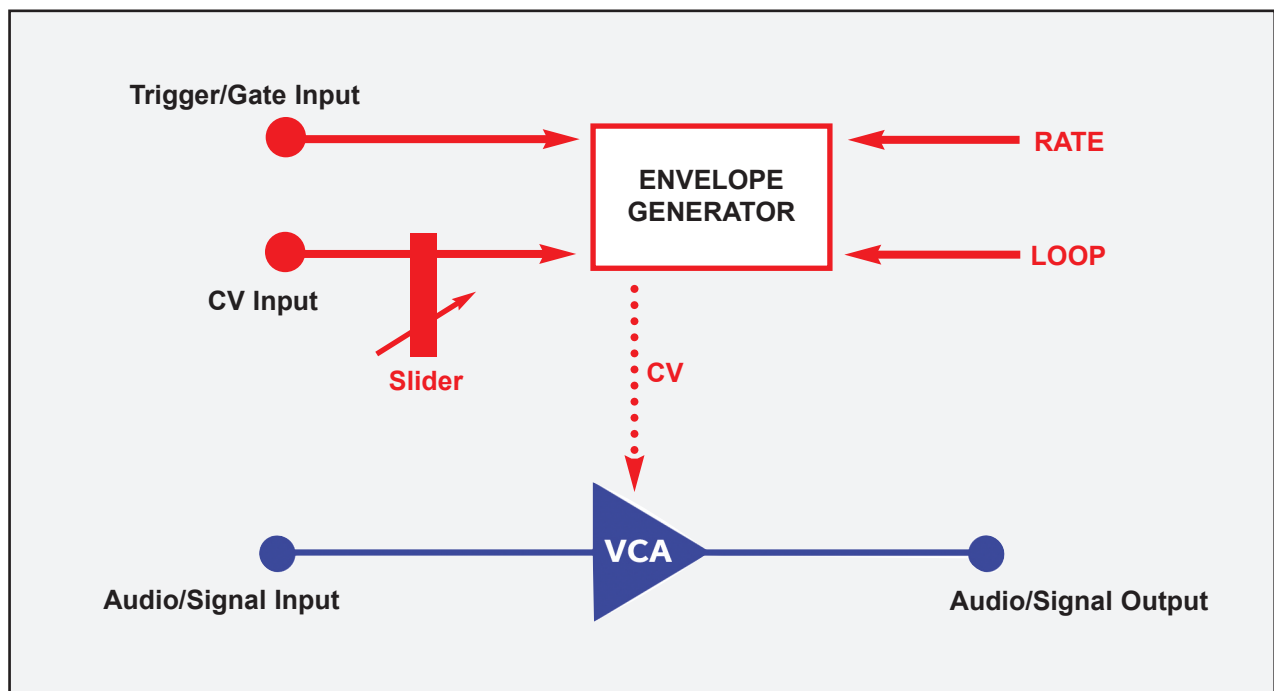
Channel block diagram with envelope control
**(MODE: AD or AR)**

3.2 MODE AD (Attack-Decay envelope per trigger)

Set the MODE switch to the "**AD**" position. Now an envelope with attack and decay is generated. The envelope starts with a trigger pulse at the trigger/gate input. The length of the impulse (gate) has no influence on the envelope length (except when LOOP is switched on). The shape of the envelope, i.e. the length of the attack and release times, are determined by the position of the track slider and the RATE switch.

Toggle the LOOP switch down (LOOP=off).
Push the slider all the way down. In the RATE setting "FAST" you get the shortest (fastest) envelope with an attack of 1.5ms and decay of 5.5ms (so a total of 7ms). With RATE = "MEDIUM" the envelope lasts approx. 42ms and with "SLOW" approx. 250ms. Changing the RATE will change the attack and decay times proportionally.

If you move the slider further up, the times of the attack and decay phases change unevenly and with it the shape of the envelope. At about two-thirds of the way down on the slider, attack and decay are the same length. Higher up, the attack continues to increase and the decay time drops to almost zero in the top slider position (see graphic below).
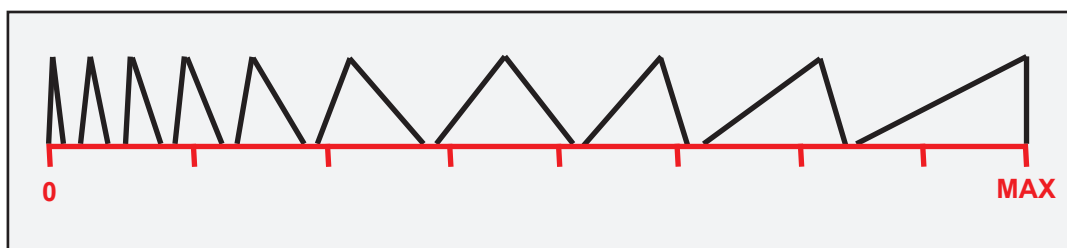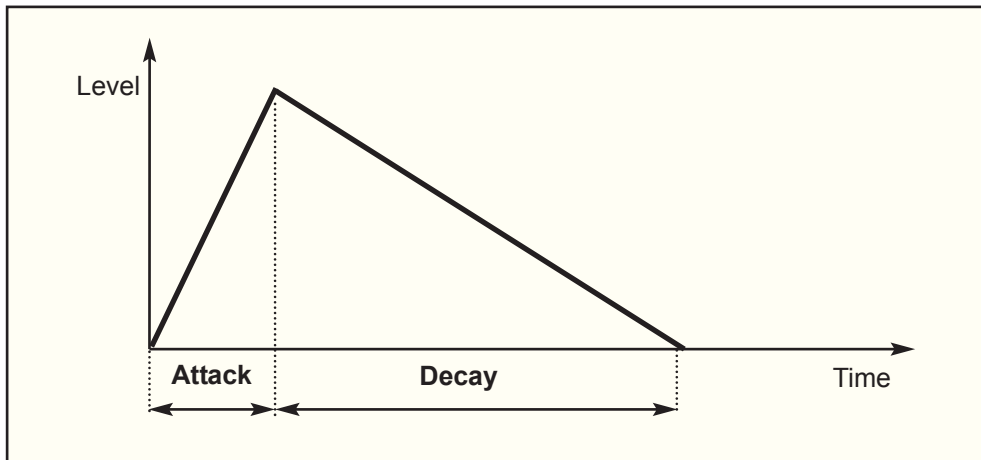

Effect of the slider on the attack and decay times
(0=slider down MAX=slider up)

Morph
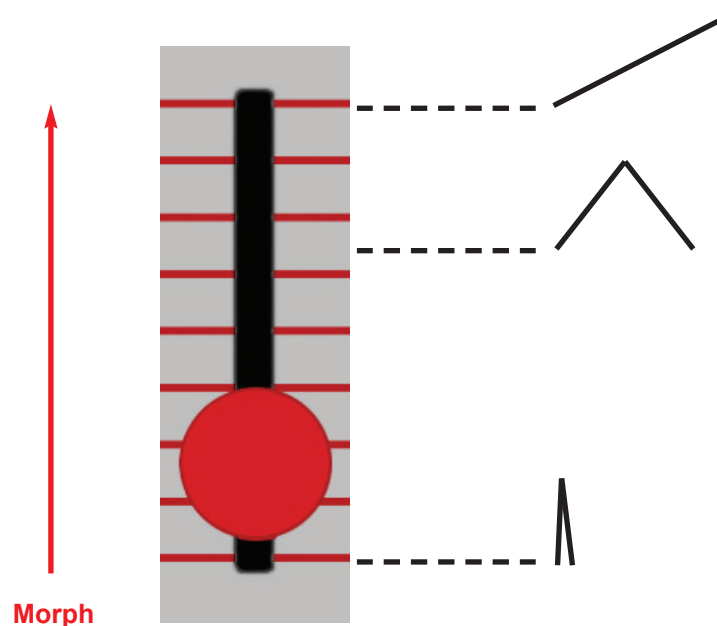
AD ENVELOPE

The envelope consists of two phases:

Attack   Rise to maximum voltage after start by trigger
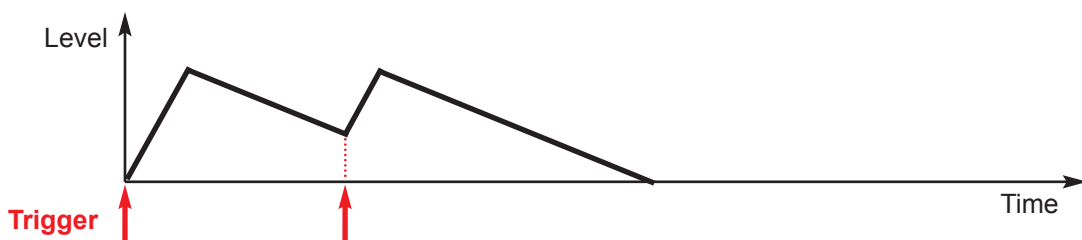**Decay**   Voltage falling to zero

FASTEST TIMES OF ENVELOPE PHASES

Slider position zero

RATE	ATTACK	DECAY	gesamt
FAST	1,5ms	5,5ms	7ms
MEDIUM	9ms	33 ms	42ms
SLOW	54ms	198ms	252ms

RETRIGGER

If the trigger pulse train is faster than the envelope, the envelope is restarted (automatic retrigger):
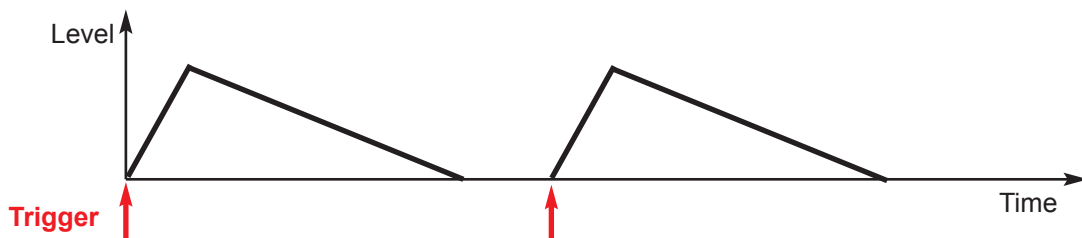
3.3 MODE AR (Attack-Release envelope per gate)

Set the MODE switch to the "**AR**" position. Now an envelope with attack and release curve is generated. The envelope starts with a positive gate at the trigger/gate input. The length of the impulse (gate time) determines how long the envelope remains high after the attack phase. The release phase only begins at the end of the gate.

The graphic below illustrates the behavior of the envelope. To do this, switch off the LOOP function!

COMMENT: With LOOP on, the AR envelope behaves the same as a looped AD envelope (both modes are identical with LOOP=on).

AR ENVELOPE
The envelope consists of three phases:

Attack　　　Rise to maximum voltage after start by gate
Hold　　　Holding the voltage after the attack phase as long as the gate is on
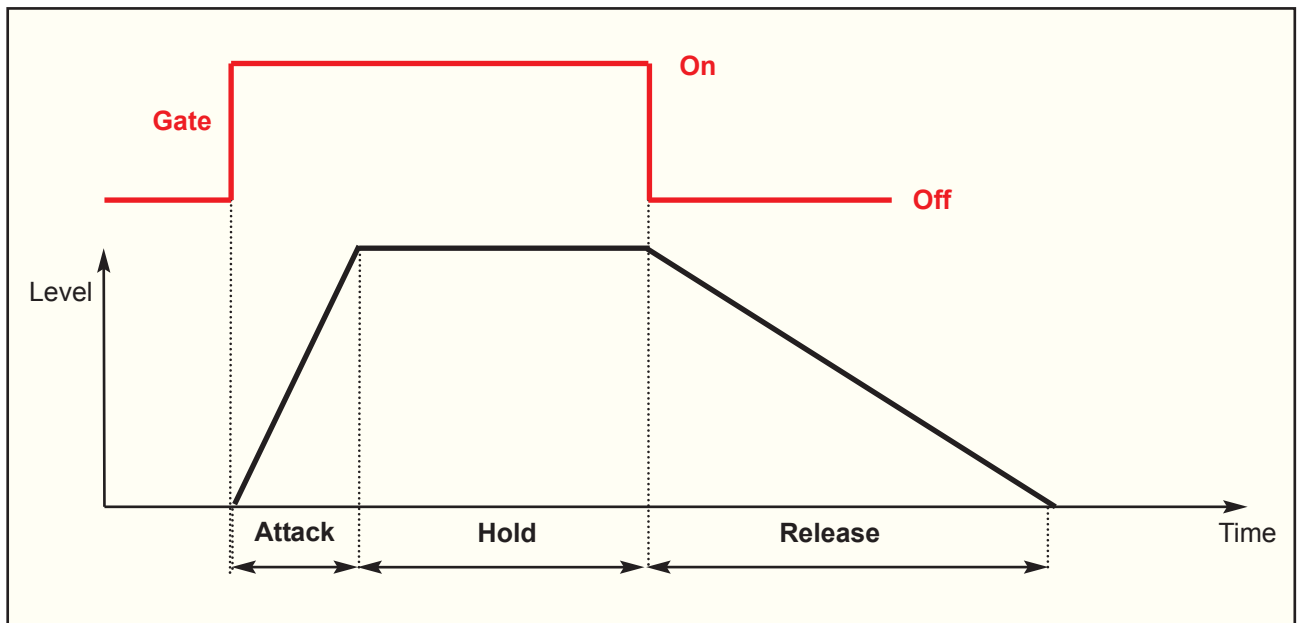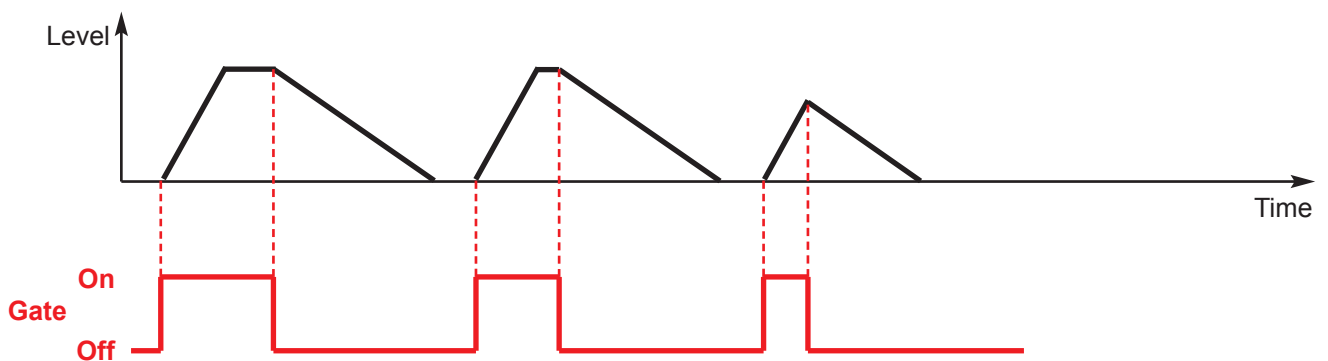**Release**　　Voltage drop to zero at Gate=0


AR ENVELOPE WITH DIFFERENT GATE LENGTHS

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3.4 LOOP Function

LOOP

Normally the AD envelope is started by a trigger and then runs once until a new trigger pulse arrives. The gate time (i.e. the length of the pulse) is not evaluated. However, if the LOOP function is on (LOOP switch up), the envelope will restart as long as the gate is on. If the gate is generated by an external key, the envelope loops as long as the key is pressed. When the key is released again, the envelope is set to zero.

The function behaves the same in both **AD** and **AR** modes.

The following graphic illustrates the behavior of the envelope when LOOP is switched on:
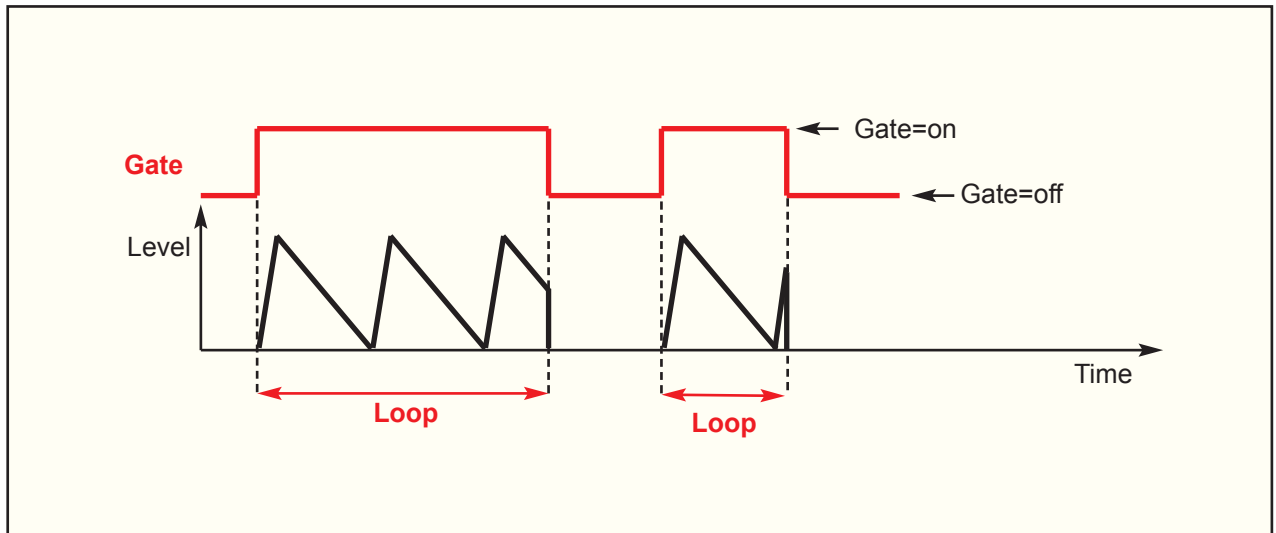

Comment:

If only short triggers are sent with the LOOP switched on, the envelope curve will not take effect because it is triggered too briefly!

3.5 MODE VCA (Envelopes inactiv)

Set the MODE switch to the "**VCA**" position. Now the internal envelopes are switched off and the four VCAs can be used directly and controlled externally via CV.

You can now use the module as a simple quad VCA module.

The sliders work as VCA controls or as attenuators for the CV input. The RATE and LOOP switches as well as the trigger/gate inputs have no function.
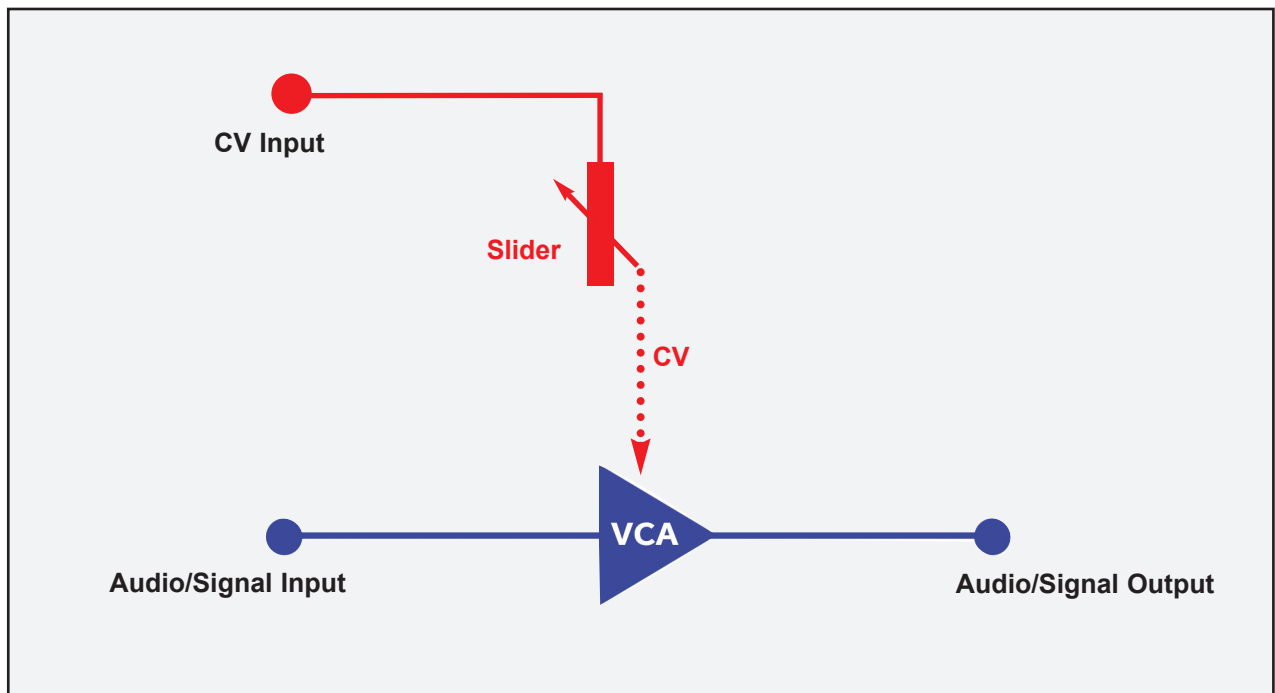
Channel block diagram without envelope control
(MODE: VCA)

The signal inputs and outputs of the VCA work in the range of +/-5v without distortion. They are DC-coupled and can therefore be used to control CV signals in addition to audio signals.

The CV inputs work in the range from zero to +5V.

4. Appendix

4.1. Technical details

Connections:
>Ribbon cable adapter for Doepfer bus +/-12Volt
Inputs: 4x Audio/Signal (+/-5v), 1/8th inch mono jacks
>4x Trigger/Gate (0/+5v..10v), 1/8th inch mono jacks
>4x CV (0..+5v), 1/8th inch mono jacks
Outputs: 4x Audio/Signal (+/-5v), 1/8th inch mono jacks

Control elements:
>3 switches
4 Slider
4 LED's

Current consumption: max + 60mA / - 30mA
Size: Euro rack format 3U / 10HP   51x128,5x42 mm

4.2 Warrenty

Beginning from the date of purchase a 2-year warranty is guaranteed for this device in case of any manufacturing errors or other functional deficiencies during runtime.The warranty does not apply in case of:

- damage caused by misuse
- mechanical damage arising from careless treatment (dropping, vigorous shaking, mishandling, etc)
- damage caused by liquids penetrating the device
- heat damage caused by overexposure to sunlight or heating
- electric damage caused by improper connecting
  (wrong power supply/ jacks/ MIDI connections/ voltage problems).

If you have any complaints please contact your dealer or send an e-mail to:
service@flame-instruments.de

4.3 Terms of production
conformity: CE, RoHS, UL

4.4 Disposal

The device is produced with RoHS-conformity (subject to the regulations of the European Union) and is free of hazardous substances (like mercury, plumb, cadmium and hexavalent chrome). But electronical scrap is hazardous waste. Please don't add this to consumer waste. For an environment friendly disposal of waste please contact your distributor or specialist dealer.

4.3 Support

Updated and additional informations, updates, downloads and more see:
www.flame-instruments.de

4.4 Acknowledgment
For help and assistance big thanks to: Alex4 and Schneiders Büro Berlin, Shawn Cleary (Analogue haven, Los Angeles), Thomas Wagner, Robert Junge und Anne-Kathrin Metzler.