Filter Threek 13700 V1.1

Manual En V1.0

If you have any questions, please contact us at **info@funkstill.ch**

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Module overview

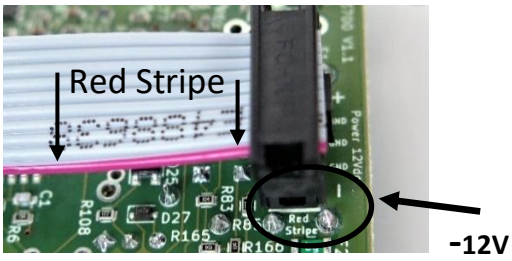
The Filter Threek 13700 is an analogue, 3 Pole Morphing Filter with 6 steplessly variable and voltage controllable modes. It provides self-oscillation, wave shaping (between the modes) and a lot of modulation possibilities: VC-Mode (continuously), VC-Resonance, Linear FM, two assignable CV inputs and more. It is a low distortion filter, which develops its rough character through the various modulation and feedback possibilities. Especially if you modulate the Mode at audio rates, for example with a VCO or by feeding back the output signal to the Mode input (CV1, Out > Mode) you can explore very unique und dynamic sounds. With the additional 1 Pole input and 2 Pole output there are 12 filter modes available. The module is compact and user friendly at the same time. The Products are engineered, assembled and tested in Switzerland.

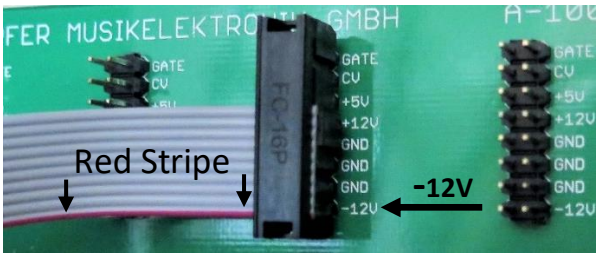
Specification:

- Eurorack Synthesizer Module, Doepfer-compatible
- Width: 14 HP (70.8mm)
- Depth: 27mm
- 75mA @+12V, 75mA @-12V
- protected against reversal voltage (±12V)
- 3 analogue Filter-Pole, LM13700 OTA´s with FET/Darlington Buffer

Installation:

- The module is intended only for the installation in a closed synthesizer eurorack case with a ±12Vdc power supply.
- Turn off your eurorack case and disconnect the power cable before unplugging or installing any module.
- Ensure that the current consumption of all installed modules does not exceed the rated current of your eurorack power supply
- Properly connect the ribbon cable to the module and to the power bus board of your case. Ensure the **red** stripe on the cable lines up with the **minus** (-12) pins on the boards (see picture below).

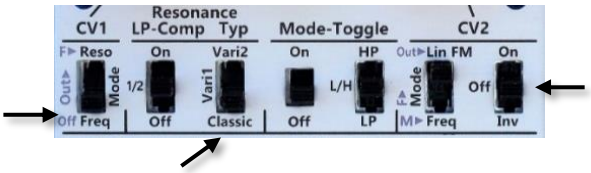




Before you start

it is helpful to set the switches to the following positions: switch off *CV1* and *CV2* to the *Off* position (so there is no internal modulation)

and switch *Resonance Typ* to *Classic*. This way it is easier to get familiar with the basic functions and then to discover all the sounds and possibilities step by step.



Panel and labelling

5) Resonance
8) Filter Mode
14) Input Level
19) CV1 Level
20) CV1 assign switch
6) Resonance LP-Comp
7) Resonance Type
17) 1 Pole Input
18) 2 Pole Output
15) Signal Input (3 Pole)
16) Signal Output
10) Mode CV Input
13) Toggle Input
3) Freq CV Input
4) 1V/Oct Input
21) CV1 Input
25) CV2 Input
24) CV2 On/Off/Inverse
23) CV2 assign switch
12) Mode-Toggle Position
11) Mode-Toggle On/Off
22) CV2 Level
9) Mode CV Level
2) Freq CV Level
1) Cutoff Frequency

Cutoff Frequency

1) Frequency Knob (1):
The *Frequency*-knob defines the filter cutoff frequency.
There are several Inputs for cutoff Frequency modulation:
- *Freq* (3) with attenuator *Freq CV* (2). If there is no cable plugged it is used for *Fine Tune*
- *1V/Oct* (4)
- *CV1* (21) with Attenuverter (19) is assignable with switch (20) to cutoff frequency
- *CV2* (25) with Attenuator (22) is assignable with switch (23) to cutoff frequency (exp FM) or to Linear FM. (Note the normalling of *CV1* und *CV2*)

2) Freq CV Knob (2)**:**
The *Freq CV* Knob controls the level of *Freq* (3) input.
As long as there is no cable plugged, *Freq CV* Knob (2) is used for fine tuning (grey label).

3) Freq CV Input (3):
This is the input for the frequency control voltage. Use *Freq CV* Knob (2) to adjust the signal level.

4) 1V/Oct Input (4):
This ist the CV input with 1V per Octave tracking.
Turning *Resonance* (5) fully clockwise the filter will oscillate (when *Resonance Typ* (switch (7)) > *Classic*).
The 1V/Oct tracking is acurate in LP-Mode and in the lower frequency range at least up to 1kHz.

Resonance

5) Resonance Knob (5):
This sets the resonance of the filter.
- You can use *CV1,* (19), (20), (21) to modulate the resonance with a control voltage. (Note the normalling of *CV1* (21))
- There is a level-compensation (*LP-Comp*) you can turn on with Switch (6).
- With *Typ*-switch (7) you can choose from two additional resonace characters.

Turning *Resonance* (5) fully clockwise the filter will oscillate (when Typ (switch (7)) -> *Classic*).
In the center range of *Mode* the sinewave gets shaped. Use *1V/Oct*-input (4) for keyboard tracking.

6) Resonance LP-Comp Switch (6):
Switching *LP-Comp* "On" the Signal level stays constant with increasing resonance.
With *LP-Comp* "Off" increasing resonance also reduces the signal level of the lower frequency range.
In position "1/2" the drop in level is partially compensated.
LP-Comp has influence on 3LP-Mode as well as 1L-2A, 1H-2A and LP and All pass at *2 Pole* out.

7) Resonance Typ Switch (7):
In position "*Classic"* resonance behaves as usual.
There are another two interesting variations (*Vari1* und *Vari2*) which expands the tonal variety. In position *Vari1* and *Vari2* resonance behaviour is less predictable and highly depends on signal type, signal level, filter mode and LP-Comp.

Filter mode

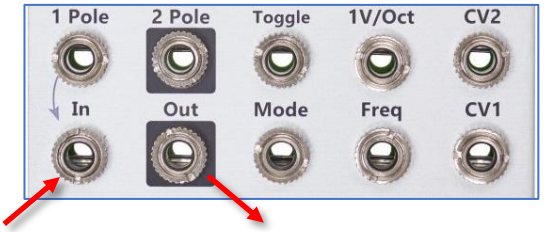
8) Mode Knob (8):
The *Mode*-Knob is used to change continuously between the filter modes. To achieve this a diode circuit splits the signal wave and leads each part to the corresponding filter inputs. This causes also wave shaping between the modes (see Wave Shaping). There are four position you can dial in, whereas the two position in the middle can be toggled. Therefore 6 different 3 pole filter modes are available for sound shaping. For toggling the two modes in the middle, *Mode*-*Toggle*-switch (11) and (12) or *Toggle* input (13) is used.
There are several inputs for controlling *Mode*:
- *Mode* (10) Input with attenuator *Mode CV* (9)
- *CV1* (21) with attenuverter (19) can be assigned to *Mode* with switch (20).
- *CV2* (25) with attenuator (22) can be assigned to *Mode* with switch (23).
(Note the normalling of *CV1* and *CV2*)

9) Mode CV Knob (9):
The *Mode CV* Knob sets the level of the control voltage at *Mode*-input (10).

10) Mode CV Socket (10):
A signal at this input controles the Filter mode. you can set the input level with the *Mode CV* knob (9).

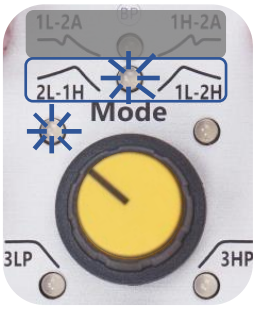
3 Pole Filter:

Signal: *In* (15) > *Out* (16), with attenuator (14) for *In.*
The Signal path is DC coupled.
Six Modes are available:
(The blue LEDs indicate the actual state)

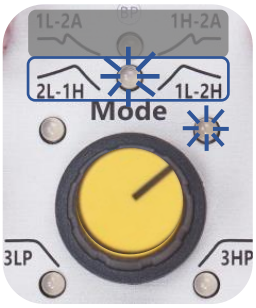


3LP:
3 Pole Low Pass, (-18dB/oct)

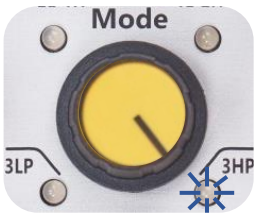
2L-1H: Band Pass
2 Pole Low Pass (-12dB/oct) and
1 Pole High Pass (-6dB/oct)



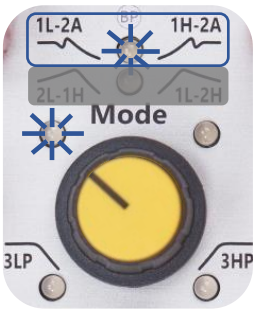
1L-2H: Band Pass
1 Pole Low Pass (-6dB/oct) and
2 Pole High Pass (-12dB/oct)



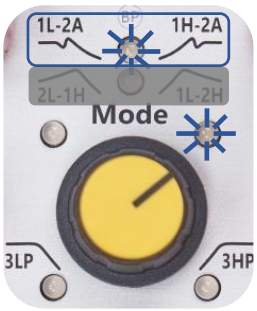
3HP:
3 Pole High Pass (-18dB/oct)



1L-2A:
1 Pole Low Pass (-6dB/oct) and
2 Pole All Pass *

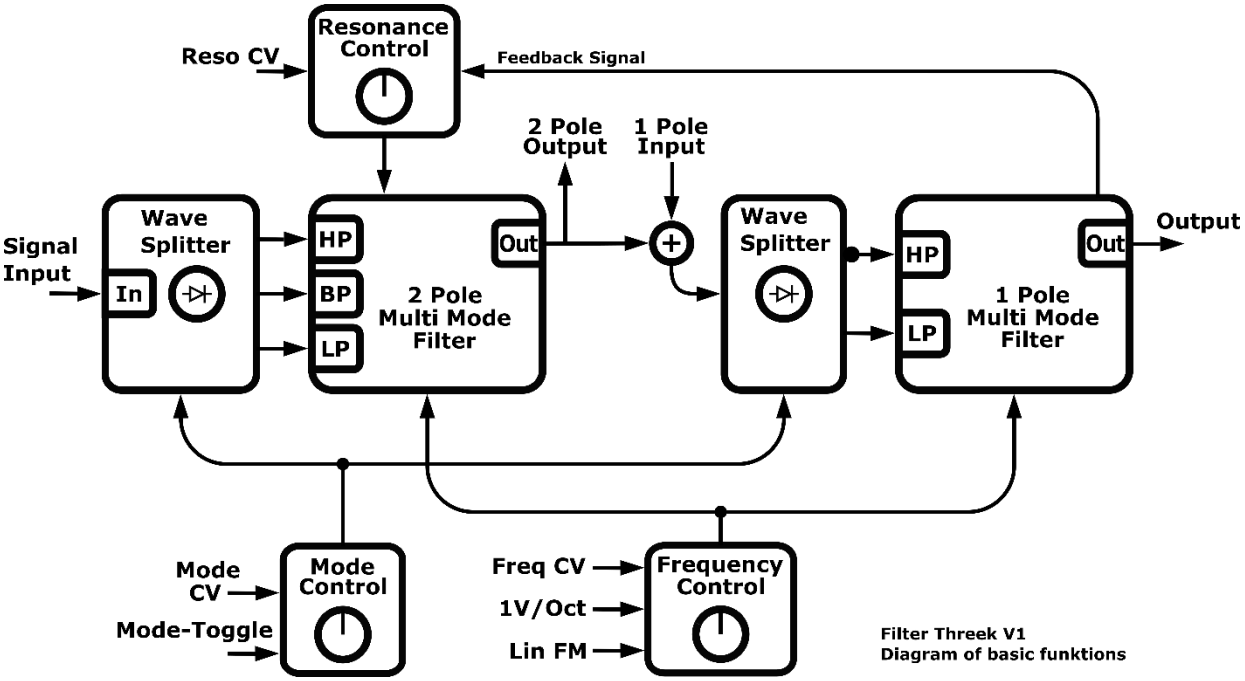


1H-2A:
1 Pole High Pass (-6dB/oct) and
2 Pole All pass *

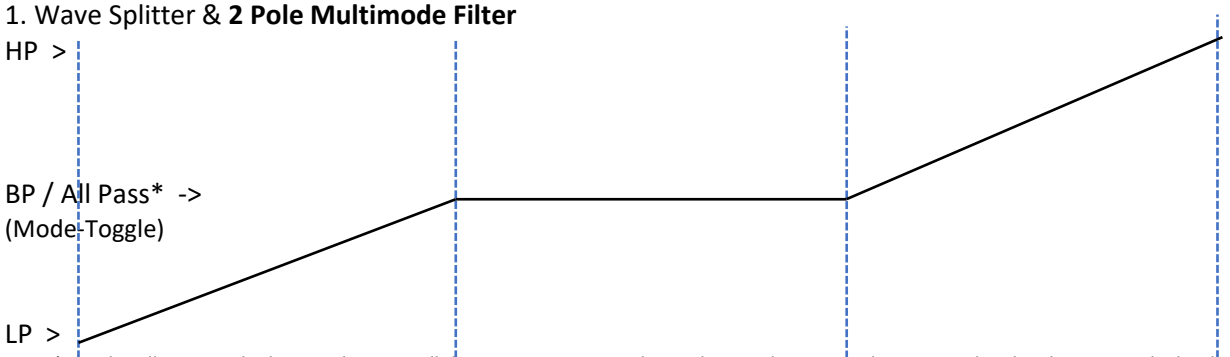


* The 2 Pole All Pass Signal actually consists of the mix of the 2 pole LP, HP and the inverted BP Signals with 1.7 times higher level (This is also true for the *2 Pole* Output (18)).

Diagramm of basic funktions:

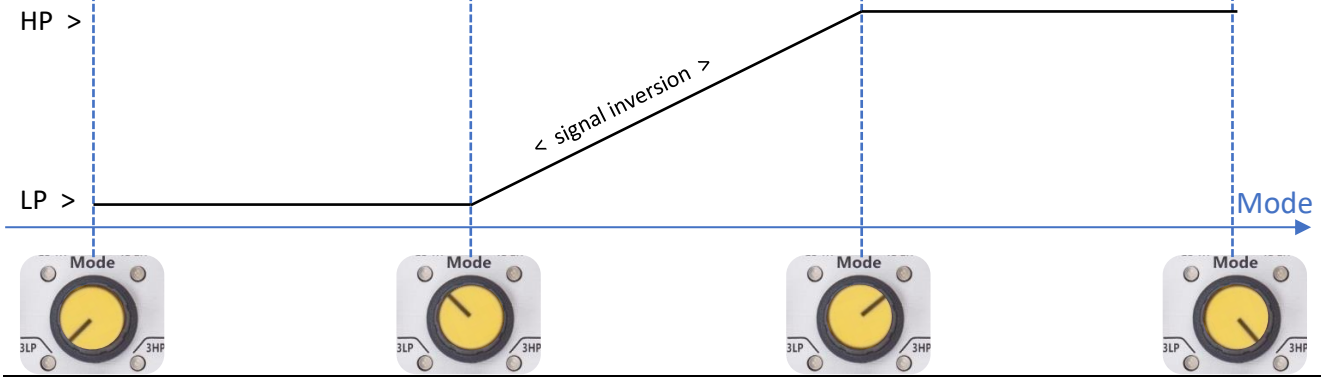


1. Wave Splitter & **2 Pole Multimode Filter**



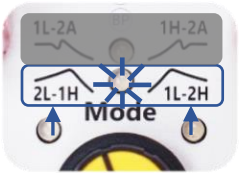
* For the All Pass Mode the Signal goes to all three inputs LP, BP and HP, whereas the BP Signals is inverted and with 1.7 times higher level

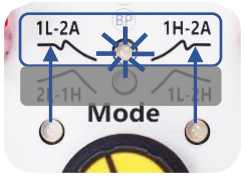
2. Wave Splitter & **1 Pole Multimode Filter**



Mode-Toggle:

In the two positions in the middle, either
2L-1H and 1L-2H or
1L-2A and 1H-2A are active (blue LED).





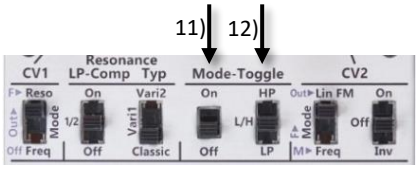
Switching switch (11) from "Off" to "On" the filter modes change between the two states manually. Leaving switch (11) On, the two filter mode in the middle toggle automatically. Switch (12) determines when the two filter modes in the middle toggle automatically. Either when reaching 3LP, 3HP or both. Alternatively you can toggle between the modes using *Toggle*-Input (13).

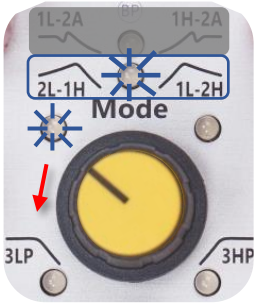
11) Mode-Toggle Switch, Off, On (11):
This switch serves to change the two filter modes in the middle to either 2L-1H and 1L-2H or 1L-2A and 1H-2A. switch from Off to On to change state manually. It changes automatically when switch (11) is On. Use switch (12) to determine when the modes change automatically.

12) Mode-Toggle Switch, LP, L/H, HP (12):
Use this switch to determine in which position the two modes in the middle (2L-1H and 1L-2H or 1L-2A and 1H-2A) toggle automatically. Switch (11) has to be On. When *Mode-Toggle*-Switch (12) is at „LP" it changes automatically only when reaching 3LP Mode. When it is at „L/H" it changes when reaching 3LP or 3HP. When at «HP» it changes automatically only when reaching 3HP.

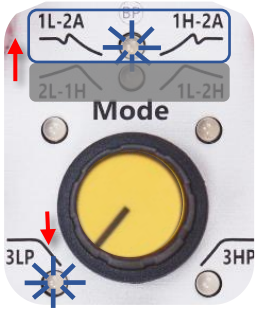
13) Toggle Socket (13):
A signal at this input changes the two modes in the middle each time it exceeds the threshold of 1.5V.

Exemple of automatic toggle:
Switch on automatic Mode-Toggle: Switch (11) to „On". Switch (12) at LP or L/H so it toggles (for this example) at 3LP.

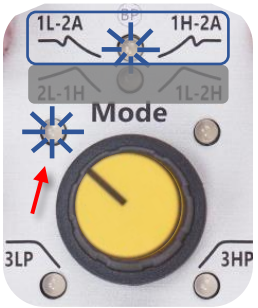




We start with 2L-1H Bandpass Mode and turn the *Mode*-Knob towards 3LP.



As soon as reaching 3LP Mode the two mode in the middle switch automatically. (the corresponding LEDs turn blue)



Turning back *Mode* you reach 1L-2A Mode.

Repeating the process and turning *Mode*-Knob again towards "3LP" the two mode in the middle switch back to the bandpass-modes as soon as reaching "3LP". Turning now *Mode*-knob clockwise you get back to 2L-1H Bandpass. The same works as well in the other direction so that the two mode in the middle toggle as soon as it reaches „3HP". Therefor Switch (12) has to be at „H/L" or „HP" and switch (11) to „On". Automatic toggle works also with a control voltage for Mode.

Wave Shaping:

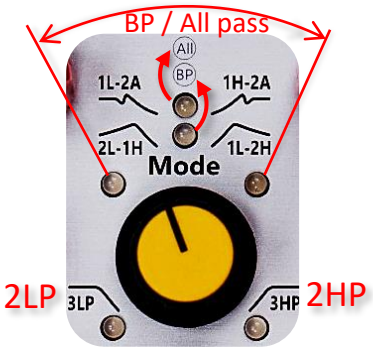
A diode circuit (no VCA´s) enables the stepless transition between the filter-modes. The diode circuit splits the signal wave and leads each part to the corresponding filter inputs. This causes also wave shaping between the modes.
Crossing the middle Position, the signal gets inverted and the module behaves like a combination of a rectifier and a filter.
(there is no signal inversion or rectification for the *2 Pole* (18) output)

signal inversion „rectifier“

2 Pole Filter:

Signal:
In (15) > *2 Pole* (18) output (attenuator (14) for *In*)

Four filter modes are available:
LP, HP, BP, All pass*:
LP: far left
HP: far right
The entire centre range is either BP or All pass (grey label).
Mode-Toggle toggles between BP and All pass.
(there is no signal inversion or rectification for the *2 Pole* (18) output.
*The 2 pole all pass signal actually consists of the mix of the 2 pole LP, HP and the inverted BP signals with 1.7 times higher level)



1 Pole Filter:

Signal: *1 Pole* (17) > *Out* (16).
The left range is LP and the right range is HP.
There is no attenuator for the *1 Pole* input and it is optimized for ±5V (10Vp-p) signal.
The *In*-socket (15) is normalled to the *1 Pole* input (grey arrow). If you only want the *1 Pole* signal at *Out* (16), turn the *In*-Knob (14) completely counterclockwise. On the other hand you can mix the 3 pole signal to the 1 pole signal using the *In*-Knob and thus creating further filtermodes.
Mode-Toggle has no influence on *1 Pole* Input.
Crossing the centre Position, the signal gets inverted.

Signal: *1 Pole* (17) > *2 Pole* (18): is allways 3 pole lowpass. Resonance acts also like a VCA here, so with no resonance there is also no signal at output (18). (Note the normalling of *1 Pole* (17) to *In* (14))

Signal Input / Output

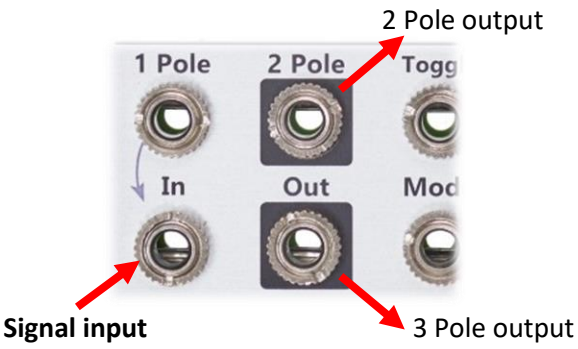
14) In Knob (14):
The *In*-Knob sets the level of the signal at *In* (15). An LED displays if the signal clips.
The signal path is DC-coupled.

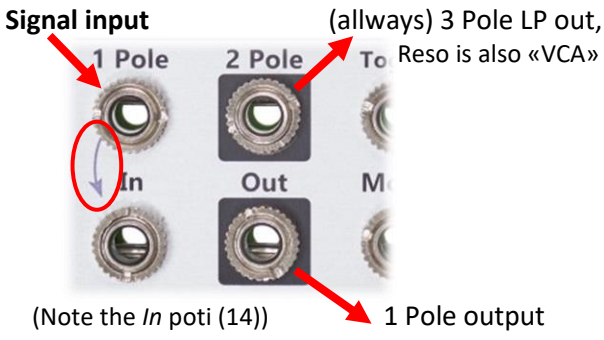
15) In Socket (15):
This is the signal input for the 3 pole filter *Out* (16) and the *2 Pole* (18) Output. There is an attenuator (14) for the input level and a clip LED. The signal path is DC-coupled. The *In*-socket is normalled with the *1 Pole* Input (grey arrow).

16) Out Socket (16):
This is the 3 pole output of the signal at *In* (15) and the 1 pole output of the signal at *1 Pole* Input (17).

17) 1 Pole Input Socket (17):
This is the signal input for the 1 pole filter with *Out* (16).
There is no attenuator for the *1 Pole* input and it is optimized for ±5V (10Vp-p) signal.
When nothing is pluged at *In* (15) the signal at the 1 pole input is also at *In* (grey arrow).
If you only want the *1 Pole* signal at *Out* (16), turn the *In*-Knob (14) completely counterclockwise (grey label). The *1 Pole* Input is DC-coupled.

18) 2 Pole Output Socket (18):
This is the *2 Pole* filter output with input *In* (15).
A signal at *1 Pole* input (17) is at this output allways a 3 pole lowpass with resonance also working like a VCA (no resonace => no signal).





CV1

19) CV1 Knob (19):
The *CV1* Knob sets the level of the control signal at *CV1* input (21) which you can asign with switch (20). The *CV1* Knob (19) is Bipolar, therefore in center-position there is no modulation. Turning clockwise increases (positiv) control signal and turning counterclockwise increases inverted control signal. (Note the normalling of *CV1*)

20) CV1 Switch assignment (20):
Asign the signal at *CV1* (21) with switch (20) to the following destinations:
- Reso (Resonance)
- Mode
- Freq (Frequency)

21) CV1 Socket (21):
This is the CV1 input with bipolar attenuator (19) and switch (20) to assign the signal.

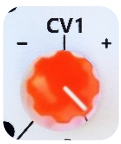
Socktet *CV1* (21) is normalled. If there is no cable plugged at *CV1* (21), *CV1* is normalled depending on switch (20) as follows (grey label):
- F > Reso, (Frequncy > Resonance)
- Out > Mode
- Off Freq (no nrmalling, no internal modulation)

If the CV1-function is not being used, turn switch (20) to the „Off Freq“ position in order to turn off the internal modulations.

F > Reso:

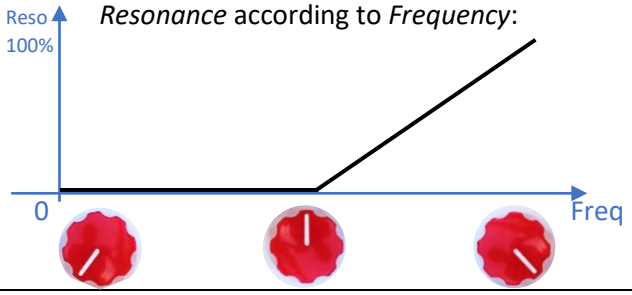
Switch (20) in position: F > Reso, and no cable plugged at input *CV1* (21): therefore, the sum of all frequency control signals is also present at *CV1* (21) input and modulate the resonance:

Adjustment:
Resonance: 0 CV1: +100% (F > Reso)

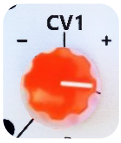


leads to the following behaviour: ->

Resonance according to *Frequency*:

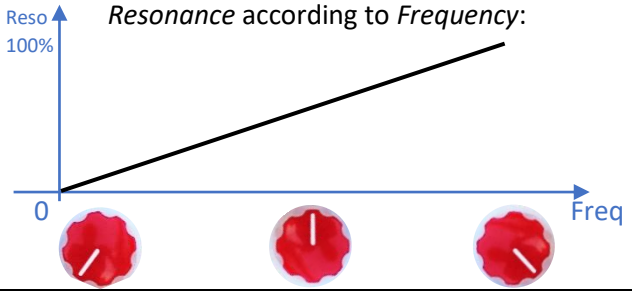


Adjustment:
Resonance: 40% CV1: +60% (F > Reso)

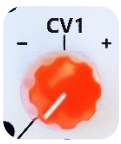


leads to the following behaviour: ->

Resonance according to *Frequency*:

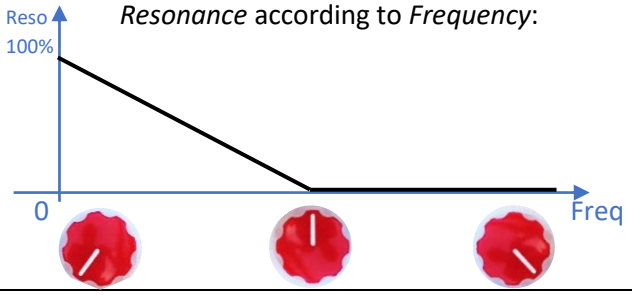


Adjustment:
Resonance: 0 CV1: -100% (F > Reso)

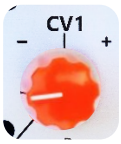


leads to the following behaviour: ->

Resonance according to *Frequency*:

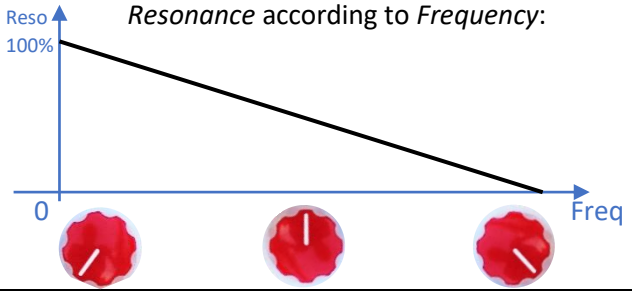


Adjustment:
Resonance: 40% CV1: -60% (F > Reso)



leads to the following behaviour: ->

Resonance according to *Frequency*:



Out > Mode:

Switch (20) in position: Out > Mode, and no cable plugged at input *CV1* (21):
The *Out* (16) -signal is present at input *CV1* (21) and modulates *Mode.*
The feedback of the *Out*-signal to *Mode* leads due to CV-modulation capabilities of *Mode* and due to its diode circuit to unique, dynamic and resonant like tones. Depending on the *Mode*- (8), *Mode-Toggle*-adjustment (11), (12) and if it is positive or negative feedback, you get different results.

CV2

22) CV2 Knob (22):
The *CV1* Knob sets the level of the control signal at *CV1* input (25) which you can asign with switch (23) and with switch (24) you switch it on, off or invert the signal.
(Note the normalling of *CV2*)

23) CV2 Switch, Assignment (23):
Asign the signal at *CV2* (25) with switch (23) to the following destinations:
- Lin FM (AC-gekoppelt)
- Mode
- Freq

24) CV2 Switch, On, Off, Inv (24):
Switch on, off or invert the signal input at *CV2* (25).

When the CV2-function is not being used, turn switch (24) to the „Off“ position in order to turn off the internal modulations.

25) CV2 Socket (25):
This is the input with attenuator (22) and switch (23) and (24) to assign the signal.

Socktet *CV2* (25) is normalled. If there is no cable plugged at *CV2*, *CV2* is normalled depending on switch (23) as follows (grey label):
- Out > Lin FM
- F > Mode (Frequency > Mode)
- M > Freq (Mode > Frequency)

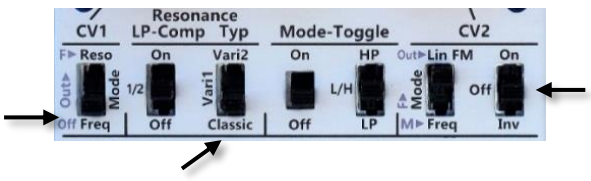
Out > Lin FM:
The feedback of the *Out* (16) -signal to the *Lin FM* input (*Out > Lin FM*) creates dynamic and distortion like tones and when the filter is in self oscillation the sin wave turns into other waveforms. Positive or negative feedback leads to different results.

F > Mode:
In switch position *F > Mode*, *Mode* is linked to *Frequency*. This way you can control *Frequency* and *Mode* at the same time with the *Frequency* control. The LEDs indicate how the *Mode* is depending on the *Frequency.* Switch (24) determines if *Frequency* controles *Mode* in the same direction or the opposite direction.

M > Freq:
In switch position *M > Freq*, *Frequency* is linked to *Mode*. This way you can control *Mode* and *Frequency* at the same time with the *Mode* control. Switch (24) determines if *Mode* controles *Frequency* in the same direction or the opposite direction.

Tips:

Before you start it is helpful to set the switches to the following positions: switch off *CV1* and *CV2* to the *Off* position (so there is no internal modulation)
and switch *Resonance Typ* to *Classic*.



- VCO at the *In*-Socket and a second VCO at *Mode*-input
- VCO at *Mode*-input and an LFO, Envelope… at the *In*-Socket (tremolo)
- VCO at the *In*-socket and split the same signal to the *Toggle*-input. This creates a sub octave (for the Modes in the middle range)