

## VCO-1 v1.0a

**VCO-1** is a **voltage controlled oscillator** for the **Eurorack modular system**. VCO-1 is the core module and you can add many functions by the VCO-1 Expander (will follow) - Sync, lin. FM, LFO, Wave Morphing etc. VCO-1 is temperature stable and provides a clean 1V/oct tracking over minimum 5 octaves. Outside of our workshops, you can buy the VCO in our shop [Exploding Shed](#).

***For correct assembly and usage, some information is necessary, please read the following info carefully before you start!***

**DIY Level: Medium.** A successful assembly is only possible if you have some basic DIY skills, experience and good tools. The success is based on your skills, besides our workshops we don't offer any support. The DIY kit can be assembled by halfway experienced DIYers in about 2-4h. After assembly it has to be adjusted to meet the 1V/octave scale which is used by most synths, this might be a bit of a challenge.

**Needed tools:** Good soldering iron (min 75W), solder, de-soldering pump, wirecutter, flat-nosed pliers, wirestripper, much light, maybe a multimeter. Recommendations for good tools you can find here [www.leaf-audio.com/downloads/service/Recommended-Tools.pdf](http://www.leaf-audio.com/downloads/service/Recommended-Tools.pdf) and some stuff maybe offered in our own shop [www.exploding-shed.com](http://www.exploding-shed.com).

**Completeness:** Despite all care it might happen from time to time, that a part is missing or wrong, because we assemble our kits by hand. In such a case please contact [mail@leaf-audio.com](mailto:mail@leaf-audio.com) or Exploding Shed and we will find a solution.

**Power supply:** Like all Eurorack modules, the VCO-1 is running on symmetrical power of +12V, -12V and GND. It is connected via the included ribbon cable, please check the polarity written on the PCB. Usually the red stripe is -12V.

### Connectors and Controls:

#### Controls:

Tuning (Coarse) ~ 20Hz – 20kHz  
Tuning (Fine) ~ 8 half tones  
Pulsewidthmodulation (PW)

#### Connectors:

1V/oct input for controlling pitch by CV  
PWM input for controlling PW by CV  
Pulse output  
Saw output

**Adjustment of the 1V/oct tracking:** Via the corresponding input the pitch of VCO-1 can be played by other synths or Midi-to-Gate/CV interfaces. Before, you need to manually adjust the 1V/octave tracking. If you have no experiences with that, it might be a little challenge. At the end of this document you'll find a link which leads to a separate guide which helps you with this procedure.

**Note:** Links to good soldering tutorials can be found at the end of our [tool recommendations list](#).

**Assembly:**

*Please see notes in the partlist / on the plastic bags and also have a look to the photo documentation via attachment link 1!*

1. Diodes
2. Resistors, Coils
3. Small Capacitors
4. IC holder
5. Big polarized Capacitors
6. Transistors
7. Trimmers
8. Pin Headers (Bus & Expander)
9. Potentiometers and Connectors (placed on the backside).

In the next step, ICs are placed in their holders. They have a polarity, which is marked on the silkscreen on the PCB, the holder (notch) and also the IC itself (notch or dot).

Before you power the module, please check all solder joints if they look clean, good contact and no short circuits. Also check the polarity of parts again. Then you are ready to power it up for testing if it generates audio and all controls work as intended. If it works, you can mount it behind the panel now and go on with adjusting the 1V/oct tracking.

Part	Name	Value	#	Notes	Info
<b>ICs</b>					
OP Amp	IC1	TL072	1	Polarity!	
OP Amp	IC2	TL074	1	Polarity!	
IC Holder	Holder IC1, MOD1	DIL8	2	Polarity!	
IC Holder	Holder IC2	DIL14	1	Polarity!	
<b>Capacitors</b>					
X7R	C1, C2	100nF / 25V	2	No polarity	
X7R	C3, C4	100nF / 25V	2	No polarity	
Ceramic	C5	100pF / 50V	1	No polarity	
Elko, Polymer	C6, C7	180µF / 16V	2	Polarity!	
Wima FKP	C8	2200pF / 63V	1	No polarity	
Ceramic	C9	10nF / 25V	1	No polarity	
Elko, axial	C10	47µF / 25V	1	Polarity!	
<b>Resistors</b>					
Resistor	R2, R35, R40	6,8kΩ	3	No polarity	BL-GREY-BLK-BR-BR
Resistor	R4	130kΩ	1	No polarity	BR-OR-BLK-OR-BR
Resistor	R5	3,3MΩ	1	No polarity	OR-OR-BLK-GE-BR
Resistor	R6, R7, R24, R32, R37	100kΩ	5	No polarity	BR-BLK-BLK-OR-BR
Resistor	R8, R11	1MΩ	2	No polarity	BR-BLK-BLK-YEL-BR
Resistor	R9, R25	470Ω	2	No polarity	YEL-PRPL-BLK-BLK-BR
Trimmer	R10	100Ω / lang	1	Polarity!	
Resistor	R12, R20, R30	4,7kΩ	3	No polarity	YEL-PRPL-BLK-BR-BR
Resistor	R13, R16, R17, R19, R21, R27, R34	10kΩ	7	No polarity	BR-BLK-BLK-RED-BR
Trimmer	R14	20kΩ	1	Polarity!	
Resistor	R15	10Ω	1	No polarity	BR-BLK-BLK-GO-BR
Resistor	R18, R26	20kΩ	2	No polarity	RED-BLK-BLK-RED-BR
Resistor	R22	100Ω	1	No polarity	BR-BLK-BLK-BLK-BR
Resistor	R23, R29	47kΩ	2	No polarity	YEL-PRPL-BLK-RED-BR
Resistor	R28, R31	100kΩ / mini	2	No polarity	BR-BLK-BLK-OR-BR
Resistor	R33	8,66kΩ	1	No polarity	
Resistor	R36	330kΩ	1	No polarity	OR-OR-BLK-OR-BR
Resistor	R38	1kΩ	1	No polarity	BR-BLK-BLK-BR-BR
<b>Potentiometers</b>					
ALPS RK09L1140	R1, R3, R39	10kΩ linear	3	Polarity!	
Nuts, Washers	für R1, R3, R39		3		
<b>Diodes</b>					
	D1, D2	1N 5059	2	Polarity!	Ring!
	D3, D4	1N4148	2	Polarity!	Ring!
<b>Transistors</b>					
	T1, T2	BC550B	2	Polarity!	See flat side!
	Q1	J112	1	Polarity!	See flat side!

## Diverse

Pin Header	X1	2 Rows, 5 Poles	1	No polarity
Pin Header	X2	2 Rows, 4 Poles	1	No polarity
Connector 3,5mm	X3, X4, X5, X6	Thonkiconn	4	Polarity!
Induktivity	L1, L2	10 $\mu$ H / 1,7 $\Omega$	2	No polarity
Matched Transistors	MOD1		1	Polarity!
Ribbon Cable	Bus Connector	16 Pol > 10 Pol	1	
Circuit Board (PCB)			1	
Frontpanel			1	
Screws			4	
Knobs	for R1, R3, R39		3	

Documentation, assembly pictures and additional info about 1V/oct scaling:

<http://www.leaf-audio.com>

**Building the kit happens on your own risk! If you don't have the skills or you are not 100% sure, please ask someone who is able to do it for you before you blow up your machine. It's a DIY kit and after we shipped it to you, it's out of our control. That means we are not responsible if you fuck it up. We cannot give a guarantee for a correct function. All our machines run on low voltage of 9V or 12V. Never handle with 110/230V or open power supplies.**