

VCO-1 v1.4 Build Guide

Thank you for purchasing this DIY module! Building DIY kits happens on your own risk and we cannot give any support. Please make sure you read this building instructions and the user manual entirely before you start, which both are part of the module and can be downloaded via Exploding Shed. Also make sure that your skills meet the difficulty of the DIY kit and you have a basic knowledge about soldering. Watch soldering tutorials and download the manuals here: www.exploding-shed.com/info

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 EXP-1: Sync, lin. FM, LFO, Wave Morphing etc.

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, what might be a bit challenging. All bags with parts are labelled very well, you find all needed info there and on the silkscreen print on the PCB. Stuff like polarity of parts etc, all is noted there.

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.exploding-shed.com/info and we also sell some tools there (EU only).

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 or Exploding Shed and we will find a solution.

Power: 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.

Connecting VCO-1 to EXP-1: To link the two modules, we use an 8-pole ribbon cable, which is included in the EXP-1 DIY kit. Correct polarity is very important here and details about this can be found in the VCO-1 user manual. Please download and read before you connect and power up your modules.

Connectors and Controls:

Controls:

Tuning (Coarse) ~ 20Hz – 20kHz

Tuning (Fine) ~ 8 half tones

Pulsewidth (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 synths or Midi-to-Gate/CV interfaces. But before, you need to manually adjust the High and Low Limit and 1V/octave tracking. Please download the user manual, which describes the procedure in detail.

Assembly: For this DIY kit the same rules apply as for any other DIY kit. All the bags with parts are labelled very well, you find all needed info there and on the silkscreen print on the PCB itself. Stuff like polarity of parts etc, all is noted there.

Generally it makes sense to start with the most flat components and then take the next higher ones.

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

* Make sure to use the very flat 8-pole holder for MOD1 position!

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

Before you power up the module, please check all solder joints if they look clean, good contact and no short circuits. Additionally you can use a multimeter to check for short circuits between the plus and minus and GND pins on the power connector. Also check the polarity of parts again.

If you are sure that everything was done correctly, you are ready to power it up for testing. Check 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

1. adjusting the Low and High Limit of the VCO
2. 1V/oct tracking

Please read the user manual, where this steps are explained in detail. You can download it here www.exploding-shed.com/info

Part	Name	Value	#	Notes	Info
ICs					
Voltage Regulator	IC1	uA78L09	1	Polarity!	
Voltage Regulator	IC2	uA79L09	1	Polarity!	
Op-Amp	IC3	TL072	1	Polarity!	
Op-Amp	IC4	TL074	1	Polarity!	
IC Holder	Flat Holder for MOD1	DIL8	1	Polarity!	Flat Version
IC Holder	Holder IC3	DIL8	1	Polarity!	
IC Holder	Holder IC4	DIL14	1	Polarity!	
MOD1	Matched Transistors	DIL8	1	Polarity!	With Tempco
Capacitors					
Elko, Low ESR	C1, C8	180µF	2	Polarity!	Red, Würth
X7R	C2, C3, C4, C5, C6, C7	100nF	6	No polarity	Grid 2,5mm
Ceramic Disc	C9	10nF	1	No polarity	Grid 2,5mm
Wima FKP	C10	2,2 nF	1	No polarity	Red, Wima MKS-2, 2,5
Ceramic Disc	C11	100 pF	1	No polarity	Grid 2,5mm
Elko, axial	C12	47 uF	1	Polarity!	
Elko, axial	C13	10uF	1	Polarity!	
Resistors					
Resistor (Mini)	R1, R13, R15	6,8 kΩ	3	No polarity	
Resistor (Big)	R6	3 MΩ	1	No polarity	
Resistor (Mini)	R7, R30	1 kΩ	2	No polarity	
Resistor (Mini)	R8	2 kΩ	1	No polarity	
Resistor (Mini)	R9, R19	20 kΩ	2	No polarity	
Resistor (Mini)	R10, R16, R27, R32, R35, R36, R37	10 kΩ	7	No polarity	
Resistor (Mini)	R11	4,7 kΩ	1	No polarity	
Resistor (Mini)	R14, R20, R21, R22, R23, R25, R28, R34, R38, R39	100 kΩ	10	No polarity	
Resistor (Mini)	R17	100 Ω	1	No polarity	
Resistor (Mini)	R18	330 kΩ	1	No polarity	
Resistor (Mini)	R26	470 Ω	1	No polarity	
Resistor (Mini)	R29, R31	1 MΩ	2	No polarity	
Resistor (Mini)	R33	820 Ω	1	No polarity	
Trimmer	R12	20 kΩ	1	Polarity!	
Trimmer	R24	100 Ω	1	Polarity!	
Trimmer	R40	5 kΩ	1	Polarity!	
Trimmer	R41	2 kΩ	1	Polarity!	

Potentiometers

ALPS RK09L1140	R2, R3, R4	10kΩ linear	3	Polarity!
Nuts, Washers	for R2, R3, R4		3	

Diodes

Diode	D1, D2	1N 5059	2	Polarity!	(Black Body) Ring!
Diode	D3, D4	1N4148	2	Polarity!	(Red Body) Ring!

Transistors

Transistor	T1, T2	BC547	2	Polarity!	See flat side!
Transistor	Q1	J112	1	Polarity!	See flat side!

Diverse

Inductor Ferrite	L1, L2	10μH / 1,7Ω	2	No polarity	
Conector, Male	X1	2 Rows, 5 Poles	1	No polarity	Straight
Conector, Male	X2	2 Rows, 4 Poles	1	No polarity	Straight
Connector 3,5mm	X3, X4, X5, X6	Thonkiconn	4	Polarity!	
Nuts, Knurled	for X3 - X6		4		
Ribbon Cable	10/16-Pole, 25cm	For Power	1		
Circuit Board (PCB)	v1.4		1		
Frontpanel			1		
Screws	M3x6		4		
Collet Knob	for R2, R3, R4	15mm, Black	4		

This module was made by:

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