

DIY Assembly Manual

for the LPZW.modules PO-Series Adapter

Version 1.0

Introduction

The LPZW.module PO-Series Adapter has five functions:

- hold the PO in your Eurorack
- supply power to the PO from bus-power
- route the I/O 3.5mm jacks to the front
- divide incoming 16th-note clock to a 8th-note clock used by the PO
- amplify the output signal times 2

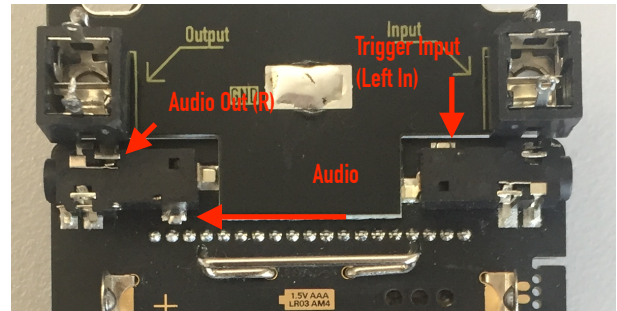
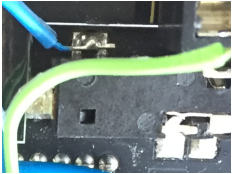
It is up to you to decide which of those functions you want to use. Read this manual carefully and completely first and decide for yourself.

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- Remarks regarding clocking the PO series
- Remarks regarding the PO-32
- PCB Assembly (Only for blank PCBs)
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Assembly step-by-step

Step 1: Solder wires to the PO's 3.5mm jacks. This is easier without the adapter in place. The top part of the adapter will sit tightly next to the pads of those jacks, so be careful not to solder on their sides but on top of the pins:



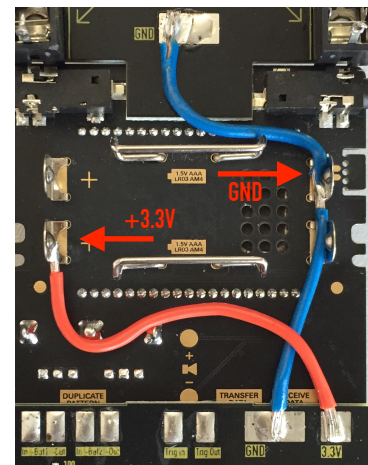
Step 2: Break the adapter into the top and bottom piece. There is a notch so this is easy and you shouldn't need to much force to do it.

Step 3: Attach the adapter to the PO with the adapter's blank side towards the back side of the PO. There is a line on the bottom part that marks the alignment for the PO and the handle is marked on the top part. Try first before you permanently attach it! You can use thin double sided tape if you want to be able to remove the adapter in the future or you can use super glue, which is a more solid solution for transport.

Step 4: Wire the GND from the bottom part to the top part and also to the negative pole battery clip. Make sure to use the correct one since the two batteries are in series, so only one of the clips is actually GND.

It is easier to remove solder from the clip than from the pad under the clip. So if you want to be able to remove the adapter, try soldering this cable to the clip.

Step 5: Connect 3.3V to the positive clip. Again: only one clip is correct!



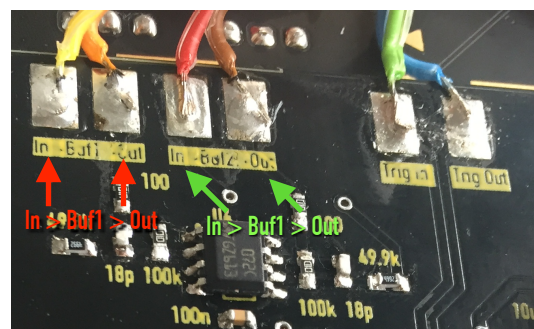
Step 6: connect the wire from the PO input jack left channel to the Trig Out pad of the adapter.

Step 7: connect the Trig In pad to the new input jacks tip connector.

Step 8 (optional): if you want to use the mono audio thru feature of the PO, connect the ring connector of the new input jack to the right channel of the PO input jack directly.

Step 9: connect left and right output of the PO to the Buf1 and Buf2 In of the adapter. You could also connect the output jacks to each other directly if you do not want to use the buffer.

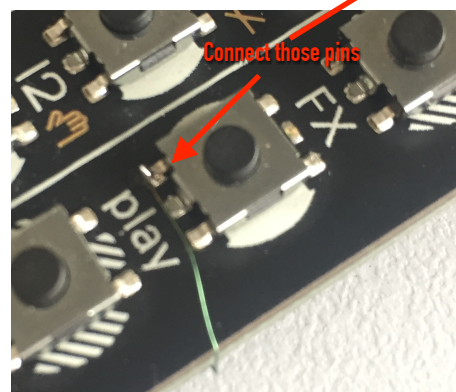
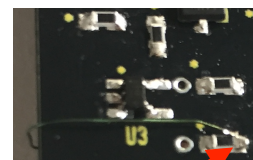
Step 10: connect the Buf1 and Buf2 Out to the tip and ring of the new output jack. Try to route left to the tip and right to the ring pin of the new output.



Step 11: the PO only recognizes the rising edge of the clock, therefore the clock divider needs a reset. Only so the the PO starts with the first 16th trigger coming in after a restart. Connect the "play" button of your PO with the asynchronous preset of the adapter's clock divider. THIS IS THE ONLY WIRE THAT WILL WRAP AROUND TO THE FRONT OF THE MODULE!

Consider fixing it with tape or glue. If you use very thin wire you can wrap around right there, the gap between two modules in Eurorack is usually way wider. Alternatively you can route thru the cutout in display area of the PO.

For advance DIYers: You can also connect this point to a NPN transistor pulling towards GND, with its base connected to some sort of external reset (probably some inverter needed - I have not done this yet).



Step 12: Stick some non-conducting ca. 3mm thick round thing into the PO's I/O jacks to break the normaLED conditions. (GND to the input; speaker to the output). If you want to only use trigger in and mono output, a 3mm round LED works well and you can easily pull it out by its legs again. A M3 nylon screw cut to length is better because it opens all normaLED connectors. Alternatively you can desolder the original PO jacks altogether which I wouldn't recommend.

Step 13: connect the PO+adapter to your Eurorack. Make sure you align the red line with the marking on the adapter and the bus boards -12V!

Step 14: set the PO to sync mode SY2 or SY4.

Remarks regarding clocking the PO series

The PO series clock on the rising edge of a 1/8th note clock. Our clock divider divides a more common 16th note clock to a 1/8th note clock.

The POs seem to calculate the distance between the clock pulses for the intermediate steps. This works accurately down to approximately 50BPM. This means you can clock the PO with half speed in standard BPM ranges without artifacts.

When you go below that (clock at quarter notes) or want to send single triggers with larger interval, the PO will asynchronously step an intermediate 16th note further. This will give you a polyrhythmic structure that we strongly encourage to explore!

Remarks regarding the PO32

The PO-32 Tonic is as of today the only PO with an exception. You need to take care to preserve its upload capabilities. Which is actually not that difficult. there is only one thing you need to decide: do you want to use the mic or the audio input jack for sound upload?

If you want to use the mic - connect the right channel pin and its normaling pin on the PO-32's input jack.

If you want to use the audio input use the right channel from the stereo input jack of the adapter and connect it directly to the PO-32.

In any case you have to use sync mode SY4 on the PO-32 and stop the clock while uploading data!

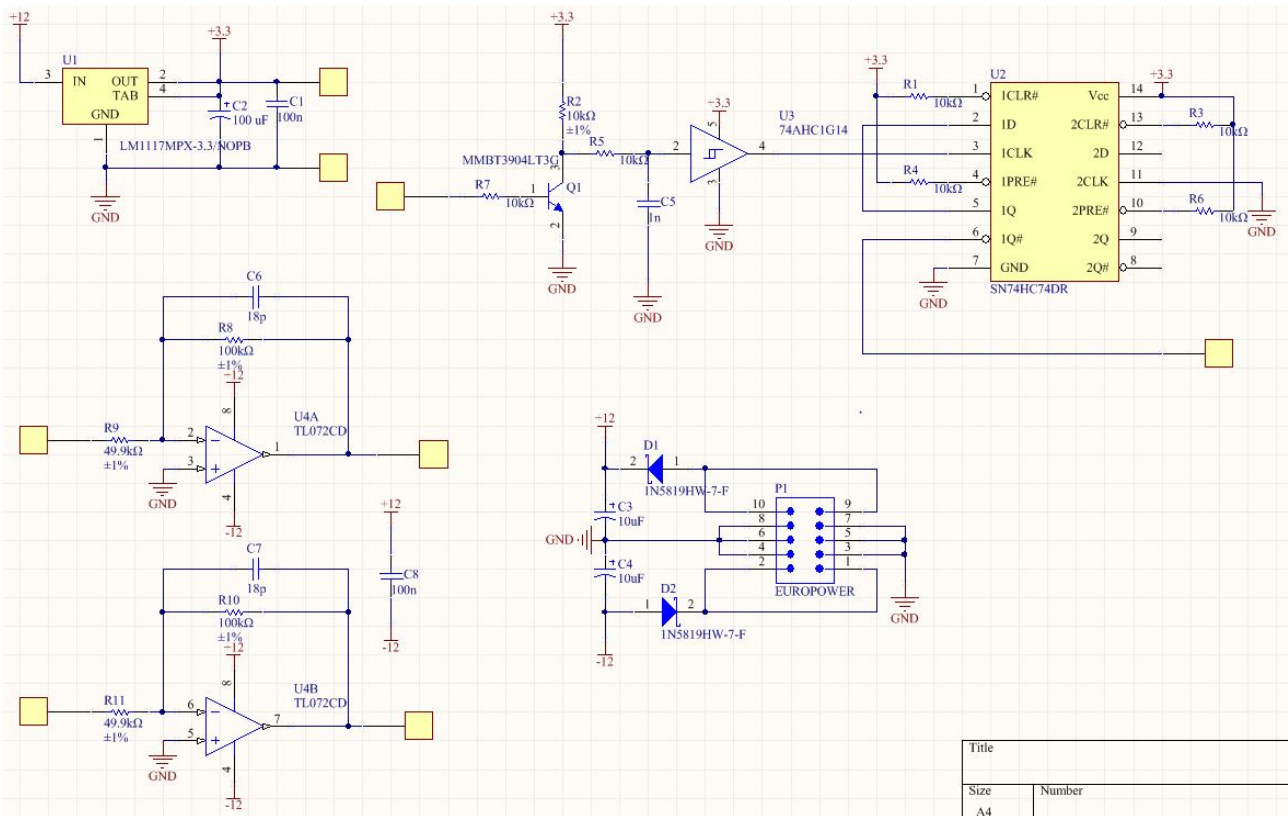
PCB assembly (only if bought blank)

BOM

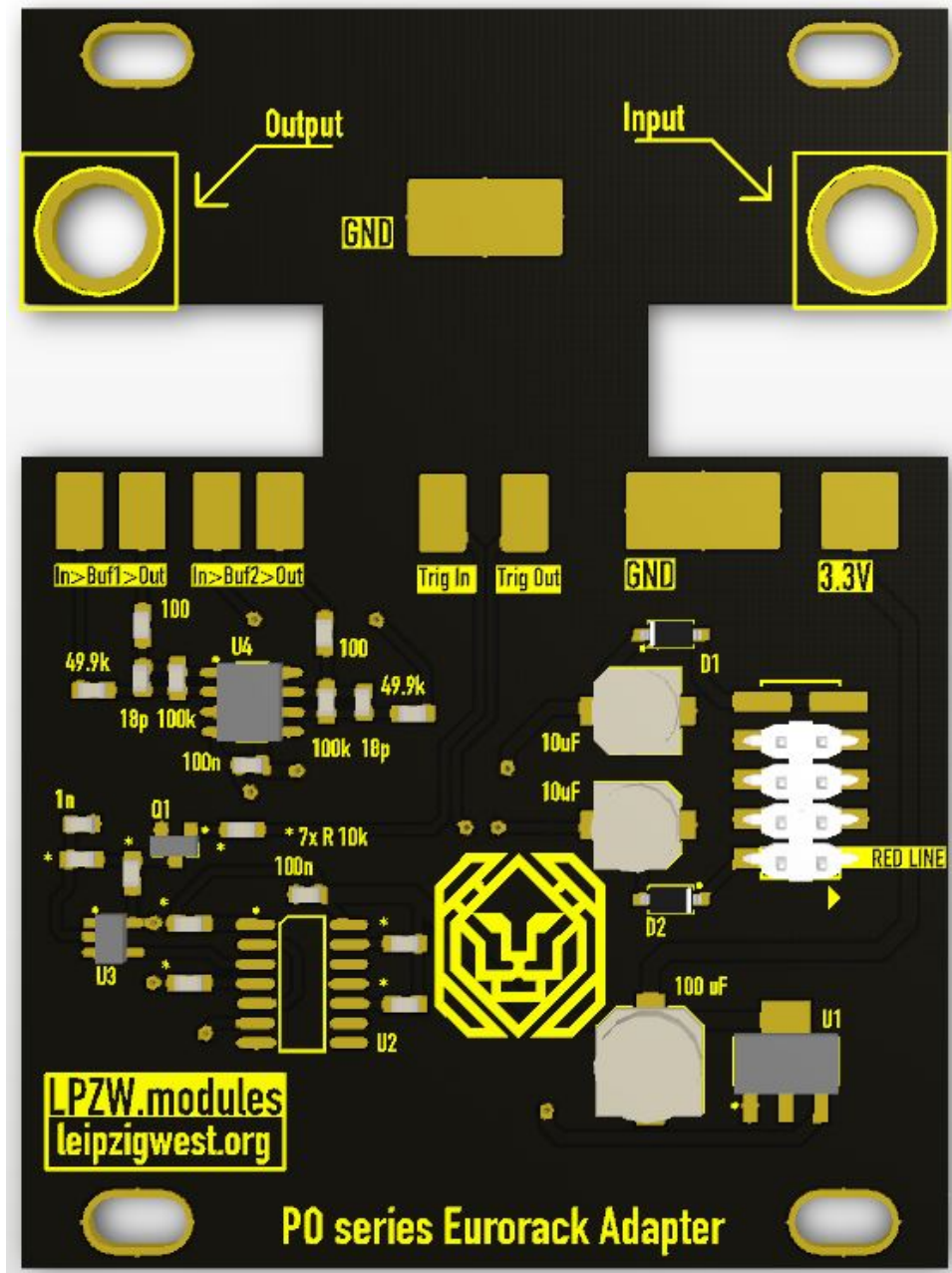
- 100n - C1, C8 - CAP CER 16V 10% - X7R 0603
- 100 uF - C2 - 6.3mm x 5.4mm 100u/10-Volt Surface Mtg/Pkg Aluminum Electrolytic Cap
- 10uF - C3, C4 - Cap Aluminum Lytic 22uF 16V 20% (5 X 5.8mm) SMD 160mA 2000h
- 1n - C5 - CAP CER 16V 10% X7R 0603
- 18p - C6, C7 - CAP CER 16V 10% X7R 0603
- 1N5819HW - D1, D2 - 1.0 A Surface Mount Schottky Barrier Rectifier, 40 V, -65 to 125 degC, 2-Pin SOD-123 Package
- 2x5 Pin header SMD - P1 - Conn.; Rect/PCB; Header; 10 Pos. SMT; 2-Row
- MMBT3904LT3G - Q1 - General Purpose Transistor, NPN Silicon, 3-Pin SOT-23
- 10k Ω - R1, R2, R3, R4, R5, R6, R7 - RES SMD 1K OHM 0.1% 1/10W 0603
- 100k Ω - R8, R10 - RES SMD 1K OHM 0.1% 1/10W 0603
- 49.9k Ω - R9, R11 - RES SMD 1K OHM 0.1% 1/10W 0603
- 100 Ω - R12, R13 - RES SMD 1K OHM 0.1% 1/10W 0603
- LM1117MPX-3.3/NOPB - U1 - 800mA Low-Dropout Linear Regulator, 4-pin SOT-223
- SN74HC74DR - U2 - IC:DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS
- 74AHC1G14 - U3 - MC74VHC1G14 Series 2 to 5.5 V Single Schmitt-Trigger Inverter - SOT-23
- TL072CD - U4 - Dual Low-Noise JFET-Input General-Purpose Operational Amplifier, 8-pin SOIC
- 2x Thonk PJ301CM - Stereo 3.5mm jacks.

Schematic

Note for version 1,0: there is a flaw in the design: feedback to the D-FF from Q and not /Q (check the fix below)



Component placement

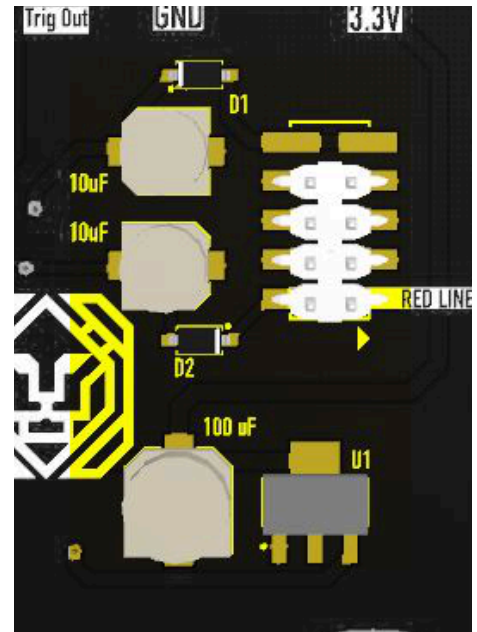


U1: LM1117MPX-3.3
U2: 74HC74 (CMOS!)
U3: 74HC1G14 (CMOS!)
U4: TL072
Q1: MMBT3904
D1, D2: 1N5819HW

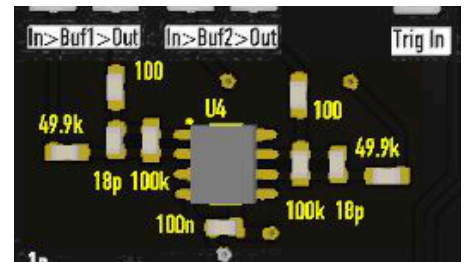
Resistors marked with an asterisk are 10k (7x)
The rest is printed in values on the PCB

Steps

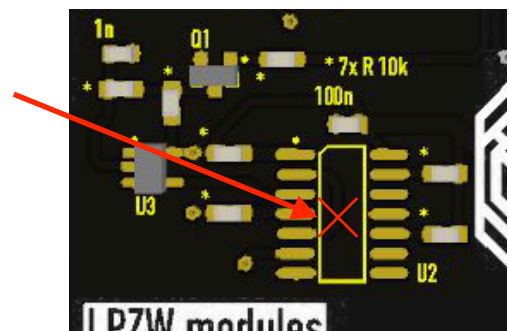
1. Populate all the parts for power supply.
Connect to your bus power and check if the output is 3.3V



2. Populate all the buffer parts. (You could check if there is a DC on the buffer outputs - it should be DC free)



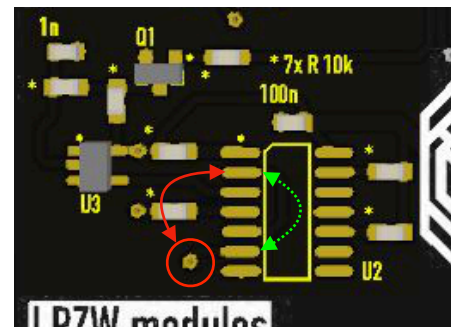
3. Populate the clock divider parts. **THERE IS A DESIGN FLAW IN THE V1.0 PCB.** Here is what you need to do: Cut the trace between pin 2 and pin 5 (D and /Q) of U2. It is located under U2 so cut it before you place the 74HC74!!



When you have placed U2 connect pin 6 and pin 2 (D and /Q). This connection can be wired to the via (Red arrow in pic:)

If you want a perfect fix, you can also hide the wire under U2 (Green arrow)

If you bought a populated PCB this fix is already in place



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Thanks to the crowd on Muffwiggler Forum for the support and motivation!

If you find faults or inconsistency in the manual's steps or unbearable grammar mistakes, please contact info@leipzigwest.org. It is my first manual of this kind.