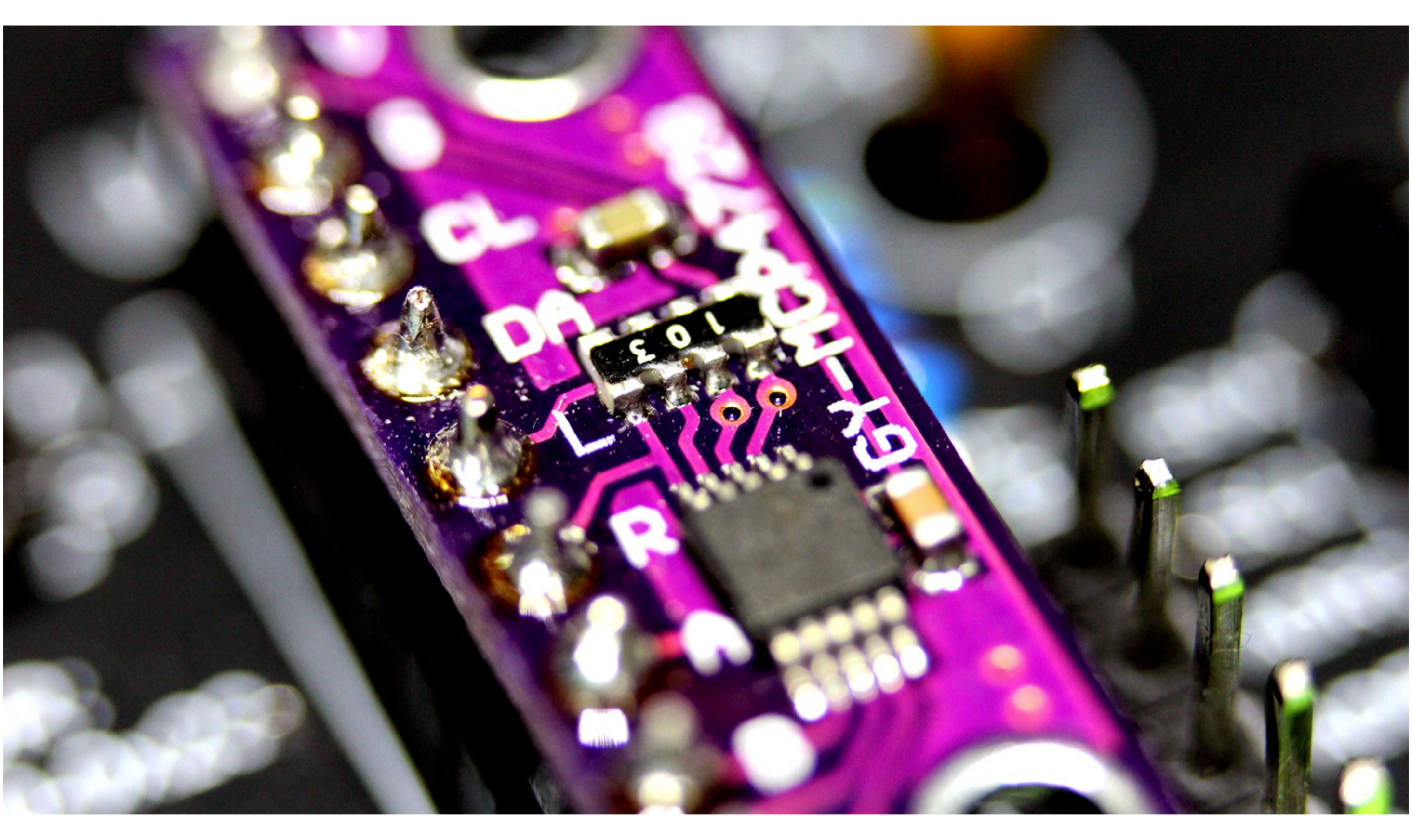
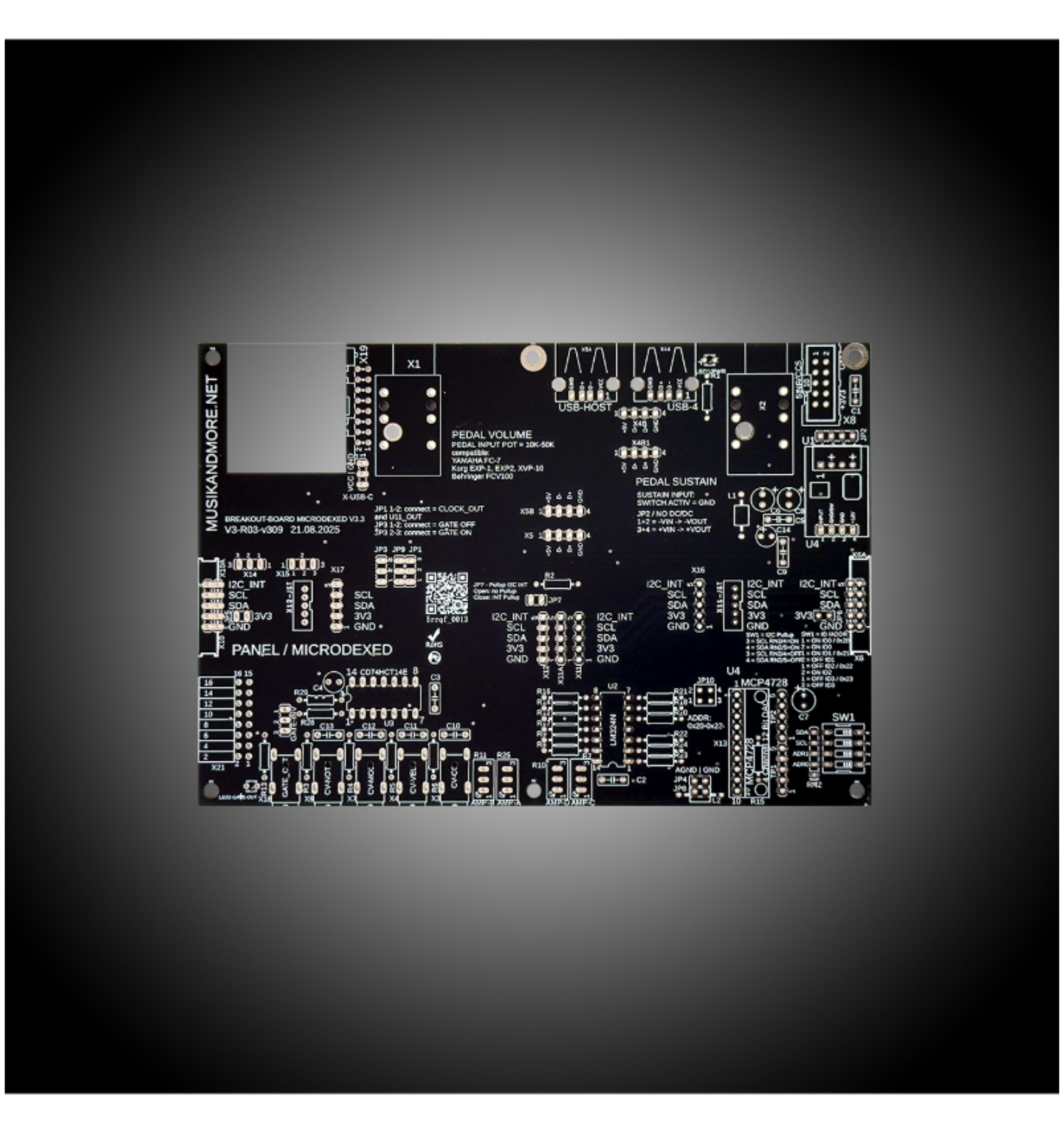
ASSEMBLY INSTRUCTIONS MIDI-TO-CV PEDAL-USB/ V1.0-DE

Home / Assembly instructions MIDI-to-CV PEDAL-USB/ V1.0-DE



Assembly instructions / Documentation / MIDI-to-CV Pedal-USB



Technical Documentation V1.0 DE / Status: 23.09.2025

- for PCB version mainboard V3-R05-v526 from May 21, 2025
- for PCB version mainboard V3-R05-v541 from July 2nd, 2025
- for PCB version mainboard V3-R06-v583 from September 19, 2025
- for PCB Midi to CV-Pedal-USB-Breakout v85 from September 21, 2025
- for PCB Amphenol-TRS-6.35mm-Breakout v46 from August 20, 2025
- for PCB 8TE-MIDItoCV-Panel-V1-v11 from May 21, 2025
- **Technical-data-MIDI-to-CV-Pedal-USB-Breakout-September-19-2025** (PDF)
- **BOM-Part-list-for-NAVIPANEL-Midi-to-CV** (PDF)

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1) Disclaimer

Before you begin with the kit and assembly, we have some legal information for you. Please read the disclaimer carefully. Thank you for your understanding. The right of withdrawal and return expires as soon as you have opened the DIY kit and you have soldered the included circuit boards or populated the front panels. The DIY kit can only be returned to us in an unused condition. The buyer is responsible for the return shipping costs. The warranty is limited to the components included in the DIY kit. Any warranty claims will be passed on to our suppliers (supply chain verification) in accordance with product liability law. The warranty is void in the event of improper use or application, such as soldering electronic components at excessively hot temperatures or for too long, which can inevitably lead to damage or total loss of the components.

Nicole Effendy (Designvorsprung) and Thomas Effendy (Musikandmore) are free from any legal claims that may result from injuries caused by the assembly, soldering and improper use of the NAVIPANEL V3 for Microdexed, as well as from health damage caused by inhaling soldering fumes.

This project requires **good soldering skills** and a certain degree of **soldering experience** , as well as **basic electronics knowledge** . Every electronics project depends on the tools and the care taken when soldering, including SMD soldering and soldering GND (ground) copper surfaces. Cold solder joints are the most common cause of failures in electronics. The same applies to unwanted solder bridges, e.g., caused by too much solder.

One important aspect of handling electronic components is the **ESD treatment** of semiconductor devices such as ICs, PSRAM, the Teensy 4.1, etc. We also know that not every electronics hobbyist or musician has an ESD (electrostatic discharge **) soldering** station **.** Unfortunately , such a discharge can cause irreversible damage to electronic components.

Tip: To avoid damage to the semiconductors, if possible, touch something metallically conductive, e.g. a radiator, before touching semiconductors in order to discharge static electricity.

This electronic circuit is designed for operation with USB 2.0, a 5V DC power supply (optionally with USB-C power), and the 16-pin Eurorack power supply (+5V and GND). Power banks and USB power supply work very well. However, the operating time depends heavily on the power bank's performance. The current consumption of the NAVIPANEL-V3 is currently approximately 250mA at 5V DC without any USB host devices connected.

A power supply with **3.7V LiPo batteries** is **not technically possible** , as the USB devices, the USB hub, and the analog components require 5V DC. Should the NaviPanel-V3 be used with LiPo batteries despite our recommendation, we will not be held responsible for any warranty claims and will not be held liable for any technical defects in the NAVIPANEL-V3 for Microdexed or other technical devices!

LiPo 3.7V batteries are not safe to **handle and should only be used by professionals with appropriate electronics knowledge.**

2) Soldering recommendations and tips

Use only **lead-free solder** with a diameter of 0.7 mm - 1.0 mm, e.g., from STANNOL KS115 Sn99.3Cu0.7 d=1.0 mm (Made in Germany). The KS115 solder wire contains a **rosin-free** flux with synthetic resins.
Source / link to the product: **https://www.conrad.de/de/p/stannol-ks115-loetzinn-bleifrei-spule-sn99-3cu0-7-rom1-100-g-1-mm-588742.html**

Another point is **soldering fume extraction** .
Inhaling soldering fumes through the mouth and nose is harmful to health. Therefore, please ensure that the soldering fumes are effectively extracted from the soldering joints and that the room is well ventilated. Soldering fumes irritate the nasal mucosa—unfortunately, this isn't immediately noticeable—and anyone who assembles and solders a lot of circuit boards should, in their own interest, ensure that they have good soldering fume extraction. A highly recommended soldering fume extraction system is the ZeroSmog Shield Pro from Weller. It's not a bargain, but it's very effective.
Source / link to the product: **https://www.reichelt.de/de/de/shop/produkt/loetrauchabsaugung_zerosmog_shield_pro-371544** ,

The soldering iron should have a power rating of at least 30 VA, preferably 70 VA, and, if possible, an adjustable soldering temperature setting in the range of 275°C to a maximum of 375°C. Cleaning the soldering tip with a copper mesh and a sponge (filled with water) is necessary to remove any scale residue from the soldering tip.

3) Work preparation – assembly and soldering

We recommend the following **electronic tools and accessories** :

- Electronic side cutters and electronic flat-nose pliers
- Small slotted or Phillips screwdriver
- Allen key (Allen) 2mm (M3x5/6 ISK screws)
- 5.5mm (M3) socket wrench or 5.5mm open-end wrench
- 8mm (M6) socket wrench for hexagon nuts for the TRS 3.5mm jacks in the front panel
- Solder (see **point 2**)
- Desoldering pump or desoldering copper wire 1.5mm wide (just in case)
- A multimeter to check the supply voltages, to adjust the DAC outputs and, if necessary, to measure the metal film resistors
- a small ESD tweezers (very useful for the PSRAMs)
- A heat-resistant silicone mat (min. DIN A4 format)
- Soldering fume extraction (see **point 2**)
- A "third hand" or electronic vice (e.g. Bernstein Spannfix Vario 9-250 ESD) or similar.
- Source / Link to the product: **https://www.bernstein-werkzeuge.de/produkte/produktdetails/9-250-esd-kugelgelenk-kombination-vario-6-tlg**

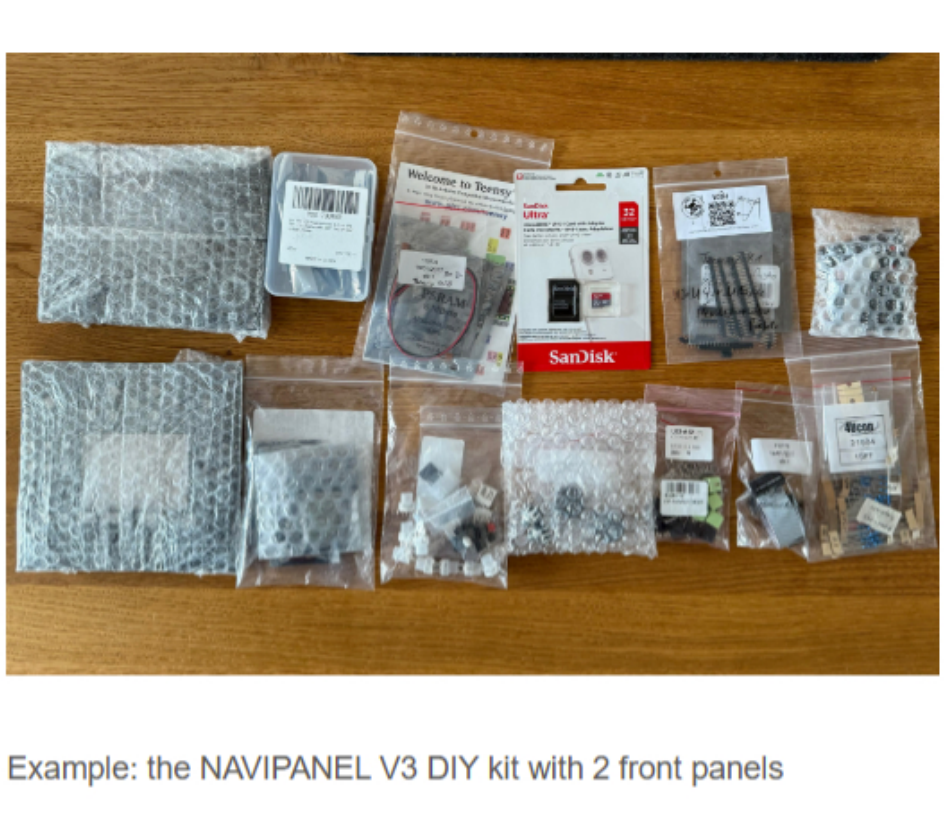
4) GND – Soldering of GND pads and areas

The **GND pins** require very good heat distribution for a clean soldering joint, so if possible, heat the soldering pad and the component pin at the same time and add a very small amount of solder. The soldering is "good" when the solder flows "voluntarily" into the via.

A quick tip: In general, less (solder) is more. The larger the solder ball, the more likely it is to have a cold solder joint! The fact that the GND pins are harder to solder than the other pins is due to the copper surfaces on both sides of the GND and their high heat dissipation on the circuit board. However, the electrical advantage of good mass distribution on the soldering and component sides outweighs this.

5) Preparation and sorting of components

Note:
We assume that you already own the NAVIPANEL V3, as this is a hardware extension for the NAVIPANEL V3 mainboard from version V3-R05-v526 or newer.



Example: the NAVIPANEL V3 DIY kit with 2 front panels

Sort components by type:

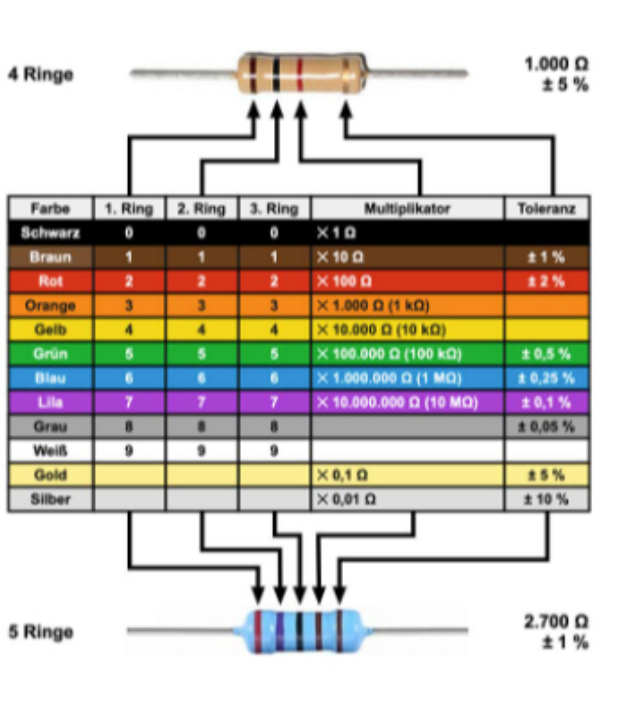
Resistors, capacitors, electrolytic capacitors, diodes, coils, ICs, LEDs, DIP switches, USB-A sockets, other plugs and sockets, studs, screws, hex nuts, and washers. With our special **test software for the Navipanel V3 hardware,** you can test and calibrate the DAC CV outputs. The latest software available at the time of delivery can be downloaded from our website under **" Downloads."**

Resistance determination using the color code table

The resistors are labeled on the paper tape. We only supply metal-film resistors with 1% and 0.1% tolerances. The color coding table can be found here: Source: **https://www.elektronik-kompendium.de/sites/bau/1109051.htm**

The color code table

Before you start determining the resistance, you have to count how many colored rings are applied to the resistor. Carbon film resistors usually have 4 rings. **Metal film resistors have 5 rings** . For resistors with 5 rings, the resistance value is specified a little more precisely. Then you have to determine which ring is the first. Usually you try to find out which ring is the last ring. This is the tolerance ring, which indicates how high the determined resistance value can deviate from the actual resistance value. The tolerance ring is usually gold. If this color is not available, you have to pay attention to the two outer rings. Usually one is further away from the end of the body. This is the tolerance ring. Then you start putting the resistance value together from the beginning. The colors have specific values. The first and second rings determine the resistance counter (4 rings for a carbon film resistor). The third ring acts as a multiplier. It determines how high the resistance value is. The fourth ring is the tolerance ring, which determines the deviation of the resistance value (for carbon film resistors, 4 rings).


4 Ringe
1.000 Ω ±5 %
Farbe
1. Ring
2. Ring
3. Ring
Multiplikator
Toleranz
Schwarz
Braun
Rot
Orange
Gelb
Grün
Blau
Lila
Grau
Weiß
Gold
Silber
5 Ringe
2.700 Ω ±1 %

Resistance determination using the color code table

6) Equipping the Midi to CV Breakout Board

Please decide now whether the Midi to CV / Pedal-USB breakout should be configured for desktop or Eurorack!

This decision is now necessary because the fully populated desktop version doesn't fit between the Eurorack module rails (max. 112.11 mm). The 5 sockets at the front, the 2 TRS 6.35 mm, and the 2 USB-A connectors at the rear extend beyond the edge of the circuit board (h = 111.76 mm) (114.62 mm). There's just enough space in the desktop case… unfortunately, not in the Eurorack.

1. The Eurorack version requires the **8HP MIDI to CV / Pedal-USB front panel** , otherwise the connectors and LEDs are missing!

2. The **Eurorack version omits** the following components:

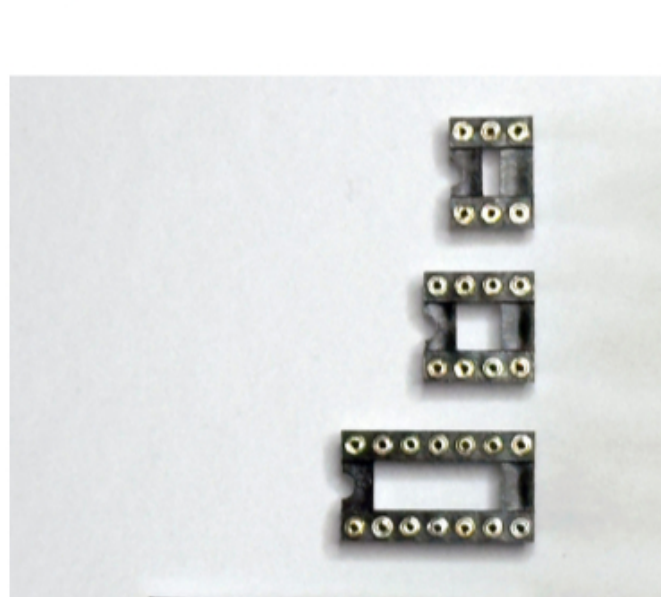
- 3.5mm TRS sockets GATE_OUT, CV-OUT-A, CV-OUT-B, CV-OUT-C, CV-OUT-D
- LED2 GATE_OUT
- LED1 PWR 5V
- R1 series resistor for LED1
- R29 series resistor for LED2
- X1, X2 TRS connectors 6.35mm 1/4" (rear pedal connectors)
- X5A USB-HOST and X4A USB-4 (USB ports at the rear)
- X19 16-pin angled header (power is supplied via the mainboard)
- the cover panel for the desktop case **MIDItoCV-PANEL-Jacks-v26** is omitted

3. For the **desktop version** , proceed as described from **point 6.1** .

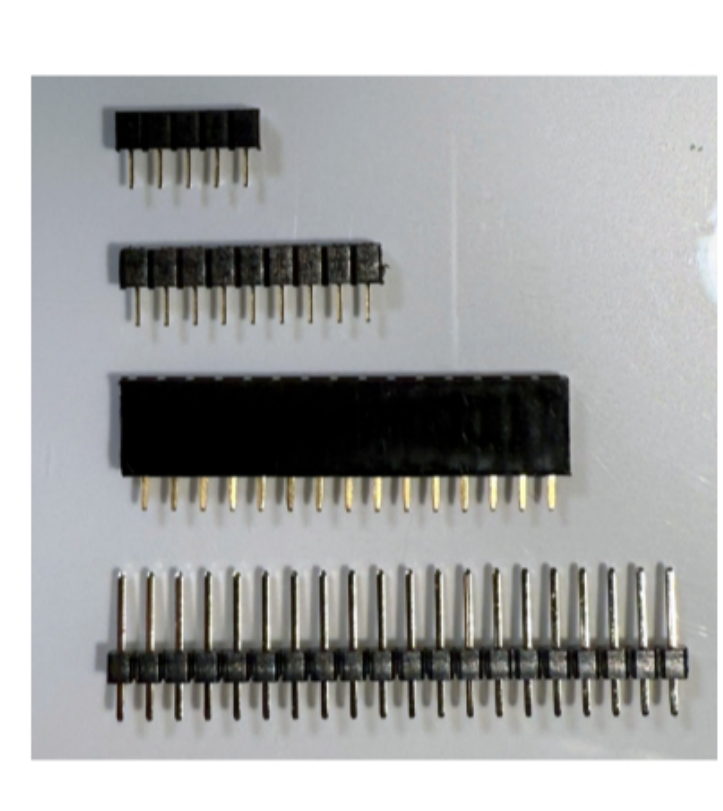
- **IMPORTANT:** The X19 16-pin angled header is not installed in the desktop version either (power is supplied via the motherboard).

6.1) Further assembly of the Midi to CV Breakout Board

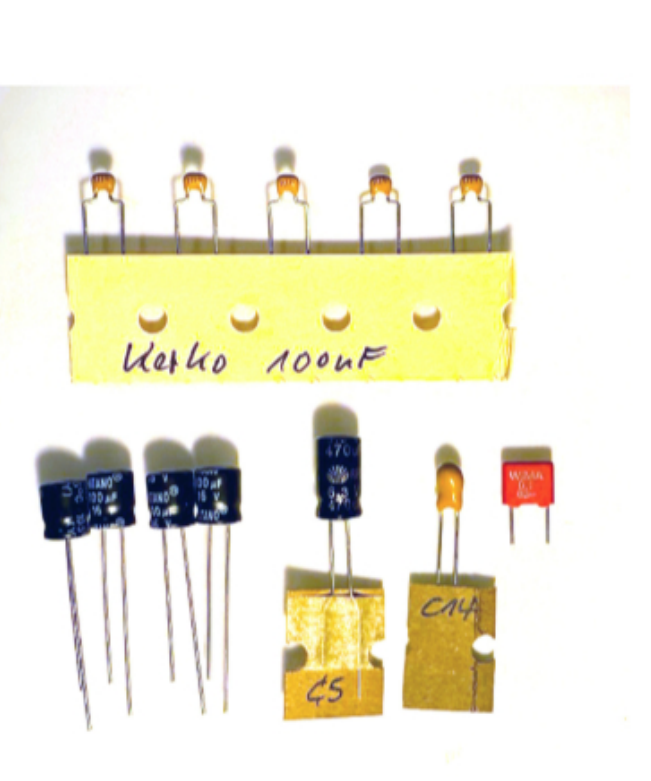
All ICs are socketed with high-quality machined sockets. All other components (breakouts), such as the MCP4728 DAC, are mounted on low-profile 2.54 mm pitch female headers and are assembled with 2.54 mm pitch headers.



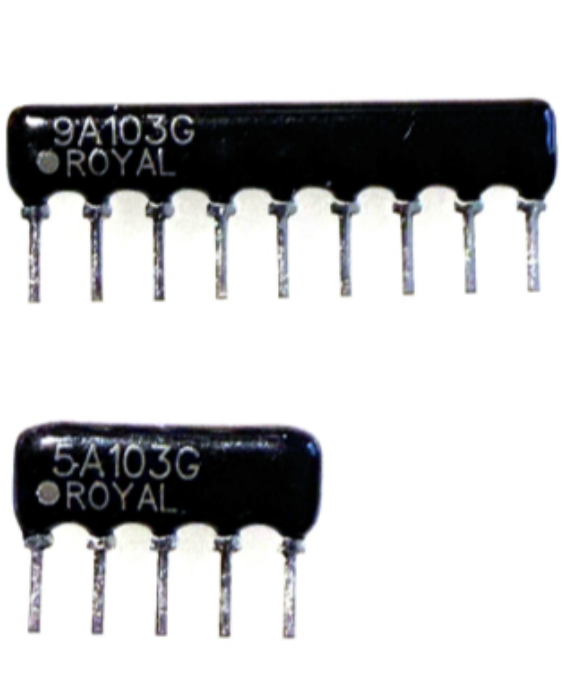
IC sockets 6/8/14/28 pin



Male (low-profile) socket strips RM2.54



Example: Kerkos/Elkos

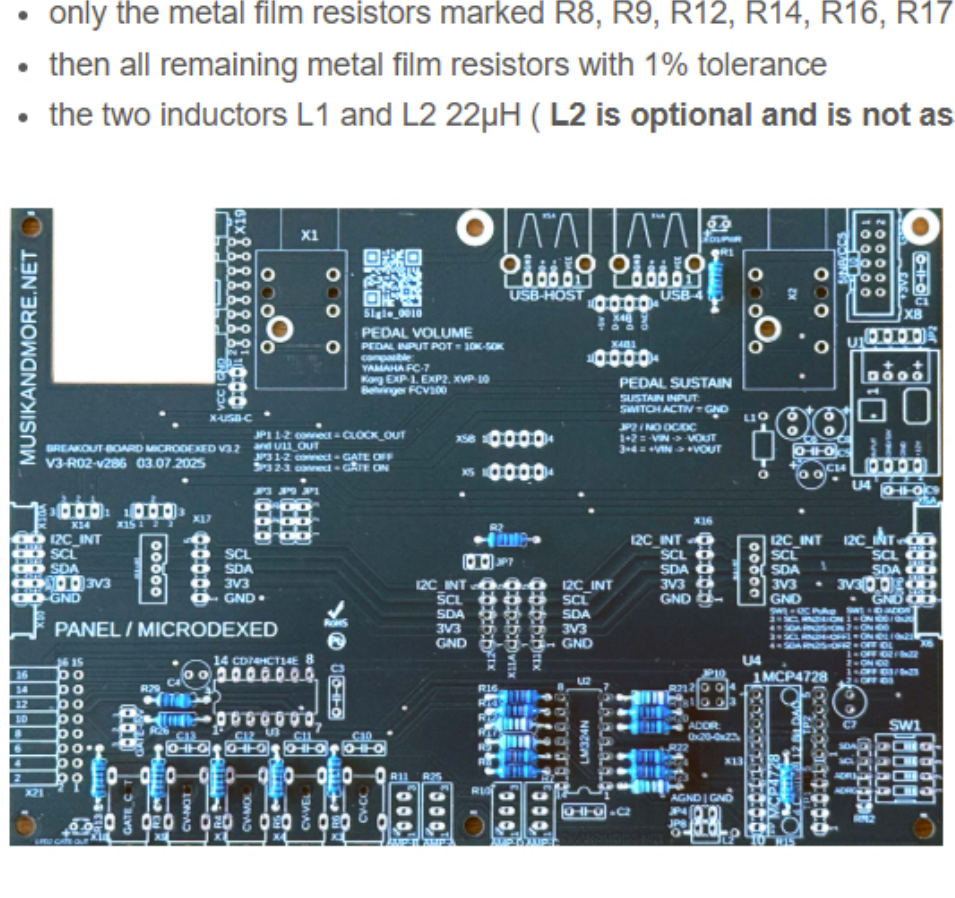


Dot = PIN1 – RN2/10K 5-Pins

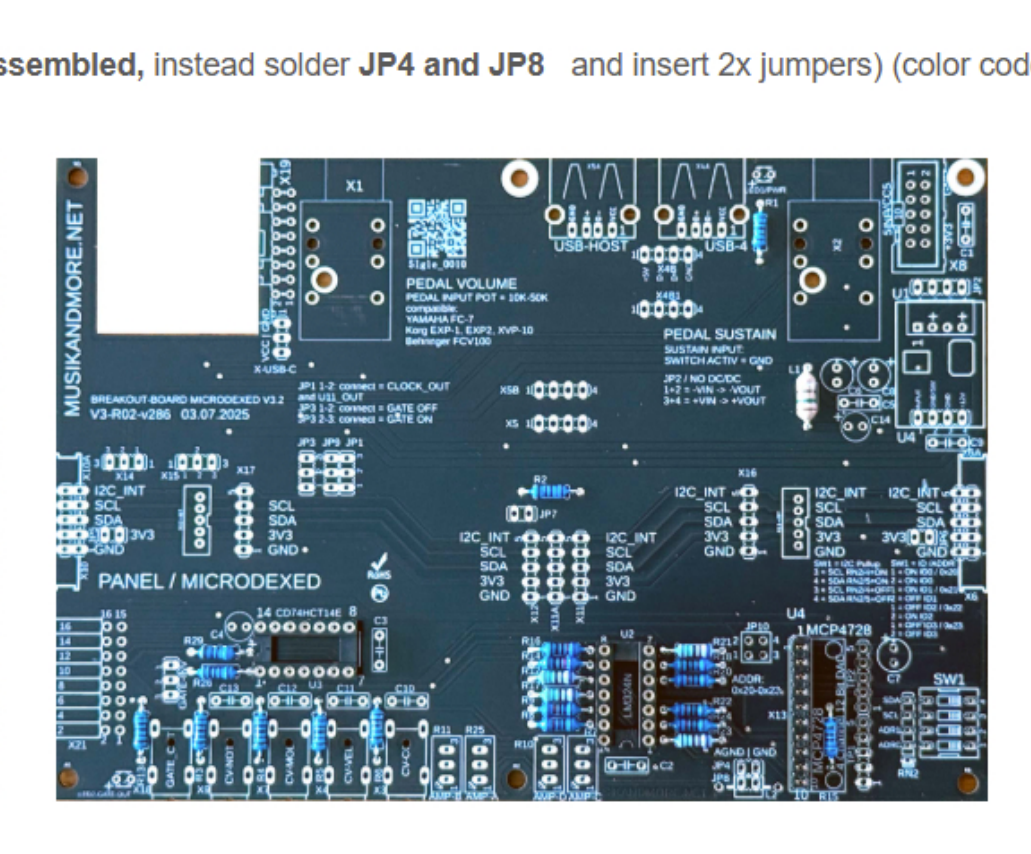
7) Assembly of components resistors, coils

Due to its design, the MIDI-to-CV breakout board is plugged into the back of the mainboard (solder side). Components are normally mounted on the component side. All components are mounted and soldered according to their height:

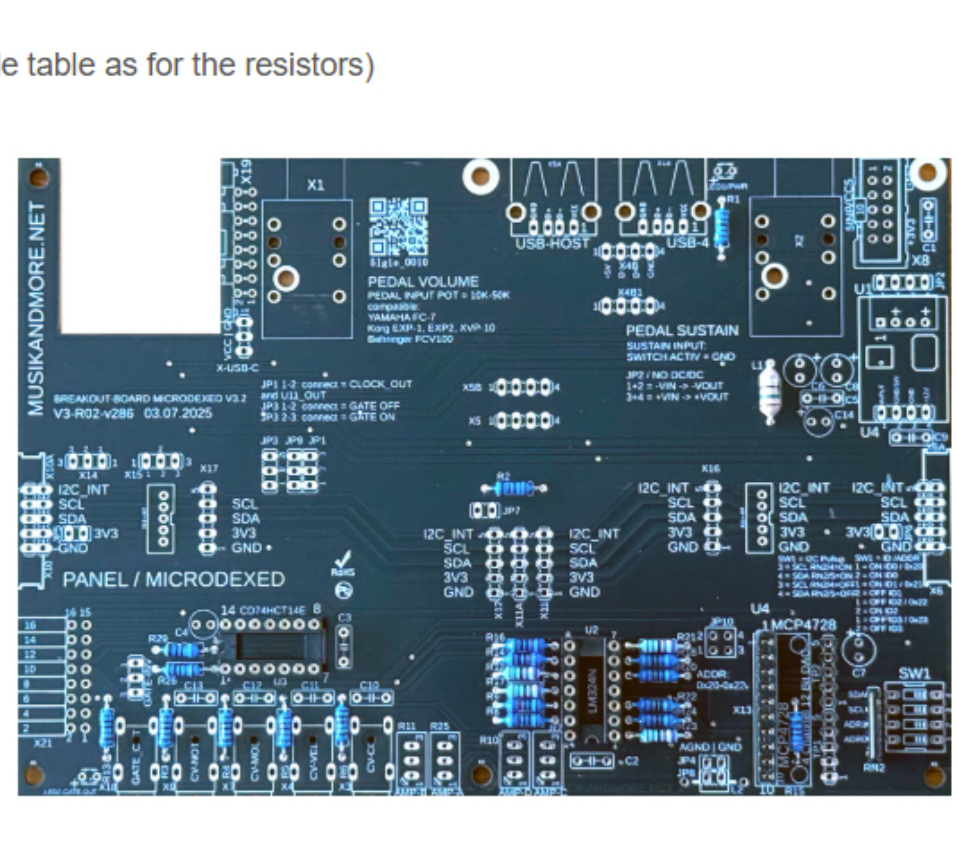
- first the metal film resistors (all labeled on the paper tape)
- only the metal film resistors marked R8, R9, R12, R14, R16, R17, R18, R20, R21, R22, R23 and R24 with **0.1% tolerance**
- then all remaining metal film resistors with 1% tolerance
- the two inductors L1 and L2 22µH (**L2 is optional and is not assembled,** instead solder **JP4 and JP8** and insert 2x jumpers) (color code table as for the resistors)



Assembly of metal film resistors 0.1% and 1%



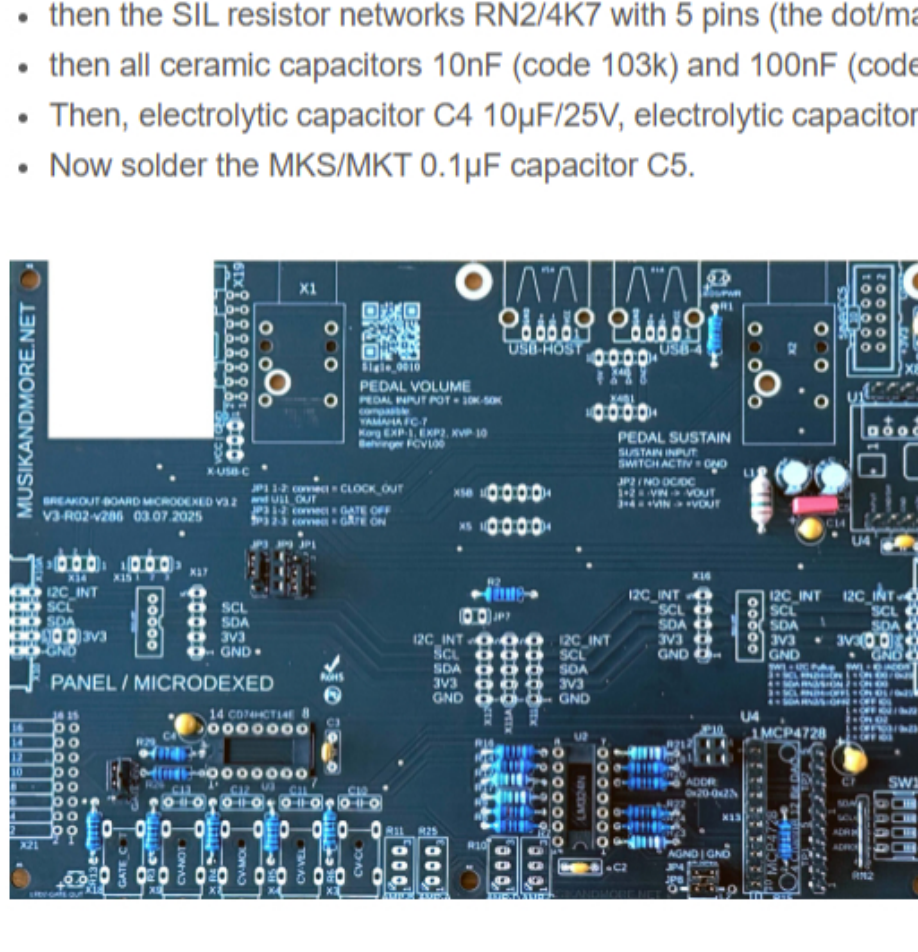
IC sockets 14-pin / 10-pin low profile socket strip



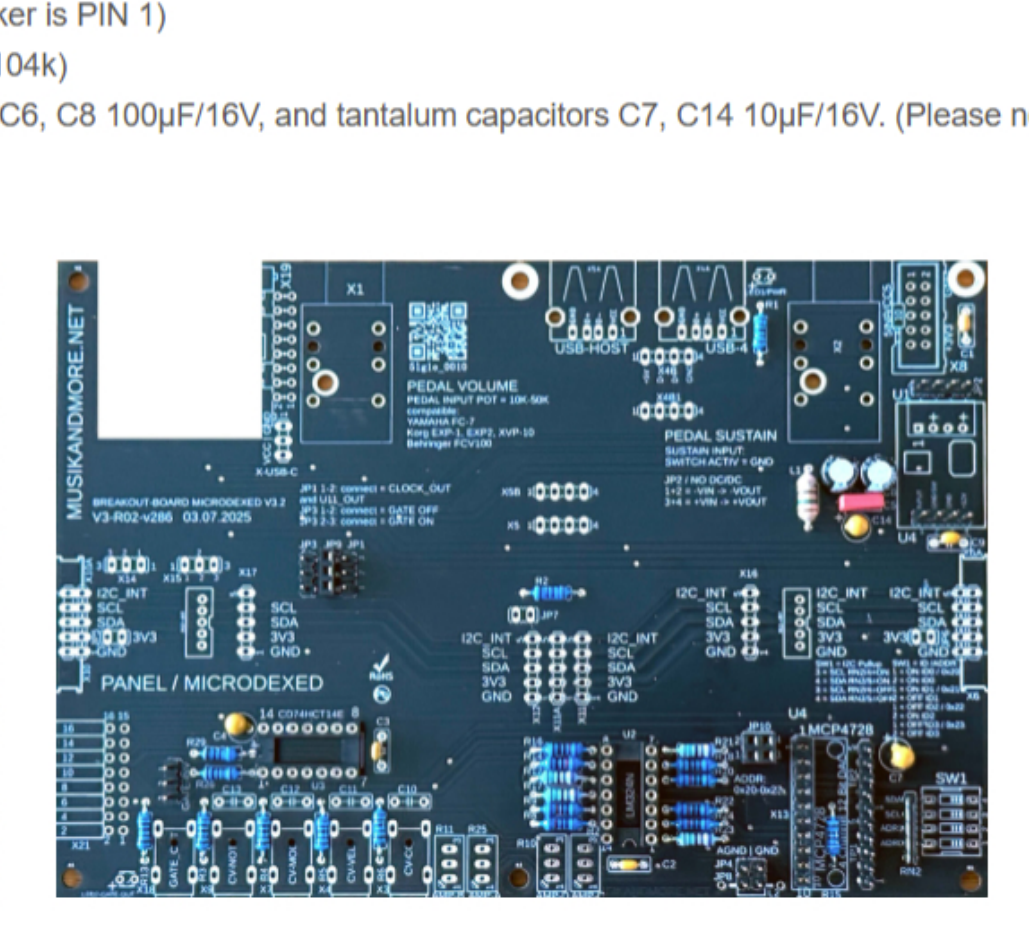
Dot = PIN1 – RN2/10K 5-Pins

8) Assembly of components SIL network, IC sockets, capacitors

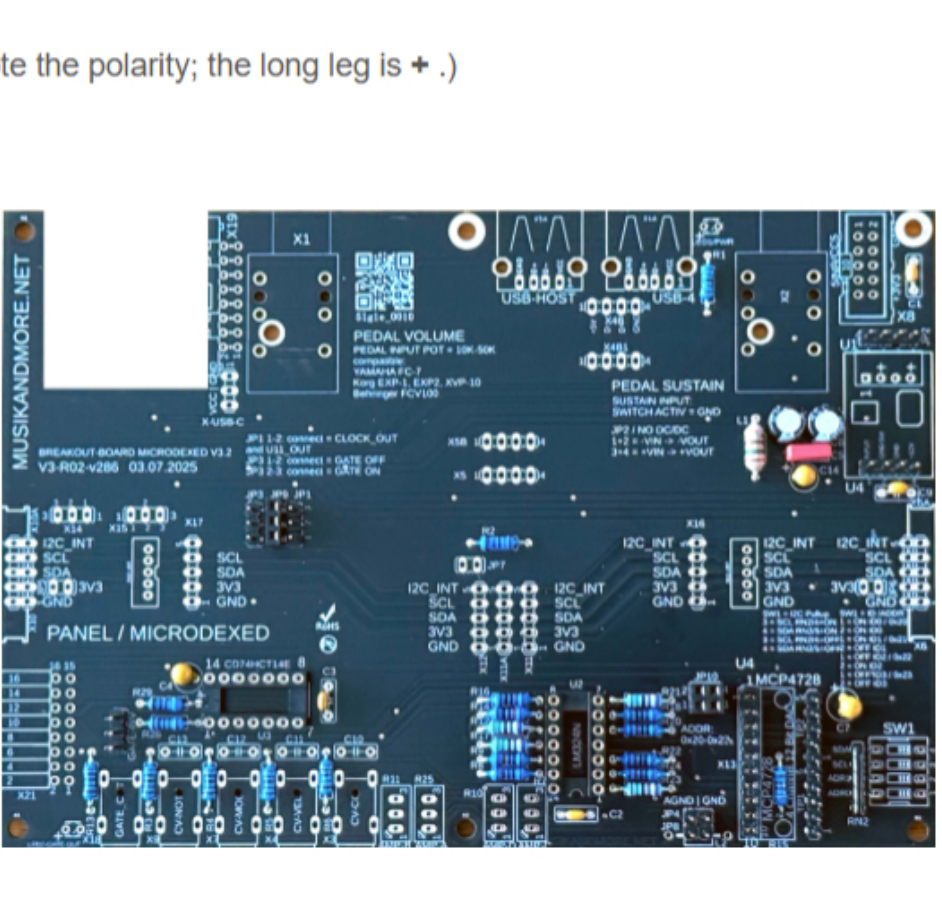
- then all IC sockets 14-pin and 10-pin low profile socket header GY-MCP4728 (DAC 12Bit 4 Channel)
- then the SIL resistor networks RN2/4K7 with 5 pins (the dot/marker is PIN 1)
- then all ceramic capacitors 10nF (code 103k) and 100nF (code 104k)
- Then, electrolytic capacitor C4 10µF/25V, electrolytic capacitors C6, C8 100µF/16V, and tantalum capacitors C7, C14 10µF/16V. (Please note the polarity; the long leg is **+** .)
- Now solder the MKS/MKT 0.1µF capacitor C5.



Coil L1, electrolytic capacitors, ceramic capacitors, tantalum capacitors and MKS film capacitor C5



Components JP1, JP3, JP9 (3-pin female connector) JP10 (2x2-pin female connector) Jumper GATE INV

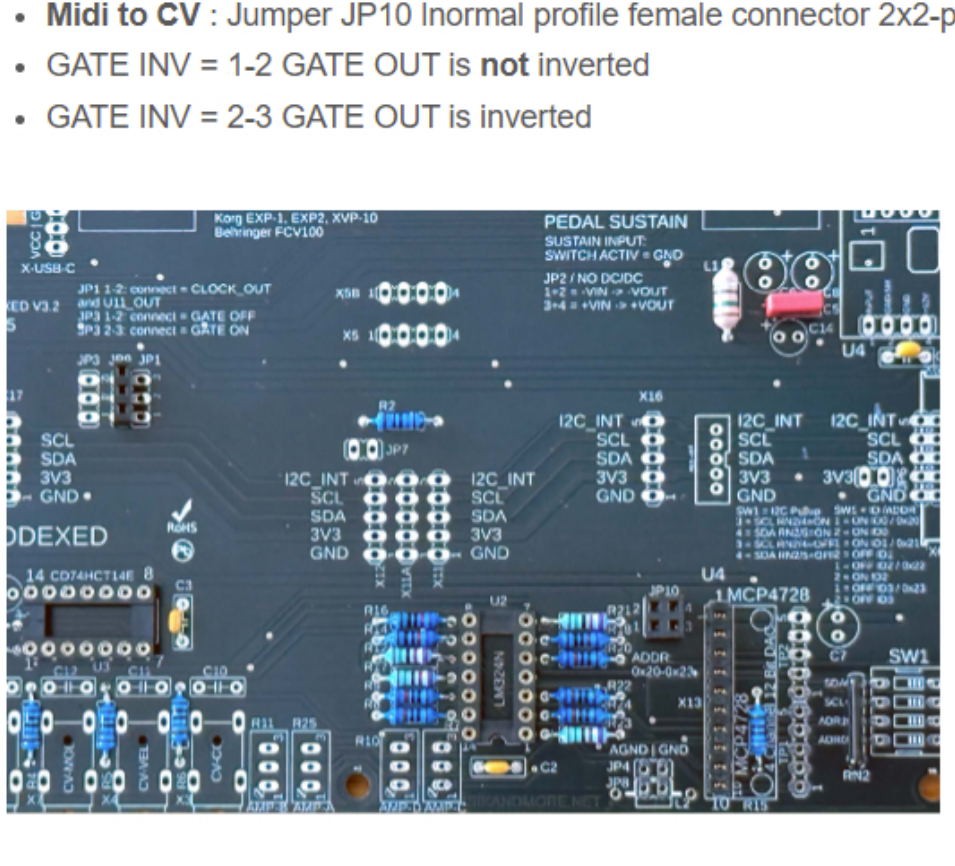


Low Profile Socket Headers for MCP4728 DAC 12Bit 4 Channel

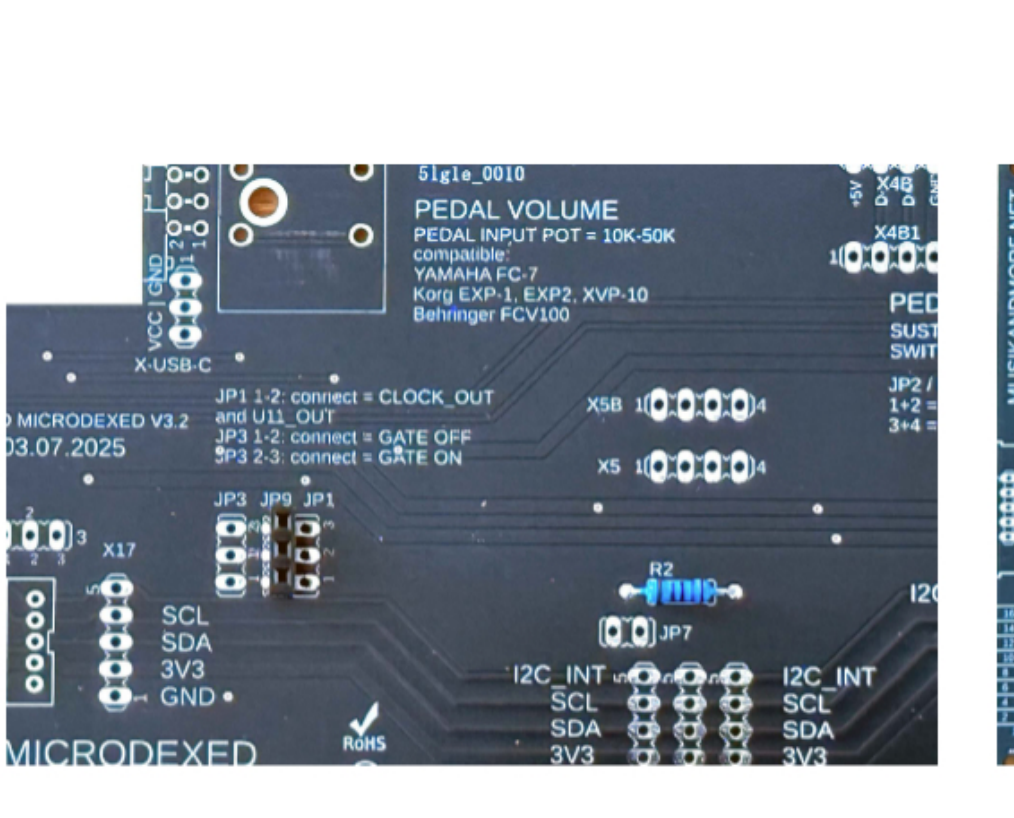
Here, too, it's important to solder in with a small amount of solder first , and be sure to prevent any solder from bleeding through! **Inserting header pins** is a good way to prevent solder from bleeding through and to align the female headers parallel.

9) Component assembly – connectors for MIDI-to-CV and PEDAL-USB options

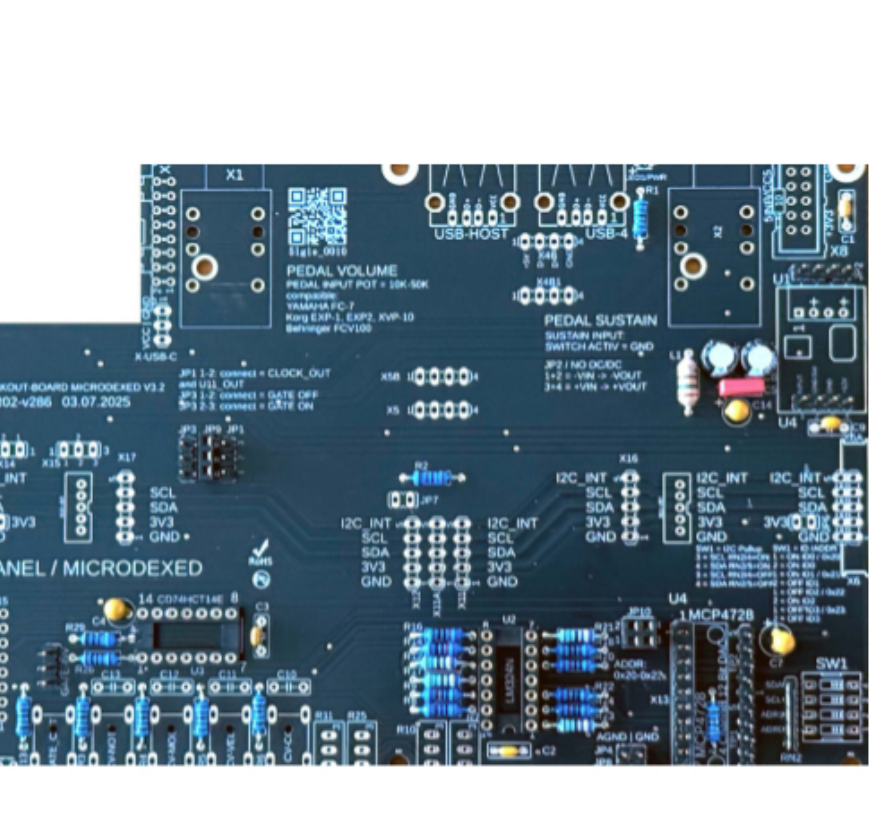
- Normal Profile sockets and connector strips for Midi-to-CV and Pedal-USB Breakout
- **Mainboard** : Jumper JP9 long (14.6mm) connector strip 1x3-pin. 1-2 = CLOCK OUT / 2-3 = SPDIF OUT
- **Midi to CV** : Jumper JP9 normal profile socket strip 1x3pol. JP1 1-2 = CLOCK OUT / JP1 2-3 = SPDIF OUT
- JP3 1-2 = GATE ON (alternatively SPDIF OUT via 8TE front panel and JP3 2-3 = GATE OFF)
- **Mainboard** : Jumper JP10 long (14.6mm) 2x2-pin connector for MCP23017 (1-2 = 0x20 address 0 / 3-4 = 0x20 address 1)
- **Midi to CV** : Jumper JP10 normal profile female connector 2x2-pin for MCP23017 (1-2 = 0x20 address 0 / 3-4 = 0x20 address 1)
- GATE INV = 1-2 GATE OUT is **not** inverted
- GATE INV = 2-3 GATE OUT is inverted



Midi to CV: Jumper JP10 normal profile female connector 2x2-pin.
1-2 = 0x20 address 0 (MCP23017)
3-4 = 0x20 address 1 (MCP23017)



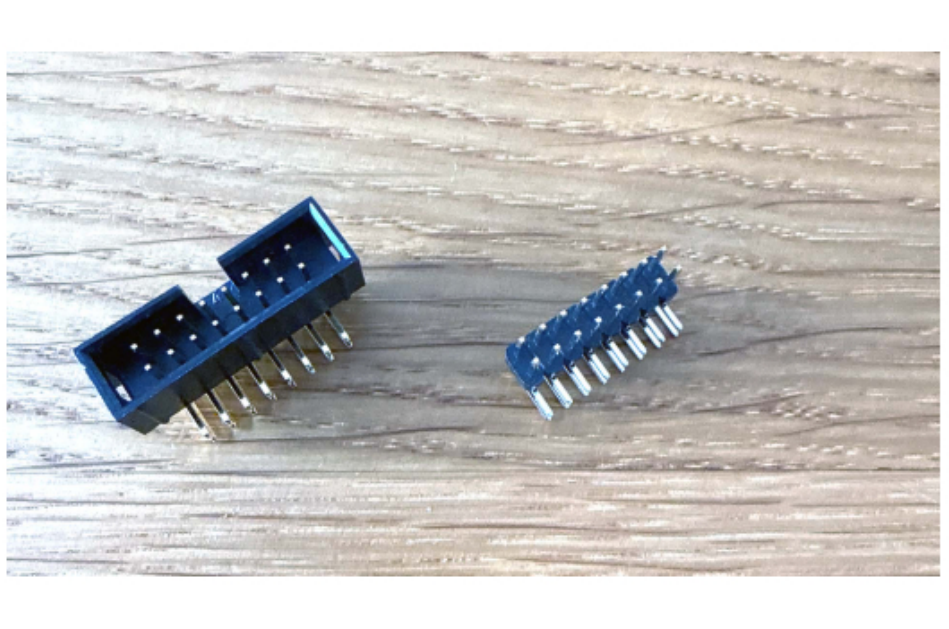
Midi to CV: Jumper JP9 normal profile socket strip 1x3pol.
1-2 = CLOCK OUT
2-3 = SPDIF OUT



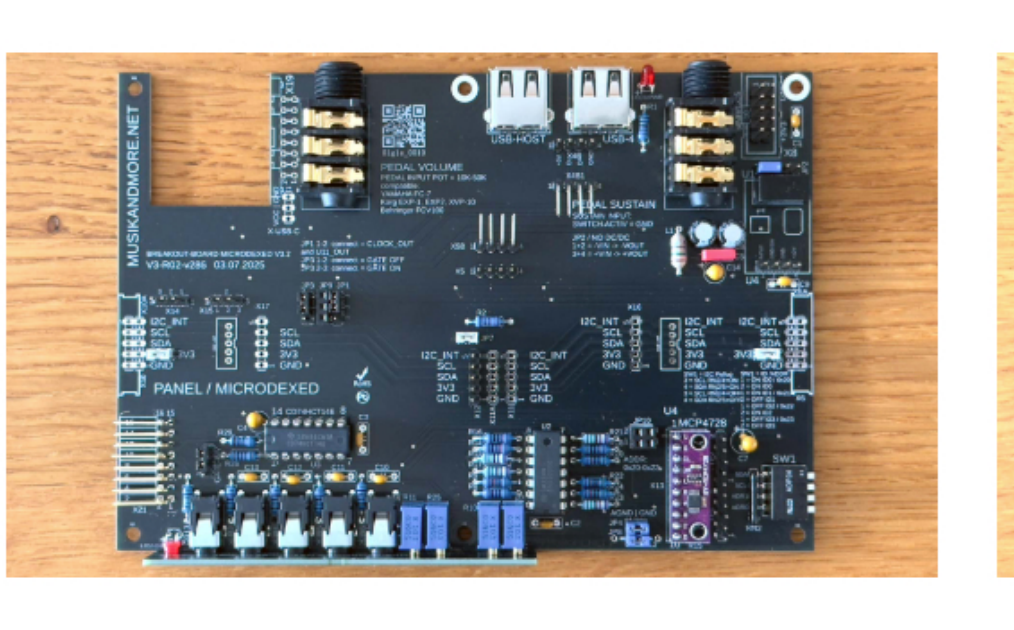
Overview: Jumper, plug and socket connectors assembly

10) Component placement: Eurorack 16-pin X19 / USB-C / 16-pin connector strip X21

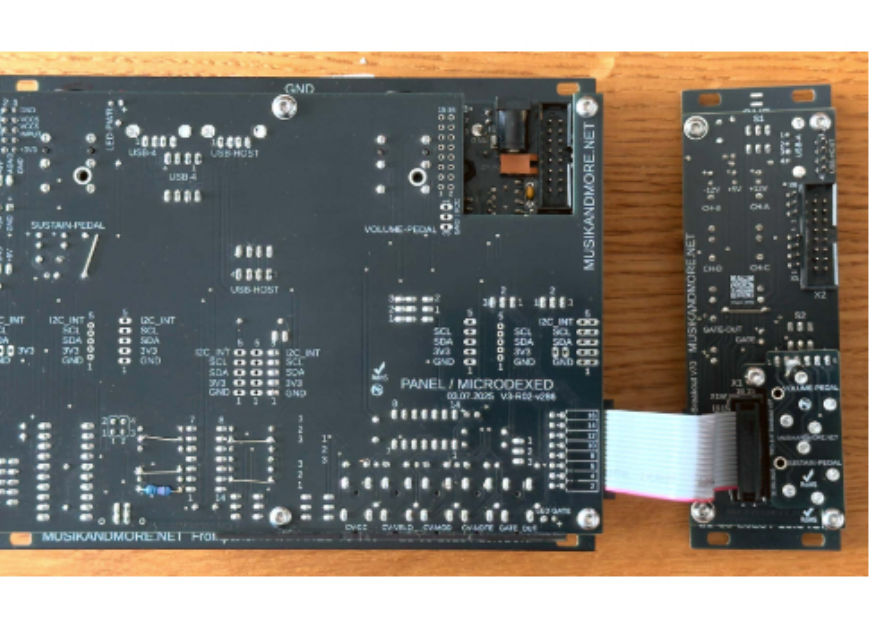
- **IMPORTANT: The X19 16-pin angled header is not installed** in the desktop version either (power is supplied via the motherboard).
- The 16-pin (2x8-pin) 90° pin header X21 is for the connection to the **8HP front panel for MIDI to CV** or **pedal/USB front panel** and should be soldered **to the installed mainboard using a 10cm ribbon cable** . The IC U8 (mainboard) is located directly above the connector, and there's **not a millimeter** of space between the boards!
- The X-USB-C connector is only required with a USB-C PD charger. It's not required, as the power is already supplied via the NAVIPANEL V3 mainboard.



On the left is the 16-pin box header X19 for Eurorack (**do not equip!**) and on the right is the 16-pin 90° connector X21 for the connection to the **8HP front panel for Midi to CV** or **Pedal / USB front panel**



Bottom left: 16-pin (2x8-pin) 90° connector strip X21 is for the connection to the **8HP front panel for MIDI to CV** or **pedal/USB front panel** .

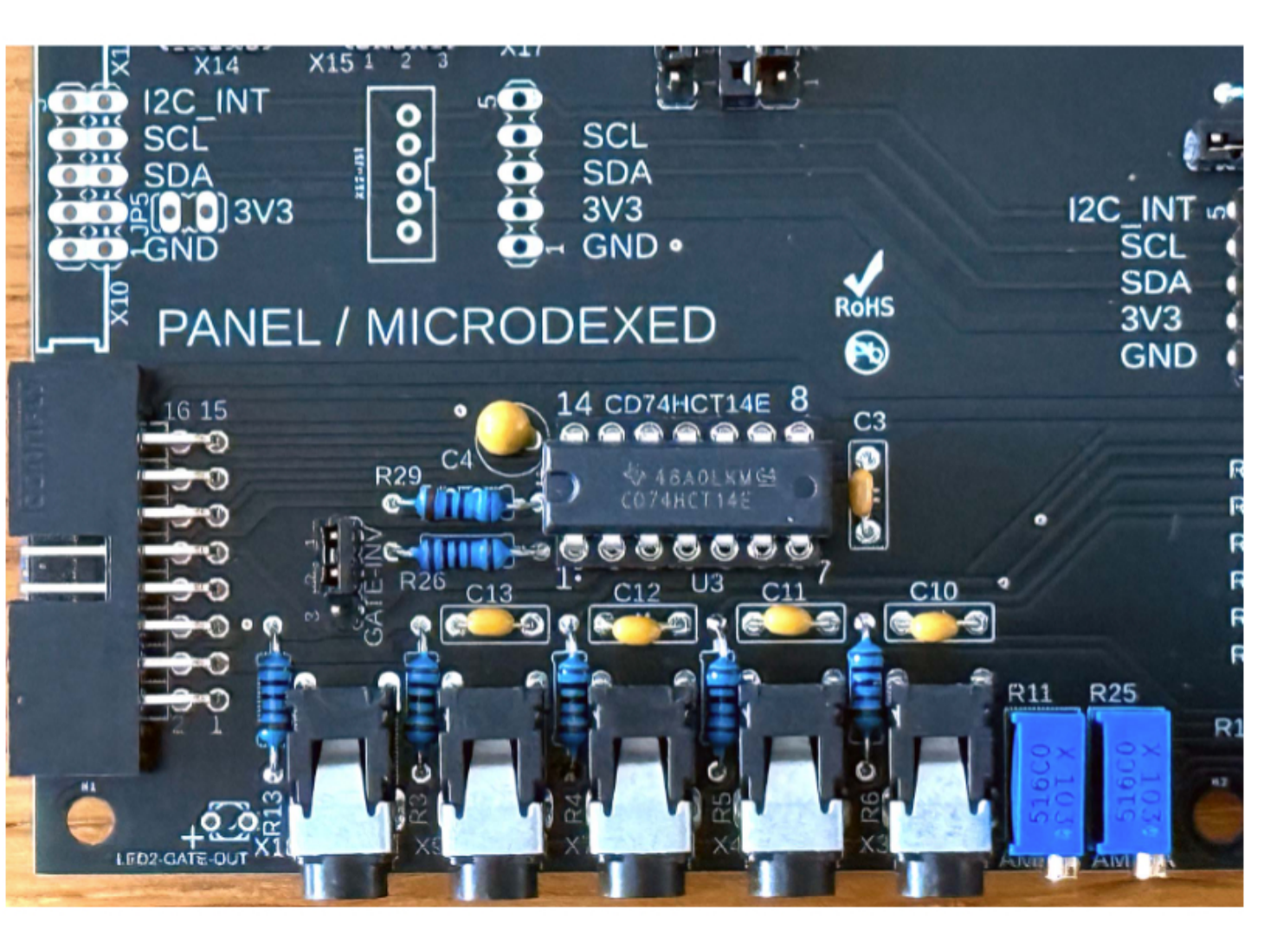


Rear / solder side: **Midi to CV** with plugged ribbon cable (10cm) for the **8TE front panel for Midi to CV**

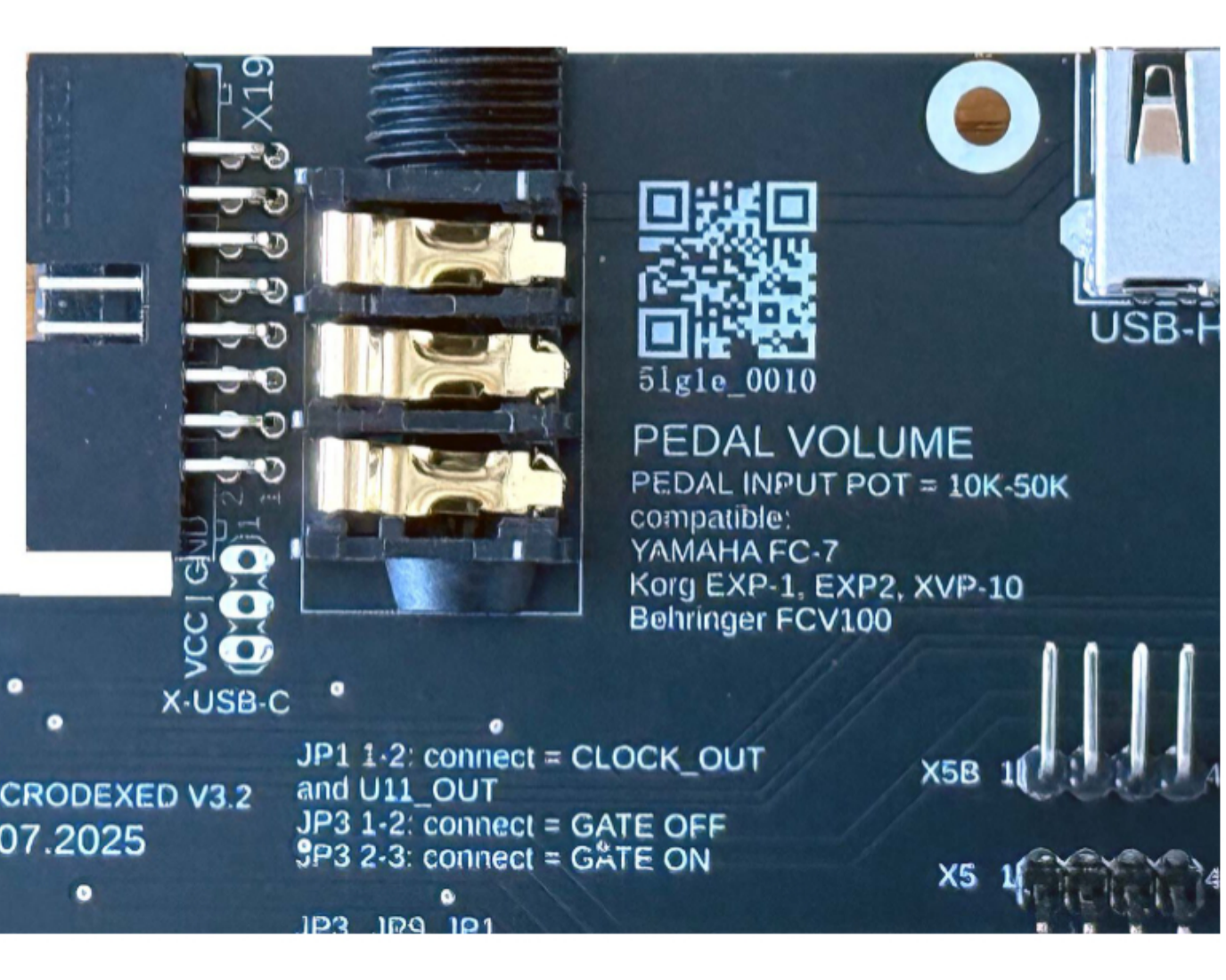
11) Assembly of the TS/TRS sockets / USB-A4 / USB-HOST / DIP switch

Now the 3.5mm and 6.35mm (1/4") TS/TRS sockets, USB sockets and the DIP switch I2C-ADDR are soldered in.

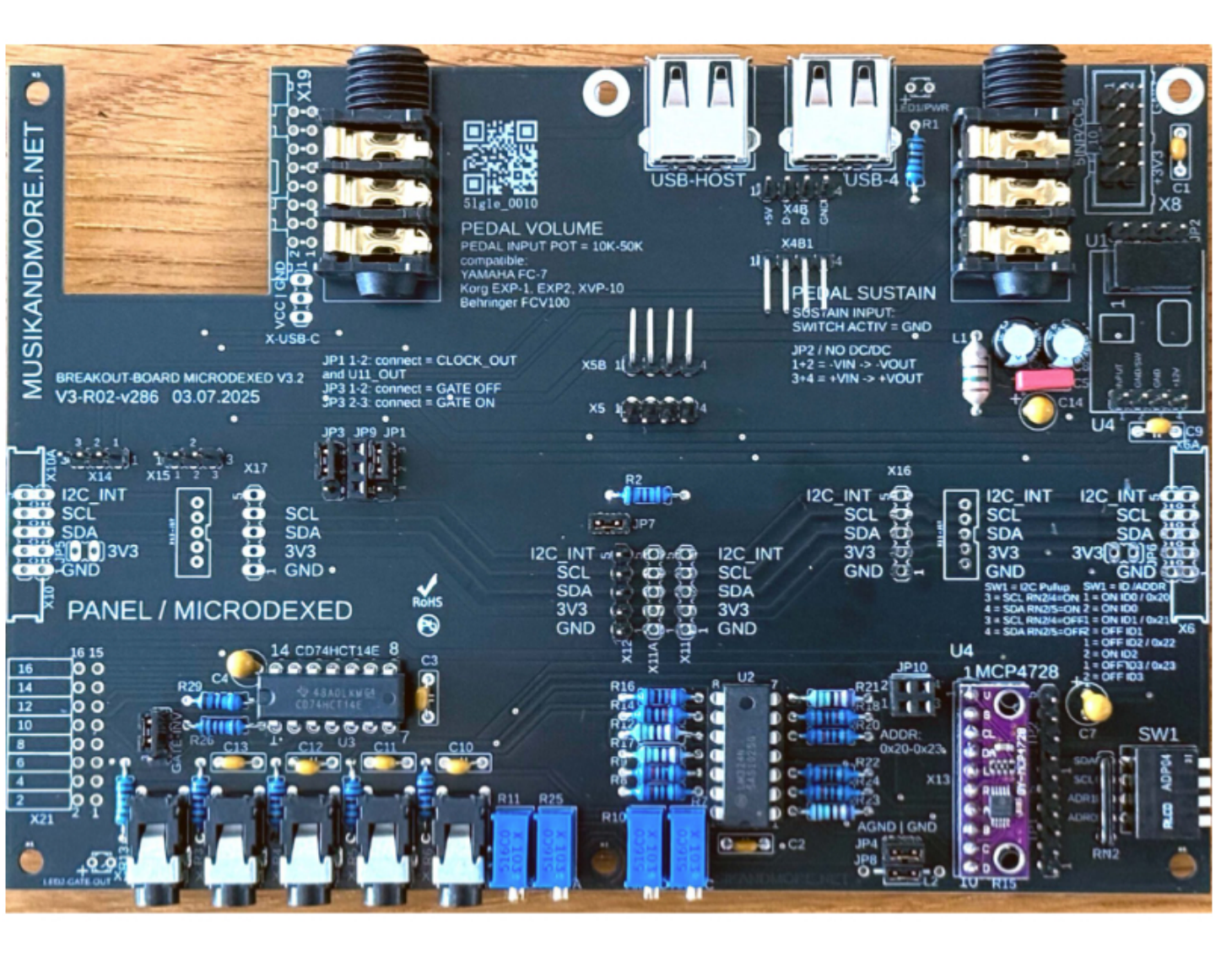
- Solder USB A4 and USB-Host 90° print sockets… **DO NOT use on EURORACK and 8HP front panels!**
- Solder in the DIP switch I2C-ADDR.
- 2x TRS- (black) 6.35mm for pedal volume and pedal sustain… **DO NOT use on EURORACK and 8HP front panel!**
- 5x TRS 3.5mm mini jack sockets for CV-OUT Channel AD and GATE OUT… **DO NOT use on EURORACK and 8HP front panels!**
- Then briefly bend the 3mm LEDs LED2 GATE OUT and LED1 PWR 5V, ensuring correct polarity. The **long leg is the + anode** . The **+ anode of the LED** is marked on the board.
- With the DESKTOP version, the 3.5mm jack sockets and the LED2 can be precisely aligned using the included **MIDItoCV-PANEL-Jacks-v26** !



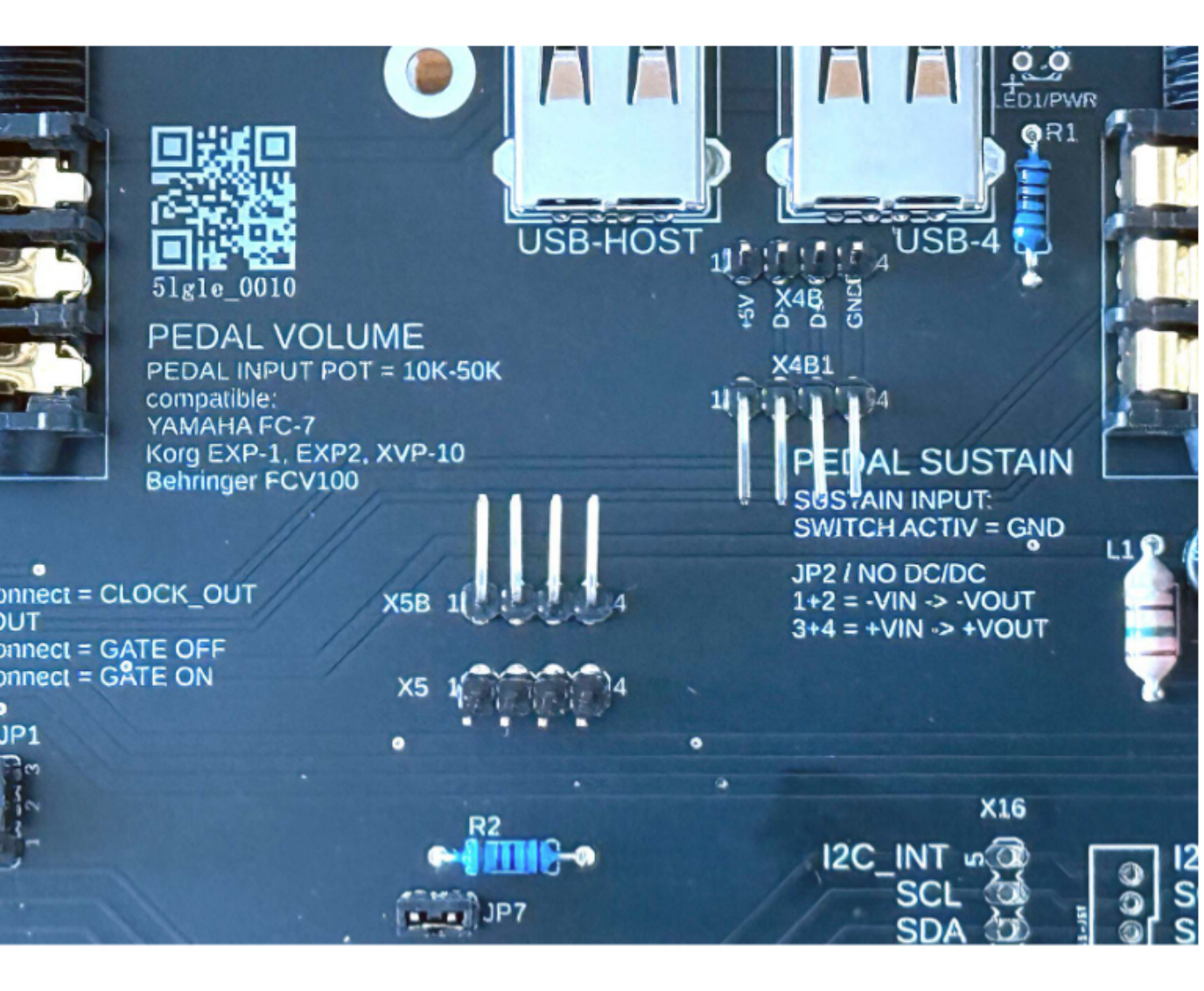
Example: 5x TRS 3.5mm mini jack sockets for CV-OUT Channel AD and GATE OUT, not yet LED2. The X21 box connector is for illustrative purposes only. Please fit the X21 connector strip **without** the "box"!



Example shows: PEDAL-USB PCB with the box connector and TRS 6.35mm for PEDAL Volume.



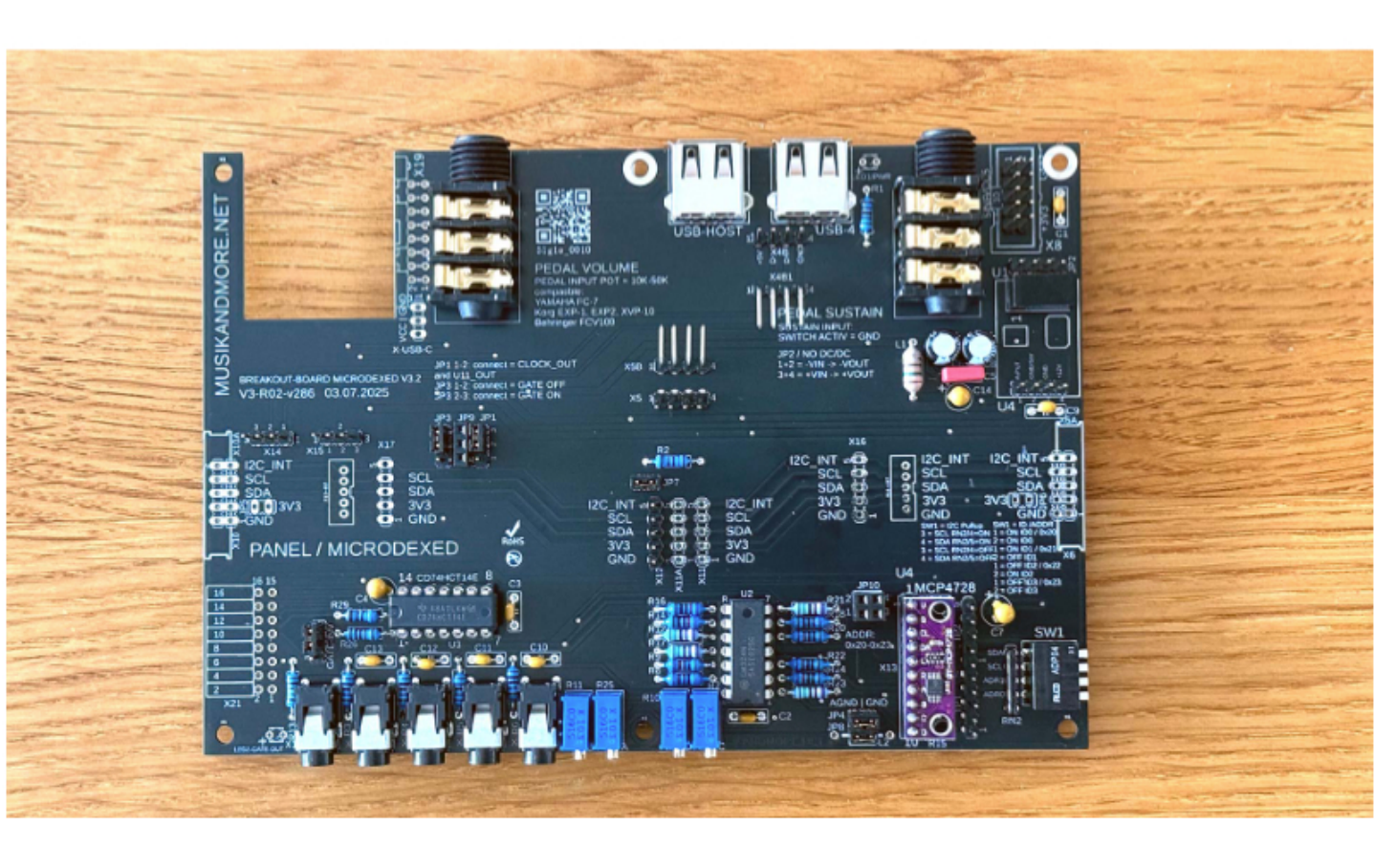
USB A Host | USB A4 | both TRS pedal jacks, DIP switch… **Completely assembled for desktop!**
See also **JP4 and JP8** (bottom left next to the MCP4728). **Insert 2 jumpers horizontally** (connects GND to AGND).



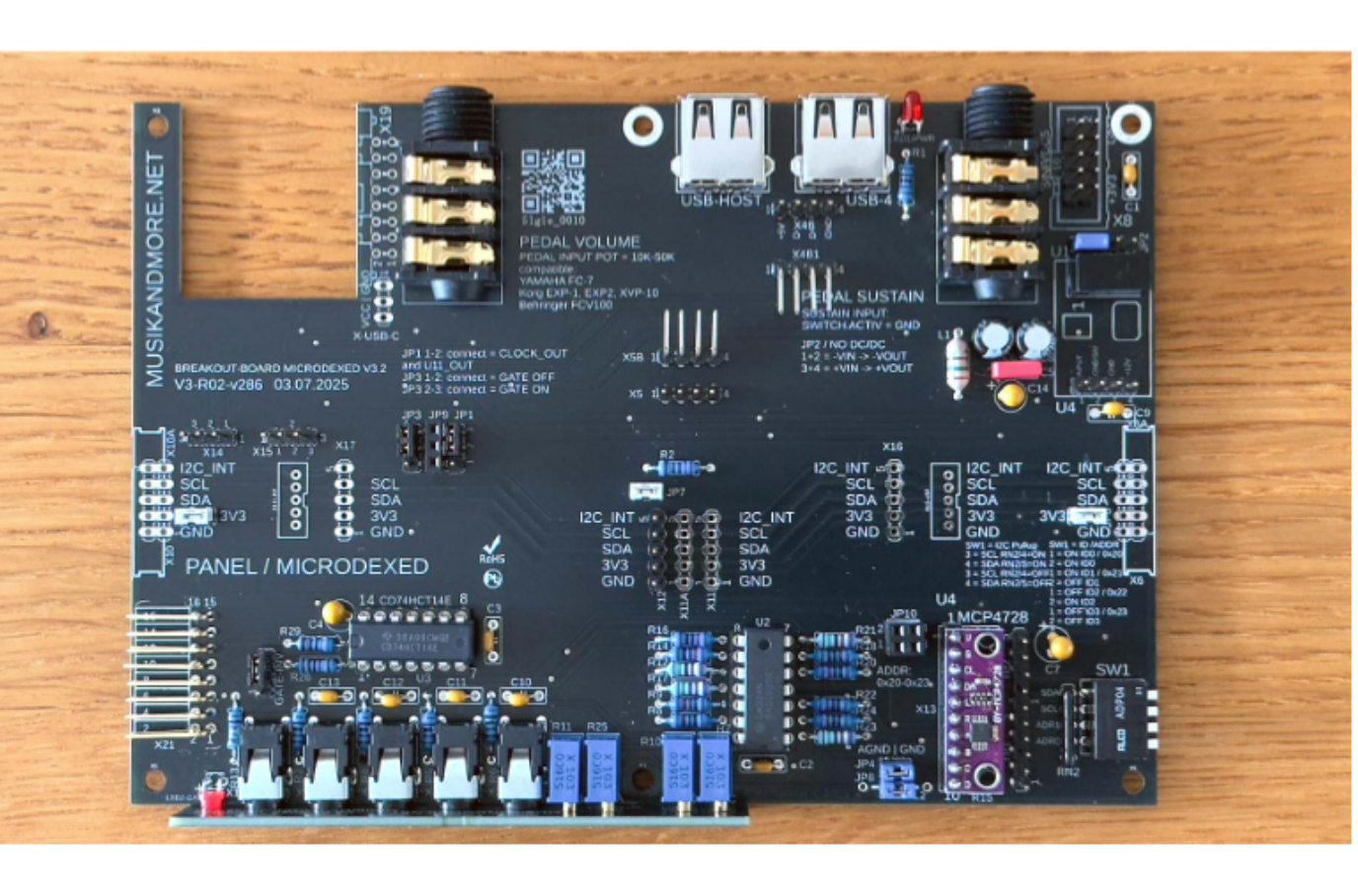
USB-A4 X4B1 = 4-pin 90° connector for cable to the 8HP front panel connector
. USB-HOST X5B = 4-pin 90° connector for cable to the 8HP front panel connector.
Note: Only one of the two USB ports is provided in the 8HP front panel!

12) Assembly of the ICs, the MCP4728 DAC, DC-DC converter and 4x trim potentiometers

- Mounting the MCP4728 on the 10-pin, low profile socket header
- the ICs U2 LM324N Quad OP-Amp and the U3 CD74HCT14E hex converter
- the TRACO DC-DC converter 5VDC – 12VDC 1W (VDD +12V for U2)
- 4 x 10K trim potentiometers for adjusting the CV outputs AD

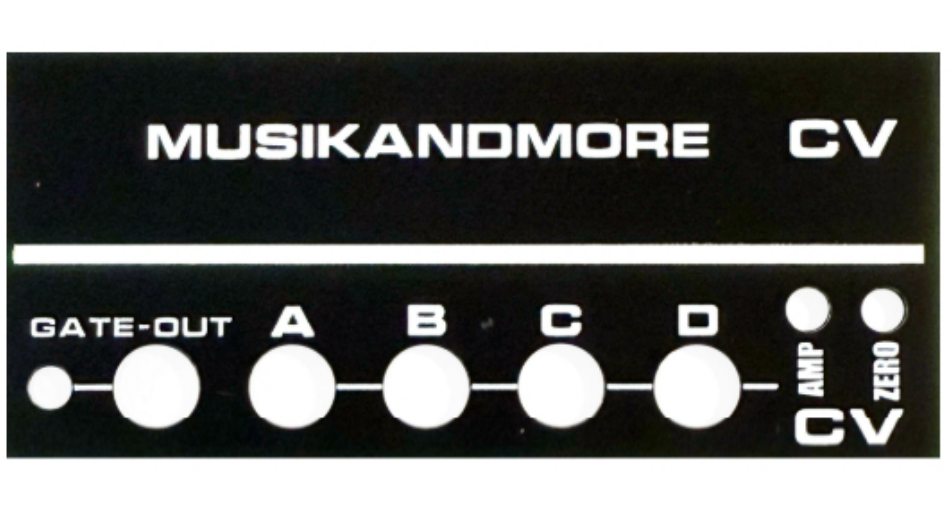


Assembly of the ICs, the MCP4728 DAC, DC-DC converter and 4x trim potentiometers

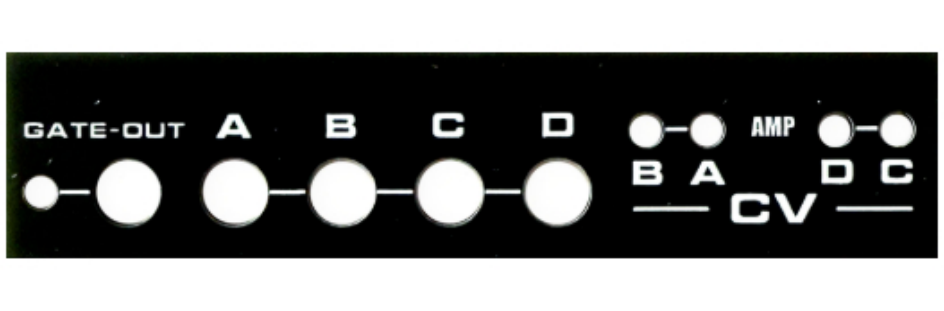


Complete assembly with ICs, the MCP4728 DAC, DC-DC converter and 4x trim potentiometers, the correct X21 connector strip **bottom left** (no box connector) and LED1 and LED2.

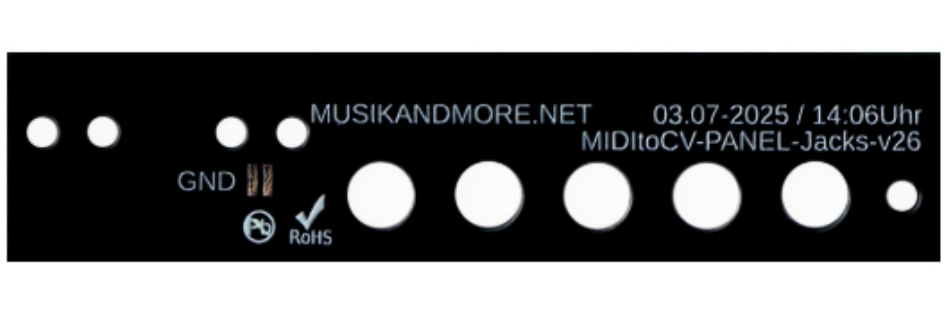
DESKTOP version with the included **MIDItoCV-PANEL-Jacks-v26** cover to cover the opening in the optionally available **3D-printed V3 housing 32TE for Navipanel NEW!**



Picture left: for desktop version for PCB **MIDI-to-CV Breakout V3-R02-v286** and **3D-printed V2 housing 32TE** for Navipanel



Picture middle: DESKTOP version with the attached **MIDItoCV-PANEL-Jacks-v26** panel front



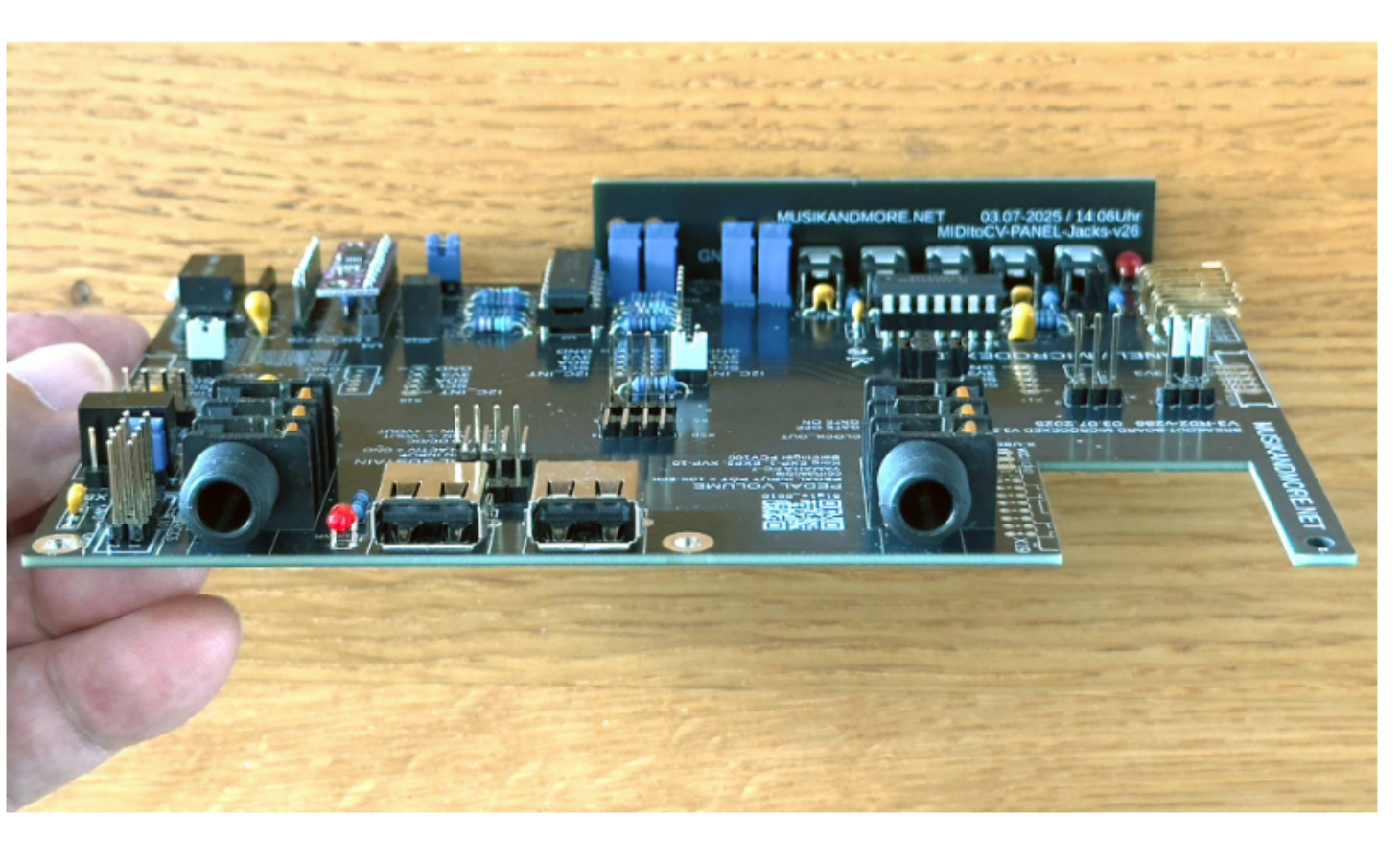
Picture right: DESKTOP version with the attached **MIDItoCV-PANEL-Jacks-v26** panel back

13) Equipping the long connector strips

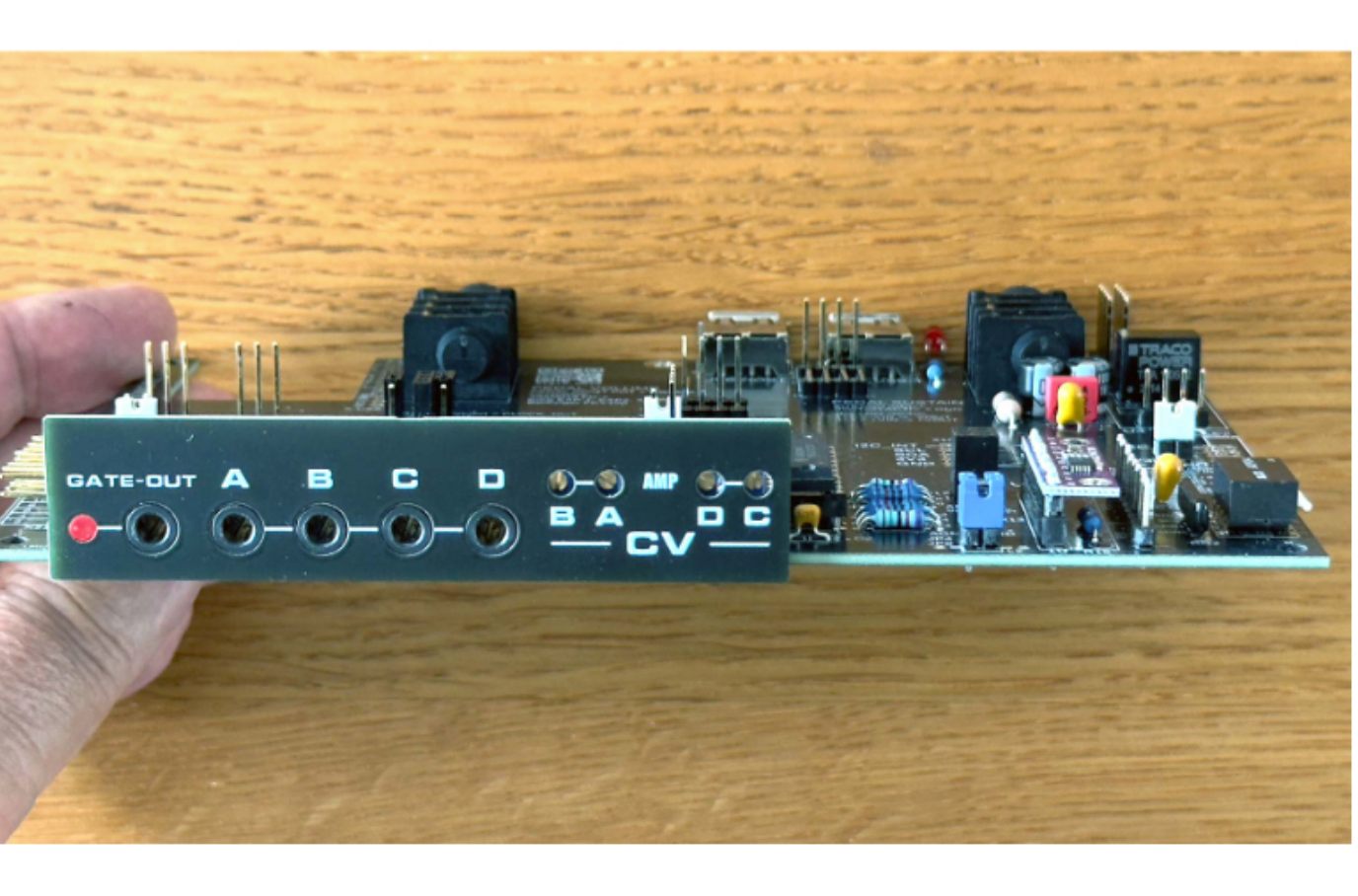
Adaptation between Midi to CV breakout and the Navipanel mainboard with **special 14mm long connector strip** n

- 3-pin pins X14 and X15 (pedal volume and sustain)
- 2x 5-pin pins X8 (power supply)
- 1x 5-pin X12 (I2C bus)
- 1x 4-pin X4B USB-A4 (USB Hub Mainboard)
- 1x 4-pin X5 USB HOST (USB Hub Mainboard)

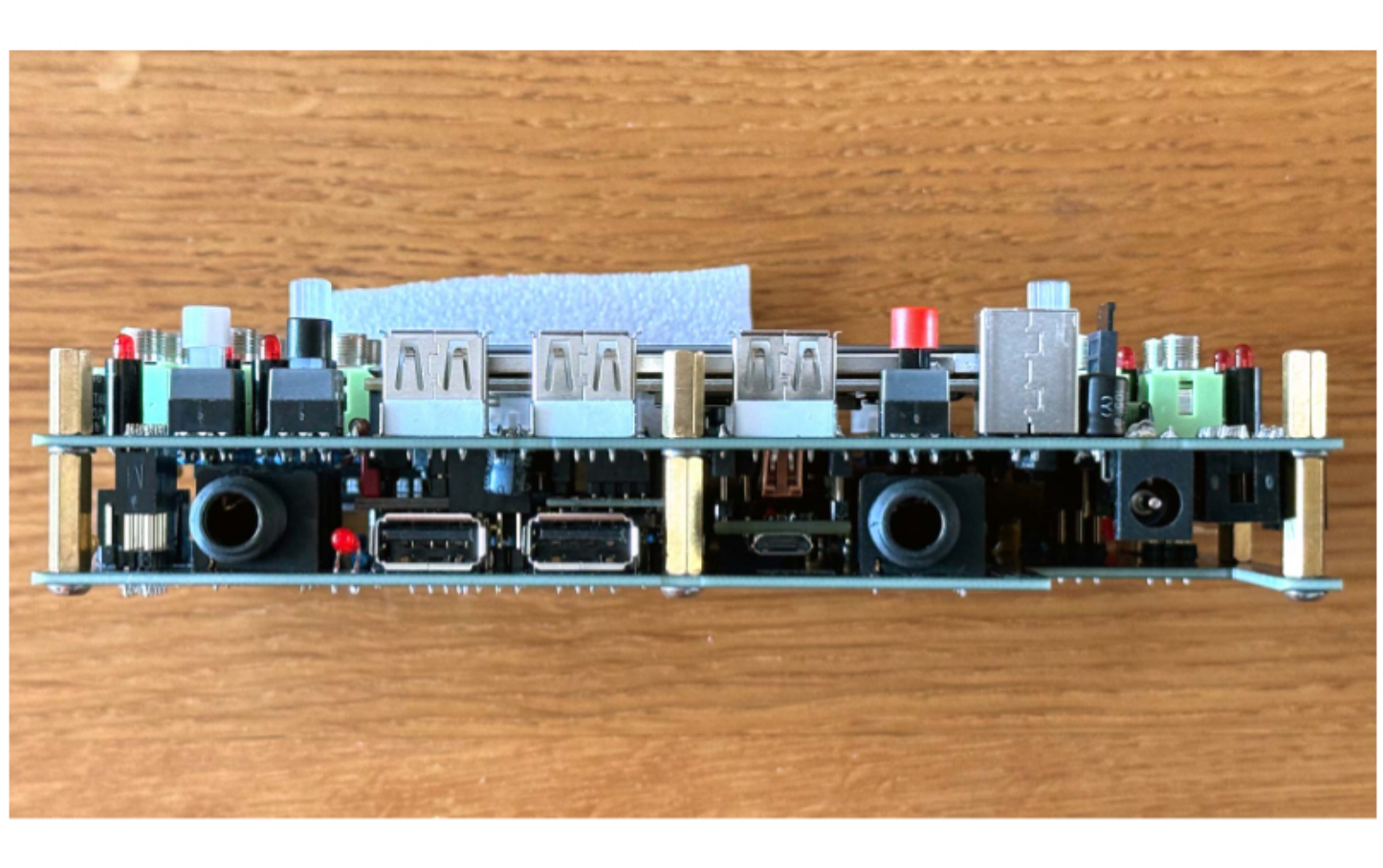
Now loosen the M3x5mm ISO7380-1 mounting screws located on the back of the mainboard and screw them through the M3x15 studs for mounting the connector strips **without the 3.2mm washers** to the M3x5mm ISO7380-1 mounting screws removed from the mainboard. The connector strips will then sit tightly in the socket strips on the mainboard, and everything will fit. Solder all connector strips on the MIDI to CV board with the mainboard plugged in and screwed in place.



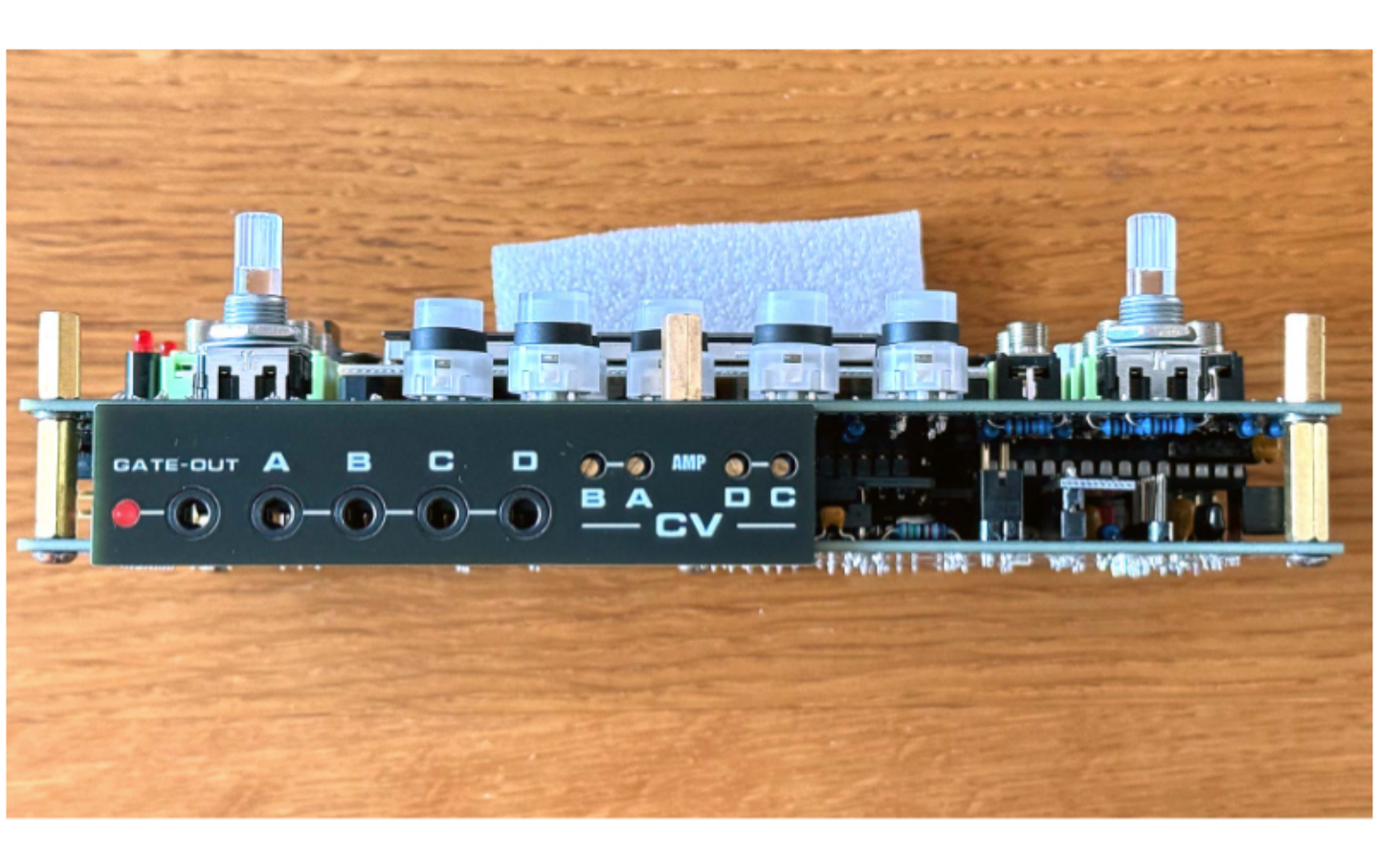
Midi to CV breakout board back (desktop version)



Midi to CV breakout board front with front panel (desktop version)



Midi to CV breakout board back with mainboard (desktop version)



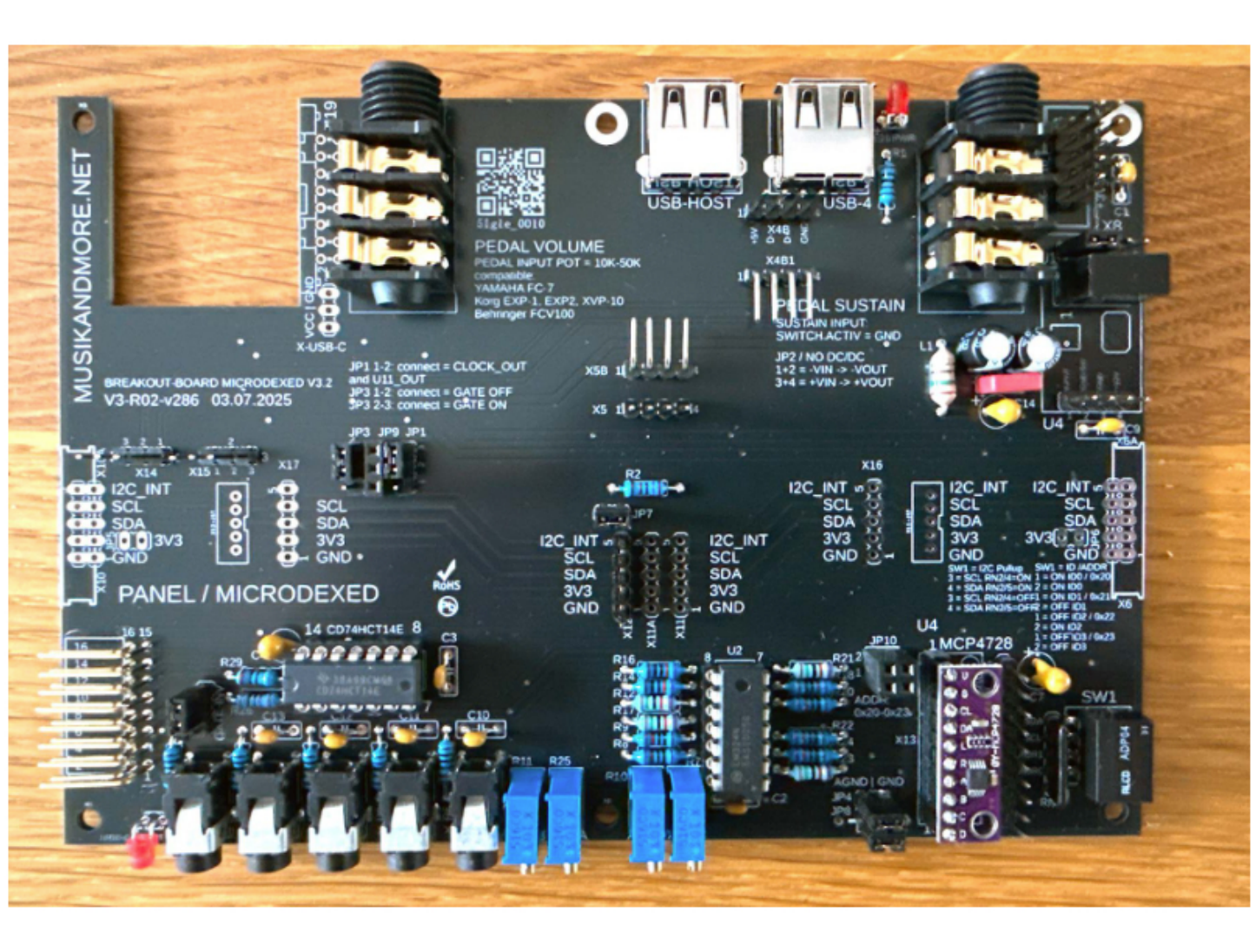
Midi to CV breakout board front panel (CV front panel) and mainboard (desktop version)

14) Check the Midi to CV / Pedal-USB Breakoutboard assembly

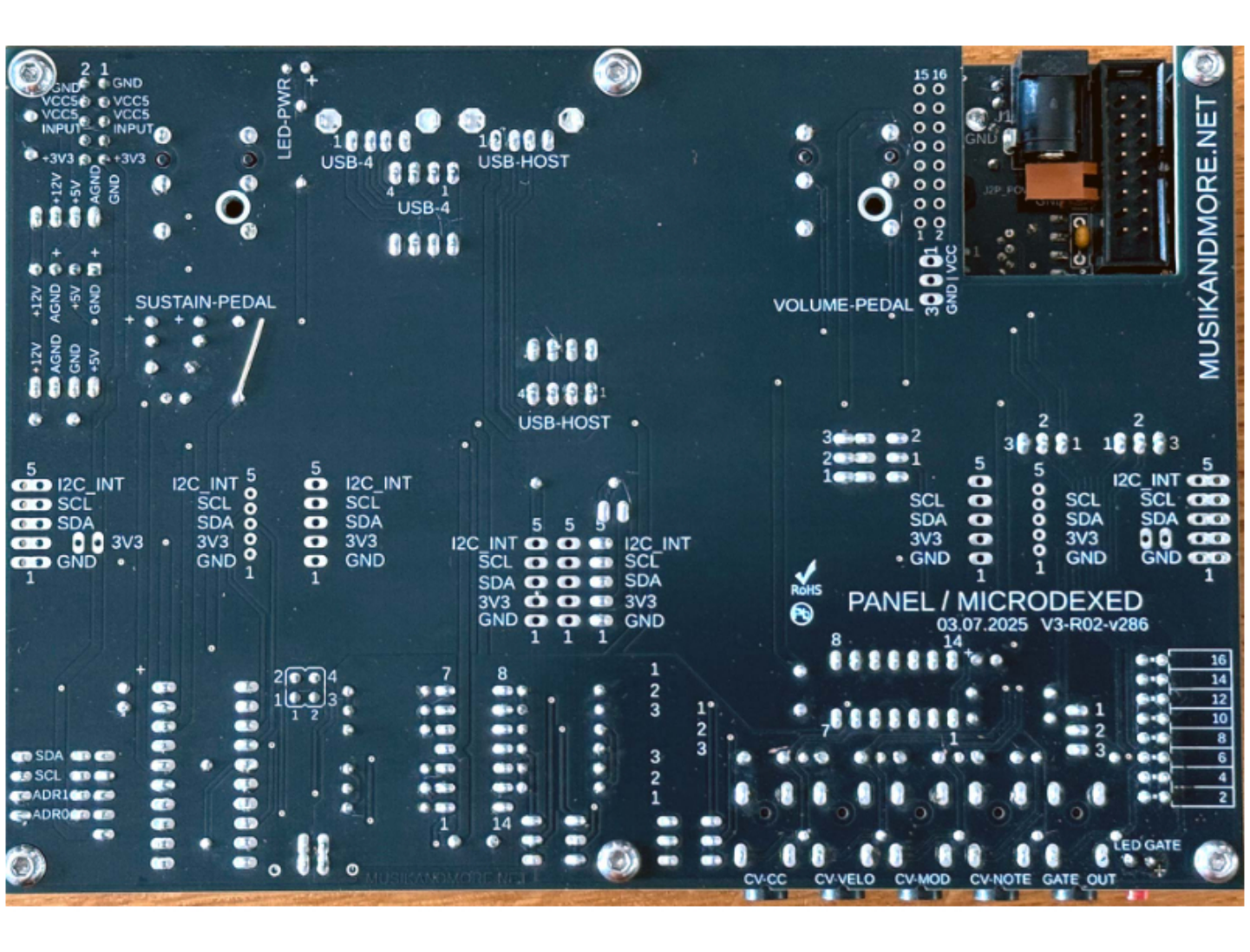
We're nearing the end of the assembly. There shouldn't be any components left except for the 9x M3x15 I/O hex bolts and 9x 3.2mm washers as spacers. These should then be inserted onto the threaded side of the 9x hex bolts before the final assembly of the motherboard/MIDI to CV. This will slightly increase the distance between the two boards. Now, all solder joints will be checked again and re-soldered if necessary.

- Check components for correct position…
- Diodes, electrolytic capacitors, the tantalum capacitor…
- Are the ICs and the MCP4728 correctly inserted into sockets?
- Are all long power strips in the correct positions?

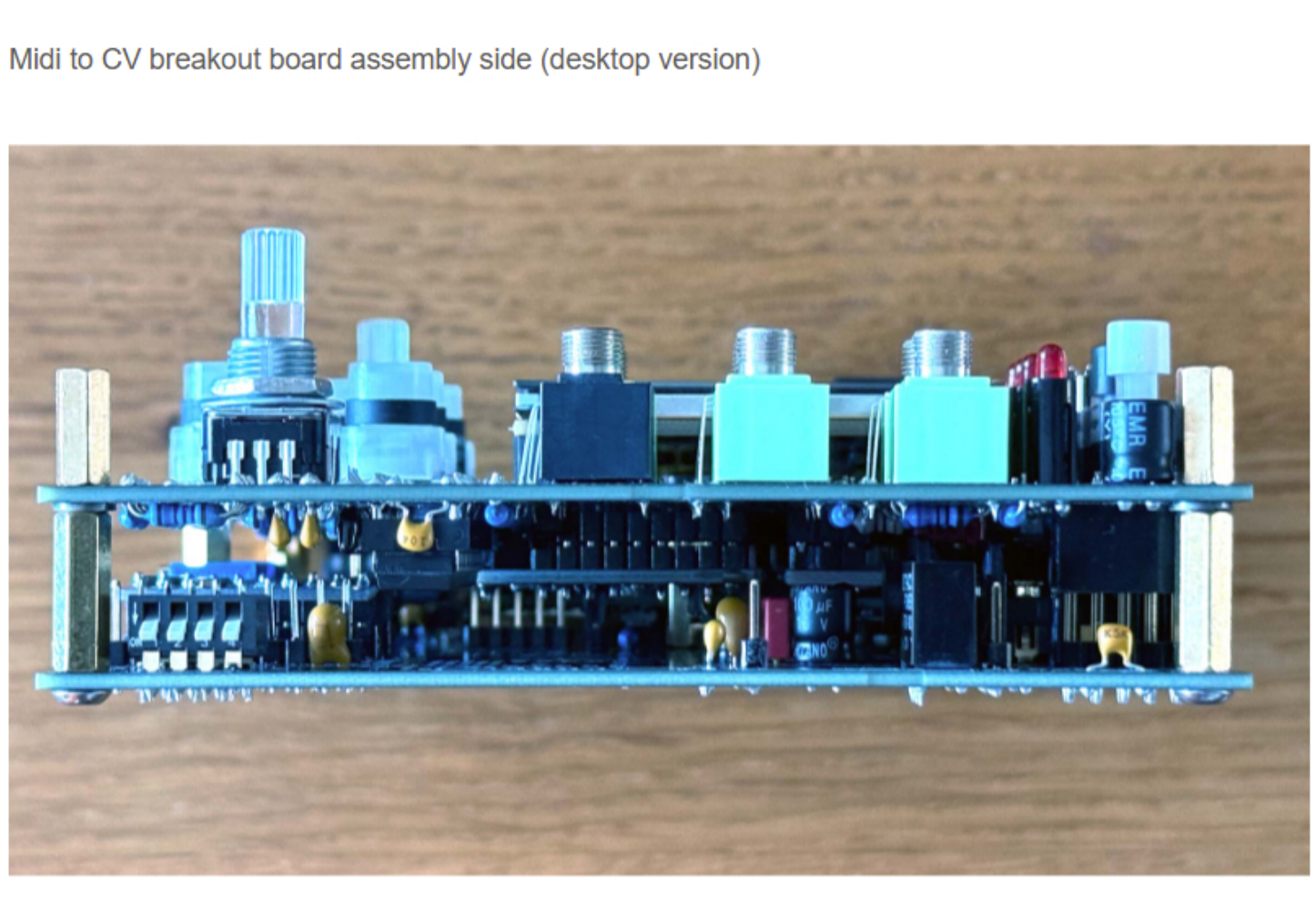
The Midi to CV board (component side / solder side) should now look like this:



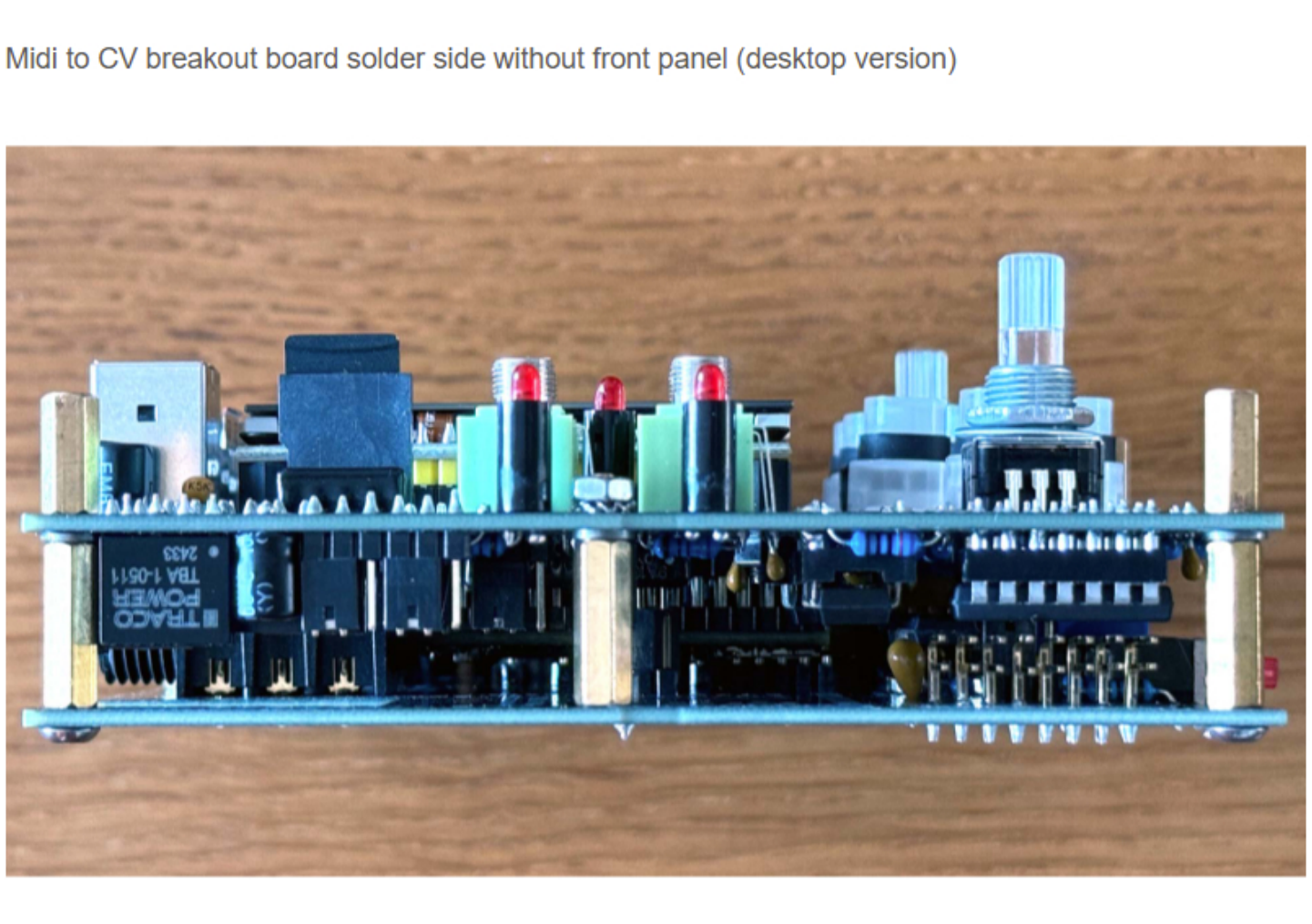
Midi to CV breakout board assembly side (desktop version)



Midi to CV breakout board solder side without front panel (desktop version)



Midi to CV breakout board view from the right with mainboard (desktop version)
Note: the DIP switch (bottom left in the photo) all 4 switches to ON.



Midi to CV breakout board view from left and mainboard (desktop version)

15) Commissioning / Functional test

We assume that a functioning **mainboard V3-R05-v541** is already available , as described in **point 14 .**

Before plugging in the mainboard, set the following jumpers:

- JP8 = 1-2 and JP4 = 1-2 and on JP2 1-2 (directly on the DC-DC converter) this connects the AGND and GND.
- JP1 = 1-2 CLOCK_OUT loop through to the TRS output on the mainboard.
- JP3 = 2-3 to loop through the SPDIF_OUT as GATE-OUT.
- JP GATE-INV = 1-2 for a non-inverted GATE output.
- JP7 = 1-2 to set the pull-up resistor (R2, 2K7) for the I2C_INT interrupt to a "low-impedance" level.
- JP5 and JP6 are intended for extensions via the I2C bus (splits the 3.3V on the I2C) and do **not need to be set** .
- S1 DIP Switch **all 4 switches must be ON.**

Next comes a short functional test:

- USB B connector and supply power to the mainboard
- **S1 PWR Mainboard** press " **ON** " = LED 5V lights up
- **LED1 PWR** on the **Midi to CV Board** (back) lights up
- Press **S1 PWR " OFF"** = LED 5V does **NOT light up**
- **LED1 PWR** on the **Midi to CV Board** (back) is **NOT lit**

If that works, check the voltages (**S1 ON**) with a multimeter at **test point TP2 on the Midi to CV breakout board** : +5V VCC5, +3V3, VDD+12V, and GND/AGND. The voltage level depends on the USB interface of the PC, MAC, or USB hub. However, the voltage should be between 4.8V and 5.2V. We generally recommend an external power supply for the motherboard.

Test program for NAVIPANEL V3 and MIDI TO CV / PEDAL-USB

We have already flashed our test program onto the Teensy at the time of delivery. (This only applies to customers who have purchased the complete DIY kit!)
The test program tests the LEDs, the buttons, the RGB encoder LEDs and encoder buttons, and the TRS USB MIDI interface, provided you have a keyboard connected to the MIDI input. MIDI IN is looped through to MIDI OUT via software. Both LEDs flash synchronously when a MIDI signal is received.
The SUSTAIN IN and LED inputs and the volume pedal are also tested. The buttons can then also be used to issue fixed voltages to all four DAC outputs, allowing precise adjustment of the output voltages via blue trim potentiometers on the TRS outputs AD… a simple mono 3.5mm TS mini jack cable is sufficient for testing. The output level for Channel A is max. 8.00V and for Channels B, C, and 10.00V. All four DAC outputs are also measurable at **test point TP1** . Clock out and gate out are also tested.

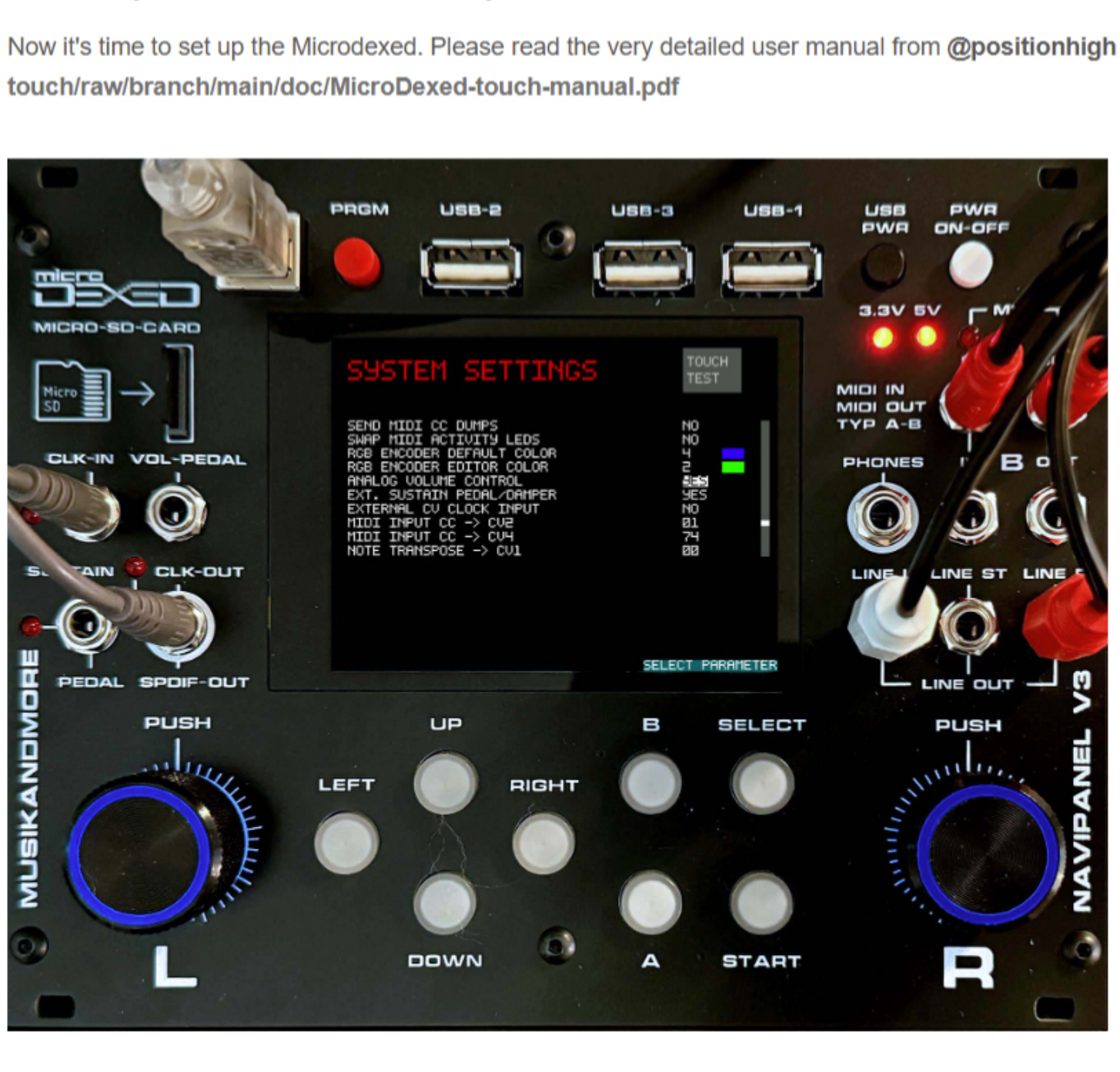
Detailed functional description of the test software under " **Downloads** "

If the alignment was successful, you can flash the MICRODEXED software onto the Teensy 4.1 again.

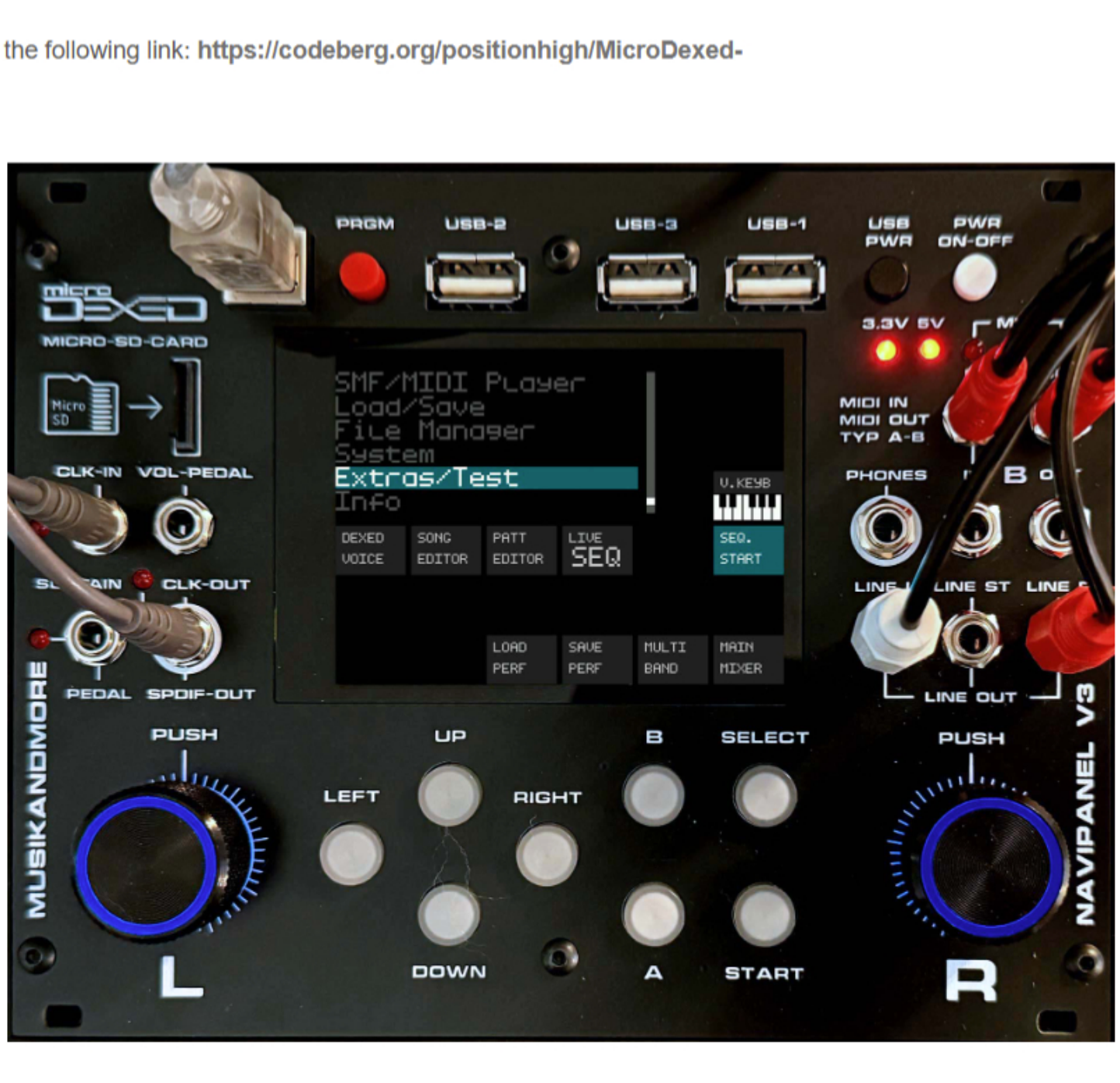
Now switch the white switch back to **S1 PWR "OFF"** .

The setup for the MIDI to CV and pedals

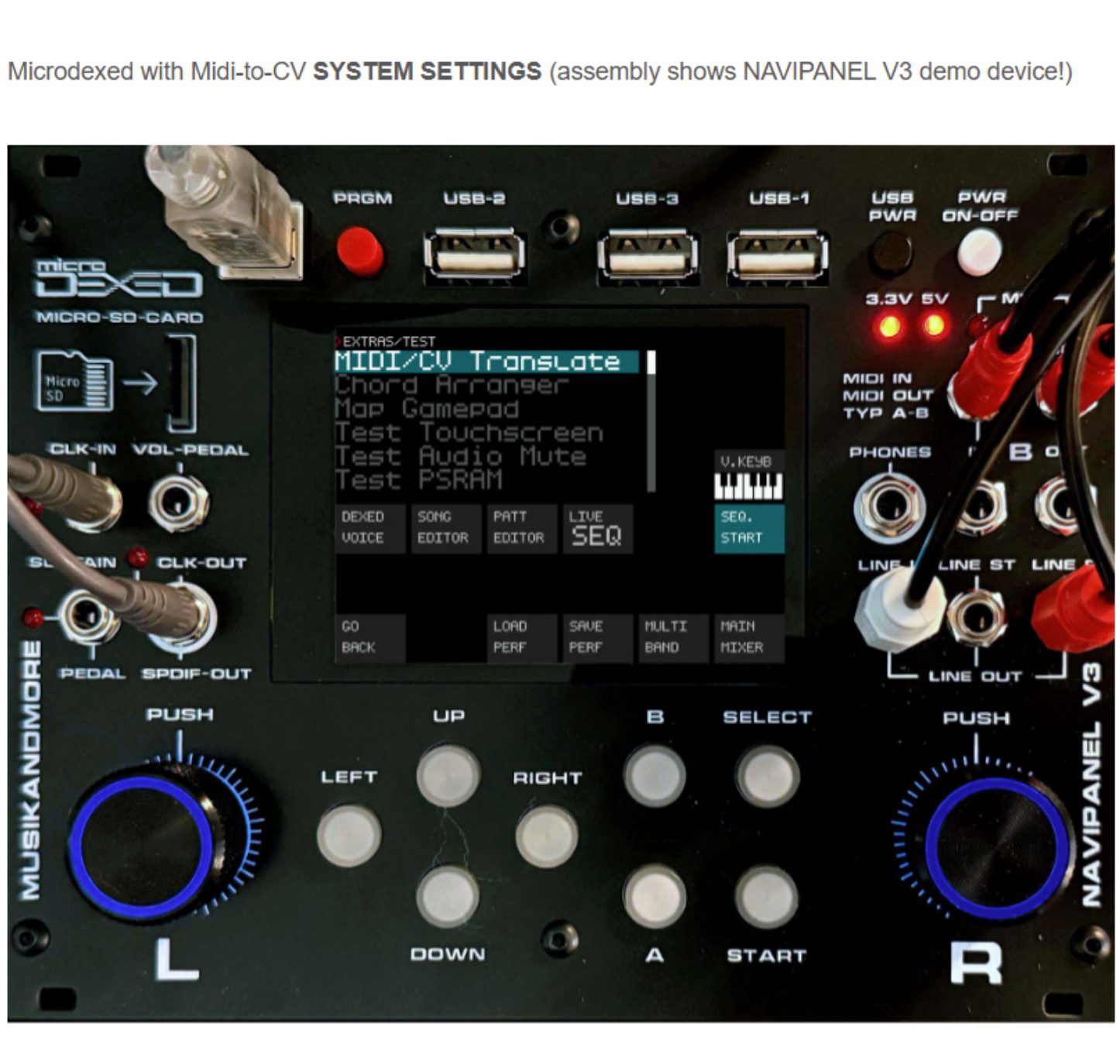
Now it's time to set up the Microdexed. Please read the very detailed user manual from **@positionhigh** at the following link: **https://codeberg.org/positionhigh/MicroDexed-touch/raw/branch/main/doc/MicroDexed-touch-manual.pdf**



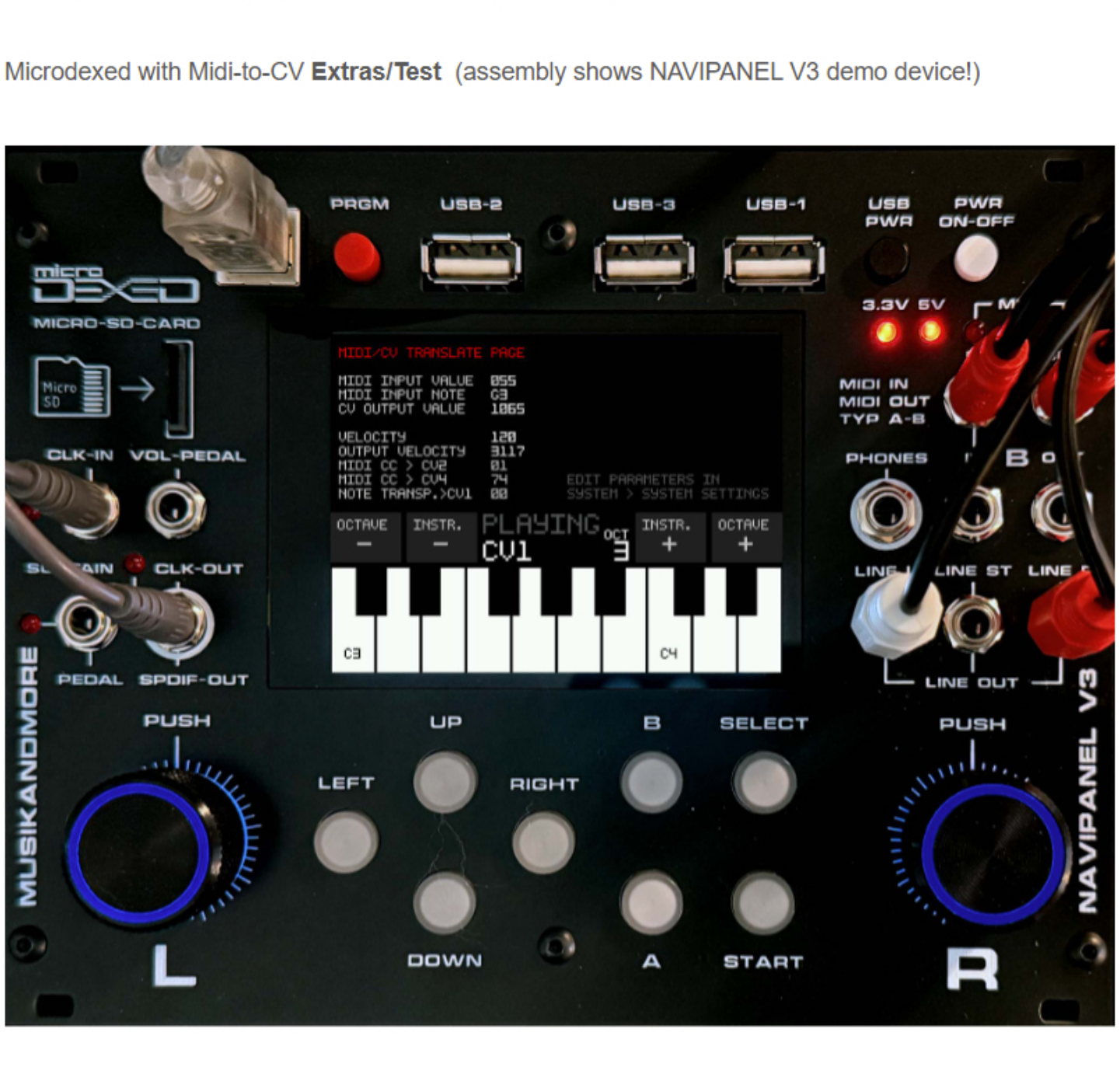
Microdexed with Midi-to-CV **SYSTEM SETTINGS** (assembly shows NAVIPANEL V3 demo device!)



Microdexed with Midi-to-CV **Extras/Test** (assembly shows NAVIPANEL V3 demo device!)



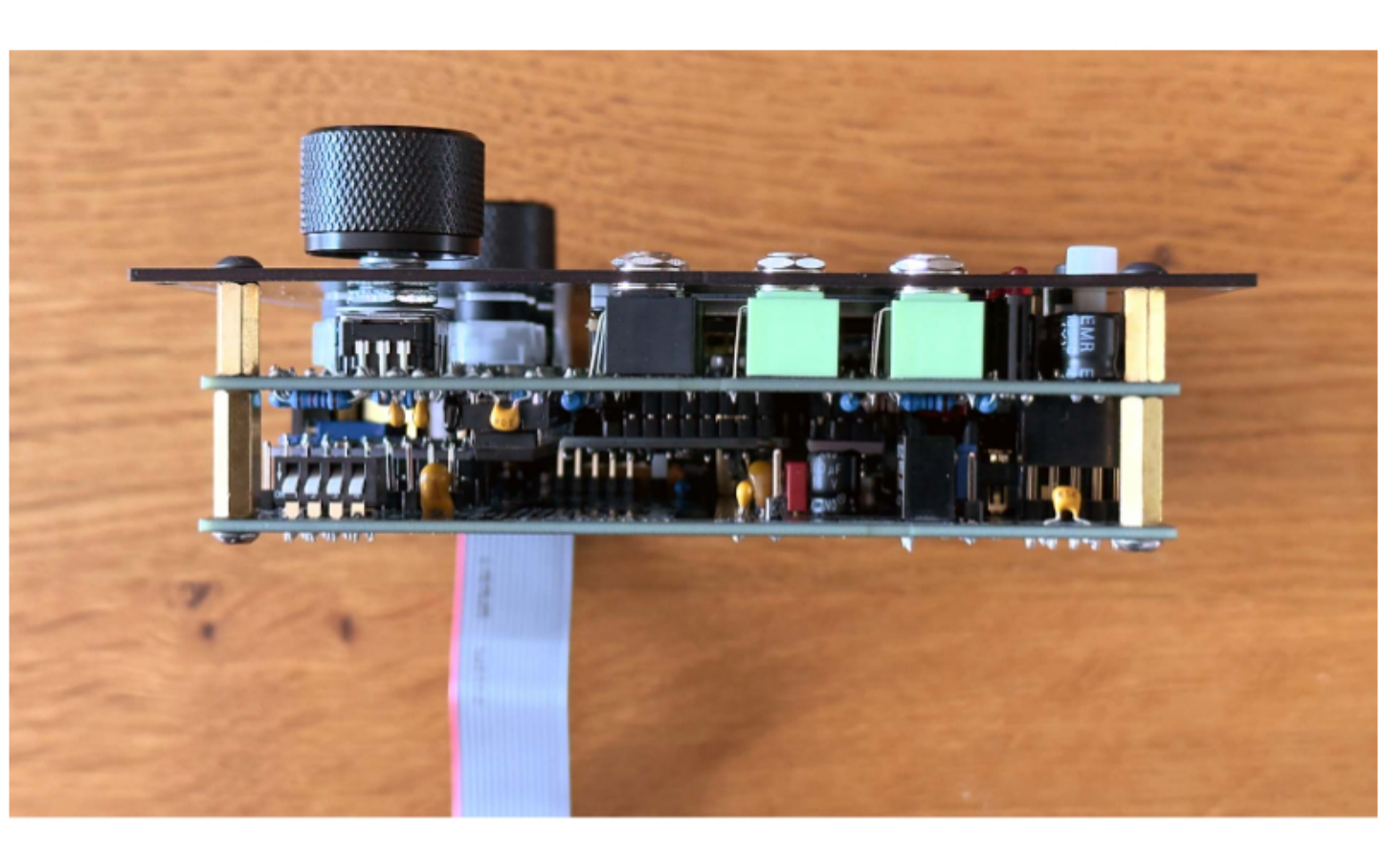
Microdexed with Midi-to-CV **Extras/Test ⇒ MIDI/CV-Translate** (assembly shows NAVIPANEL V3 demo device!)



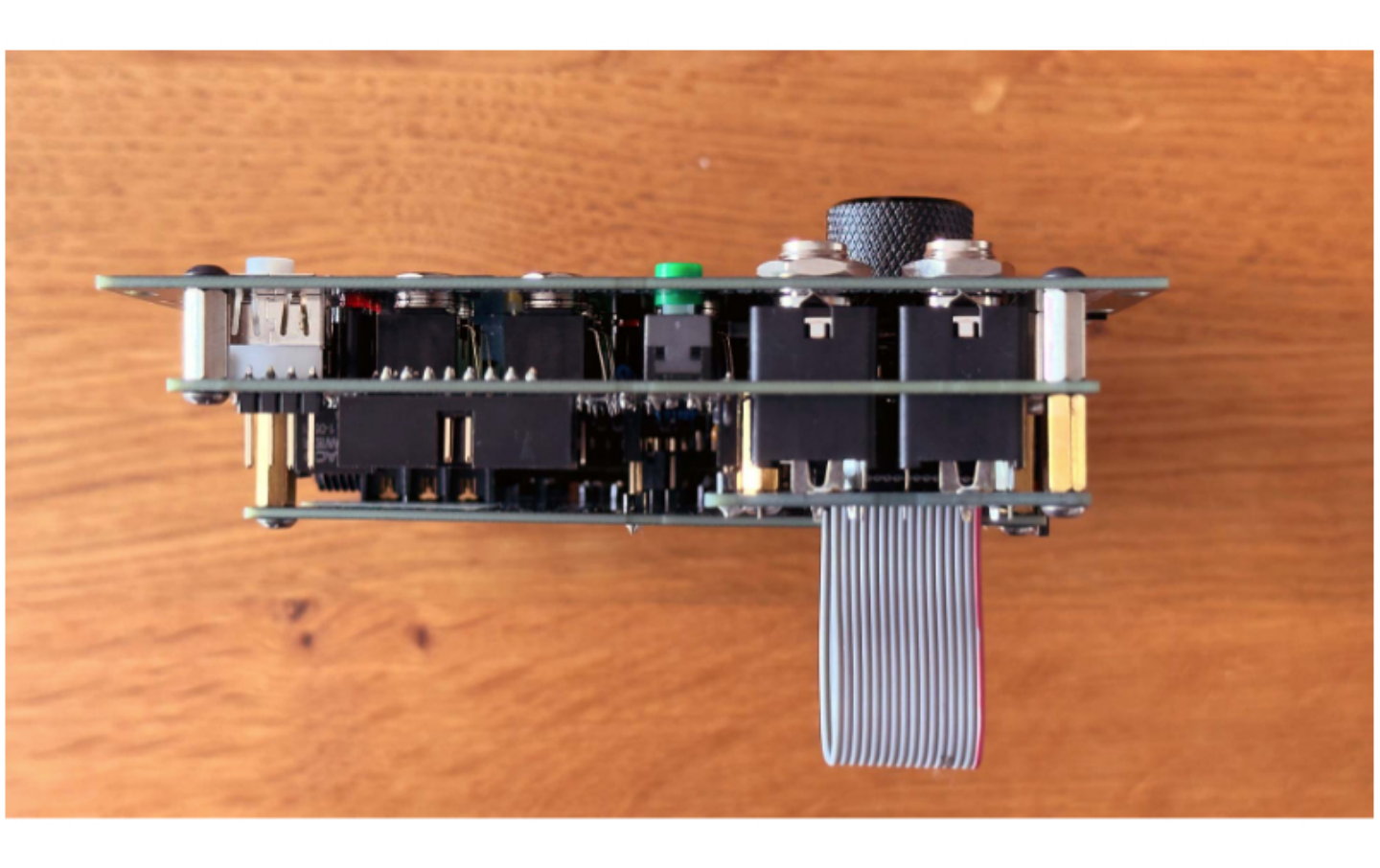
Microdexed with Midi-to-CV **Extras/Test ⇒ MIDI/CV-TRANSLATE-PAGE**
Display of parameters adjustable under **SYSTEM ⇒ SYSTEM SETTINGS:**
MIDI Note CH1 (Value 0-3300), Velocity CH3 (Value 0-127), Midi-CC CH2 (Controller 0-127), Midi-CC CH4 (Controller 0-127)

It's almost done!

- the white switch on the mainboard to **S1-PWR "OFF"**
- then the final assembly can take place… Install the NAVIPANEL V3 front panel
- the white switch on the mainboard back to **S1-PWR "ON"**
- Connect the volume pedal and sustain pedal. The 3.5mm TRS jacks on the mainboard's front panel for SUSTAIN and VOL PEDAL are wired in parallel with the 6.35mm TRS jacks on the MIDI to CV / Pedal-USB breakout board.
- Connect GATE OUT and CLOCK OUT / CLOCK IN as well as CV Note (Ch.A) and Velocity (CH.C) to an external synthesizer and test….
- The software version 1.9.9.8 (under **Downloads**) of @positionhigh has implemented the necessary functions.
- CLOCK IN 0/5V (optocoupler separated)
- CLOCK OUT 0/5V (optocoupler separated)
- GATE OUT 0/5V
- SUSTAIN PEDAL IN 0/5V
- VOLUME PEDAL IN 0-3.3V
- CV-OUT Ch.A = NOTE 0-8V = max. 8 octaves 1V/octave (0-3300)
- CV-OUT Ch.B = MIDI-CC 0-10V / 0-127 (CC controller freely selectable)
- CV-OUT Ch.C = VELOCITY 0-10V / 0-127
- CV-OUT Ch.D = MIDI-CC 0-10V / 0-127 (CC controller freely selectable)



Midi to CV breakout board view from the right with mainboard (desktop version)
Note: the DIP switch (bottom left in the photo) all 4 switches to ON.



Midi to CV breakout board view from left and mainboard (desktop version)

16) Test environment with 4 Microdexed / USB devices / Midi CC-Fader V3

We tested in the following configuration:

Test environment: AKAI MPCmini, ARTURIA MiniLab3, and 1x Microdexed NAVIPANEL V2 4MS – 3x Microdexed NAVIPANEL V3 and **MIDI FADER V3** . For testing CLOCK IN/OUT or the CV outputs and GATE OUT, we also have analog modular devices in Eurorack format such as VCO, ADSR, VCF, and VCA, as well as the necessary mono and stereo mixers in the test setup.

Test environment: AKAI MPCmini, ARTURIA MiniLab3 and 1x Microdexed NAVIPANEL V2 4MS - 3x Microdexed NAVIPANEL V3 and **MIDI FADER V3** .

The entire setup is powered by the **Behringer Eurorack Go** with an external 95VA power supply and USB plug-in power supplies.

AKAI
APCmini

AKAI MPCmini via USB host on the Microdexed **NAVIPANEL V2 4MS**

Test environment : We tested the following configuration with the USB hub 1-4 on 3 of 4 possible USB-A ports

- AKAI MPC mini (Midi via USB)
- AKAI MPD 218 (Midi via USB)
- ARTURIA MiniLab3 (Midi via TRS MIDI IN)

The total current consumption was in the range of 390mA – 410mA, so still well under 500mA.

A notice:

If the black push button **S3 USB PWR is not set to " ON ,"** USB ports 1-4 of the U6 USB hub cannot be used, e.g., for USB MIDI data transfer. In general, using USB for audio and MIDI is a tricky issue. Many ports don't even have 4.4V under load (instead of the required 5V USB). Another issue is potential noise on the audio outputs when using USB audio and/or audio line outputs. In the studio, galvanic USB isolation is very helpful for eliminating ground loops and USB "interference." We use several of these USB isolation modules in our studio.
Link to the product: ARCELI USB Isolator Module, Industrial Isolator Protection Against Audio Noise, 1500V Digital Module: **https://www.amazon.de/dp/B07SJD86TD?ref=ppx_yo2ov_dt_b_fed_asin_title**

17) External power supply and Eurorack NAVIPANEL and options

An external 5V power supply (J1), either via the 5V/1A DC connector or via an external (USB) 5V power adapter, is also helpful to prevent any noise or hum. The new version, released in April 2025, now also includes a USB-C power connector (J2P_POWER-IN).

IMPORTANT: The X19 16-pin angled header on the **Midi-to-CV breakout board** and **Pedal-USB breakout board** is **not equipped** (the power supply is via the mainboard; only +5V and GND are used). The external power supply only makes sense if the USB PC or MAC connection is not used for data transfer. So decentralized without a notebook or similar, e.g. during live performances. But both external +5V and USB on PC or MAC also work.

IMPORTANT: The power switch of the NAVIPANEL V3, **S1 PWR** (white cap) must then be set to " **OFF" when using external power supply .**

18) Additional hardware functions and sockets

The **SPDIF OUT output** is fully functional and integrated into the Microdexed software. It delivers a 44 kHz/16-bit digital signal to the 3.5 mm jack (TS) connector (SPDIF OUT). For connection, a standard SPDIF cable adapter from a mono 3.5 mm TRS jack to an RCA connector is required.

The CLOCK OUT output (same jack as SPDIF OUT) is fully integrated into the current software. Two software versions are available for operation with **SPDIF** or **CLOCK OUT** (current version under " **Downloads** ").

The **TRS jacks VOLUME PEDAL/CV-IN, CLOCK-IN, and SUSTAIN PEDAL/GATE-IN** are hardware and software functional. Information on voltage levels can be found under " **Technical Specifications** ."

The functionality and use of the USB HOST, USB-1, USB-2, USB-3, and the USB4 port (USB-HOST) on the rear panel are described in **section 11.** The Teensy 4.1 micro-USB port can be switched **ON/OFF using S1 PWR** and is no longer accessible from the front panel.

For hardware support, please contact:
Thomas Effendy, **info@musikandmore.net** or **@musikandmore** on Discord (**https://discord.gg/XCYk5P8GzF**)

For questions about the Microdexed software, please contact:
Mark Koslowski aka @positionhigh (**https://discord.gg/XCYk5P8GzF**)

19) The finished device NAVIPANEL V3 for Microdexed with the MIDI to CV Option / Pedal-USB

Photos with different housing variants:

NAVIBUTTON V2
MUSIKANDMORE

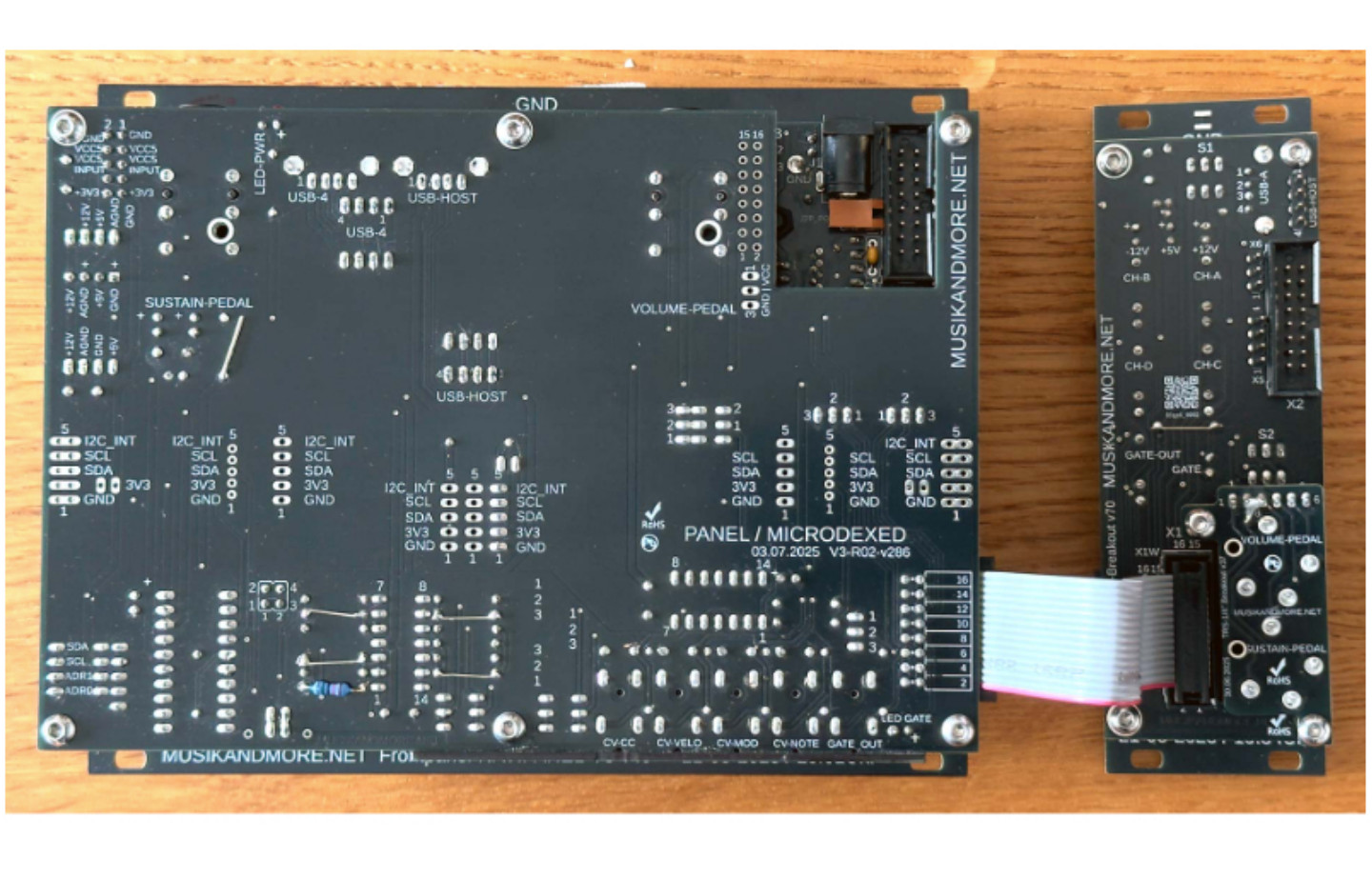
Housing variant **4MS pod32** Supply via external power supply 4MS Powerbrick

MUSIKANDMORE
NAVIPANEL V3

NAVIPANEL V3 DESKTOP 3HE/32TE with **3D-printed V3 housing 32TE** for Navipanel

MUSIKANDMORE
MIDI to CV
NAVIPANEL V3

Case variant front **Eurorack 3U/32HP** with **8HP front panel MIDI to CV / Pedal-USB**



Case variant rear **Eurorack 3U/32HP** with **8HP front panel MIDI to CV / Pedal-USB**

20) Appendix A.

As of: September 18, 2025

Sources / Links / Product recommendations

- Bernstein ball joint tool holder / Link to the product:
  https://www.bernstein-werkzeuge.de/produkte/produktdetails/9-250-esd-kugelgelenk-kombination-vario-6-tlg
- Solder / Link to the product:
  https://www.conrad.de/de/p/stannol-ks115-loetzinn-bleifrei-spule-sn99-3cu0-7-rom1-100-g-1-mm-588742.html
- Soldering extraction system / Link to the product:
  https://www.reichelt.de/de/de/shop/produkt/loetrauchabsaugung_zerosmog_shield_pro-371544
- USB host adapter from pjrc.com / Link to product:
  https://www.pjrc.com/store/cable_usb_host_t36.html
- Resistor color code table: **https://www.elektronik-kompendium.de/sites/bau/1109051.htm**
- Current software for NaviPanel-V3 is available at: **https://codeberg.org/positionhigh/MicroDexed-touch/releases**
- Current original manual from Microdexed @positionhigh:
  https://codeberg.org/positionhigh/MicroDexed-touch/raw/branch/main/doc/MicroDexed-touch-manual.pdf
- prjc.com Teensy Software: **https://www.pjrc.com/teensy/loader.html**
- Discord Channel @positionhigh: **https://discord.gg/XCYk5P8GzF**
- Link to the Web Remote Console: **https://positionhigh.codeberg.page/**
- ARCELI USB Isolator Module, Industrial Isolator Protection Against Audio Noise, 1500V Digital Module:
  https://www.amazon.de/dp/B07SJD86TD?ref=ppx_yo2ov_dt_b_fed_asin_title
- Midi cable red pack of 3 classification TYPE A
  https://www.thomann.de/de/befaco_trs_midi_cable_a.htm
- Midi cable grey 3-pack classification TYPE B
  https://www.thomann.de/de/befaco_trs_midi_cable_b.htm
- 4MS pod32 cabinet 32HP (powered)
  https://www.thomann.de/de/4ms_pod32_powered.htm
- **4MS pod32 enclosure 32HP (powered)** (musikandmore.net)
- 4MS pod32 cabinet 32HP (unpowered) (**special purchase via Thomann)**
  https://www.thomann.de/de/4ms.html
- Power supply for Eurorack enclosure 4MS pod32 / maximum output power: 15 V / 3 A 45W
  https://www.thomann.de/de/4ms_power_brick_45w.htm
- **3D case / housing 32HP for NAVIPANEL V1 from mainboard v380** (musikandmore.net)
- **3D case / housing 32TE for NAVIPANEL V2 from mainboard v526** (musikandmore.net)
- **3D case / housing 32HP for NAVIPANEL V3 from mainboard v541** (musikandmore.net)
- USB C Charger/Power Supply Breakout U9 (Amazon)
  https://www.amazon.de/dp/B0CQNCFYGV?ref=ppx_yo2ov_dt_b_fed_asin_title

21) Appendix B. Credit

Contributors

Mark Koslowski aka @positionhigh (**https://discord.gg/XCYk5P8GzF**)
for the excellent software and hardware base.

Holger Wirtz for the original port of the DEXED PC/Desktop OS to the Teensy 4.1 MICRODEXED – Microcontroller

Thomas Effendy **https://musikandmore.net** Hardware development and panel / PCB design

Nicole Effendy – **https://designvorsprung.de** for her patience with the seemingly endless proofreading of the assembly instructions and technical documentation.

22) Appendix C.

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Project: NAVIPANEL V3 for Microdexed
Author: Thomas Effendy (Hardware Version V3-R04-v380 -V3-R05-v541, V3-R02-v286, V3-R03-v309)
Author: Mark Koslowski (Software Microdexed Version 1.9.8.4–1.9.9.8)
Email: info@musikandmore.net
Date: 21.09.2025
Version: V.1.0-DE (this document)
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23) Appendix D.

Technical data MIDI to CV Pedal USB Breakout / September 15, 2025

MIDI to CV Pedal USB for Microdexed Navipanel Mainboard from V3-R05-v541

Print PDF

NAVIPANEL V3 MIDI to CV Pedal USB | Date: September 15, 2025	Technical data sheet	ID-(BOM)	X21 PINs
01) Modular rack 3U / 32HP / Dimensions (W x L x H) 163x127x33mm	Eurorack	optional… 1*)	
02) 3D printed Desktop Case 3HE / 32TE / Dimensions (W x L x H) 169x134x38mm	Desktop	optional… 1*)	
03) Desktop aluminum case 4MS pod32 powered / Dimensions (W x L x H) 166x159x40mm	Metal housing	optional… 1*)	
04) power supply (USB-C Power Supply Breakout and 4MS 45W Power Brick)	Power supply	optional… 1*)	
05) 16-pin box connector with 20cm ribbon cable	for modular (+5V)	Eurorack cable	
06) 16-pin box connector with 10cm ribbon cable	for 8HP Eurorack front panel	Eurorack cable	1-16
07) internal / external supply for USB hub	switchable	included	
07) from USB-HOST Hub Port 4, 1x USB-A of which are NOT in the front panel	from active USB hub U6	U6 (Mainboard)	
08) 1x USB A connectors on the back via a 4-pin connector	USB-A 2.0	X5B HOST-X4B	
09) DAC Channel 1(A) 0-8VDC = 0-3300 (4095) TRS 3.5mm / 1V/Octave	CV output 1 (NOTE)	TRS 3.5mm	9
10) DAC Channel 2(B) 0-10VDC = 0-3300 (4095) TRS 3.5mm	CV output 2 (MIDI CC)	TRS 3.5mm	11
11) DAC Channel 3(C) 0-10VDC = 0-3300 (4095) TRS 3.5mm	CV output 3 (Velocity	TRS 3.5mm	13
12) DAC Channel 4(D) 0-10VDC = 0-3300 (4095) TRS 3.5mm	CV output 4 (MIDI CC)	TRS 3.5mm	15
13) GATE OUT TRS 3.5mm 0/5V Optocouplers	modular connection	TRS 3.5mm	5
14) alternative CLOCK OUT TRS 3.5mm 0/5V optocouplers	modular connection	TRS 3.5mm	(5) 2*)
15) PEDAL Volume Input 1/4 inch TRS +3.3V /Signal /GND (Backside)	modular connection	TRS 6.35mm	6/4
17) CV IN / alternative 0-5VDC / 0-10VDC input (protected with suppressor diodes)	modular connection	TRS 6.35mm	6/4
18) PEDAL SUSTAIN IN = SUSTAIN 0/+3.3V= LOW/HIGH (Backside)	modular connection	TRS 6.35mm	12/10
19) GATE IN = PEDAL SUSTAIN IN 0/+3.3V= LOW/HIGH	modular connection	TRS 6.35mm	12/10
20) LED2 GATE OUT (front side)	LED 3mm low current RED	LED2	7
21) LED1 5V Power (Backside)	LED 3mm low current RED	LED1	14 (VCC +5V)
22) Expansion connector 16pol for 8TE front panel with Eurorack compatible	MIDI to CV / Pedals / LEDs	X21	1/2/8 (GND)
23) Expansion connector 16-pin			3 (AGND)
23) Expansion connector 16-pin			16 (VDD +12V)
Notes:			
Note 1*): the technical data apply from motherboard version and the Navipanel V3 mainboard is necessary!	V3-R05-v541, July 02, 2025		
Midi to CV PCB version (Breakout Board V3.3) with CV and Gate, Pedals and USB-A4	V3-R03-v309, August 21, 2025		
Note 2*) only on the smaller pedal / USB PCB version (PEDAL-USB-Breakout-Board) without Midi to CV and Gate OUT	V3-R02-v73, July 02, 2025		

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24) Appendix E.

BOM Part list for NAVIPANEL Midi to CV

Pedal / USB / I2C /V3-R3-v323 / 09-21-2025

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part ▲	Value ▲	Detailed Description ▲
C1	100nF	CAPACITOR
C10	10nF	CAPACITOR
C11	10nF	CAPACITOR
C12	10nF	CAPACITOR
C13	10nF	CAPACITOR
C14	10uF/16V tantalum	Capacitor Polarised - Generic
C2	100nF	CAPACITOR
C3	100nF	CAPACITOR
C4	10uF/25V	Capacitor Polarised - Generic
C5	0.1uF MKS/MKT	CAPACITOR
C6	100uF/16V	POLARIZED CAPACITOR, European symbol
C7	10uF/16V tantalum	POLARIZED CAPACITOR, European symbol
C8	100uF/16V	POLARIZED CAPACITOR, European symbol
C9	100nF	CAPACITOR
EURORACK_CABLE	Flatcable_16pol_20cm	Flatcable_16pol_20cm
GATE-INV	INV/NOINV	PIN HEADER 1x3-pin jumper
H1	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H2	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H3	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H30-H38	9x_WASHER_DIN125A_3.2mm_for_distance	9x_WASHER_DIN125A_3.2mm_for_distance
H4	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H40-H42	3x_NUTS_DIN127_M3_for_Standoff_M3x1…	3x_NUTS_DIN127_M3_for_Standoff_M3x15mm
H5	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H50-H58	9x_SCREWS_M3x5mm_ISO7380-1_V2A	9x_SCREWS_M3x5mm_ISO7380-1_V2A
H6	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H7	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H8	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
H9	STANDOFF_M3X15mm_I/A	STANDOFF_M3X15mm_I/A
IC-SOCKET_14	2x_IC-socket_14-pin	2x_IC-socket_14-pin
JP1	CLOCK/GATE_OUT	PIN HEADER 1x3pin 1x Jumper
JP10	MCP-23017-I2C ADDRESS 0x20-0x23	FEMALE HEADER 2x2pol IC2 Address 0x20-0x23
JP2	NO_DC/DC	PIN HEADER 1x3pin 1x Jumper
JP3	GATE ON/OFF	PIN HEADER 1x2pin 1x Jumper
JP4	AGND | GND	PIN HEADER 1x2pin 1x Jumper
JP5	I2C 3V3 L	PIN HEADER 1x2pin 1x Jumper
JP6	I2C 3V3 R	PIN HEADER 1x2pin 1x Jumper
JP7	I2C INT	PIN HEADER 1x2pin 1x Jumper
JP8	AGND | GND	PIN HEADER 1x2pin 1x Jumper
JP9	CLK_OUT	FEMALE HEADER 3-pin
JUMPER	JUMPER 2-pin	9x JUMPER 2-pin
L1	22uH	Noise/EMI Suppression Filters Inductor Type
L2 (not used)	22uH (not used)	Noise/EMI Suppression Filters Inductor Type (not used)
LED1/PWR	3mm_red_low_current	3mm_red_low_current
LED2-GATE-OUT	3mm_red_low_current	3mm_red_low_current
LOGO1	NO_PB_LOGO	3mm_red_low_current
LOGO2	ROHS_LOGO	3mm_red_low_current
LOGO3	NO_PB_LOGO	3mm_red_low_current
LOGO4	ROHS_LOGO	3mm_red_low_current
PCB_BREAKOUT	MIDI_TO_CV_V3-R03-v309-21-08-2025	MIDI_TO_CV_V3-R03-v309-21-08-2025
PCB_MIDItoCV	PANEL-Jacks-v26-03-07-2025	PANEL-Jacks-v26-03-07-2025
R1	1K	RESISTOR, European symbol
R10	10K	3296X-1-103LF Bourns 3/8" 10K potentiometer
R11	10K	3296X-1-103LF Bourns 3/8" 10K potentiometer
R12	13K7 / 0.1%	RESISTOR, European symbol
R13	1K	RESISTOR, European symbol
R14	1K0 / 0.1%	RESISTOR, European symbol
R15	2K7	RESISTOR, European symbol
R16	10K / 0.1%	RESISTOR, European symbol
R17	13K7 / 0.1%	RESISTOR, European symbol
R18	1K0 / 0.1%	RESISTOR, European symbol
R2	2K7	RESISTOR, European symbol
R20	10K / 0.1%	RESISTOR, European symbol
R21	13K7 / 0.1%	RESISTOR, European symbol
R22	0R	RESISTOR, European symbol
R23	13K7 / 0.1%	RESISTOR, European symbol
R24	10K / 0.1%	RESISTOR, European symbol
R25	10K	3296X-1-103LF Bourns 3/8" 10K potentiometer
R26	10K	RESISTOR, European symbol
R29	680R	RESISTOR, European symbol
R3	1K	RESISTOR, European symbol
R4	1K	RESISTOR, European symbol
R5	1K	RESISTOR, European symbol
R6	1K	RESISTOR, European symbol
R7	10K	3296X-1-103LF Bourns 3/8" 10K potentiometer
R8	1K0 / 0.1%	RESISTOR, European symbol
R9	10K / 0.1%	RESISTOR, European symbol
RN2	4K7	SIL RESISTOR 5-pin
SW1	I2C ADDR	DIP SWITCH 4 small version
TP1	Testpoint DAC CH.AD	PIN HEADER 1x5pin
TP2	Test point 12V/5V/3V3/AGND/GND	PIN HEADER
U1	TRACO TBA1-0512	DC/DC CONVERTER 12V 1W
U2	LM324	Quad Op Amp 4.7V to 12.0V Single Supply CMOS
U3	CD74HCT14E	Hex Schmitt trigger Inverter
U4	DC/DC 5V/12V	DC/DC CONVERTER 5V-12V 1W
U5	GY-MCP4728-4Ch_12Bit_DAC	MCP4728 4x12Bit DAC VCC 3V3 - 5V
USB-4-CABLE	1x USB4_Cable_20cm_4pin	1x USB4_Cable_20cm_4pin
X-USB-C	PIN2=NC	PIN HEADER 2-pin RM5.08
X1	NRJ6HF-1-AU	Phone Connectors 1/4 JACK STEREO SW SLIM-FULL THREAD NSE
X10	I2C-L-POGO	PIN HEADER 1x5pin
X10A	I2C-L-POGO	PIN HEADER 1x5pin
X11	I2C-R	PIN HEADER 1x5pin
X11-JST	I2C-R-JST	JST Header-pin footprint for 0.1 inch spaced/style header connections
X11A	I2C-C	PIN HEADER 1x5pin
X12	I2C-L	LONG PIN HEADER 1x5pin 14mm
X12-JST	I2C-L-JST	JST Header-pin footprint for 0.1 inch spaced/style header connections
X13	GY-MCP4728	LOW PROFILE FEMALE HEADER 10pol
X14	SUST-PEDAL	LONG PIN HEADER 1x3pin 14mm
X15	VOL PEDAL	LONG PIN HEADER 1x3pin 14mm
X16	I2C-R2	PIN HEADER 1x5pin
X17	I2C-L2	PIN HEADER 1x5pin
X18	1503_08	Jack connectors according to JISC 6560, 3.5 mm
X19	EURORACK 16-pin	HARTING
X2	NRJ6HF-1-AU	Phone Connectors 1/4 JACK STEREO SW SLIM-FULL THREAD NSE
X21	16-pin 90° pins	PIN HEADER 2x8-pin 90°
X3	1503_08	Jack connectors according to JISC 6560, 3.5 mm
X4	1503_08	Jack connectors according to JISC 6560, 3.5 mm
X4A	USB4-A4	DIP-USB-A-TYPE-FMAL(4+2P-2.0-90D)
X4B	USB4-A4	LONG PIN HEADER 1x4pin 14mm
X4B1	USB4-A4	PIN HEADER 1x4pin 90°
X5	USB HOST	LONG PIN HEADER 1x4pin 14mm
X5A	USB HOST	DIP-USB-A-TYPE-FMAL(4+2P-2.0-90D)
X5B	USB HOST	PIN HEADER 1x4pin 90°
X6	I2C-R-POGO	PIN HEADER 1x5pin
X6A	I2C-R-POGO	PIN HEADER 1x5pin
X7	1503_08	Jack connectors according to JISC 6560, 3.5 mm
X8	VCC Breakout	LONG PIN HEADER 2x5-pin 14mm
X9	1503_08	Jack connectors according to JISC 6560, 3.5 mm

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25) Appendix F

Changes:

Changelog: from 03.07.2025 to 21.08.2025

Midi to CV – PCB version V3-R02-v286 from July 3rd, 2025

- USB Host (X5B) 4-pin and USB A4 (X4B1) with 90° 4-pin connector strips added for connection cables to the 8HP front panels

Midi to CV – PCB version V3-R03-v309 from August 21, 2025

- Parts lists as subpages for components that are included in the scope of delivery but are not directly located on the PCBs
- LED2 GATE_OUT / X21-7 extra output via U3A for LED 8TE front panel

26) Appendix F

Changes:

Changelog: from September 14, 2025

Midi to CV – PCB version V3-R04-v322 from September 19, 2025

- Parts lists as subpages for components that are included in the scope of delivery but are not directly located on the PCBs
- minimal corrections to PCB labeling and component distances
- 3 mounting holes for securing the 4-pin USB adapter cable with a cable tie

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- Assembly instructions for the 8HP front panel
- Assembly instructions for the 8HP front panel MIDI-to-CV/ V1.0-DE
- Assembly instructions PEDAL-USB/ V1.0-DE
- Assembly instructions for the 8HP front panel PEDAL-USB/ V1.0-DE
- mdt_PSRAM-CAP_TOUCH-MAM-CV-1.9.9.9
- mdt_PSRAM-CAP_TOUCH-MAM-APC-1.9.9.9
- mdt_PSRAM-CAP_TOUCH-MAM_SPDIF-1.9.9.9
- MicroDexed-touch-manual-version-0.57.pdf
- codeberg.org/positionhigh/MicroDexed-touch
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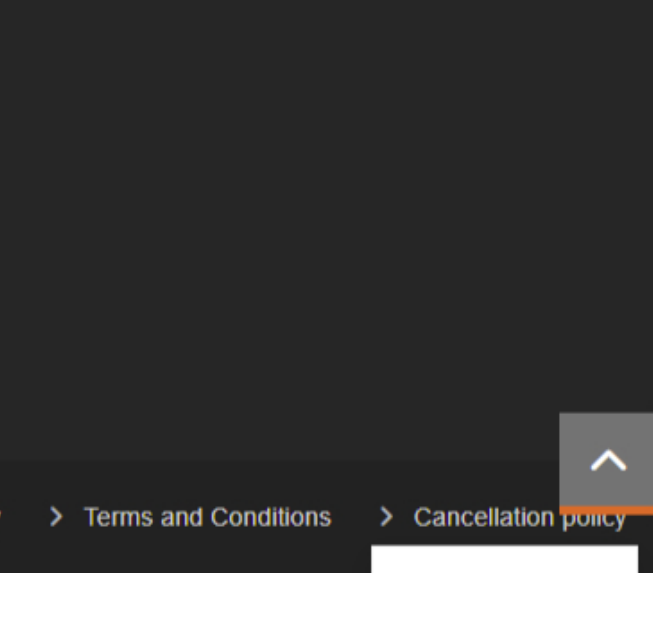

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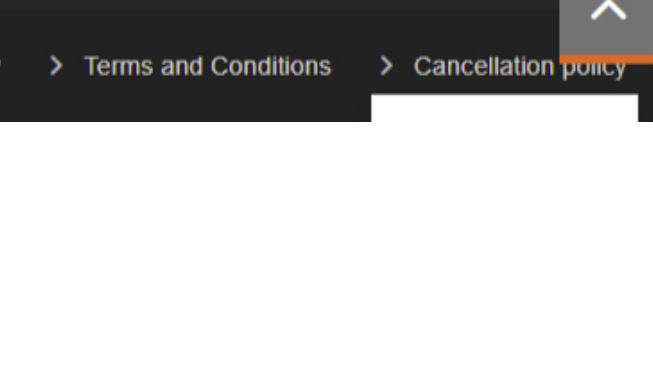

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