

## MATRIX II - User manual 2.2 (Firmware 0.3)

### 1 Introduction

The **ALYSEUM** MATRIX II module consists of a dynamic switching matrix, both analog and digital in nature, which supports 15 inputs and 16 outputs.

Input 16 is specific, it is low impedance (3K $\Omega$ ) and is permanently connected to all no routed outputs.

A special 256 LED display made for a friendly and intuitive graphical user interface, with each LED representing one of the 256 connection points available.

The module accepts a variety of signals such as Gates, Clocks, CV and OSC simultaneously, while the different user configurations can be saved as user presets in 7 banks of 32 Presets.

These presets can then be recalled by:

1. CLK+RST inputs to obtain a Sequential MATRIX I/O router
2. CV input and her its offset trimming
3. MIDI Note On or PGM Change
4. The front panel and the freeware MATRIX II editor.

The banks & presets of the expander Q-VCA and SELECTOR modules from **ALYSEUM** can be controlled by MIDI directly from the MATRIX II.

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## 3 Hardware

### 3.1 Package Content

- One MATRIX II module with Eurorack compliant front panel
- One plastic bag containing:
  - Four M3 screws + nylon washers
  - One 16/16 pins power ribbon cable
  - One MIDI adapter DIN1.0 female to Jack 3.5mm TRS
- Warranty & user manual access card

### 3.2 Installation.



#### 3.2.1 Choose the installation location of your unit carefully:

- Avoid placing it in direct sunlight or close to a source of heat.
- Avoid locations subject to vibrations, excessive dust, heat, cold, moisture or rain.

#### 3.2.2 Procedure:

1. Only connect the module to a Eurorack bus board powered by a specified A-100 power supply.
2. Switch OFF and disconnect the Eurorack case from the main power supply by unplugging it from the wall socket!
3. Make absolutely certain that the ribbon cable has the right orientation by connecting the indicated red stripe on the negative 12 Volt side of your Eurorack case bus board.
4. Carefully place the module on an appropriately spaced spot on your Eurorack and fasten it firmly in place with the supplied screws and nylon washers. Replace any covers or blanking plates that you removed to install the module and screw them in firmly.
5. Reconnect the Eurorack case power cable back into the main power supply and switch the case power on.
6. If it doesn't seem to be working as expected (Initialisation LED sequence), immediately disconnect the system from the main power supply again. In this case, double-check the connections, making completely sure that the ribbon cable is the right way round where it connects to the module and the bus.

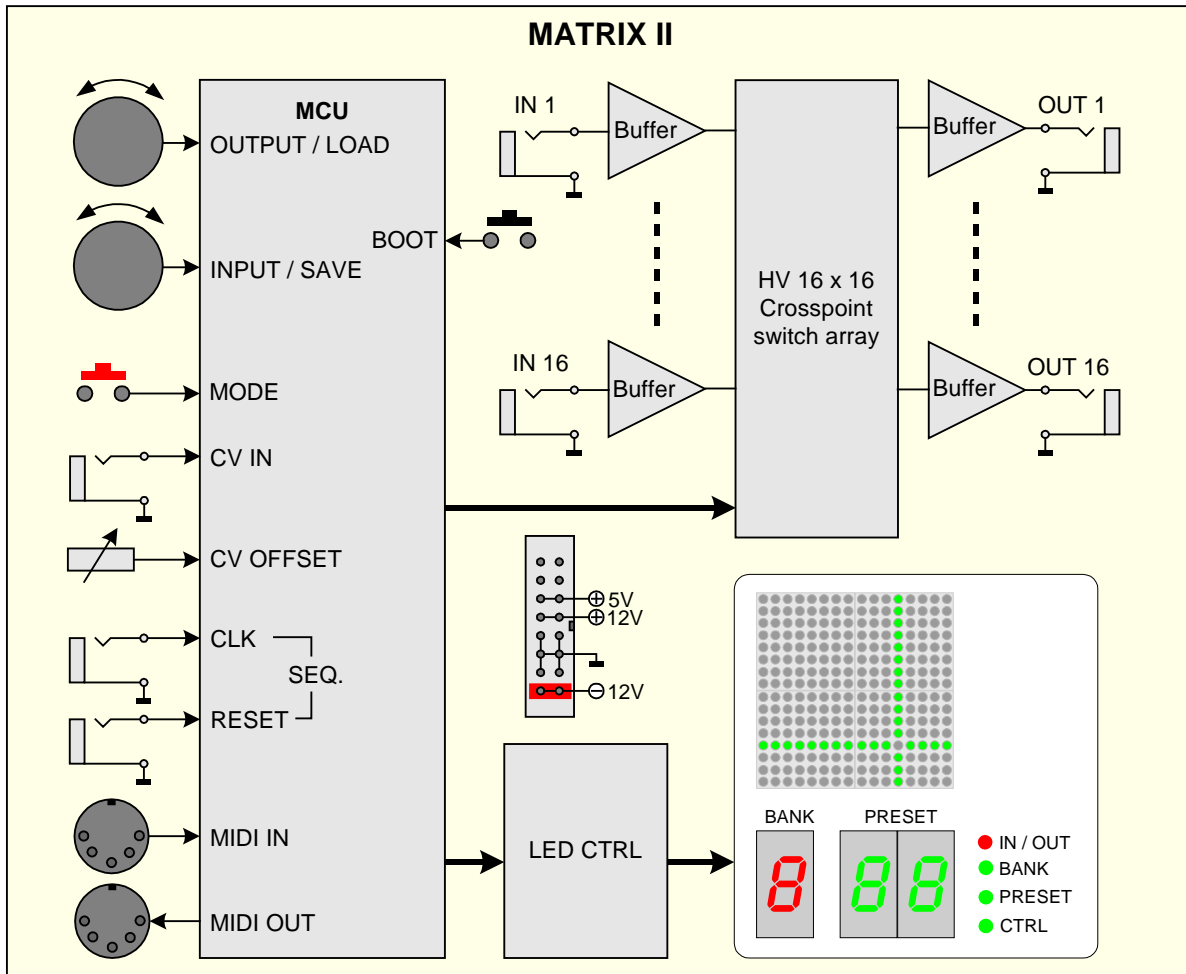
### 3.3 Features

- Specialized single Chip from Analog Device (AD75019) which guarantees:
  - Wide signal range: from -11 Volts to +11 Volts.
  - Isolation between channels: -92dB at 1 KHz.
  - Low distortion: 0,01% .
  - Low noise.
  - High bandwidth DC up to 20KHz.
- 16 low offset inputs & outputs unity gain buffers.
- 7 Banks of 32 Presets storage in EEPROM memory selectable manually or via MIDI (NOTE or PGM CH) or by CV (0 – 5 Volts range) or by CLK+RESET.
- Unlimited presets via the freeware editor for WIN or OSX.
- Programmable MIDI channel number for NOTE or PGM CH.

### 3.4 Specifications

- Front panel width: 111.5 mm (22HP).
- Module maximum depth: 26 mm.
- CV and Digital input protected level: -12 to +12 Volts.
- Power requirements: 5 Volts regulated at 90 mA and +/-12 Volts regulated at 10 mA.

### 3.5 Bloc diagram

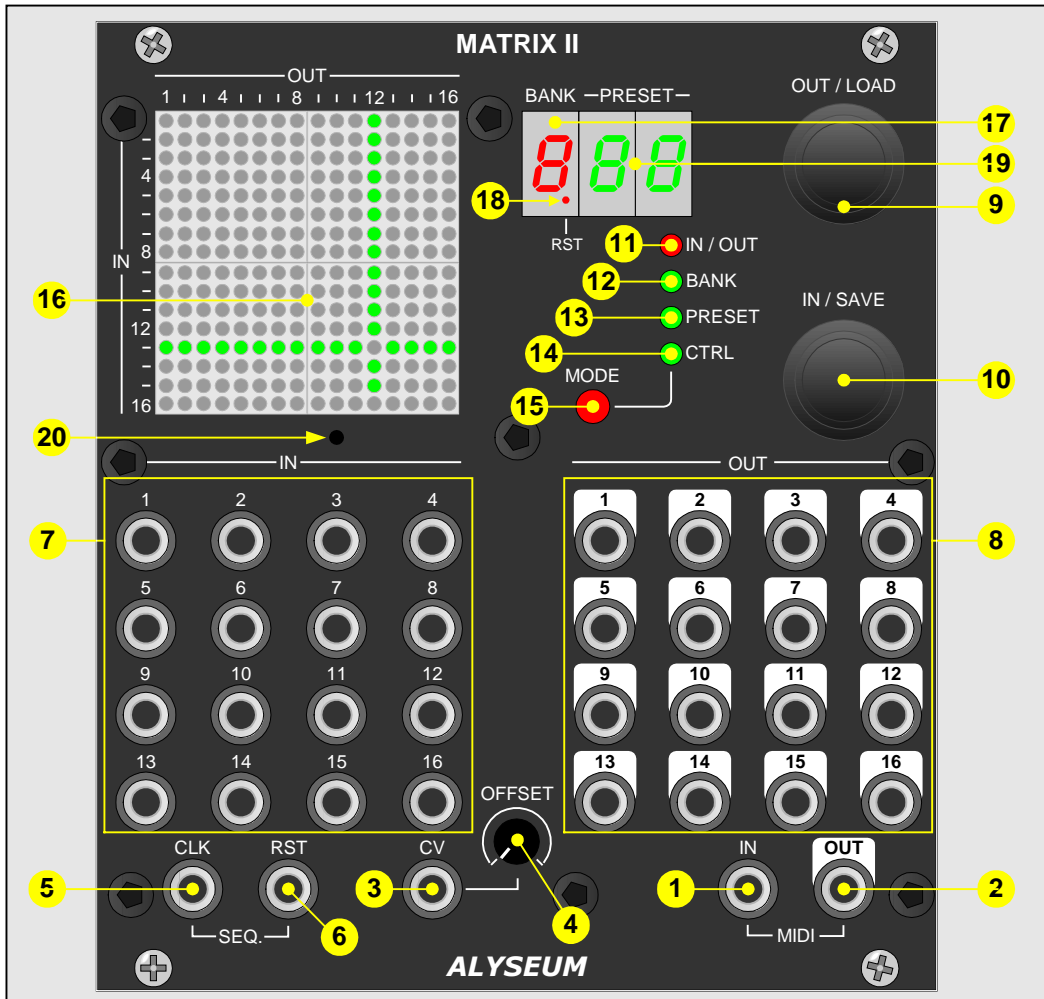


### 3.6 How to wiring a TRS 3.5mm Jack to MIDI DIN 5?

MATRIX II only uses the cabling "Type B", used by Novation, Arturia, 1010, and more

TRS 3.5mm JACK	DIN 5
Tip contact	Pin 4 (+)
Ring contact	Pin 5 (-)
Sleeve contact	Pin 2 (GND)

### 3.7 Front Panel



- |   |   |
|---|---|
| 1. <b>MIDI IN Jack plug:</b>              | The MIDI input - TRS (stereo) 3,5 mm jack.                    |
| 2. <b>MIDI OUT Jack plug:</b>             | The MIDI output - TRS (stereo) 3,5 mm jack.                   |
| 3. <b>CV IN Jack plug:</b>                | Analog CV input for Preset selection - 3,5 mm jack.           |
| 4. <b>TRIM:</b>                           | Offset adjustment of the CV level input.                      |
| 5. <b>CLK IN Jack plug:</b>               | Digital CLK input for Preset selection - 3,5 mm jack.         |
| 6. <b>RESET IN Jack plug:</b>             | Digital RESET input for Preset selection - 3,5 mm jack.       |
| 7. <b>IN 1 – 16 jack plug:</b>            | The sixteen inputs of the matrix - 3,5 mm jack.               |
| 8. <b>OUT 1 – 16 jack plug:</b>           | The sixteen outputs of the matrix - 3,5 mm jack.              |
| 9. <b>OUT/LOAD push encoder:</b>          | Rotary encoder with momentary push button.                    |
| 10. <b>IN/SAVE push encoder:</b>          | Rotary encoder with momentary push button.                    |
| 11. <b>IN/OUT LED (red):</b>              | When turned On it indicates that IN/OUT Mode is engaged.      |
| 12. <b>BANK LED (green):</b>              | When turned On it indicates that Preset Mode is engaged.      |
| 13. <b>PRESET LED (green):</b>            | When turned On it indicates that Preset Mode is engaged.      |
| 14. <b>FN. LED (green):</b>               | When turned On it indicates that MIDI/CV/CLK Mode is engaged. |
| 15. <b>Red Push Button:</b>               | Scrolls through the different Modes.                          |
| 16. <b>Graphical LED display (green):</b> | A LED array indicates the current connections of the matrix.  |
| 17. <b>1 Digit LED display (red):</b>     | Display the current BANK (1 to 7).                            |
| 18. <b>Red dot RST input activity:</b>    | Blink each time a RST is received.                            |
| 19. <b>2 Digits LED display (green):</b>  | Display the current PRESET (1 to 32).                         |
| 20. <b>Small hole:</b>                    | insert a pointed object when programming                      |

## 4 Use.

### 4.1 Initialization Sequence

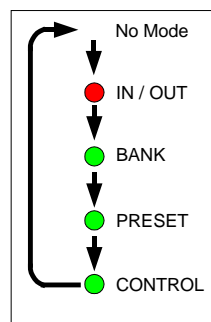
1. Turn the Eurorack case power ON.
2. The brand name **ALYSEUM** and firmware revision are displayed on the LED array display for less than a second.
3. Sequentially, the 4 modes LEDs flash for half a second each.
4. The matrix stored in the last used BANK & PRESET are loaded and displayed on the LED digit and corresponding connection on the LED array display 16X16 .
5. A MIDI message is sent by MIDI to informing next MATRIX II and/or Q-VCA and/or SELECTOR module(s) that the particular Bank & Preset has been loaded.

The MATRIX II is ready!

### 4.2 Mode Selection

Push the Mode button to select:

- No Mode (Default - All LED Mode Off)
- IN / OUT
- BANK
- PRESET
- CTRL (Control Selection)



### 4.3 IN / OUT Mode

To select a connection between an input and an output on the matrix:

1. Push the Mode button to select IN/OUT Mode (see paragraph 5.2).
2. The line and column guides appear on the LED array.
3. Turn the IN/SAVE encoder to select a row.  
The selected row number corresponds to the input jack of the same number.
4. Turn the OUT/LOAD encoder to select a column.
5. The selected column number corresponds to the output jack of the same number.

To activate the selected connection push either the IN/SAVE or the OUT/LOAD encoder until the corresponding LED is turned ON. The line and column guides disappear.

To deactivate the selected connection push either the IN/SAVE or OUT/LOAD encoder until the corresponding LED is turned OFF. The line and column guides disappear

To move on to another connection, turn the IN/SAVE or the OUT/LOAD encoder and then go to step 3 .

**NB:** Red I/O LED blinking as long as the changes are not saved (Unsaved IN/OUT warning).

#### 4.3.1 Specific algorithm in the firmware

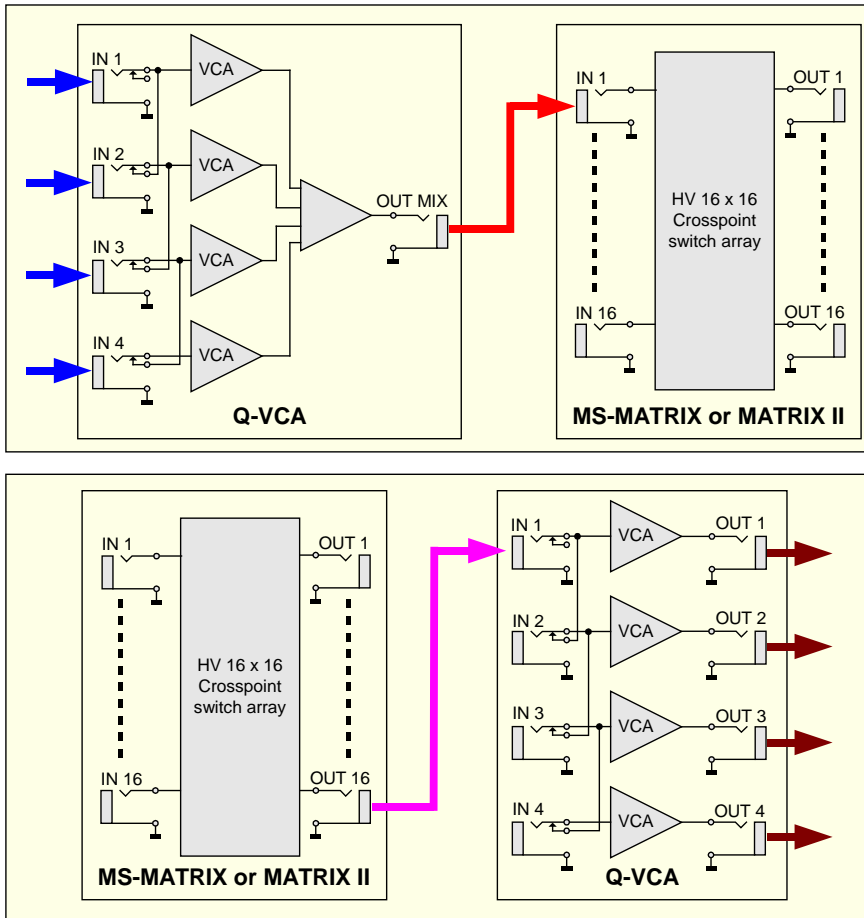
To increase the performance, we have added a specific algorithm in the firmware: All outputs not specifically connected to an input, are by default connected to input 16 (or GND by default), so as to improve the performances between analog audio channels.

Please, do not use input 16 unless all other inputs (1-15) are already connected to an output.

### 4.3.2 Mixer Function on the inputs and/or outputs

The MATRIX II does NOT function as a mixer. Please refer to our expander Q-VCA for mixer function.

While it is possible to map one input location to several output locations (and thus have the MATRIX II act as a multiplier), it is impossible to map several inputs to the same output.



## 4.4 BANK Management.

### 4.4.1 Loading a BANK.

Bank # can be loaded manually and via the **MATRIX II** Editor.

1. Push the MODE button to select BANK Mode.
2. Turn the OUT/LOAD encoder to select a BANK location (1 to 7)
3. During 10 Seconds, the matrix stored in the selected Bank/Preset location is displayed on the LED matrix display and on the red and green Digits LED (but not loaded yet).
4. Push the OUT/LOAD encoder a second time to confirm your selection.
5. The matrix connections are set according to the selected Bank. A MIDI signal is sent informing slave modules that the particular Preset has been loaded.

### 4.4.2 Saving a BANK.

Don't exist a saving bank location function.

Each time you save a PRESET, the BANK number is automatically saved.

## 4.5 PRESET Management.

Presets # can be loaded in several ways: manually or by the dedicated CV Input or by the CLK+RST inputs or by MIDI (either incoming Note On or PGM CH) and finally via the **MATRIX II** Editor.

#### 4.5.1 Loading a PRESET.

1. Push the MODE button to select PRESET Mode.
2. Turn the OUT/LOAD or IN/SAVE encoder to select a preset location. PRESETs are indexed in locations between **01** and **32** and displayed on the dual green LED digit during 10 Seconds (but not loaded yet).
3. Push the OUT/LOAD encoder to confirm your selection.
4. The matrix connections are set according to the selected PRESET. A MIDI signal is sent informing slave modules that the particular PRESET has been loaded.

**TIP:** In CV mode and if you don't use the CV input, you can select a PRESET easily via the OFFSET trim.

#### 4.5.2 Saving a PRESET

1. Push the MODE button to select PRESET mode.
2. Turn the OUT/LOAD or IN/SAVE encoder to select a PRESET location. PRESETs are indexed in locations between **01** and **32** and displayed on the dual green LED digit during 1 Second (but not overwritten yet).
3. Push the IN/SAVE encoder to confirm your selection and the dual green LED digit flashing 3 times.
4. The current matrix connections are stored to the selected PRESET location. A MIDI signal is sent informing slave modules that the particular PRESET has been saved.

**NB:** Pushing the IN/SAVE encoder will overwrite the current matrix connections to the specific location and the previously saved matrix will be lost.

#### 4.5.3 Saving a PRESET Automatically

When Auto Save is activated (see paragraph 4.7.2) there is no need for any action in order to save a PRESET as any change made is automatically saved.

This means that by activating or deactivating a connection while in IN/OUT Mode you also alter the matrix saved on the specific PRESET location.

**NB:** There is no possibility to save manually a preset, when the Auto Save mode is enable!

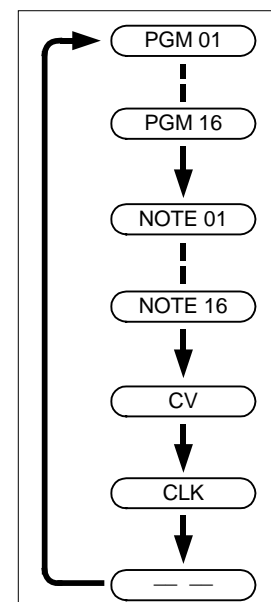
### 4.6 CONTROL Mode

To select the method of loading a PRESET:

1. Push the red push button to select the CONTROL mode.
2. Turn the IN/SAVE encoder to select one of the 35 settings: (see diagram right).
  - A. **PGM XX**: Preset changing via PGM change (MIDI channel 1 to 16).
  - B. **NOTE XX**: Preset changing via MIDI notes (MIDI channel 1 to 16).
  - C. **CV**: Preset changing via CV input (0 to +5 Volts range).
  - D. **CLK**: Preset changing via CLK+RST inputs, like a Sequential MATRIX I/O Router.
  - E. **— —**: Preset changing only manually .
3. Push the INPUT/SAVE encoder to confirm your selection.
4. Your selection has been saved as soon as the CONTROL Mode LED is turned Off.

**NB 1:** When one of the five CONTROL Mode settings has been selected any incoming activity, either from the MIDI IN input or the CV input, will be indicated by the flashing CONTROL Mode LED.

**NB 2:** All PRESETs changes due to MIDI IN input or CV input or CLK+RESET inputs are ignored while IN/OUT Mode, BANK Mode or PRESET Mode is active.





## 4.7 Settings

### 4.7.1 Assigning a MIDI NOTE to PRESET 01

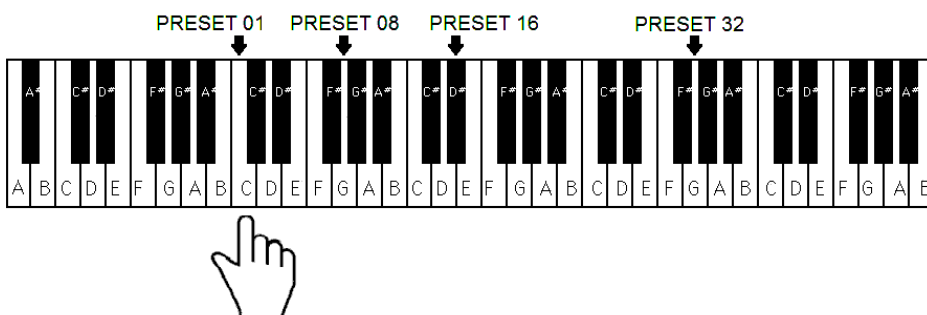
By default PRESET 01 corresponds to key C3 (MIDI Note 48). Consecutive chromatic notes correspond to the rest of the Preset locations as shown below.

If your keyboard range is too short, the lowest key which will correspond to PRESET 01 can be reassigned:

1. Make sure you have your MIDI keyboard properly connected to the MIDI IN input of the MATRIX II
2. Turn the Eurorack case power off.
3. Push and hold the push button while turning the Eurorack case power back on.
4. **NEW NOTE** is displayed on the LED display
5. Release the Mode push button (Mode button)
6. Press the desired key on your MIDI keyboard (Note On), hold it for at least 5 seconds or wait for the MIDI/CV LED to flash 4 times and then release the key (Note Off).
7. The MIDI/CV Mode LED flashes 4 times and the new lowest Note is saved. **ATTENTION:** MIDI Channel sensitive.
8. The initialization sequence begins (see paragraph 5.1)

**NB 1:** There is no need to repeat this operation every time you turn the module ON, since the lowest Note under a MIDI Channel are stored in the non-volatile memory (EEPROM) of the module.

**NB 2:** In step 6, if more than one keys are simultaneously pressed for more than 5 seconds, only the one pressed earlier will be used for setting the new lowest key for PRESET 01.



### 4.7.2 Setting Auto Save or Manual Save

To change the method Presets are saved:

1. Turn the Eurorack case power off.
2. Push and hold the IN/SAVE encoder while turning the Eurorack case power back on.
3. Release the encoder.
4. Turn the OUT/LOAD encoder to choose between **AUTO SAVE** and **MAN. SAVE** as indicated on the LED display.
5. Push the OUT/LOAD encoder to confirm your selection.
6. The Initialization sequence begins (see paragraph 4.1)

## 4.8 Factory Reset



Be aware that a Factory Reset will erase all 7 BANKS of the 32 PRESETs and all Settings stored by the user.

Additionally the expander Q-VCA & SELECTOR modules and a other slave MATRIX II will also undergo a Factory Reset.

To perform a Factory Reset:

1. Turn the Eurorack case power OFF.
2. Push and hold both IN/SAVE and OUT/LOAD encoders while turning the Eurorack case power back ON.
3. **RESET** will be displayed on the LED array.
4. Release both encoders.
5. The 7 BANKs of the 32 PRESETs and all CONTROL settings are erased.
6. System reset command (F0 00 20 09 00 1F 7F 7F 7F F7) is sent to slave Q-VCA and/or SELECTOR modules via MIDI connected.
7. The initialization sequence begins.

## 4.9 Firmware upgrade.

Always ensure that you have the latest firmware installed before using the module.

The MATRIX II is pre-programmed with the ability to receive firmware upgrades (for bugfixes, extra features, etc...) via MIDI protocol (SysEx commands).

Please, fill in the page Firmware Upgrade <http://alyseum.com/firmwareupdate> to receive all new firmwares for your product.

In order to flash new firmware, please follow the instructions below:

1. Turn the Eurorack case power off.
2. Close all MIDI software on your computer.
3. Connect the computer and the MATRIX II with a MIDI cable.
4. Download Sys Ex utility at <http://www.elektron.se/support-and-downloads> (WIN & OSX).
5. Press and hold the BOOT button, while turning the Eurorack case power back on. The BOOT button is located behind the small hole in MATRIX II front panel – left from the mode LED, and can be pressed using a thin, long object like a toothpick.
6. All the LEDs flash 3 times, now release the BOOT button.
7. Open the Elektron C6 Sys Ex utility software, click **Load**, find the new firmware file and click Open.
8. Click **Configure**, select a MIDI Out port, set 400ms for Delay in the textbox, select x1 for Turbo limit field and click OK.
9. Click **Send**, the LEDs first flash one after the other, then all together fast.
10. Wait more as 1 minute until sending is complete. All the LEDs flash 4 times, and the module reboots to normal operating mode with new firmware.

Please note that for the software to be able to send the MIDI commands successfully, no other software or Active Sensing message should be using the MIDI device simultaneously.

All parameters (lowest note, last used Preset and Bank, last used midi channel or cv input or CLK+RST, preset save mode) are reset and all Presets are erased during new firmware flashing.

Thanks to Émilie Gillet from Mutable Instrument for his open Bootloader code: <https://github.com/pichenettes/avr-midi-bootloader>.

## 5 MATRIX II Editor

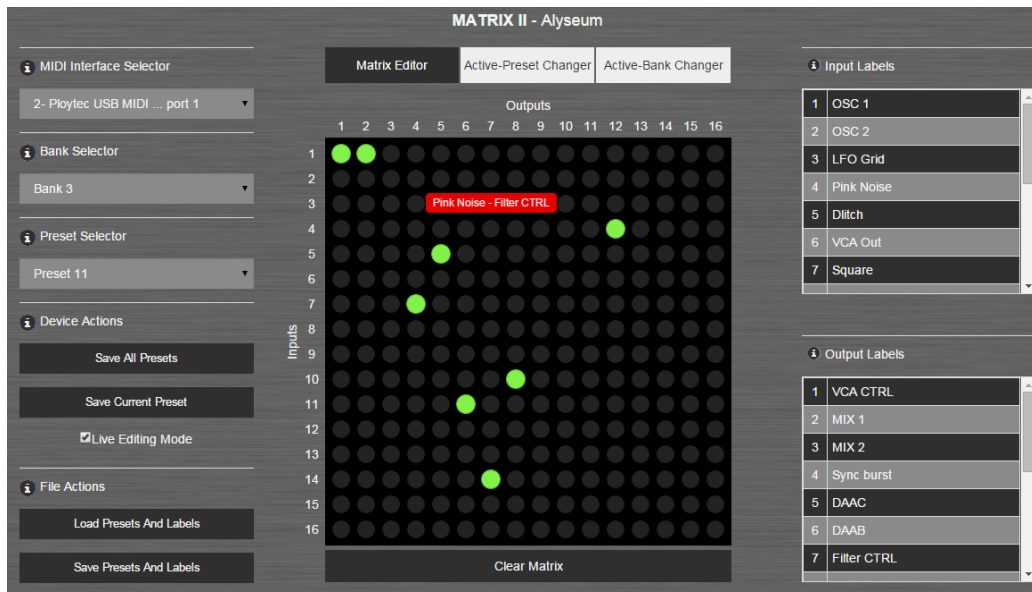
The MATRIX II Editor is an free application that provides an easy and fast interface to the MATRIX II functionalities.

It works on Windows and Mac OSX, and it's free to download from the Alyseum website.

The MATRIX II Editor is a standalone/portable executable, so there is no installation process. Once you download it, all you have to do is open it, so you can use it.

Depending on your computer's specifications, it could take a few seconds to load, as it has been compressed, in order to save space.

Once you have opened the MATRIX II Editor, you are presented with a screen such as the following:



**NB 1:** Please note that the MATRIX II Editor can not manage the Bank allocations.

**NB 2:** You need to SAVE Bank manually on the front panel, one by one.

**NB 3:** In case the MIDI Device Selector is empty, although there are MIDI-output devices connected to your computer, please re-open the MATRIX II Editor with Administrator permissions (right click the executable and choose "Run as Administrator").

### 5.1 Matrix Editor Tab

This is the default active tab when opening the application.

It consists of a 16x16 matrix with round buttons, that have a toggling functionality, as well as a "Clear Matrix" button, for easy matrix clearing.

#### 5.1.1 MIDI Device Selector

All available MIDI devices connected to your computer will be listed in the dropdown field "MIDI Device Selector".

Please choose the one connected to your MATRIX II.

In case another device is selected (for example, Microsoft GS Wavetable Synth virtual interface), the MATRIX II Editor could automatically exit during MIDI transmission.

#### 5.1.2 Bank Selector

The "Bank Selector" is a dropdown list of 7 Banks.

When a Bank is selected, it is loaded onto the matrix, in the center of the screen.

#### 5.1.3 Preset Selector

The "Preset Selector" is a dropdown list of 32 Presets.

When a Preset is selected, it is loaded onto the matrix, in the center of the screen.

Also, the “Save Current Preset” button uses the Preset selected in this list.

### 5.1.4 MATRIX II Actions

Save All Presets: All Presets are saved to the MATRIX II. The active I/O connections are not changed.

Save Current Preset: The selected Preset is saved to the MATRIX II. The active I/O connections are not changed.

### 5.1.5 File Actions

Load Presets and Labels: Select a file previously saved by using the “Save Presets and Labels” button (see below - Save Presets and Labels), so that its contents are loaded into the MATRIX II Editor.

In case you have edited Presets or Labels without having saved the changes, you are presented with a verification for overwriting the existing Presets and Labels with the imported ones.

Save Presets and Labels: Download a file containing all Presets and Labels currently in the MATRIX II Editor.

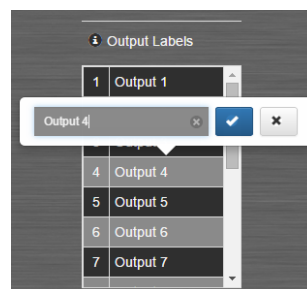
You can afterwards load it (see above – Load Presets and Labels) and continue working where you left off.

### 5.1.6 In / Out Labels

Output and Input Labels are used to easily identify Outputs and Inputs, respectively.

They appear when hovering the mouse over the matrix.

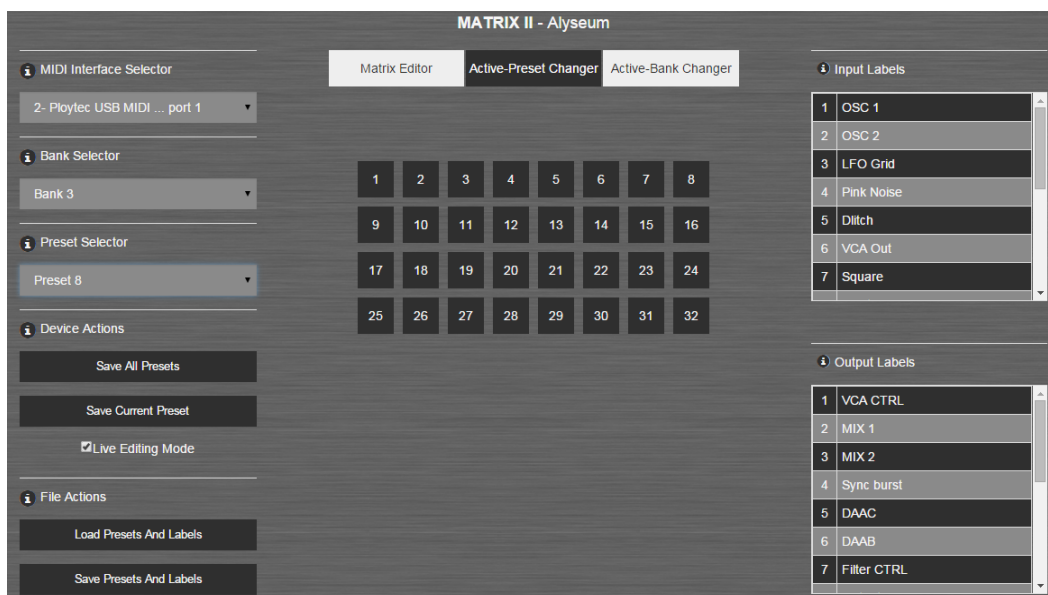
By clicking on a label row, a popup appears, providing the ability to change that label, as seen in the image on the right.



## 5.2 Active-Preset Changer Tab

The Active-Preset Changer Tab can be used to load fastly a Preset from the MATRIX IIs EEPROM memory to the active switch matrix (see 4.5.1 - Loading a Preset).

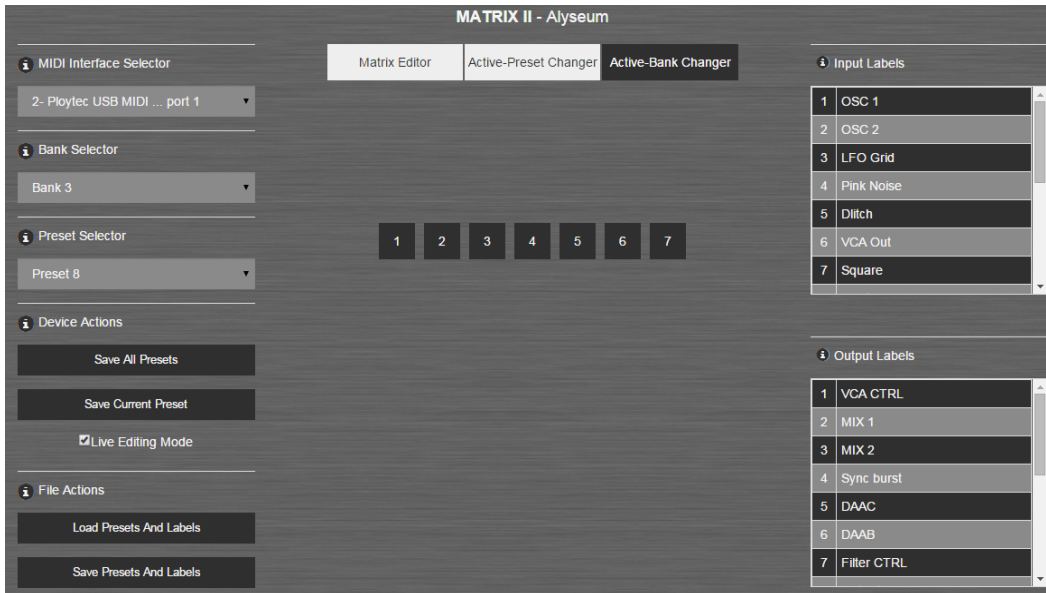
After selecting the correct channel – the one that the MATRIX II is configured to receive PGM Change Messages on (see 4.6) – you just press the button corresponding to the Preset you want to load and the matrix connections are set according to the selected Preset.



## 5.3 Active-Bank Changer Tab

The Active-Bank Changer Tab can be used to load fastly a Bank from the MATRIX IIs EEPROM memory to the active switch matrix (see 4.4.1 - Loading a Bank).

After selecting the correct channel – the one that the MATRIX II is configured to receive PGM Change Messages on – you just press the button corresponding to the Preset you want to load and the matrix connections are set according to the selected Bank.



## 5.4 How to control MATRIX II via MIDI (SYS-EX) ?

### Preamble:

For musicians who wish to control the MATRIX II via their favorite software, we provide the information below.

Please note that no support or assistance will be provided!

You can communicate with the MATRIX II with the following protocol

### Send Preset to device:

Send the following, via MIDI: [0xf0, 0x00, 0x20, 0x09, 0x00, 0x1f, 0x7e, 0x01, BANK\_INDEX, PRESET\_INDEX, PRESET\_VALUES, 0xf7] <- if the BANK\_INDEX and PRESET\_INDEX in this message are the same as the respective active bank index and active preset index of the MATRIX II at that time, this preset will also directly appear on the matrix (live mode)

### Change active Bank:

Send the following, via SYS EX: [0xf0, 0x00, 0x20, 0x09, 0x00, 0x1f, 0x7e, 0x02, 0x00, BANK\_INDEX, 0xf7]

### Change active Preset:

Send the following, via SYS EX: [0xf0, 0x00, 0x20, 0x09, 0x00, 0x1f, 0x7e, 0x02, 0x01, PRESET\_INDEX, 0xf7]

### Live editing mode:

Send preset to device, making sure that the BANK\_INDEX and PRESET\_INDEX in this message are the same as the respective active bank index and active preset index of the MATRIX II at that time (otherwise, this will be considered a "Send preset to device" message).

### Notes:

- BANK\_INDEX = 0 to 7
- PRESET\_INDEX = 0 to 15
- PRESET\_VALUES = 16 separate values (0-15), 1 for each matrix row
- MIDI\_CHANNEL = 0 to 15

## 6 Miscellaneous

### 6.1 Disclaimer

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The information and specifications described in this manual are subject to change without prior notice.

Throughout this manual, trademarked names might be used. We state herein that we are using the name to the benefit of the trademark owner, with no intention of infringement.

### 6.2 Static Electricity, ESD



Electrostatic discharge (ESD) can cause malfunction and/or damage to electronic devices if discharged into the module.

Despite **ALYSEUM** products having built-in protections against ESD, voltages might build up at levels that could harm your equipment.

Some tips and precautions for ESD sensitive environment:

- Make sure to discharge any built-up static electricity from yourself and your devices before touching or connecting one device to another.
- Ground yourself by touching an earth grounded metal surface before handling your module and other equipments.
- For fixed installations, place the module in a grounded metallic rack.
- Ensure air relative humidity is minimum 60%.
- Install ESD specific prevention items, such as grounding mats.
- Reduce movement speed when handling or (dis)connecting devices.
- Avoid carpet or other synthetic flooring.



### 6.3 Warranty and repair

**ALYSEUM** warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for a period of two years following the date of purchase.

This warranty does not apply to any products which have been repaired or altered by other than **ALYSEUM**, or which have been subject to ESD, moisture, abuse, accident, improper installation or use.

**ALYSEUM** assumes no liability as a consequence of such events under the terms of this Warranty.

Please, consult your dealer for more details or visit our support page on [alyseum.com/support](http://alyseum.com/support) before any action.

## 6.4 MIDI Chart

### MATRIX II MIDI IMPLEMENTATION CHART ver.2.0. 2019-04-18

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	X	1-16	Memorized
	Changed	X	1-16	Memorized
Mode	Default	X	X	not applicable
	Messages	X	X	
	Altered	X	X	not applicable
Note Number		X	O	
Velocity		X	X	
After Touch	Keys	X	X	
	Channels	X	X	
Pitch Bend		X	X	
Control Change		X	O	32-63
Prog. Change True#		X	O	1-32
System exclusive		O	O	Firmware upgrade & Editor
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune Request	X	X	
System Realtime	Clock	X	X	
	Commands	X	X	
Aux Messages	Local On/Off	X	X	
	All Notes Off	X	X	
	Active Sensing	X	X	
	System Reset	X	X	
Notes				

O= Implemented

X= Not supported