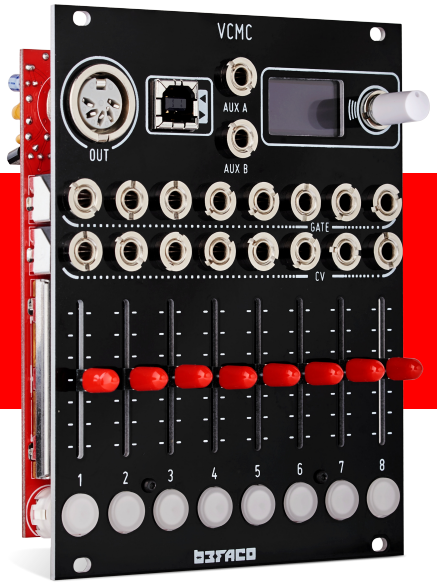

VCMC

USER MANUAL

b3FACO

User Manual Rev 13 Oct.
Current Firmware v1.0

Page 2 POWER & INTRODUCTION
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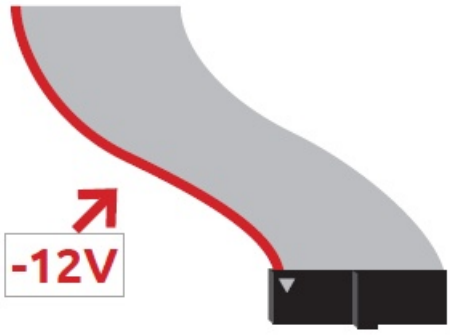
POWERING THE MODULE | THANKS FOR PURCHASING A MODULE FROM BEFACO! BEFORE YOU PLUG THIS MODULE IN...

1. **Disconnect your cabinet from the mains.**

2. **Triple check the power cord polarity.** The coloured line on the cable (pin number one) is the -12V rail.



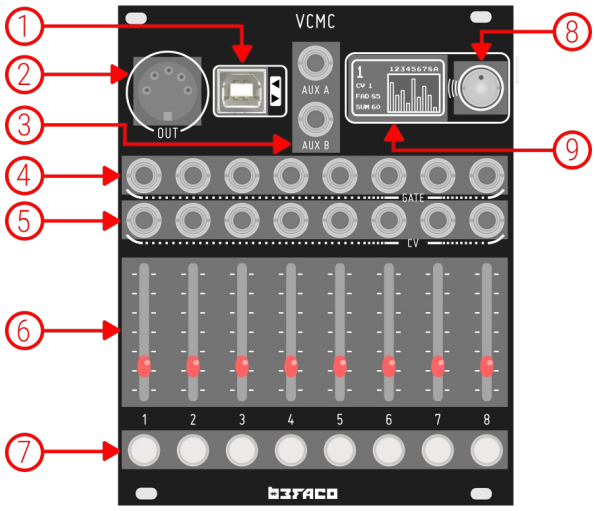
3. If you plug the module backwards or in **EXP connector** you might burn it out and unfortunately this is not covered by the warranty.

4. If you have any questions about this product please send them to: support@befaco.org

INTRODUCTION | VCMC

VCMC is a Voltage Controlled MIDI Controller, a fully mapable MIDI device with eight Faders and Buttons. Each of those controls has a CV and a Gate Input associated either to automate their functioning or to be configured independently for further control.
Every setting on VCMC can be edited through its OLED screen and will be output either via DIN5 or USB as Class Compilant MIDI Device.

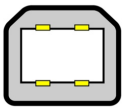
MODULE REFERENCE | PANEL OVERVIEW



1. USB Output
USB Type B Midi output connector.
2. MIDI DIN Output
DIN5 Midi output connector.
3. Aux A/B
CV auxiliar inputs.
4. Gate
Gate Inputs.
5. CV
CV inputs.
6. Faders
Manual sliding controls.
7. Push Button
Manual push control associated to each Gate Input.
8. Encoder
Rotary encoder control.
9. OLED Screen
OLED Screen for visualization and editing all functions.

STARTING WITH VCMC | CONNECTING THE UNIT TO EXTERNAL GEAR

There are two main MIDI connections in VCMC: USB and DIN5. Both connections send every MIDI message generated by the module, choosing each one depending on the device you will be controlling. Let's take a deeper look:



USB

The USB port is the most convenient way to connect VCMC to a computer. Just plug a USB Type B cable from VCMC to a free USB port of your computer and the module should be automatically recognized as a MIDI Device. You will be able to select it on the MIDI connections of your DAW or any other software that supports MIDI.

If you have USB Host devices, you can use this port with it in the same way we did with the computer.

DIN5

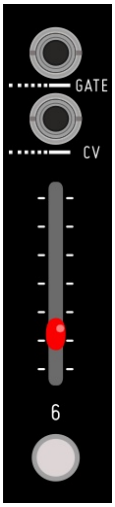
Most of the external gear out there uses DIN5 connections for MIDI control. If you want to control your external gear with VCMC, just plug a standard MIDI DIN cable from VCMC´s DIN5 Out port to your device´s MIDI Input.

BASIC STRUCTURE | BLOCKS & PERFORMANCE SCREEN

In VCMC, you have a variety of different controls and connections capable of sending MIDI to your external gear. To make it as clear and friendly as possible, the module is divided in eight functional blocks.

A block is conformed by a set of controls that can be configured to send different MIDI messages. Basically, each block contains a CV Input, a Fader and a Gate Input with a linked Push Button.

The activity of each block is displayed on the Performance Screen.



VCMC Block

The Performance Screen is the main level of the VCMC menu structure. Here you can navigate trough the different blocks, rotating the encoder, to check their activity.

On the left of the screen, you will see the values sent by the CV Input and Fader of the current block and, if both are linked, the value of the link. On the right part, you have overall real time information about the values sent by every VCMC block.

Besides its eight functional blocks, VCMC includes two Auxiliar inputs. The behaviour of those inputs is exactly the same as the block CV inputs and their activity is displayed on the Performance Screen as well.

Performance Screen

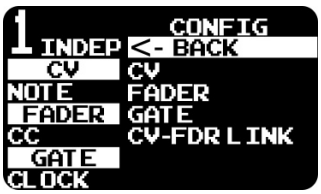
SETTING THE BLOCKS | CONFIGURATION SCREEN

Click the encoder on a selected block to configure it.

In this menu you can navigate through the different controls of the selected block. Access them by clicking the encoder button. For each control you will be able to map MIDI Messages, MIDI Channel and input and output ranges.

As pictured, the available controls to configure are as follow:

On the left column of the Configuration Screen you have the information section. It displays the MIDI Messages assigned to each control.



Configuration Screen

1. CV
Configure CV Input
2. Fader
Configure Fader
3. Gate
Configure Gate Input
4. CV-FDR-Link
Select CV-Fader Link mode: Sum or Attenuation.

Keep in mind that some of these options will disapear, depending on the choosen mode. We will cover this further ahead in the manual.

SETTING THE BLOCKS | CONTROLS OVERVIEW

BUTTONS/GATES
Buttons can be mapped to send a MIDI message when pressed. This message can be either a Note or a value of certain CC. They can be configured as Gate, where value will be present while pressed, or latch where the value will remain on when pressed and turn off when pressed again. Other messages that can be mapped are clock or ST/SP.
Gates are associated to Buttons by hardware, so a gate present here will be added to the value of the button and viceversa. The LED will show us any activity.

FADERS
Faders will be sending a midi message with value proportional to the fader position.
It can be set up as an independent, or associated to the CV input to be added, or as an attenuator.

CV
Each CV input will be sending a MIDI message with value proportional to the voltage received.
It can be set up as independent or associated to the fader to be added or attenuated, or to the Gate for the V/Oct to MIDI note mode.

AUX
These are two auxiliar inputs. They can be mappedr to MIDI messages, similar to inputs, **but they do not accept negative voltages.**

SETTING THE BLOCKS | CV EDIT

Each VCMC control has its own configuration menu where you can configure its behaviour. Let's start with the CV Inputs.

From the Performance Screen, select a block and press the encoder to enter into the main Configuration Screen. Go to CV and press the encoder again to enter into the CV Edit Menu.

On the left of the screen there is information about the selected MIDI channel and the current Function of the CV Input.

CV Edit Screen

At the right you have the following options:

FUNCTION

Selects the MIDI message that will be mapped to this input. By pressing on it you will have access to the MIDI Mapping screen.

1. V/Oct to Note

In this mode Gate and CV will be linked so we can convert CV + Gate messages to MIDI notes. When Gate goes high, a NOTE ON message will be sent with value proportional to the CV input. When Gate goes down a Note OFF message will be sent. Keep in mind that, in order to keep V/Oct range, only 120 MIDI notes will be sent for the whole range. 1 Octave=12 semitones, so 10 Octaves 120 notes.

FOR EVERY NOTE REPRESENTATION IN VCMC WE ARE ASSUMING THAT MIDI NOTE 0 IS C-2

2. Notes

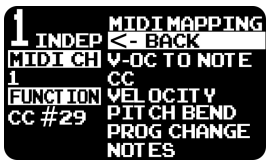
On this mode the module will generate MIDI notes at the selected MIDI Channel following the V/Oct ratio regardless of the presence of Gate or not. The Gate lenght is fixed.

3. CC

This will send CC messages. When selected you will be prompted to choose which CC number will be sent.

4. Velocity

CV will be mapped to velocity message representing the notes selected in the MIDI channel.



CV MIDI Mapping

5. Pitch Bend

CV will be mapped to pitch bend message.

6. Program Change

A program change message will be sent proportional to CV value.
TIP: Program change will change the program in the current bank selected in your Machine. Map CC#0 or CC#32 in another input to do a bank select and double the fun!!

7. NRPN

In this mode the CV will be converted to NRPN messages. Upon selection of this mode you will be prompted to select a NRPN number. Keep in mind there are two NRPN modes available: 7 bit and 14 bit.

SETTING THE BLOCKS | CV EDIT

MIDI CHANNEL
Selects MIDI Channel for this CV Input.

CV DELAY
Set a delay on the CV reading. Specially useful on V/Oct mode. As some sequencers have some delay between setting the gate high and sending the CV, with this feature you will avoid sending old messages.

RANGES
On this screen we will be able to set the functional ranges of the CV Input and the MIDI Output. Here you will be able to calibrate the CV Input as well. Let's take a look:

1. In Range

+10: The CV Input will expect a voltage range of 0-10V, translating each voltage in concrete MIDI value. A voltage of 10V will be translated as the maximum MIDI message value (see OUT Range below)

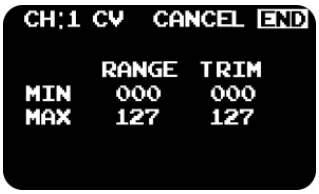
+5: The CV Input will expect a voltage range of 0-5V, translating each voltage in concrete MIDI value. A voltage of 5V will be translated as the maximum MIDI message value (see OUT Range below)

-5/+5: The CV Input will process negative voltages as well. In this mode a voltage of 5V will be translated as a MIDI value of 64 and -5V to -64, Negative values will be clipped to 0, so linking the fader as SUM (see CV/FDR Link) is adviced for effectivity.

2. Out Range

MIDI RANGE: Select from what MIDI value to which one your CV will be scaled. This feature will select the minimum and maximum MIDI values and will scale the input to that range.

MIDI TRIM: With these you can set MIDI limits, so no messages will be sent beyond the minimum and maximum set here. This feature clips the range, do not scale.



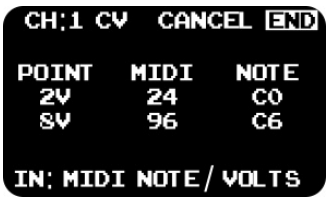
Out Range Screen

Set the values of each range by turning and pressing the encoder. If you don't want to keep the changes and go back to the previous screen, press Cancel, otherwise press End.

3. Calibration

This will perform a two points callibration. You will be prompted to send 1v and 4v, stating to which MIDI Note they relate to. A voltmeter is shown to monitor incoming voltage.

This calibration is useful when your CV source has some offset, so you can avoid note shifting on conversion. Also, if source CV does not have perfect V/Oct linearity, this will correct the scaling.



Calibration Screen

CALIBRATION PROCEDURE: Before selecting calibration, be sure you have V/Oct to Note mode selected on the CV Input you want to calibrate, otherwise you will get an error message prompting to activate it.

Once done, plug the CV signal from your sequencer or CV source, set it to send 1V (go to the manual of your CV source if you don't know the equivalent Note/Volts) and check the voltmeter at the bottom of the screen. If all is well it should show you C0/1V, then turn the encoder till you have the first line (1V 24 C0) selected and press the encoder. Repeat the process for 4V and press End to finish the calibration. If you don't want to keep the changes, press Cancel.

SETTING THE BLOCKS | FADER EDIT

From Performance Screen, select a block and press the encoder to enter in the main Configuration Screen. Go to Fader and press the encoder again to enter into the Fader Edit Menu.

On the left of the screen you will have information about the selected MIDI channel and the current Function of the Fader.

At the right you have the following options:

Fader Edit Screen

FUNCTION

Selects the MIDI message that will be mapped to this Fader. By pressing on it you will access the MIDI Mapping screen.

1. V/Oct to Note

In this mode Gate and CV will be linked so we can convert CV + Gate messages to MIDI notes. When Gate goes high, a NOTE ON message will be sent with value proportional to the CV input. When Gate goes down, Note OFF message will be sent. Keep in mind that, in order to keep V/Oct range, only 120 MIDI notes will be sent for the whole range. 1 Octave=12 semitones, so 10 Octaves 120 notes.

FOR EVERY NOTE REPRESENTATION IN VCMC WE ARE ASSUMING THAT MIDI NOTE 0 IS C-2

2. Notes

On this mode the module will generate MIDI notes at the selected MIDI Channel following the V/Oct ratio regardless the presence of Gate or not. The Gate lenght will be configured in a menu.

3. CC

This will send CC messages. When selected youÍl be prompted to choose which CC number will be sent.

4. Velocity

CV will be mapped to velocity message for the notes in the MIDI channel selected.

5. Pitch Bend

CV will be mapped to pitch bend message.

6. Program Change

A program change message will be sent proportional to the CV value.

7. NRPN

In this mode the CV will be converted to NRPN messages. Upon selection of this mode you will be prompted to select NRPN number. Keep in mind there are two NRPN modes available: 7 bit and 14 bit.

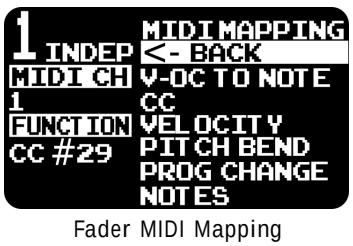
MIDI CHANNEL

Selects MIDI Channel for this Fader.

OUT RANGES

MIDI RANGE: Select from what MIDI value to which one your CV will be scaled. This feature will select the MIDI minimum and maximum values and will scale the input to that range.

MIDI TRIM: With these you can set MIDI limits, so no messages will be sent beyond the minimum and maximum set here. This feature clips the range, do not scale.



Fader MIDI Mapping

Set the values of each range by turning and pressing the encoder. Change the Block Function will reset this parameters so we recommend to set it after.

SETTING THE BLOCKS | GATE EDIT

From Performance Screen, select a block and press the encoder to enter into the main Configuration Screen. Go to Gate and press the encoder again to enter into the Gate Edit Menu.

On the left of the screen you will have information about the selected MIDI channel and the current Function of the Gate.

Gate Edit Screen

On the right you have the following options:

FUNCTION

Selects the MIDI message that will be mapped to this input. By pressing on it you will access the MIDI Mapping screen.

1. Note Gate

A Note will be fired each time a Gate signal is received at Gate Input. Press the encoder to select the Note number and press again to confirm the operation. Note ON message will be sent when the Gate goes up and Note OFF when Gate goes down.

2. Note Latch

This mode is essentially the same as Note Gate but Note OFF message is not sent till Gate signal goes up again.

3. CC Gate

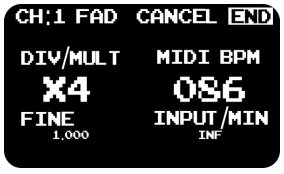
A CC message will be sent each time a Gate signal is receive at Gate Input. Press the encoder to select the CC Number, press again to select the CC value, and one last time to confirm the operation. A CC message with the selected value will be sent when a Gate goes up and a second message with a CC value of 0 when a Gate goes down.

4. CC Latch

Similar functionality as CC Gate but the CC value 0 won't be sent till a second Gate goes up.

5. Clock

Clock messages will be sent. Keep in mind it will consider a Clock IN when the level is higher than Volts. By pressing the encoder you will access the Clock Set Screen. There you will be able to Divide and Multiply the incoming clock signal as well as check the BPM.



Clock Set Screen

6. ST/SP

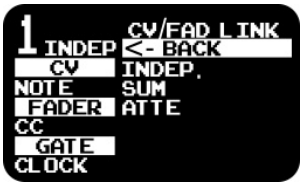
This will enter into the menu to set messages Start, Stop and Continue. A few combinations are available to match your sequencer. Options are:

- **ST/SP Gate:** START message will be sent when Gate goes up and STOP when Gate goes down.
- **ST/SP Latch:** START message will be sent when Gate goes up and STOP when Gate goes up again.
- **START:** START message will be sent when Gate goes up.
- **STOP:** STOP message will be sent when Gate goes up.
- **CONTINUE:** CONTINUE message will be sent when Gate goes up.

SETTING THE BLOCKS | CV/FADER LINK

In VCMC, the Faders can take multiple functions. One of the most interesting of these, is to link them with the block CV Input. With it, you can use the Fader as, for example, an attenuator of the signal present at the CV Input. Let's take a look.

- **INDEP:** The Fader has its own function and is not linked to the CV Input (Default behaviour)
- **SUM:** The value of the Fader is summed with the value of the CV Input. On this mode the Fader works as an offset control for the incoming signal.
- **ATTE:** The Fader acts as attenuator of the incoming signal at the CV Input.



CV-FDR Link Screen

SETTING THE MODULE | GLOBAL SETTINGS

In Performance Screen, hold the encoder for 5 seconds to access the Global Settings. On this screen you will be able to save and load presets between other things. Let's take a look deeply.

PANIC
Sends a Note OFF message in all the channels. Press it if you experience that some messages gets stuck or held.

FACTORY RESET
Restarts the module to initial factory settings (see Out of the Box Configuration)

DIM SCREEN
Sets the brightness of the screen to a lower value.

SAVE CONFIGURATION
Saves the current configuration of the module in one of the two banks available. At the same time the module saves the setting on its internal memory, a SYSEX message is sent via MIDI Outputs (see SYSEX paragraph below)

LOAD CONFIGURATION
You can choose either one of the settings saved in one of the settings saved in one of the two user banks or a factory preset (Go to Apendix 1 for further details)

GLOBAL CV CAL
Calibrates all CV Inputs at the same time. Quite useful when you have a multichannel CV Source (like a sequencer)

Global CFG Screen

SETTING THE MODULE | OUT OF THE BOX CONFIGURATION

By default, VCMC comes with an initial setting that allows you to quickly test some of the features of the module. In this configuration, push buttons have assigned **C Major scale notes**, starting with **C3 (Note 60) in Block 1** button and finishing with **C4 (Note 72) in Block 8**. CV Inputs and Faders are assigned to CC's. **Being Faders CC numbers from 14 to 22 and CV Inputs CC numbers from 23 to 30.** AuxA is assigned to CC 31 and AuxB to CC32.

MANAGING PRESETS | SYSEX FUNCTIONING

In VCMC, you can save and load configuration presets externally via SYSEX (System Exclusive Messages). This process can be done with a lot of applications (like DAWs or specific MIDI apps) and if you have vintage digital gear for sure those terms won't be new for you.

If this is not the case, don't worry, we're gonna explain a very easy and fast way using MIDI OX.

SAVING PRESETS

MIDI OX is a free program for Windows (and Linux through Wine-HQ) that is able to play *mid/*syx files and upload them into VCMC. First connect your VCMC to your PC via USB connector (Type B to Type A USB cable). Launch MIDI OX and in the top bar press "Options >> MIDI Devices..." Select VCMC on MIDI Inputs and press OK.

Now go to "View >> SysEx..." On the new window (SysEx View & Scratchpad) press "SysEx >> Receive Manual Dump..." The program will start to wait for SysEx messages. Once done, go to the Global Settings Screen on your VCMC (hold the encoder for 2 seconds on Performance Screen) and selects Save Conf. selects the bank and now check MIDI OX again. If all is fine you will have a message on MIDI OX with the size of the file received, press Done. Now go to "Display Window >> Save As..." Put a name to your file, save it in your preferred folder and that's all.

LOADING PRESETS

Launch MIDI OX and in the top bar press "Options >> MIDI Devices..." Select VCMC on MIDI Outputs and press OK.

Now go to "View >> SysEx..." On tihe new window (SysEx View & Scratchpad) press "File >> Send SysEx File..." Select your SysEx file and press Open. As soon as the status bar finishes, you will have a prompted screen on your VCMC. Press Load SysEx, select the bank, press Discard and you are done.

FIRMWARE | UPDATING PROCEDURE

1: Get latest firmware file from Hex folder in our github:
https://github.com/Befaco/VCMC

2: Install Teensy uploader app found here

https://www.pjrc.com/teensy/loader.html

3: Connect VCMC to your computer using a USB cable.

4: Run Teensy uploader and load hex file. If prompted by the app, press teensy button to begin transfer...

Make sure module is plugged in.

MISCELLANEA | SPECS & CREDITS

* **Size**: 20HP
* **Depth**: 30mm
* **+12v:** 65mA
* **-12v:** 8mA

This module is the result of loads of hours of work, love and care. It would have been imposible to finish without the help of beta testers, loving friends, people from Hangar's open thursdays providing very strong opinions and the whole Befaco team kicking asses as usual.

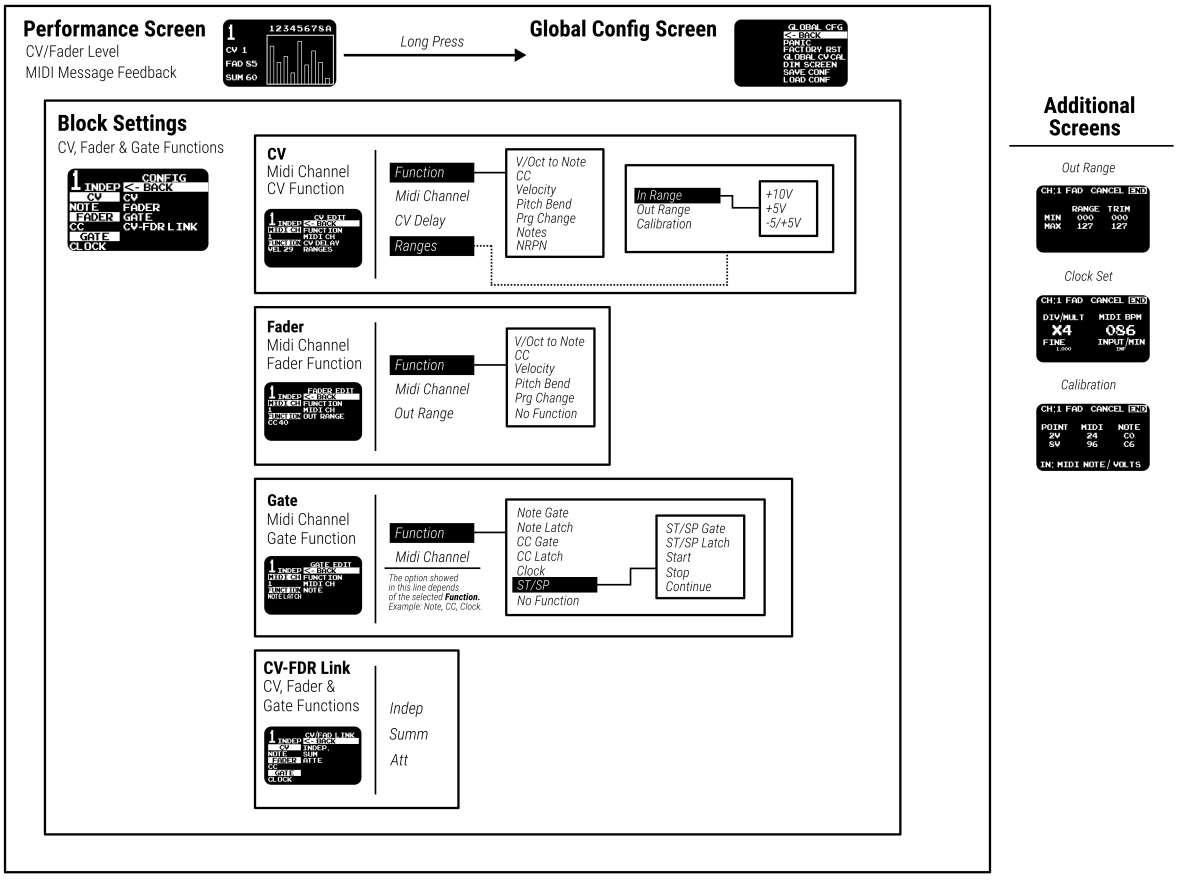
Hardware design, testing, documentation, graphic user interface and many funky extra features: Befaco team.

Caring, relentless, tireless beta testers: Jon "Jessica Fletcher" Bernabeu, Miguel Cruz, Jose A. Cabrera, Miguel Eedl, Luis Bot, Ben wilson aka Divkid and Ziv Eliraz aka Loopop.

Firmware coding, common sense and über-cold beers:
Sergio Retamero (sergio.retamero@gmail.com)

MISCELANEA | HIERARCHY SCHEMATIC

VCMC MENU HIERARCHY SCHEMATIC



MISCELANEA | FACTORY PRESETS

SHRUTHI-1 PRESET

	Function	Midi Ch.	CV/Fdr Link	In Range	Parameter
CV 1	CC#20	1	SUM	N/A	**Osc 1 Shape**
CV 2	CC#24	1	SUM	N/A	**Osc 2 Shape**
CV 3	CC#14	1	SUM	N/A	**Filter Cutoff**
CV 4	CC#15	1	SUM	N/A	**Filter Resonance**
CV 5	CC#23	1	INDP	N/A	**SubOsc Shape**
CV 6	CC#101	1	SUM	N/A	**Env 1 Release**
CV 7	CC#111	1	SUM	N/A	**Env 2 Release**
CV 8	CC#103	1	SUM	N/A	**LFO 1 Cutoff Modulation**
FADER 1				N/A	
FADER 2				N/A	
FADER 3				N/A	
FADER 4				N/A	
FADER 5	CC#30	1	INDP	N/A	**SubOsc Volume**
FADER 6				N/A	
FADER 7				N/A	
FADER 8		1		N/A	
GATE 1	CC#112	1	N/A	N/A	**LFO 1 Waveform** / CC Value 62 / Latch Mode
GATE 2	CC#116	1	N/A	N/A	**LFO 2 Waveform** / CC Value 62 / Latch Mode
GATE 3	CC#31	1	N/A	N/A	**Noise Volume** / CC Value 45 / Gate Mode
GATE 4	CC#102	1	N/A	N/A	**Env Cutoff Amount** / CC Value 53 / Gate Mode
GATE 5	CC#28	1	N/A	N/A	**Operators Mode** / CC Value 13 / Latch Mode
GATE 6	CC#105	1	N/A	N/A	**Env 1 Decay** / CC Value 70 / Gate Mode
GATE 7	CC#109	1	N/A	N/A	**Env 2 Decay** / CC Value 94 / Gate Mode
GATE 8	CC#75	1	N/A	N/A	**Sequencer Mode** / CC Value 2 / Latch Mode
AUX 1	CLOCK	1	N/A	N/A	
AUX 2	ST/SP	1	N/A	N/A	

YAMAHA RX5 PRESET

	Function	Midi Ch.	CV/Fdr Link	In Range
CV 1	NOTE 40-63	10	SUM	10V
CV 2	NOTE 40-63	10	SUM	10V
CV 3	NOTE 40-63	10	SUM	10V
CV 4	NOTE 40-63	10	SUM	10V
CV 5	NOTE 40-63	10	SUM	10V
CV 6	NOTE 40-63	10	SUM	10V
CV 7	NOTE 40-63	10	SUM	10V
CV 8	NOTE 40-63	10	SUM	10V
FADER 1				10V
FADER 2				10V
FADER 3				10V
FADER 4				10V
FADER 5				10V
FADER 6				10V
FADER 7				10V
FADER 8				10V
GATE 1				N/A
GATE 2				N/A
GATE 3				N/A
GATE 4				N/A
GATE 5				N/A
GATE 6				N/A
GATE 7				N/A
GATE 8				N/A
AUX 1	CLOCK	10		N/A
AUX 2	ST/SP	10		N/A