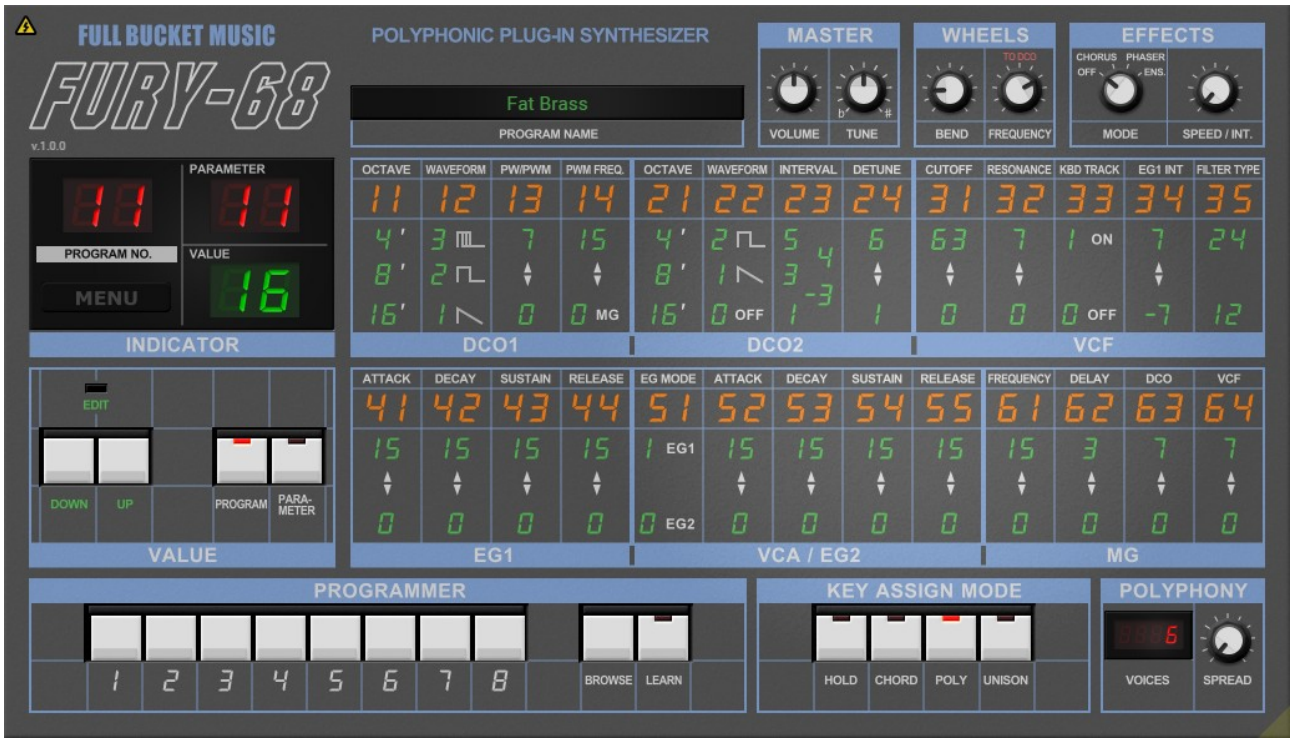
Fury-68

Polyphonic Synthesizer
Version 1.0

www.fullbucket.de/music

Beta testing by kraftraum and Dirk Tegtmeier
Additional sounds by kraftraum



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Introduction

Fury-68 is a software instrument plug-in for Microsoft Windows and Apple macOS simulating the KORG® *Poly-61* synthesizer from 1982. It is written in native C++ code for high performance even on "lighter" systems. The main features are:

- Close simulation of the original hardware
- Extended polyphony and Unison mode
- Increased parameter resolution
- Optional enhancement parameters (VCA envelope generator etc.)
- Additional Phaser, Chorus and Ensemble section
- Alternative parameter panel with preset browser
- Tape dump import
- All parameters can be controlled by MIDI controllers
- Plug-in supports Windows and macOS

Fury-68 is based on the **iPlug2** framework maintained by **Oli Larkin and the iPlug2 team**. Big thanks, guys!!! Without your work it would not have been possible to create a resizable *Fury-68* user interface.

To resize the plug-in you just grab the yellow triangle at the bottom right of the window and drag it. You can save the current window size using the menu entry "Save Window Size" in the *Options Menu* or by right-clicking somewhere into an empty space of *Fury-68*'s panel.

If you have trouble with the standard version of *Fury-68*, please grab the (sound-wise identical) "N" version of the plug-in which is based on the original **iPlug** framework.

Acknowledgments

- **Oli Larkin** and the **iPlug2** team.
- **kraftraum** (https://soundcloud.com/kraftraum) did the Beta testing and designed many of the presets.
- **Dirk Tegtmeier** for Beta testing and discussion.
- **Paolo Di Nicolantonio** aka *Synth Mania* (https://synthmania.com/) for sound examples.
- **Dirk Eusterbrock** for deciphering the *Poly-61* tape dump format.

No, I am not affiliated with KORG in whatever relation except that I find myself entangled with their instruments. ☺

KORG Goes Buttons-Only

In 1982, KORG released the *Poly-61* as a successor to the very popular *Polysix* synthesizer. It introduced two Digital Controlled Oscillators (DCO) instead of a single VCO and – then praised as a new innovation – the "Buttons-Only/No-Knobs" style of editing sounds which haunted many instruments of that era (Yamaha *DX-7*, Sequential Circuits *Six-Trak* etc.). Later in 1984, the *Poly-61M* was released and featured a simple MIDI interface (unfortunately without SysEx implementation ☹).

However, the *Poly-61* did not reach the same cult status as the *Polysix*:

- Editing sound the new "digital" way is horrible.
- The resolution of many parameters is very coarse (for example only 16 different values for EG times and MG frequency).
- The VCF was changed from the famous 4-pole SSM 2044 design to a 2-pole LM 13600 design.
- The Unison mode was dropped.
- For reasons unknown (well, not really… presumably cost reduction ☺) the popular Effects section of the *Polysix* was dropped.

A year later, KORG came up with the *Poly-800* which was cheaper and became the workhorse of many amateur musician. Slowly the *Poly-61* faded into oblivion… Anyway, the *Poly-61* also has its fan base, and many folks asked me to revive it virtually. OK, eventually I did it.

Breaking The Rules

At first glance, the *Poly-61* is a pretty boring and limited machine. Even the second DCO with its "staircase sawtooth" implementation looks like an uninspired appendix (it is not!). To make the instrument a little bit more flexible, I decided to break my own rules[1] and to add and enhance a few parameters without loosing compatibility to the original design. For example, since I had to implement a dedicated envelope generator for the "gated" VCA mode anyway, I created the "new" parameters 52 to 55 (A, D, S, R) which results in a fully editable second EG2.

I also imagined what the instrument could have been if KORG would have followed the good old *Polysix* and *Mono/Poly* style. This resulted in an alternative panel view and the addition of the classic Effects section – but this time with a proper Phaser effect, not the Flanger type thingy of the *Polysix*. Furthermore, you now can switch the filter back to a 4-pole lowpass.

I will not conceal the fact that I deliberately dropped the arpeggiator like I did with the *FB-7999*. I'm sure you'll find better alternatives on your master keyboard or in your DAW.

Disclaimer

As usual, I do not argue whether *Fury-68* sounds exactly like the *Poly-61*. I don't have the original hardware and modeled everything from the schematics plus videos and sound examples on the Internet.

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1 My rules: I will not add things that do not exist in the original hardware. I did break it in the past, too.

Overview

Fury-68 provides 64 programs which can either be chosen from a program bank designed by **kraftraum** and myself or from the original *Poly-61* factory bank.

Depending on the Key Assign Mode, polyphony ranges from 1 to 64. Each voice of *Fury-68* has two oscillators (DCOs), a lowpass filter (VCF), two envelopes (EGs) and a modulation generator (MG). The final voice mix can be send to a (stereo) effects section (Phaser/Chorus/Ensemble).

Differences To The Original Hardware

A shortcoming of the *Poly*-61 is the very coarse parameter resolution. Thus, *Fury-68* parameter values for VCF resonance or the EG timings are truly "continuous" and will be interpolated between the original integer values of the *Poly-61*.

There are some additions to *Fury-68* that you will not find on the original hardware:

- **Parameter 14 – PWM Frequency**
  The pulse width of the *Poly-61* can only be modulated by the common MG. *Fury-68* sports an additional MG for pulse width modulation only.
- **Parameter 34 – EG1 Intensity**
  On the *Poly-61*, the VCF cutoff modulation by EG1 can only be positive. *Fury-68* also allows for negative (inverted) modulation.
- **Parameter 35 – Filter Type**
  This new parameter allows you to switch the filter type from a 2-pole non-self-resonating lowpass to a 4-pole self-resonating lowpass.
- **Parameter 51 – EG Mode**
  The VCA envelope of the *Poly-61* can be switched from EG1 to a gated, organ-like envelope. *Fury-68* turns this second "gate" envelope into a "real" ADSR-type envelope (EG2).
- **Parameters 52 to 55 – EG2**
  These *Fury-68*-only parameters control the Attack, Decay, Sustain and Release of EG2.
- **Unison Mode**
  Fury-68 re-introduces the Unison mode.
- **Extended polyphony**
  Fury-68 allows more (or less!) than 6-voice polyphony – even in Chord or Unison mode!
- **Voice Spread**
  This parameter will place *Fury-68's* individual voices in the stereo panorama.
- **Effects Section**
  Fury-68 also brings back the Effects of the *Polysix*. But this time, the Phaser is a real phaser and not some flanger-type thing.

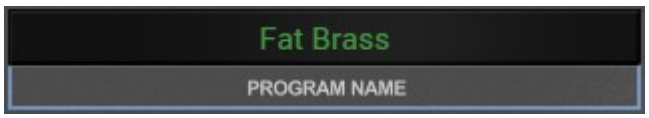
Although this is a pretty long list, it is still possible to produce the sounds of the original *Poly-61*.

General Operation

Selecting Programs

Programs numbers are organized in blocks of 8: The first program is "11", the next "12", and the last of the first block is "18". The first program of second block is "21", the last is "28", and so forth. Thus, the number of the 64th program is "88".

The number of the current program is shown in the dedicated "PROGRAM NO." display. To select a program, the LED of the button "PROGRAM" has to be lit; if it is not, just click the button. Now you can select the program's block by pressing the corresponding number button at the bottom of the screen, and then the program's number within the block. Done.



When "PROGRAM" is lit you also can increment or decrement the program number via the "DOWN" and "UP" buttons. *Fury-68* also allows you to browse the programs using the "BROWSE" button (which opens a context menu giving direct access to all programs). And since program numbers are hard to memorize, *Fury-68* allows you to give each program an individual name.

Editing Parameters

When you click the "PARAMETER" button (or when this button is already lit) you can select and edit the sound parameters of *Fury-68*. Parameter numbers are organized like the program numbers in blocks of 8. However, not every possible number is associated with a parameter (for example there is no parameter with number 27). The value of the selected parameter can be changed via the "DOWN" and "UP" buttons.

The more comfortable option is of course to click the parameter itself and drag the handle that appears. Note that the "EDIT" LED is lit when the current parameter value deviates from the original value of the program.

Voice Parameters

DCO 1

Digital Controlled Oscillator 1 has three waveform types (parameter #12 "WAVEFORM"): *Sawtooth*, *Pulse Width* (PW) and *Pulse Width Modulation* (PWM). When PW is selected the "PW/PWM" parameter #13 literally controls the pulse width, and when PWM is selected it controls the amount of pulse width modulation.

Parameter #14 "PWM FREQ." is unique to the *Fury-68*: By default it is set to "0" which means that the pulse width modulation is controlled by the overall MG. Any other value switches pulse width modulation to a dedicated PWM MG and will control this MG's frequency.

Finally, parameter #11 "OCTAVE" sets the footage of the oscillator (*16'*, *8'* or *4'*).

DCO 2

Digital Controlled Oscillator 2 features the same "OCTAVE" parameter (#21) like DCO 1, Parameter #22 "WAVEFORM" controls the waveform (*Sawtooth* or *Square*) or switches the DCO 2 off. Note that the sawtooth waveform is constructed from square waves of different octaves and thus has "staircase-like" shape[2].

Parameter #23 "INTERVAL" tunes the oscillator to a specific interval with respect to DCO 1: *Perfect Unison* (1), *Minor Third* (–3), *Major Third* (3), *Perfect Fourth* (4), and *Perfect Fifth* (5). Finally, parameter #24 "DETUNE" controls the amount of detuning of DCO 2.

VCF

The Voltage Controlled Filter has the standard parameters "CUTOFF" (#31), "RESONANCE" (#32) and "KBD TRACK" (#33). Parameter #34 "EG1 INT" sets the amount of cutoff frequency modulation by the first envelope generator (EG1). Note that *Fury-68* allows you to set a negative value here (inverted modulation) which is not possible with the *Poly-61*.

Another difference to the original hardware is parameter#35 "FILTER TYPE" where you can change the filter type from a 2-pole to a 4-pole lowpass. Furthermore, the 4-pole type is able to self-resonate.

2 This is a famous technique known from many electronic organs and string machines.

EG 1

Envelope Generator 1 is of the standard ADSR type with parameters #41 to #44 (“ATTACK”, “DECAY”, “SUSTAIN”, “RELEASE”). Due to the coarse resolution of *Poly-61’s* time parameters, the interpolated value ranges of *Fury-68* are highly non-linear. Thus, the resulting time values for parameter values between 14 and 15 will vary extremely when compared to other interpolated ranges like 7 to 8.

VCA And EG 2

The Voltage Controlled Amplifier has only one parameter (#51 “EG MODE”). On the *Poly-61* you can choose between EG 1 and a gated (organ-like) envelope. *Fury-68* extends the gated envelope to a full ASDR type envelope generator EG 2 which is parameter-wise identical to EG 1. By default, this envelope is set to a gated shape (and thus compatible to the original instrument).

MG

KORG always dubs Low Frequency Oscillators (LFOs) as “Modulation Generators” (MGs). The global MG of *Fury-68* delivers a triangle-shaped modulation signal and has the parameters #61 “FREQUENCY”, #62 “DELAY” (time until modulation starts after the first key has been pressed), #63 “DCO” (modulation amount of the DCOs’ frequency i.e. vibrato) and #64 “VCF” (modulation amount of the VCF cutoff frequency).

Common Parameters

Master Section

The overall volume as well as the master tune of *Fury-68* can be set with the "VOLUME" and "TUNE" knobs in the Master section. Note that these parameters are stored along with the program. Thus, programs can have different volumes and tune…

Wheels Section

The *Poly-61* does not have the standard Pitch Bend and Modulation wheels but features the classic KORG joystick where horizontal movement induce Pitch Bending and vertical movement controls DCO modulation (upward) or VCF modulation (downward). Here, the modulation source is an independent modulation generator, not the common MG – its frequency is set by the "FREQUENCY" knob.

Instead of a joystick, the MIDI Modulation Wheel signal is used to control DCO/VCF modulation, and the target of the modulation can be set by clicking the red label right above the "FREQUENCY" knob ("TO DCO" or "TO VCF"). Furthermore, the amount of Pitch Bend modulation is set using the "BEND" knob.

Key Assign Mode

In addition to the POLY and CHORD modes of the *Poly-61*, the *Fury-68* also sports the UNISON mode known from the *Polysix*[3].

- **POLY mode**
  This is the standard mode – for each key pressed only one voice is played.
- **CHORD mode**
  Hold a chord on the keyboard and then press the "CHORD" button: Now this chord will be played when you press a single key.
- **UNISON mode**
  Stacks some voices on top of each other for a fat detuned sound.
- **HOLD**
  A handy function to hold the keys that are pressed. On the *Fury-68*, this button is coupled to the MIDI Sustain Controller.

Polyphony Section

At this point, the *Fury-68* offers a massive enhancement compared to the hardware: You can explicitly set the number of voices for the three modes. Thus, it is possible to have a polyphonic CHORD and UNISON mode! The following table denotes possible combinations of voices per mode.

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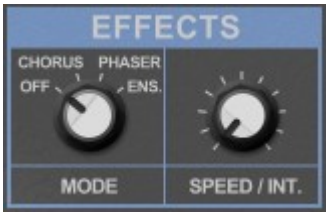
3 By clicking the "CHORD" button without pressing any keys, you can have a "Unison" mode on the *Poly-61* too, but since the DCOs are digitally controlled it lacks the mighty detuned sound of the *Polysix*.

POLY		CHORD		UNISON	
polyphony	#voices/key	polyphony	#voices/key	polyphony	#voices/key
1	1	1	max. 64	1	8
2	1	2	max. 32	8	8
6	1	6	max. 10	1	6
8	1	12	max. 6	10	6
16	1	16	max. 4	1	4
24	1	32	max. 2	16	4
32	1	–	–	1	2
64	1	–	–	12	2

For example, in CHORD mode you can have a maximum polyphony of 12 for a memorized chord of 6 notes. And in UNISON mode, you can play 8 stacked voices with a polyphony of 8!

Finally, the "SPREAD" knob positions the individual voices in the stereo panorama.

Effects Section



The Effects section surely is a highlight of the KORG *Polysix*, and it is sorely missed on the *Poly-61*. The *Fury-68* brings it back: You can select an overall Chorus, Phaser or Ensemble effect (or switch the effects off). The "SPEED/INT." knob controls the modulation frequency of the Chorus resp. Phaser, or it sets the intensity for the Ensemble effect. Note that the Phaser effect of the *Fury-68* is really a phaser (not as on the *Polysix* where it is in fact a light Flanger).

Alternative Panel View

What if KORG would have followed their famous Dark Blue style with the *Poly-61* and added dedicated knobs and switches for all the voice parameters? Maybe the answer is something like the alternative panel view I have envisioned for the *Fury-68*.

The parameters are the same as for the standard panel view (you can switch between panels by clicking the yellow triangle at the top left). What really is new is the…

Program Browser

The Program Browser has three (in fact four) modes of operation which can be activated via the gray buttons:

- **Current Bank**
  - When the lower switch is set to “SELECT”, clicking a browser item simply selects the respective program.
  - When the lower switch is set to “COPY+PASTE”, clicking a browser item copies the respective program data to the currently selected program.
- **Factory**
  - You can select the factory bank to use (“Initial” or “Poly-61”) in the “FILE” list to the right. Clicking a browser item copies the respective program data to the currently selected program.
- **File**
  - After you have chosen a folder on your computer, the files contained in that folder (if any) are enlisted in the “FILE” list. Clicking a file item reveals the contained programs in the browser. Clicking a browser item copies the respective program data to the currently selected program.

Options Menu

When clicking the MENU button in the Program section, a context menu opens with the following options:

Copy Program	Copy current program to internal clipboard
Paste Program	Paste internal clipboard to current program
Init Program	Initialize the current program
Load Program...	Load a FXP file containing a *Fury-68* program to the current program. Optionally you can restore the current program either from the original *Poly-61* factory programs, or from Full Bucket's or Kraftraum's program banks.
Save Program	Save *Fury-68's* current program to a program file
Load Bank...	Load a FXB file containing 64 *Fury-68* programs. Optionally you can restore either the original *Poly-61* factory program bank, or Full Bucket's or Kraftraum's program banks.
Save Bank	Save *Fury-68's* 64 patches to a bank file
Load Poly-61 Tape Dump	Load a bank of 64 programs from a WAV file; see section *Loading Poly-61 Tape Dumps*
Select Startup Bank	Select the bank file that should always be loaded when *Fury-68* is started
Load Startup Bank	Load the Startup bank file; can also be used to check what the current Startup bank is
Unselect Startup Bank	Unselect the current Startup bank
Default Path for Program Files	Sets the default path for program and bank files
MIDI Thru	Set globally if MIDI data sent to *Fury-68* should be sent through to its MIDI output (stored in configuration file)
Ignore Program Change	Set globally if MIDI Program Change data sent to *Fury-68* should be ignored (stored in configuration file)
Reload Configuration	Reload *Fury-68's* configuration file
Save Configuration	Save *Fury-68's* configuration file
Show All Parameters	When checked, all parameter handles are visible on the standard parameter view
Open Alt. View on Startup	When checked, *Fury-68* opens the alternative panel view on startup
Check Online for Update	When connected to the Internet, this function will check if a newer version of *Fury-68* is available at fullbucket.de
Visit fullbucket.de	Open fullbucket.de in your standard browser

The *fury68.ini* Configuration File

Fury-68 is able to read some settings from a configuration file (`fury68.ini`). The exact location of this file depends on your operating system and will be displayed when you click on "Reload" or "Save Configuration".

MIDI Control Change Messages

All parameters of *Fury-68* can be controlled by MIDI controllers, or more precise: Each MIDI controller (except *Modulation Wheel* and *Sustain Pedal*) can control one of *Fury-68*'s parameters. The mapping is defined in the `fury68.ini` for example like this:

```
[MIDI Control]
CC7  = 0  # Pitch Bend Amount
CC70 = 25 # VCF Cutoff
CC71 = 26 # VCF Resonance
...
```

The syntax is straight forward:

```
CC<controller number> = <parameter ID>
```

Given the above example, controller 7 directly controls the *Master Volume* parameter, controller 70 the *VCF Cutoff* etc. As you can see, comments are introduced by the Pound sign (#); they are here just for description purposes and completely optional. Note that the *controller number* can run from 0 to 110, with the exception of 1 (*Modulation Wheel*) and 64 (*Sustain Pedal*); the latter two are simply ignored.

MIDI Learn

The easiest way to assign MIDI controllers to *Fury-68* parameters is to use the *MIDI Learn* function. To activate MIDI Learn, click on the "LEARN" button and wiggle both the MIDI controller and the *Fury-68's* parameter that you want to link. If you want to unlearn the assignment, right-click the "LEARN" button (the label now reads "UNLEARN") and activate it. Now wiggle the MIDI controller or the parameter that you want to unlearn.

Loading *Poly-61* Tape Dumps

Starting with version 1.0.1 you can load *Poly-61* "tape dumps" that available as WAV files – this will import a whole bank of 64 programs.

Warning: There is no guarantee that the tape dump import will be successful as it heavily depends on the quality of the recorded audio stream!

Parameters

General

parameter	id	description
Master: Volume	0	Master volume
Master: Tune	1	Master tune
Wheels: Bend	2	Pitch Bend amount
Wheels: Frequency	3	Modulation Wheel frequency
Wheels: Destination	4	Modulation Wheel destination (*DCO* or *VCF*)
Mode	5	Key Assign Mode (*Poly*, *Chord*, *Unison*)
Voices	6	Polyphony
Spread	7	Voices stereo spread

DCO

parameter	id	panel	description
DCO 1 Octave	8	11	DCO 1 octave (*16'*, *8'*, *4'*)
DCO 1 Waveform	9	12	DCO 1 waveform (*Sawtooth*, *PW*, *PWM*)
DCO 1 PW	10	13	DCO 1 pulse width
DCO 1 PWM Frequency	11	14	DCO 1 PWM frequency (0 = MG)
DCO 2 Octave	12	21	DCO 2 octave (*16'*, *8'*, *4'*)
DCO 2 Waveform	13	22	DCO 2 waveform (*Off*, *Sawtooth*, *Square*)
DCO 2 Interval	14	23	DCO 2 interval (*1*, *-3*, *3*, *4*, *5*)
DCO 2 Detune	15	24	DCO 2 detuning

VCF

parameter	id	panel	description
VCF Cutoff	16	31	VCF cutoff frequency
VCF Resonance	17	32	VCF resonance
VCF Kbd Track	18	33	VCF keyboard track
VCF EG1 Int	19	34	VCF EG1 modulation intensity
VCF Filter Type	20	35	VCF filter type (*12 db/Oct* or *24 db/Oct*)

EG 1

parameter	id	panel	description
EG 1 Attack	21	41	EG 1 Attack time
EG 1 Decay	22	42	EG 1 Decay time
EG 1 Sustain	23	43	EG 1 Sustain level
EG 1 Release	24	44	EG 1 Release time

VCA/EG 2

parameter	id	panel	description
EG Mode	25	51	VCA envelope: *EG 1* or *EG 2*
EG 2 Attack	26	52	EG 2 Attack time
EG 2 Decay	27	53	EG 2 Decay time
EG 2 Sustain	28	54	EG 2 Sustain level
EG 2 Release	29	55	EG 2 Release time

MG

parameter	id	panel	description
MG Frequency	30	61	Frequency of the MG
MG Delay	31	62	Delay for MG modulation
MG DCO	32	63	MG to DCO modulation amount (Vibrato)
MG VCF	33	64	MG to VCF modulation amount

Effects and Tweaks

parameter	id	description
Effects Mode	34	Effects mode (*Chorus*, *Phaser*, *Ensemble*)
Effects Speed/Intensity	35	Effects speed or intensity
Phaser Feedback	36	Feedback for Phaser effect
Phaser Mod. Amount	37	Modulation amount for Phaser effect
Phaser Mix	38	Dry/wet mix for Phaser effect
Chorus Mod. Amount	39	Modulation amount for Chorus effect
Chorus Mix	40	Dry/wet mix for Chorus effect
Ensemble Rate 1	41	Rate of first LFO for Ensemble effect
Ensemble Rate 2	42	Rate of second LFO for Ensemble effect
LFO 1/2 Mod. Balance	43	LFO modulation balance for Ensemble effect

Frequently Asked Questions

How do I install Fury-68 *(Windows VST2 32 bit version)?*

Just copy the files `fury68.dll` from the ZIP archive you have downloaded to your system's or favorite DAW's VST2 plug-in folder. Your DAW should automatically register the *Fury-68* VST2 plug-in the next time you start it.

How do I install Fury-68 *(Windows VST2 64 bit version)?*

Just copy the file `fury6864.dll` from the ZIP archive you have downloaded to your system's or favorite DAW's VST2 plug-in folder. Your DAW should automatically register the *Fury-68* VST2 plug-in the next time you start it.

Note: You may have to remove any existing (32 bit) `fury68.dll` from your VST2 plug-in folder or else your DAW may screw the versions up…

How do I install Fury-68 *(Windows VST3 64 bit version)?*

Just copy the files `fury68.vst3` from the ZIP archive you have downloaded to your system's or favorite DAW's VST3 plug-in folder. Your DAW should automatically register the *Fury-68* VST3 plug-in the next time you start it.

How do I install the Fury-68 *(Windows AAX 64 bit version)?*

Copy the file `fury68_AAX_installer.exe` from the ZIP archive you have downloaded to any of your system's folder and run it. Your AAX-enabled DAW (Pro Tools etc.) should automatically register the *Fury-68* AAX plug-in the next time you start it.

How do I install Fury-68 *(Mac)?*

Locate the downloaded PKG package file in Finder (!) and do a right- or control-click on it. In the context menu, click on “Open”. You will be asked if you really want to install the package because it comes from an “unidentified developer” (me ☺). Click “OK” and follow the installation instructions.

What is the plug-in ID of Fury-68*?*

The ID is **`fy68`**.