

## Important Changes Since Ver. 3

This major Version 3 release enables Full Audio Unit Support, see 'Audio Unit Extension' below for more details...

### File Management

In order to accommodate Full Audio Unit Integration, the file management for User Audio and All Preset Banks required a major structural change. The previous '**Documents**' folder has now been replaced by a shared '**App Group**' folder.

Reorganising the file structure in this way allows iPulsaret to access the user files in both it's Audio Unit and Standalone App formats simultaneously and thus any user edits or changes made in one environment are also immediately evident in the other.

**IMPORTANT:** In this new file structure, the shared '**App Group**' folder cannot be accessed by iTunes nor the built-in iOS Files app, but users can access files as usual, using the 'Open In ...', 'Document Picker', 'E-Mail' etc.

### Audio Unit Extension support

Since iOS 9 Apple introduced the Audio Unit V3 format which enables multiple instances of the same plug-in running at the same time.

You can load with compliant hosts like Apple's own GarageBand or other audio editing and mixing apps, compatible with the host-automations, host-save/load presets and host-save/load state in the session.

### WARNING:

The memory limit imposed for AU Extensions on iOS is 300 MB for 32-bit devices and 360 MB on 64-bit devices.


These are performance considerations as you can expect from iOS devices having limited shared resources.



**We do not recommend loading more than 10 instances.**


### Tips & Tricks

- When the app is terminated just before to exit the whole status of parameters are saved and reload to the next opening.

- Double tap on the **Knobs** to show the options. In the **'Edit'** field you can enter the value from the keyboard. Tap **'Random'** to generate a random value, **'Default'** to reset to the factory settings and configure the knobs dragging behavior. Step fine resolution sets how many points of movement result in a one degree rotation in the knob's position. Only used in the horizontal/vertical slider modes. You can set Knobs behavior from Settings.
- Long Press Tap on the **Toggles** to open Control Manager Assignations
- iPulsaret can play audio in the background and/or mix it's own audio with other iOS apps. iPulsaret also supports Apple IAA (i.e. Inter-App Audio for iOS 7 or higher) and Audiobus, so you can send and receive audio through applications.
- Swipe gesture (right to left) on a preset or bank to rename/duplicate/delete it. See Presets for more details.
- You can load Presets (current selected bank) by remotely sending a MIDI Program Change message. See MIDI section, below for further details. You can select the MIDI channel where you can receive PC messages. A PC value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.
- We suggest you disable the screen rotation, otherwise the accelerometer doesn't work properly.
- Tap over the Output Oscilloscope to switch Oscilloscope/Spectral-Scope
- **Init** will reset to default values and removes the Control Manager assignations, a reset message will be displayed.
- **Create Random Sound** values for all of the parameters, including the Effects. The result can be very interesting and wayward.

 **MAINS Toggle** on/off DSP (Digital Signal Processing). *iPulsaret* supports mixed audio with other applications, you can also disable DSP in order to save battery and CPU consumption. You cannot toggle off the Audio Engine when it's connected to Audiobus or Inter-App Audio.

  Enable/Disable Accelerometer X/Y and LFO, see the Control Manager for more details.

 Captures Output stereo signal (post Effects) and creates an audio file *wav* format 44.1 kHz 16 bit in the App Group folder. Files created by *iPulsaret* are saved with an id-name followed by a number, for example:

**Output Rec 1.wav, Output Rec 2.wav etc...**

Each new file will be numbered with the next consecutive number.

## SYNC



The goal of SYNC is to setup a global Metronome (MASTER BPM). This will affect the LFO (Low Frequency Oscillator) and/or the Sampler (or Sequencer etc...) when enabled to receive SYNC.

You can sets the BPM (Beats Per Minute) by scrolling up/down (or left/right) the label value (♩ 120 ←○→) or tap out the tempo.

Single Tap or Long Tap the minus/plus buttons to increase or decrease by 0.25. By default 120 BPM corresponds to 1 Hz frequency for the LFOs.

### **Ableton Link description**

Ableton Link is a new technology that synchronizes the beat, phase and tempo of Ableton Live and Link-enabled iOS apps over a wireless network. It lets you play devices together with the freedom of a live band. Anyone can start and stop their part while others keep playing, and anyone can adjust the tempo and the rest will follow. You can use Link to play with several copies of Ableton Live, with Live and iOS apps, or with iOS apps together – even without Live in your setup.

### **MIDI Clock description**

The clock signal is broadcasted via MIDI to ensure that several MIDI-enabled devices such as a synthesizer or music sequencer stay in synchronization. The iOS implementation is designed to provides precise, jitter-free MIDI clock transmission and robust, error-tolerant MIDI clock reception.

### **Quantization**

When you are connected to an Ableton Live Session, the Play/Stop/Rewind transport will wait until the next sync quantum boundary before starting.

The 'Sync' button waits for the next beat (Tempo Forte) from the MIDI Clock or Ableton Link and resets all phases for LFOs, Sequencer etc.

### **Send MIDI Clock**

Will create a virtual MIDI port for the MIDI Clock Output. In Play/Stop mode the MIDI Start/Stop Clock messages are sent according to Transport Play/Stop (Sampler, Sequencer etc...). In 'Always' they will not be sent every time, but only at start.

Please note when you are connected to Ableton Link, the incoming MIDI Clock is disabled while you can send MIDI Clock out, converting the Ableton Link to MIDI Clock.

## Receive Sync

- 1) Local-Host
- 2) MIDI Clock signal
- 3) Ableton Link.

When the Ableton Link its enabled the Local-Host and MIDI Clock will be disabled and viceversa.

In Local-Host when the app is connected through Inter-App Audio, will receive the Sync from the HOST (if available, i.e. tempo/start/stop) and the current BPM is overridden.

When MIDI Clock is activated, you cannot change the BPM (Slave) since is controlled by the MIDI Clock (Master). Through the 'CLOCK' button you can select a MIDI Clock Source.

## Grain Source

*iPulsaret* use a complex waveforms as source for grains. You can switch between five operation modes: **Wave**, **Trainlet**, **Sample**, **Live** and **Harmonic**.



**Wave:** Playing with the Pad, you can interpolate between four prototypes shapes.




**Trainlet:** The *Partials* is the number of cosine, harmonically related. Chroma give equal amplitude to each partial for a value of one, higher values will reduce the amplitude of lower partials while strengthening the amplitude of the higher partials.



**Sample:** You can manipulate the Speed, Jitter and the Time position. Tapping over the waveform you will jump to current Time Position.

**Speed** (*Ratio*) = playback scanning ratio: value 1: original time, value 0.5: half-tempo (time stretching), 2: twice-tempo (time compressing); 0: freezes playback at the current location; negative values rate: backwards play;  
**Jitter** (*Ms*) = randomly moves the time-pointer around the current value;

By zooming In/Out (pinch gesture) you will impose the start/end loop points.

 You can load a sound sample from the Samples Manager (see below), only **wav**, **aif (aiff)** and **mp3** are supported. You can load also **raw** files, suitable for *glitch* generation.



Rewind the Sample to start, if you need to jump at specific position you can select different start/end loop points by zooming on the wave.



When is enabled, the scanning pointer jump to the start position for each note you play.



**Freeze** (*icon*) is a shortcut for the zero **Speed**, toggle between zero (frozen) and the last value, when it is zero the icon become orange.



**Live** take the input from device microphone or (when connected) from **Audiobus**/Inter-App Audio, then store the samples in a circular memory (i.e. Ring Buffer).

**Input Gain** will rescale the incoming signal;

**Buffer** is the length of Ring Buffer Memory, expressed in milliseconds, it should be greater than (Jitter / 2) in order to avoid dropouts;

**Jitter** (*Ms*) randomly moves the time-pointer around the current value;

**Dry/Wet** it's referring to the amount of effect used. Dry means the effect hasn't been turned on at all and you will hear the direct audio signal. As you turn from dry to wet, you will notice the effect having more dominance over the sound.

## Feedback Warning:

When a monitoring accessory is not attached, This may result in severe feedback. It is recommended that you use headphones with this app. For live input, it is recommended that you use an external microphone rather than the built-in mic because when you use the built-in microphone and speakers for Live Input, it is very easy to get the program to feed back into itself. This frequently results in extremely loud tones that are difficult to control and could be painful and harmful to you and your neighbor's ears.



## Harmonic

generate a prototype composed by 16 partials, according to the natural series of integer numbers (**Harmonics** 1,2,3...etc). From the slider-pad, you can controls the weight of each partial. You have some built-in shapes to use for spectral modelling.

## Grain Parameters



**Amplitude (%)** = grains amplitude, 1 is 100% ;

**Stereo Width (%)** = grains spread, random distributions on the stereo field;

**Density (Hz)** = grain for seconds in Hz or gps i.e. grains for second (exponential map);

**Random Density (%)** = random range deviation, in % of Grains Density;

**Length (Ms)** = grain duration in milliseconds (exponential map);

**Random Length (%)** = random range deviation, in % of Grains length;

**Masking (%)** = random masking (muting) of individual grains. Range 0 to 1, where a value of 0 will give no masking (all grains are played), and a value of 1 will mute all grains.

**Random CPS (Semitones)** = random range deviation, 0: no frequency deviation, 12: one octave range deviation i.e. one octave == 12 semitones;

**FM Mod. (Hz)** = Frequency Modulation expressed in Hz (exponential map);

**FM Index (%)** = FM Index of modulation, A value of zero, it mean no FM modulation.

### Grain Envelope

#### FM Fixed /Ratio Mode

There are two different functionality for Modulating / Carrier mode of operation depending on the value of the switch under the FIXED knob so that:

- a) *Fixed Mode* (The switch shows **RATIO** and the knob shows **FIXED** label)

In this mode the modulating frequency is the absolute value set with the Fixed knob and it ranges from 0.5 Hz to 16000 Hz

b) *Ratio Mode* (The switch shows FIXED in red colour and the knob shows RATIO label) In this mode the modulating frequency is the ratio between the actual keyboard note pitch and the modulating internal signal. For example, if Ratio = 2 and the actual pitch note is A4 (440 Hz), the modulating frequency will be automatically set to  $440 \times 2 = 880$  Hz

c)

In general, the Ratio Mode is preferred to generate tones with more harmonic content (better if the ratio is an integer number). In this mode the timbre created will stay stable along the keyboard. Conversely, the Fixed Mode is preferred to create noisy and inharmonic sound.

### Pitch Trim

This parameter controls the master tune of the synth. It is possible to vary the master tune in a range of +3 / - 3 half-steps.

**Polyphony** changes overlapping factor of the grain (maximum numbers of simultaneous grains). The range is 1 ÷ 100 (default is 25) although the granulator engine has no limits, but 50 grains is a good opportunity.

N.B. The absolute grains polyphony, if you are playing three notes, the effective polyphony factor is 1/3 for each voice.

### Grain Envelope



Is used for smoothing the grain amplitude and has three types of curve for: Attack/Decay. Envelope Deformation increase/decrease proportionally Attack/Decay durations. A value of 1 it mean 50 % (grain length/2) for the Attack and 50 % (grain length/2) for Decay. A value of zero produce a rectangular Envelope. Grain Envelope does not change Grains Length.

### Grainlet



A **Grainlet/Pulsaret** consists in a brief burst of energy. The grain duration contains one or more cycles (integer numbers), varying the grain frequency (keyboard note) you change internal frequency of grain i.e. “duty cycle”, while density parameter is independent. Enabling Grainlet the *Grain Length* will



become depending from *Grain Frequency*. Also you can select the numbers of Cycles for Grains introducing a Random deviation, according to Deterministic/Ramdomic logic, explained above

**N.B. When Grainlet is enabled, the Grain Length and Random Grain Length will be disabled.**

## Glisson Sweep



**Glisson Modes** sets the glissando direction Up, Down or Random inside of every grain.

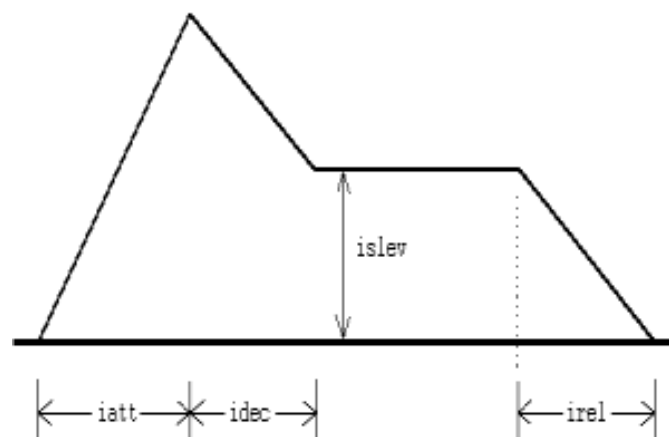
**Glisson Amount** sets the sweep amount in Semitones according to three operation modes.

**Glisson Shape**, controls the curvature of the transposition sweep. Range 0 to 1. Low values will hold the transposition at the start value longer and then drop to the end value quickly, high values will drop to the end value quickly. A value of 0.5 will give a linear sweep. A value of exactly 0 will bypass sweep and only use the start frequency, while a value of exactly 1 will bypass sweep and only use the end frequency. The sweep generator might be slightly inaccurate in hitting the end frequency when using a steep curve and very long grains.

## Note Envelope



**ADSR** calculates the classical Attack Decay Sustain Release envelope using linear segments. Release occur when you send Keyboard note Up or MIDI



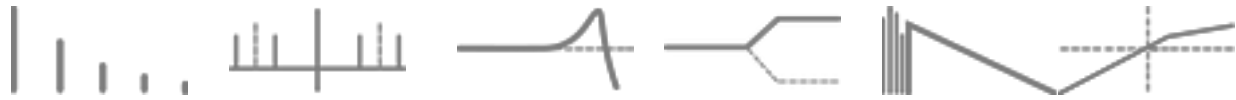
note off. This extend the note duration for the release time.

*iatt* - duration of attack phase in seconds (Attack)



*idec* - duration of decay in seconds (Decay)  
*islev* - level for sustain phase in % (Sustain)  
*irel* - duration of release phase in seconds (Release)

## Effects Chain



From left to right we have: Stereo Echo, Ring Modulation, Lowpass (Moog ladder emulation) Filter, High Shelving Filter, Reverb (8 delay line stereo FDN reverb, based on work by Sean Costello), Dynamics

For example the first effect (Stereo Echo), receives signal from *iPulsaret Granulator Engine*. If the effect is turned on, will process the audio, otherwise no, as for the next effect (Ring Modulation) etc... You can see all enabled effects through the orange icons.

## Dynamics Processor

Compress, limit, expand, duck or gate an audio signal.

This unit functions as an audio compressor, limiter, expander, or noise gate, using either soft-knee or hard-knee mapping, and with dynamically variable performance characteristics.

The 'Compress' first examines the incoming signal by performing envelope detection. This is directed by two control values '**Attack**' and '**Release**', defining the attack and release time constants (in seconds) of the detector. The detector rides the peaks (not the RMS) of the control signal. Typical values are .01 and .1.

The running envelope is next converted to decibels, then passed through a mapping function to determine what compressor action (if any) should be taken. The mapping function is defined by four decibel control values.

**Threshold** - sets the lowest decibel level that will be allowed through.

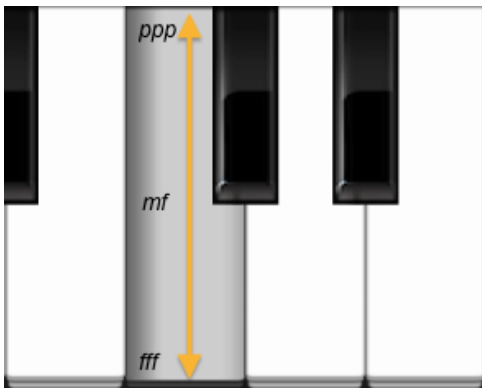
Normally 0 or less, but if higher the threshold will begin removing low-level signal energy such as background noise.

**Low Knee, High Knee** - decibel break-points denoting where compression or expansion will begin. These set the boundaries of a soft-knee curve joining the low-amplitude 1:1 line and the higher-amplitude compression ratio line. Typical values are 48 and 60 db. If the two breakpoints are equal, a hard-knee (angled) map will result.

**COMP/EXP** - ratio of compression when the signal level is above the knee. The value 2 will advance the output just one decibel for every input gain of two; 3 will advance just one in three; 20 just one in twenty, etc. Inverse ratios will cause signal expansion: .5 gives two for one, .25 four for one, etc. The value 1 will result in no change.

The actions of compress will depend on the parameter settings given. A hard-knee compressor-limiter, for instance, is obtained from a near-zero attack time, equal-value break-points, and a very high ratio (say 100). A noise-gate plus expander is obtained from some positive threshold, and a fractional ratio above the knee. Each application will require some experimentation to find the best parameter settings.

## Keyboard



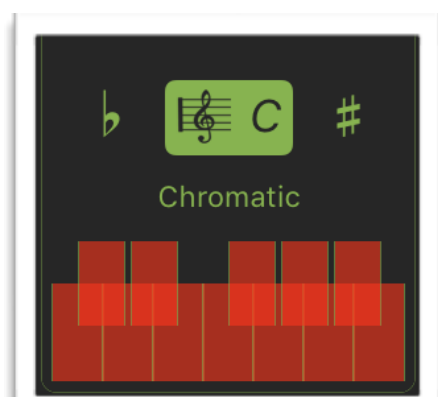
Playing keys from top to bottom, you can change the amplitude of each note i.e. key velocity (0 ÷ 127). The same with the black keys. You may think the keyboard like an audio spectral-tool, on a tempered grid. So you can create complex sounds by summing notes with own couple frequency/amplitude weights. If Keyboard is locked (see below), Snapshots will save/restore state.



**Aftertouch Y Scrub**, you **can** assign one or more *iPulsaret* parameters to aftertouch scrub Y (see Control Manager). So after played a note you can scrub in vertical axis (Y) by controlling one or more Granulator/Effects parameters.



**Locking the Keys** means, every note become a Toggle. So when you play a note, it will be held even when you lift your finger from the key and will be stopped (note off) by clicking again. When the Keyboard is locked, Snapshots will save/restore touched keys.



The  $\flat$  and  $\sharp$  transposition keys allows to change the base note of the keyboard (C) and the Scale button  $\text{C}$ , opens a menu where from

you can choose among several scales. The first item on the list (User Defined Scale) is a special feature which allow you to setup your own scale through the Musical Keyboard. **N.B. The transposition keys does not affect incoming MIDI notes.**



**Midi Panic** sends a general Message 'All Notes Off', resets the DSP and Keyboard.



**Pitch wheel** is a precise portamento (pitch bend) to vary the pitch in a continues variable manner ( $\pm 3$  semitones). It is pre-assigned to Hardware MIDI Pitch Bend.

## Presets

Preset Manager will collect all the **Banks** (*i.e.* *.ipulsaret suffix*) and **Snapshots**. A *Snapshot* is a simple "photo" of the parameters in the UI (*i.e.* User Interface). Both the Matrix and Keyboard/Sequencer are included but they can also be excluded, see the Settings for more details.

So, once you find an interesting sound you can take a snapshot (*i.e.* save this new preset) by touching the 'plus' icon and this new preset will be added to the selected Bank. The top four elements of the Snapshots list are assigned for 'HV Snapshot Pad', you can then sort or delete the Snapshots in the List by tapping the 'List Icon'. You can even share the selected Bank and you can restore the factory Built-In Banks from the 'Cloud' icon.

## Backup



Factory preset-banks (Excluded from iCloud back up)



Library preset-banks (if available as In-App Purchasing) (Excluded from iCloud back up)



User preset-banks (Included in iCloud back up)

If you delete, overwrite, rename or save new presets in factory/library banks, the icon will change as User preset-banks , being backed up.

Snapshot banks are located in App Group folder, you can access files via built-in tools as 'Open In ...', 'Document Picker', 'E-Mail' etc.

### **Use iTunes to share files between your computer and your device**

- 1) Open iTunes on your Mac or PC.
- 2) Connect your iPhone, iPad, or iPod touch to your computer using the USB cable that came with your device.
- 3) Click your device in iTunes.
- 4) In the left sidebar, click File Sharing.
- 5) Select an app to see which files are available for sharing in that app on your device.



After you have added files through iTunes in the Documents App folder, you need to move them to the shared directory ('App Group'). This action will move all files from 'Documents' to 'App Group' folder. If an item with the same name already exists (in the 'App Group'), the file will not be overwritten.



Load a preset, randomly from the banks list.



Delete all Presets for a selected bank. A warning message will be displayed.

The Snapshots bank file is a kind of Property List format (*.ipulsaret*), you can edit as text and modify the values just rename in *.plist*

Swipe (right to left) on a preset or bank to rename/duplicate/delete it.



The purpose of the unique **Snapshot Pad** is to obtain intermediate values between four snapshots (corners). You can change snapshots assigned in the corner through the Snapshots list (see above).

The Snapshots Pad performs complex interpolations between four snapshots on a two-dimensional space. By scrubbing your finger on the Snapshots Pad a temporary new snapshot will be created by mixing the four snapshots depending on distance. Thus you can modify hundreds of parameters with a single touch, this is also called *Hyper Vectorial Synthesis*.

Snapshots Pad can be resized on fullscreen for detailed controls (left bottom icon).

**N.B. Snapshots Pad have no effect on Keyboard and Switches.**

## Samples

Samples manager can read/write in the App Group folder, you can also share files through AudioCopy, Document Picker (iCloud, Dropbox etc...) and AudioShare. Samples manager can also read the Built-in files, but you cannot rename or delete them. Touch on a file in the list to show the actions popup. Here it is possible to **Load** a file in one of two Samplers (i.e. Sampler Ch.1 and Sampler Ch.2), Open In... contains all system actions over the file, according to file type. For example you can send files as an e-mail, open file with a listed app etc...



You can rename files in the App Group folder, if you omit the file extension then Samples Manager will fill the original audio file extension for you. N.B. Samples manager shows only audio files supported, the other files in the App Group folder will not be seen.



You can pre-listen to the samples before you load them.



Starts audio capture from the microphone immediately and saves new stereo audio file in wav format 44.1 kHz, 16 bit in the App Group folder. Files created are composed by id-name followed by a number, for example: Input Rec 4.wav, Input Rec 5.wav etc...

Every new file will be numbered with the next consecutive number.

N.B. You can record a mono or stereo file in wav format 16 bit 44.1 kHz according to the iDevice channels. Even if the iPulsaret is connected to Audiobus or IAA, the Grab Audio will record always from iPad microphone/line



You can import files from AudioCopy, Music Library, Document Picker (iCloud, Dropbox etc...) and AudioShare.

Access to the iPod library, this allows the application to read user's songs, audio books, and audio podcasts. The file can be converted in .wav (PCM 16 bit 44.1 kHz) or .caf formats and stored in the local app App Group folder. If the file exist at path then progressive number will be attached to the file name. The document picker feature lets users select documents from outside your app's sandbox. These include documents stored in iCloud Drive and documents provided by a third-party extension. Users can open these

documents directly, editing them in place. This access simplifies sharing documents between apps and easily enables more complex workflows.

## Use iTunes to share files between your computer and your device

See 'Presets' for more informations.

## Control



MIDI



Scrub Y



Accelerometer X

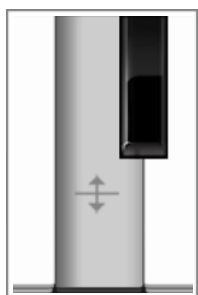


Accelerometer Y



LFO

After selecting **MIDI**, iPulsaret enters into "learn mode" i.e. it "hears" incoming MIDI Control Change messages. It's then possible to send messages with MIDI hardware, Virtual MIDI and Network MIDI. Flashing screen means the association between the parameter and the MIDI message has been successful and displays the corresponding control Change and Channel. Alternatively you can enter direct CC and MIDI Channel number through number keyboard. You will also receive an additional setting: 'Widget Range' that allows you to resize the range of action on the parameter. This is because you can use all 128 steps MIDI to control precisely particular part of the parameters.



**Scrub Y** binds the widget to vertical movement on the keyboard (Scrub Y). An additional setting allows you to specify the speed (gravity) of the action.

**Aftertouch Y Scrub**, you **can** assign one or more iPulsaret parameters to aftertouch scrub Y, so after a played note, you can scrub in the vertical axis (Y) by controlling one or more of the parameters. An additional setting allows you to specify the

speed (gravity) of the action.

N.B. Playing keys from top to bottom, you can change the amplitude of each note i.e. key velocity (0 ÷ 127). The same with black keys.

**Accelerometer X** and **Y** are used to control the parameters through the horizontal or vertical inclination of the device.

**LFO**, Low Frequency Modulation is a table look-up oscillator with seven built-in shapes. The frequency of LFO is expressed in Hz and BPM (Beats per Minute). You can get the period time by dividing 1/freq. The LFO Frequency value is converted in BPM (Beats Per Minute), you can adjust this value through the minus/plus buttons, these will replace current value with the integer BPM (previous/next) or you can TAP to set your own Tempo.

- φ Will reset to zero the phase of current LFO.
- Φ Will reset to zero the phase of ALL LFO actives.



Enabling the Link symbol, you will disable the 'Low Frequency Oscillator in Hz' Slider, so the value of the current LFO is sampled from the global 'MASTER BPM'. You can adjust the BPM value from SYNC view. When the MIDI Clock or Ableton Link is enabled (see MIDI Manager and SYNC) the BPM value will affect all LFO enabled for SYNC mode. The goal of the 'SYNC Subdivision' Slider is to rescale the 'MASTER BPM' from SYNC according to the relative symbol (abbreviate musical note time values):

Normal : 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64

Triplets : 1/1T, 1/2T, 1/4T, 1/8T, 1/16T, 1/32T, 1/64T

Dotted : 1/1D, 1/2D, 1/4D, 1/8D, 1/16D, 1/32D, 1/64D

Where 'D' is a **dotted** note and 'T' is **triplet**.

With 1/4 (Default), the BPM follows the 'SYNC BPM' or 'MIDI Clock' BPM when enabled, i.e. 120 BPM corresponds to 1 Hz.

- 1/4 - each step is a quarter note (or BPM), e.g. 60 BPM is 0.5 Hz
- 1/4D - each step is a dotted quarter note (or 1.5 x BPM),
- 1/4T - each step is a triplet quarter note (or 0.5 / 3) etc.

♪ Reset default value (1/4 = 120 BPM)

## MIDI

You can enable/disable the incoming MIDI signal from all the physical, virtual and network ports available. The MIDI Clock is managed by SYNC, see the SYNC section for more details.





If the Core MIDI Network is connected a wifi symbol will appear in the Network port cell.

**Channel** sets the input channel for the selected port, the *apeFilter* DK (Keyboard) will receive the Note On/Off messages in OMNI (from all 16 channels) or, one of the 16 channels.

### **Configure Bluetooth LE MIDI**

With the release of iOS 8 and OS X Yosemite, sending and receiving MIDI data is supported using Bluetooth Low Energy connections on any iOS device or Mac that has native Bluetooth Low Energy support. All established connections are secure which means that pairing is enforced and connections cannot be made to your devices without your explicit consent. After a connection is established, it simply appears as an ordinary MIDI device that any MIDI application can communicate with.

### **Enable NRPN**

NRPN stands for "Non-Registered Parameter Number" and is part of the MIDI specification for the control of electronic musical instruments. NRPNs allow for manufacturer-specific or instrument-specific MIDI controllers that are not part of the basic MIDI standard.

Unlike other MIDI controllers (such as velocity, modulation, volume, etc.), NRPNs require more than one piece of controller data to be sent. First, controller 99 - NRPN Most Significant Byte (MSB) - followed by 98 - NRPN Least Significant Byte (LSB) sent as a pair specify the parameter to be changed. Controller 6 then sets the value of the parameter in question. Controller 38 may optionally then be sent as a fine adjustment to the value set by controller 6.

This fine adjustment is part of the conventional MIDI controller specification, where any of the first 32 controls can be optionally paired with a control offset 32 higher. This is the rare 14-bit Continuous Controller feature of the MIDI specification, and NRPNs simply take advantage of that existing option in the same way offering 16,384 possible values instead of only 128.

(<http://en.wikipedia.org/wiki/NRPN>)

When you enable NRPN, you should not employ CC 99 and 98 as the normal CC in order to avoid an undesired overlap. An NRPN message must be sent with this order: CC 99 98 6 38 where the first couple is the CC number and the second couple is the data. You can MIDI learn as for the normal CC, and NRPN works for all knobs and parameters. Although an NRPN CC number can be greater than 127, you will not be able to learn CC beyond 127.

## Program Change for Presets Selection

You can select Presets (current selected bank) by remotely sending a MIDI Program Change. You can select the MIDI channel where you can receive PC messages. A PC value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.

## Settings

**Sampling Rate**, for full-range audio, the recommended sampling rate is 44.1 kHz. Using a lower rate *iPulsaret* will reduce the number of samples that has to calculate, this will facilitate your Device's burden, but it will also reduce the frequency range. If your device is struggling at 44.1 kHz, you should try a lower rate and/or increase Buffer Size.

**Buffer Size** set the Audio Device latency. When you run *iPulsaret* from **Audiobus**, or **Inter-App** this value will be taken from **Audiobus** or **Inter-App Host**. Warning! When an app runs first and keeps running in the background, the Sampling Rate and Buffer Size will impose for the whole iOS while running.

**Snapshots Pad Resolution Update** sets the time interval for the interpolations, from about 15 to 350 milliseconds. Short times for higher resolution but higher consumption of CPU.

**Save/Restore the Last App Setup**, when you exit from the application, save the status and recharge to the next opening.

**Add Keyboard in Snapshots**, enable/disable Snapshots capture for Keys Down. It will work only if Keyboard is Locked (see above).

## Others Settings

The switch in this section are self-explanatory. As for all warning messages; include/exclude Control Manager, Assignations and Knob Color in the presets etc...

## Knobs Interactions Mode

Use this to configure the Knobs dragging behavior. Step fine resolution set's how many points of movement result in a one degree rotation in the knob's position. Only used in the horizontal/vertical slider modes.