REAKTOR BLOCKS

MANUAL

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1 Welcome to REAKTOR Blocks

REAKTOR Blocks brings the experience of patching an analog modular synthesizer to REAKTOR 6, adding unique features only possible in software. As a self-contained system, it is composed of common building blocks found in contemporary modular synthesizers.

Unlike a regular synthesizer with a fixed architecture, a modular synthesizer does not predefine a specific arrangement for these building blocks. You can freely arrange and connect them to facilitate a wide range of different synthesis methods, or find completely new ways of generating sound.

Blocks patches can be created without prior building experience in REAKTOR. Universal connectivity between all Blocks allows for any connection to be made, with predictable results. Many features commonly associated with analog modular synthesizers, like feedback connections and audio rate modulation, have been thoroughly implemented to not only function correctly across all modules, but also sound great.

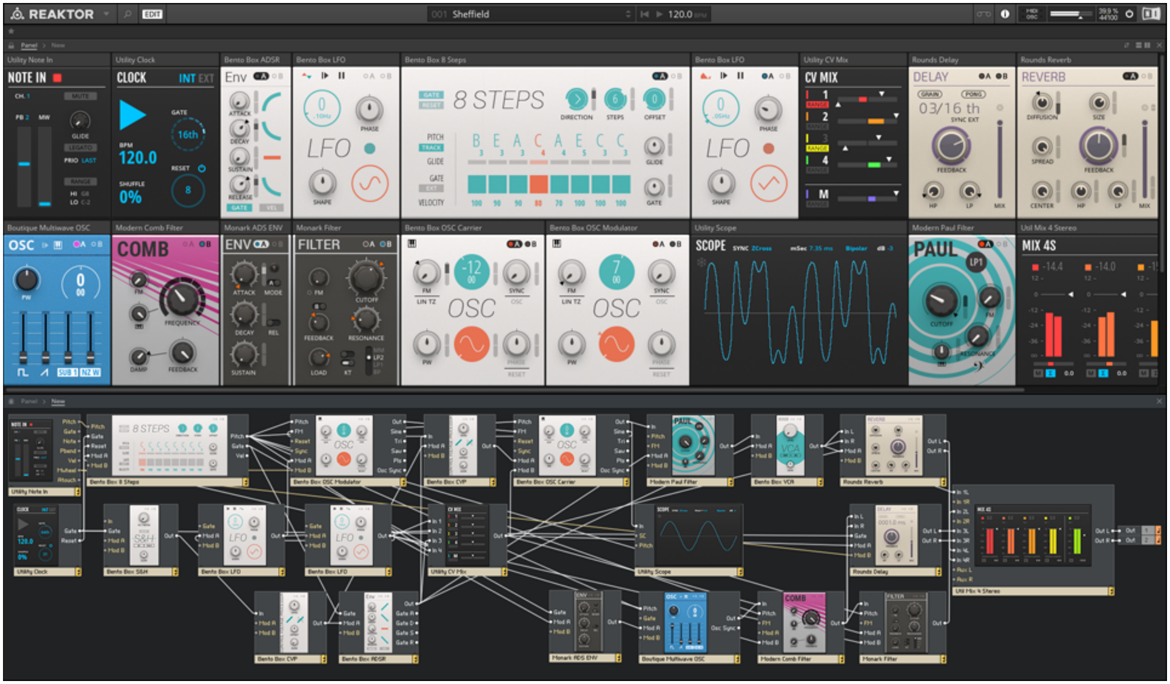
REAKTOR Blocks are based on a sophisticated framework that provides the infrastructure needed to bring together the user interface, the unified connection scheme, and the underlying signal processing. To support builders who want to contribute new Blocks to the format, an elaborate building template has been created and uploaded to the REAKTOR User Library on our website. Download it here.

Patching, Building, and Sharing

By combining an intuitive user interface with straight-forward patching, immaculate DSP algorithms and a powerful framework, REAKTOR Blocks benefits musicians and builders alike:

- The unified connection scheme allows sound designers and musicians without building experience to dive into the Structure and create their own instruments and effects.
- REAKTOR Primary builders can make a smooth transition to Core by modifying the underlying Core Cells or using buildings blocks from the Core Macro Library.
- REAKTOR Core builders can use the framework and Panel templates to create new Blocks by integrating their own custom Core Cells.

REAKTOR is fortunate to be supported by a large community of experienced users who actively share their creations in the REAKTOR User Library on our website —a great source of inspiration, both musically and technologically. We invite you to join this vibrant community and are looking forward to seeing and hearing your patches and Blocks!



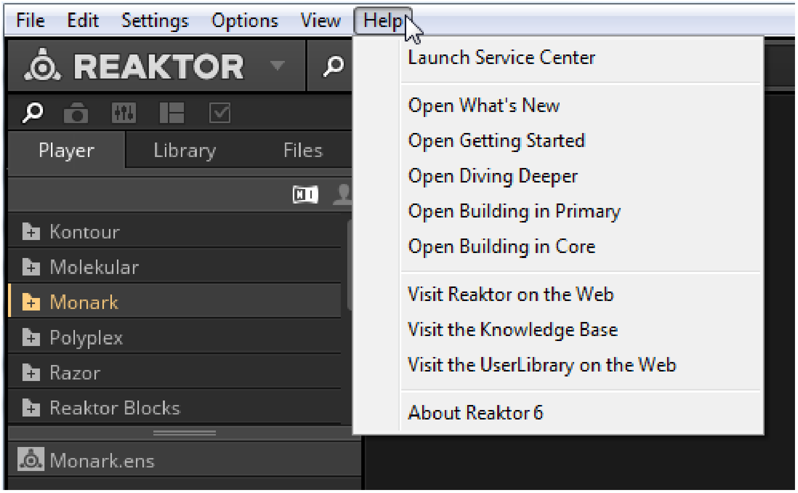
A REAKTOR Blocks patch

1.1 About the Blocks Documentation

This manual gives an overview over the basic workflows in Blocks (see section ↑2, Basic Workflow) and gets you started with patching (see section ↑3, Patching in Blocks). You will also find a detailed description of the unified connection scheme in Blocks (see section ↑4, Connections and Signals). Finally, all Blocks are described in detail, allowing you to make yourself familiar with their general functionality as well as their controls, inputs, and outputs (see section ↑5, Blocks Reference).

While most of the instructions in this manual do not require prior knowledge about REAKTOR, it is recommended to read the REAKTOR 6 documentation to get a better understanding of the underlying concepts and features.

► To access the REAKTOR 6 documentation, open the *Help* menu in the REAKTOR menu bar:



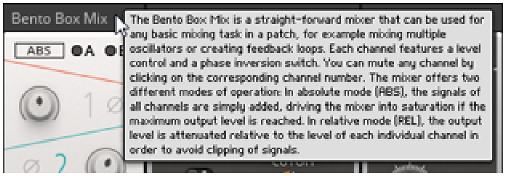
1.1.1 Info Hints

Blocks features comprehensive information about the Blocks as well as their controls, inputs, and outputs in the REAKTOR application. You can view this information in the form of tooltips (called Info Hints in REAKTOR).

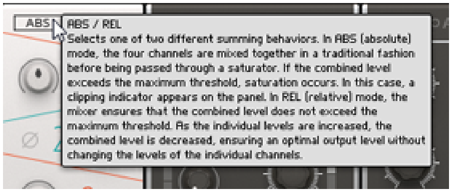
► To show the Info Hints in REAKTOR, enable the Show Info Hints option in the Toolbar.

Info Hints are available for each entire Block, the individual controls, as well as the inputs and outputs.

► To view the Info Hint for a Block, place the mouse over its header:



► To view the Info Hint for a parameter, place the mouse over its Panel control:



► To view the Info Hint for an input or output, place the mouse over the port in the Structure.

1.1.2 Blocks Framework Manual

In every Block, a sophisticated framework provides the infrastructure needed to bring together the user interface, the unified connection scheme, and the underlying signal processing.

To support builders who want to contribute new Blocks to the format, an elaborate building template has been created and uploaded to the REAKTOR User Library on our website. Download it here.

The template includes all components needed to create fully compatible Blocks based on your own designs. It features a comprehensive manual that explains all the specifics of the framework, allowing for a smooth transition into building your own Blocks.

The Blocks Template in REAKTOR

1.1.3 Document Conventions

This section introduces you to the signage and text highlighting used in this manual.

- Text appearing in (drop-down) menus (such as *Open…*, *Save as…* etc.) and paths to locations on your hard disk or other storage devices is printed in *italics*.
- Text appearing elsewhere (labels of buttons, controls, text next to checkboxes etc.) is printed in blue. Whenever you see this formatting applied, you will find the same text appearing somewhere on the screen.
- Important names and concepts are printed in **bold**.
- References to keys on your computer's keyboard you'll find put in square brackets (e.g., "Press [Shift] + [Enter]").

► Single instructions are introduced by this play button type arrow.

→ Results of actions are introduced by this smaller arrow.

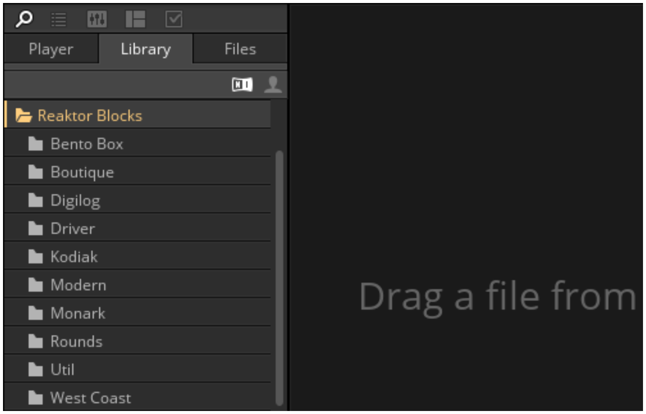
Furthermore, this manual uses particular formatting to point out special facts and to warn you of potential issues. The icons introducing these notes let you see what kind of information is to be expected:

> The speech bubble icon indicates a useful tip that may often help you to solve a task more efficiently.

> The exclamation mark icon highlights important information that is essential for the given context.

> The red cross icon warns you of serious issues and potential risks that require your full attention.

1.2 Where to Start?



Blocks in the REAKTOR 6 Library

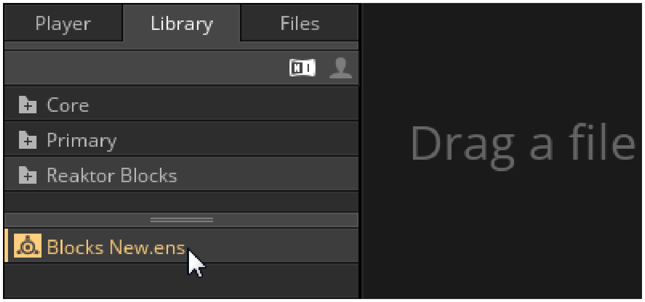
Blocks is part of the REAKTOR Library, which can be found in the Browser tab of the Side Pane. The available Blocks are organized in folders, grouping them into different lines:

- Bento Box: Core components of a modular synthesizer, enhanced with special features.
- Boutique: Boutique Blocks are inspired by great synthesizers of the past.
- Digilog: Sequencing tools for note processing, complex rhythms, and musical structures.
- Driver, Monark, Rounds: Components from well-known NI products, available in Blocks.
- Kodiak: Forward-thinking Blocks based on advanced software concepts.
- Modern: State-of-the-art Blocks with a contemporary twist.
- Util: Utilities that provide the infrastructure for your patches.
- West Coast: West Coast Blocks are inspired by the Buchla tradition of synthesizers.

The 'New' Ensemble

Ensembles are the basic project files in REAKTOR that hold all relevant information of a session. Blocks patches are based on a dedicated 'New' Ensemble, containing a few basic modules that are often used to support patches in terms of note input, clocking, and audio output. More importantly, this Ensemble includes optimizations for the automation handling and the Panel view that are required for Blocks.

► To open the 'New' Ensemble, select the *Reaktor Blocks* folder in the Library and double-click on the *Blocks New.ens* Ensemble in the lower section of the Browser (alternatively, you can click and drag it into REAKTOR's main area).



→ A new Ensemble opens, specifically set up for hosting Blocks patches.

> REAKTOR Blocks comes with a selection of pre-built patches (REAKTOR Ensembles) and many presets (REAKTOR Snapshots) that are ready to be used in your music and sound design projects. These Ensembles can be directly accessed from the MASCHINE or KOMPLETE KONTROL Browser, or you can load them from the *Reaktor Blocks* folder in the Player tab of the REAKTOR Browser (see section ↑3, Patching in Blocks).

1.3 Further Reading

If you are new to modular synthesis, or want to expand your knowledge about patching techniques and the technology involved, the following online resources can be of great help.

The websites linked below are owned and operated by third parties. The links are provided for your information and convenience only. Native Instruments has no control over the contents of any of the linked websites and is not responsible for these websites or their content or availability.

- Sound On Sound Synthesizer Secrets: This extensive collection of excellent articles by Gordon Reid covers many different synthesis techniques, explaining how they can be used to create classic synthesizer sounds or mimic acoustical instruments.
- Rob Hordijk's Synthesis Workshops: Rob Hordijk's Synthesis Workshops are among the best reads on sound synthesis available online. The articles and tutorials are very well structured and cover synthesizer theory, history, and practice in great detail.
- Basics of Sounds Synthesis: Another helpful resource from Rob Hordijk, covering some of the more basic topics from his Synthesis Workshops in a concise manner. This is especially useful as an introductory document for beginners.
- Advanced Programming Techniques for Modular Synthesizers: This online book by James J. Clark explains many different advanced synthesis methods and how they can be patched up with a modular synthesizer.
- Muffwiggler Forum: Renowned not only for its odd name, the largest online community for modular synthesis is undoubtedly the central hub of the scene, and a useful source of information. It is highly recommended to use the search engine, which is very well-featured.

2 Basic Workflow

In Blocks, you use wires to connect any number of individual Blocks to form a patch, a higher-level structure that constitutes a musical instrument, a sequencer, an effect, or any combination thereof. Each Block takes on a specific role in this structure. This does not mean each Block always performs the same function. While they all have an intended purpose, Blocks can be misused in interesting ways. There are no wrong connections in Blocks, and unusual patches often lead to surprising results.

Technically, Blocks are REAKTOR **Instruments** (REAKTOR *.ism* file format), and a patch consisting of multiple Blocks is hosted in a REAKTOR **Ensemble** (REAKTOR *.ens* format). Connections are made in the **Structure**, while the parameters are controlled on the **Panel**. The Panel is independent from the Structure, so the arrangement can be optimized for playing with your Blocks patch.

(**1**) **Panel**: The Panel is where you change the Blocks' parameters and tweak your sounds.

(**2**) **Structure**: The Structure is where you connect the Blocks' inputs and outputs.

(**3**) **Side Pane**: The Side Pane hosts the Browser and additional settings like the Snapshots.

2.1 Play Mode vs. Edit Mode

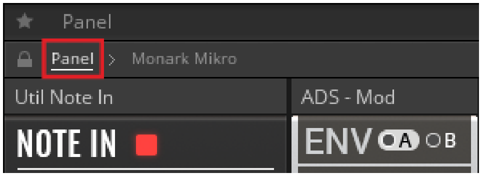
You can play your patch and control its parameters in REAKTOR's Play mode, however if you want to add Blocks to your patch, change its Structure, or edit some of its advanced settings, you have to enable Edit mode.

► To toggle Edit Mode on or off, click on the EDIT button in REAKTOR's toolbar.

2.2 Navigating between Panel and Structure

You can switch between the Panel and the Structure using so-called Breadcrumps in the navigation bar at the top of REAKTOR's main area.

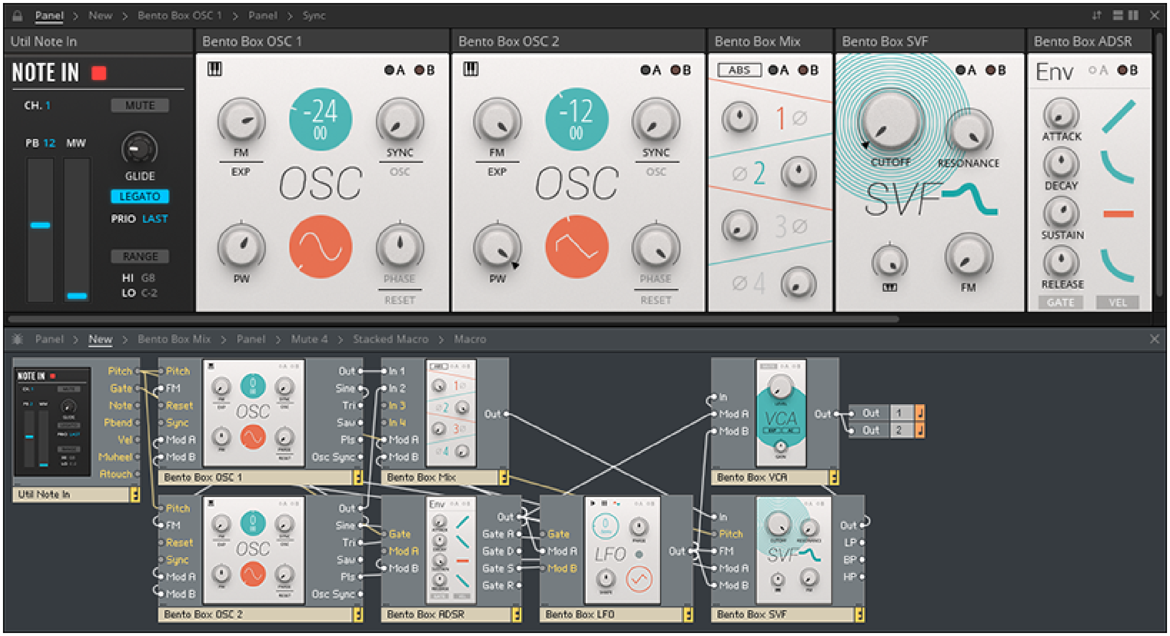
► To view the Panel, click on the Panel Breadcrump in the navigation bar.



► To view the Structure, click on the Breadcrump carrying the name of the Ensemble in the navigation bar.

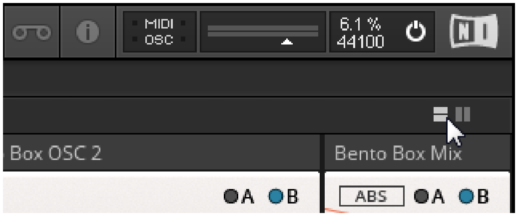
Split View

You can also use REAKTOR's split view to view both the Panel and the Structure at the same time:



A patch in REAKTOR Blocks, viewed in split view

► To enable split view, click on the Horizontal Split or Vertical Split buttons in the upper-right corner of REAKTOR's main area.



2.3 Saving Patches and Parameter Settings

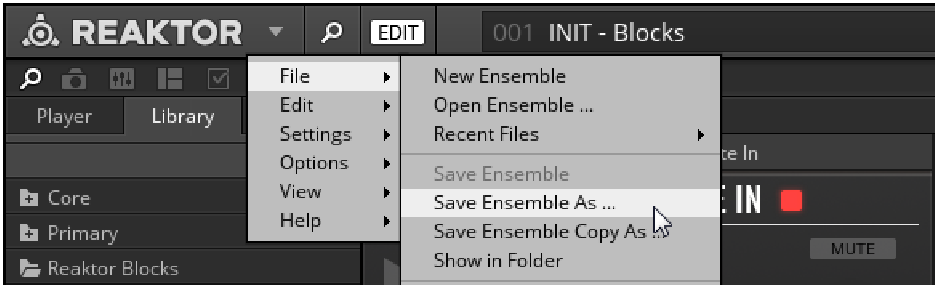
All connections between Blocks and their arrangement in the Structure are saved in the Ensemble, so you have to save a new Ensemble for each of your patches (see section ↑2.3.1, Saving and Loading Ensembles in the Stand-Alone Application).

The parameter settings on the Panel can be saved in presets, called **Snapshots** in REAKTOR. You can create global Snapshots for all Blocks in a patch at once, on the Ensemble level, or individual Snapshots for each Block, on the Instrument level. This allows you to save several sets of settings for a patch and recall them in an instant (see section ↑2.3.3, Storing and Recalling Snapshots).

2.3.1 Saving and Loading Ensembles in the Stand-Alone Application

In the REAKTOR stand-alone application, you can save and load Ensembles from the main menu in the Tool Bar.

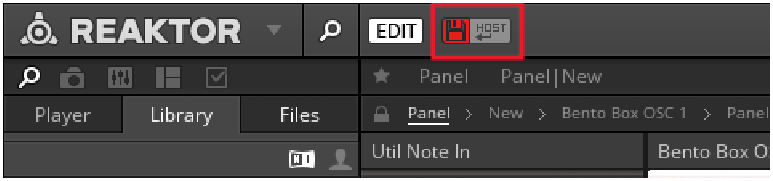
► To open the main menu, click on the arrow next to the REAKTOR logo.



> Alternatively, you can use the Files tab in the REAKTOR Browser to browse for your Ensembles and load them by drag and drop, or by double-clicking.

2.3.2 Saving and Loading Ensembles in the Plug-in

When you are using the REAKTOR plug-in in Edit Mode to work on the Structure of a Blocks patch, the Ensemble is modified in such way that the changes are not saved in the host sequencer's project. In this case, the Save Ensemble button in the Toolbar turns red, indicating that these changes will be lost when closing the project:

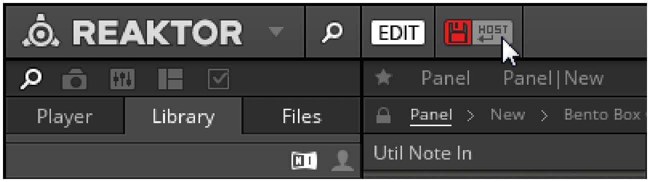


The red Save Ensemble button

To preserve the changes you have made, you need to create a local copy of the Ensemble. A link to this local copy is saved in the host sequencer's project and the Ensemble will be automatically loaded the next time you open the project. REAKTOR allows for automatic saving of this local copy every time you save the host sequencer's project. This way, you do not have to keep track of the save status of the Ensemble as long as your host sequencer's project is saved correctly.

To save a local copy of your Ensemble and enable automatic saving:

1. Click on the Enable Automatic Saving with Host button in the Toolbar.



2. In the file dialog, choose the desired location and name for the local copy of your Ensemble and click Save.

→ The Enable Automatic Saving with Host button lights up, indicating that automatic saving of your Ensemble is now enabled. The local copy of the Ensemble is saved every time you save your host sequencer's project, and will be automatically loaded the next time you open the project.

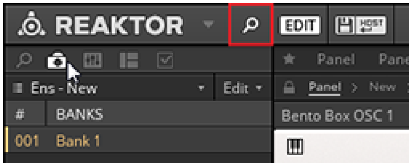
2.3.3 Storing and Recalling Snapshots

Snapshots, which are REAKTOR's sound preset format, enable you to store and recall the state of your Instrument's or Ensemble's Panel controls. When you recall a Snapshot, all the Instrument's or Ensemble's Panel controls are restored to the state they were in when the Snapshot was originally created. You can use this to store the parameter settings of entire Blocks patches (Ensemble) or individual Blocks (Instruments).

> The connections between Blocks in the Structure are not stored in Snapshots. They are saved in the Ensemble, which means that changes to the Structure of a patch will affect all Snapshots for the Ensemble.

You can view and edit the Snapshots in the Snapshots tab of the Side Pane.

► To access the Snapshots tab, go to the Side Pane and click on the Snapshots icon.

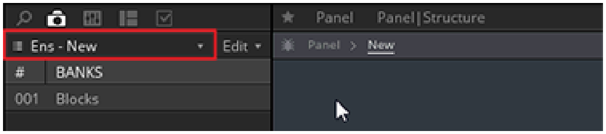


Recalling Snapshots

The Snapshots tab in the Side Pane shows either the Snapshots for the Ensemble or for an individual Block.

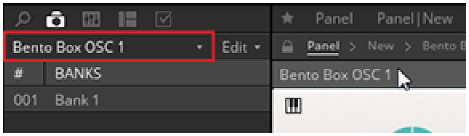
► To view the Snapshots for the Ensemble, including all settings of the included Blocks, click somewhere in the background of the Structure.

→ The Side Pane shows all Snapshots saved for the Ensemble, indicated by the menu on top of the Snapshots tab.



▶ To view the Snapshots for an individual Block, click on the header of the Block so it is highlighted.

→ The Side Pane shows all Snapshots stored for the Block, indicated by the menu on top of the Snapshots tab.



▶ Alternatively, you can select between viewing the Snapshots for the Ensemble or any of the included Blocks by using the Select Instrument for Snapshot menu at the top of the Snapshots tab.

You can also recall Ensemble Snapshots from the Snapshot menu in the Toolbar. This will re-call the stored parameter settings for all Blocks included in the Ensemble.

The Snapshot menu in the Toolbar

Storing Snapshots

Storing and editing Snapshots can be done from the Snapshots tab in the Side Pane.

> In order to be able to store and edit Snapshots, you have to enable Edit Mode by clicking on the EDIT button in the Toolbar.

At the bottom of the Snapshot pane are three buttons for storing Snapshots:

The buttons to Add, Store, and Insert Snapshots

- Add: Creates a new Snapshot with the current settings of your Instrument at the end of the Snapshot list.
- Store: Overwrites the currently highlighted Snapshot with the current settings of your Instrument.
- Insert: Creates a new Snapshot with the current settings of your Instrument directly after the currently highlighted Snapshot, moving any other Snapshots down one slot in order to make space.

> Snapshots are stored in the Ensemble, so the Ensemble needs to be saved in order to make changes to the Snapshots permanent.

2.4 Adding Blocks to a Patch

Blocks can be added to a patch by drag and drop from the Browser's Library tab.

> The Library tab is only visible in Edit Mode (see section ↑2.1, Play Mode vs. Edit Mode)

► To add a new Block to your patch, drag and drop the corresponding Instrument file from the lower section of the Library tab into the Structure.

All Blocks are associated with a specific category that hints at the Block's most common usage. The category is part of the file name: <category>-<Block name>.ism

AMP	Amplifiers	.. control the amplitude of signals.
AUX	Auxiliary (Blocks)	.. provide useful extra functions.
DRM	Drums	.. generate drum sounds.
EFX	Effects	.. process audio signals in interesting ways.
FLT	Filters	.. alter the frequency content of signals.
INT	Integration (Blocks)	.. integrate Blocks with other software and external devices.
MIX	Mixers	.. add signals together.
MOD	Modulators	.. generate signals for controlling other Blocks.
OSC	Oscillators	.. generate audio signals for further processing in a patch.
PRO	Processors	.. process modulation signals in various ways.
SEQ	Sequencers	.. generate or process pitch, gate, and modulation signals.

2.5 Organizing and Arranging Blocks

Blocks adapts the REAKTOR interface paradigm, which is based on a Structure and a Panel view. Connections are made in the Structure, while the parameters are controlled on the Panel.

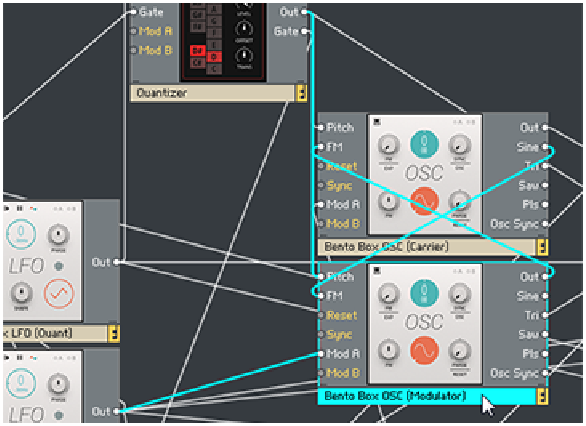
The arrangements of the Blocks in both views are independent. This means that you can organize the Blocks in Structure view to achieve the best possible overview over your signal flow, while setting up a different arrangement in Panel view that suits your way of playing with the parameters.

Arranging Blocks in the Structure

In the Structure, Blocks can be freely arranged, supported by thumbnail pictures and REAKTOR's flexible wiring system. Blocks can be placed on top of each other, however it is recommended to give each Block its own dedicated space in the Structure to maintain a better overview.

The wires connecting the Blocks always follow the shortest possible path between the ports. If a wire crosses a Block, the overlapping portion of the wire is hidden behind the Block.

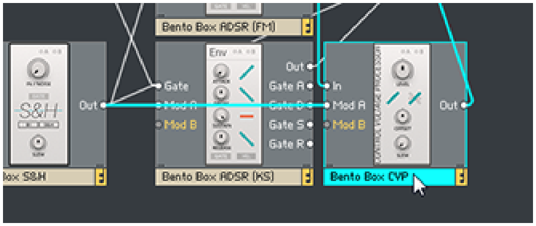
► To highlight all wires connected to a Block, including those being hidden behind other Blocks, select it.



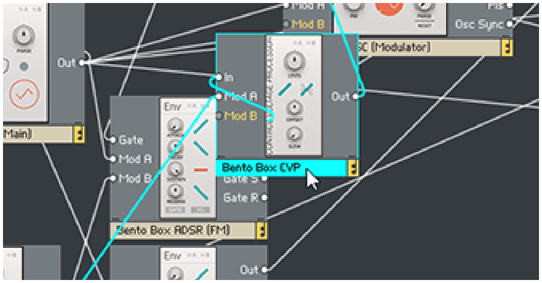
Moving a Block to a new position in the Structure is done by drag and drop. While moving the Block, all connected wires are rerouted automatically.

To move a Block:

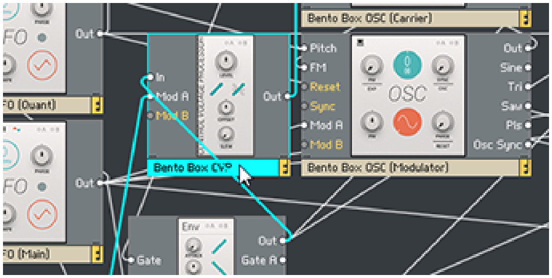
1. Click on the Block you want to move and keep the mouse button pressed.



2. Drag the Block to its new position in the Structure.



3. Release the mouse button to place the Block in its new position.

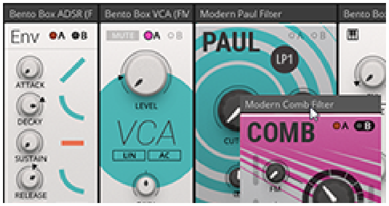


Arranging Blocks on the Panel

On the Panel, the Blocks are organized in a virtual rack that consists of as many rows as you need. All rows of Blocks have the same, fixed height. The width of the rows is determined by the number of Blocks you add to them. Blocks can be conveniently rearranged by drag and drop:

► To place a Block to the left of a particular Block, click on its header and drag it onto the left half of this Block.

► To place a Block to the right of a particular Block, click on its header and drag it onto the right half of this Block.



The only exception is if you want to place a Block to the right of the rightmost Block in an incomplete row.

► In this case, click on the Block's header and drag it onto the right half of the empty space next to the rightmost Block.

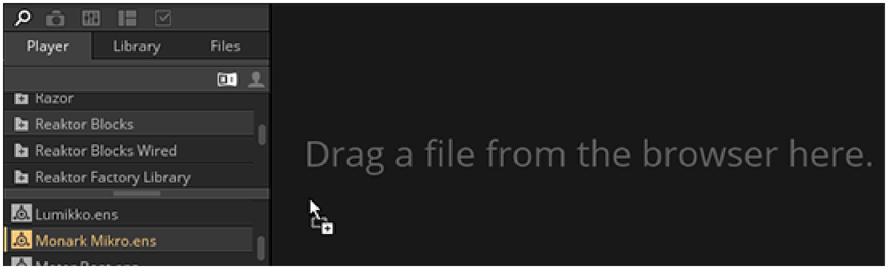
REAKTOR's Panelsets allow you to save multiple Panel configurations for a patch and recall them at an instant (see REAKTOR 6 Diving Deeper for more information).

3 Patching in Blocks

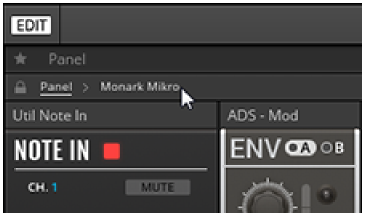
Patching in Blocks is done by making connections in the Structure (see section ↑3.1, Making Connections), controlling parameters on the Panel (see section ↑3.2, Panel Controls), and routing modulation signals to individual parameters (see section ↑3.3, Modulation Routing). If you are familiar with modular synthesizers, you can adapt your favorite patching strategies to Blocks right away.

If you are new to modular synthesis, the pre-built Ensembles provided in the Player tab of the REAKTOR Browser can serve as a starting point, showing you how Blocks can be combined in a patch.

► To load one of the pre-built Ensembles, click and drag it from the Browser into the main area of REAKTOR (alternatively, you can double-click on it).



► To learn more about how the Blocks in a pre-built Ensemble are connected, go to the Structure by clicking on the Ensemble Breadcrump in the navigation bar.



Alternatively, you can use REAKTOR's split view as described in section ↑2, Basic Workflow.

3.1 Making Connections

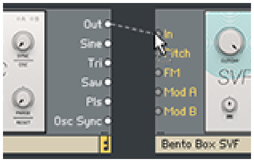
One of the most important features of Blocks is universal connectivity. You can connect any output to any input and achieve predictable results, regardless of which Blocks are connected.

> For general information about the different types of inputs and outputs see section ↑4, Connections and Signals. Specific information about each input and output can be found in section ↑5, Blocks Reference as well as in the REAKTOR Info Hints (see section ↑1.1, About the Blocks Documentation).

To establish a connection between two Blocks, an output has to be connected to an input, or vice versa:

1. Click on the output port you want to connect and keep the mouse button pressed.

2. Drag the mouse onto the input port you want to connect and release the mouse button.

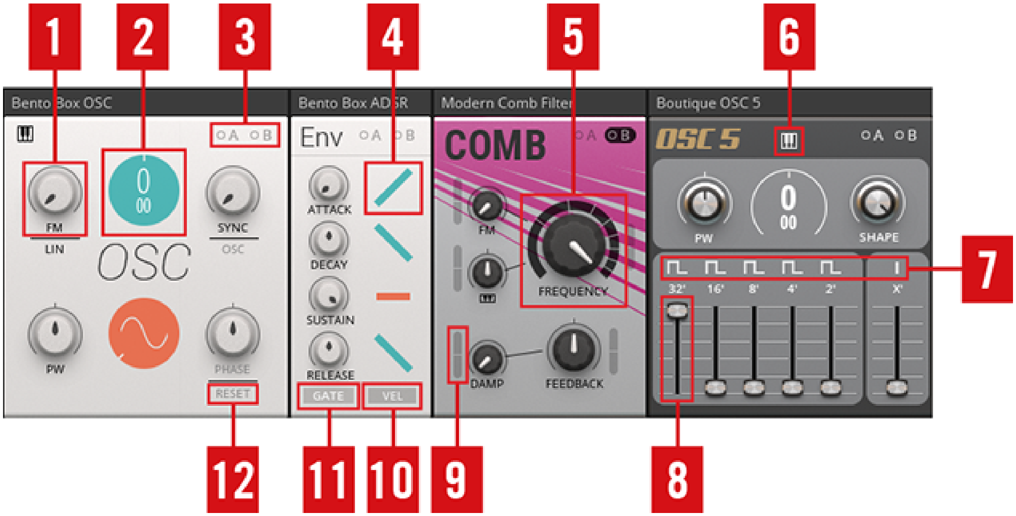


→ The connection is established, indicated by a wire going from the output port to the input port.

3.2 Panel Controls

Each line of Blocks has its own characteristic design, making it easy to tell one from another. However, most of the Panel controls follow the same interface paradigm, which allows you to adjust and play the parameters in an intuitive manner. Below, the most common Panel controls are explained briefly.

Find detailed information about each Panel control in section ↑5, Blocks Reference as well as in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).



Common Blocks Panel controls

(**1**) **Knob**: Knobs are the most common Panel control in Blocks. Click and drag a knob up and down to change its value. The current value is shown below the knob while adjusting the parameter. Double-clicking on a knob resets its value to default.

(**2**) **Circular value control**: These controls can be adjusted like Knobs, by clicking and dragging them up and down. They feature a large value display and are used for parameters like oscillator pitch and waveform selection. For pitch, a dual control is used, with coarse tuning at the top and fine tuning at the bottom. Double-clicking on the control resets its value to default.

(**3**) **Modulation buttons**: The A and B buttons are used for routing modulation signals in a Block. See section ↑3.3, Modulation Routing for more information.

(**4**) **Symbol mode control**: These controls are used to select between different modes of a function, in this case different envelope shapes on the ↑5.1.5, ADSR Envelope (MOD). Click on the symbol to step through the available modes. The symbol reflects the current setting. Double-clicking on the control resets its value to default.

(**5**) **Large knob**: Large knobs are used for the most important parameters of a Block, for example the FREQUENCY control of the ↑5.6.2, Comb Filter (FLT). Their behavior is identical to smaller sized knobs (see (**1**) **Knob** above).

(**6**) **Global control**: The options at the top of a Block select between different modes of operation, like key tracking for the ↑5.2.3, OSC 5 (OSC) in this case.

(**7**) **Label control**: On some Blocks, the labels of controls can be clicked to change a related parameter. On the ↑5.2.3, OSC 5 (OSC), the waveform label selects alternate waveforms for each of the intervals.

(**8**) **Fader**: Faders are used as an alternative to knobs and can be adjusted in the same way, by clicking and dragging them up and down. The current value is shown above the fader while adjusting the parameter. Double-clicking on a fader resets its value to default.

(**9**) **Modulation depth slider**: The modulation depth sliders control the amount of modulation applied to the associated parameter. See section ↑3.3, Modulation Routing for more information. Double-clicking on the slider resets its value to default.

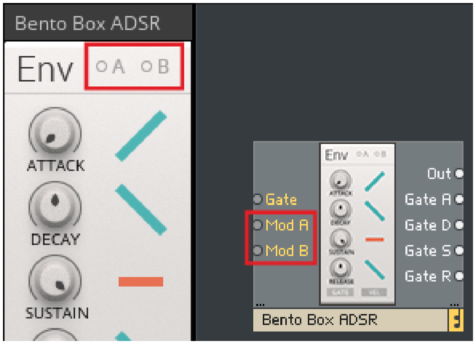
(**10**) **Button**: Buttons switch between two alternate options or toggle single functions on or off. You can change their value by clicking on them. If the button switches between alternate options, the label will change accordingly. If it toggles a single function on or off, the on-state is highlighted.

(**11**) **Momentary button**: These buttons are used for Gate and Reset functions. They light up when a gate arrives at the associated input and triggers the function. You can also click on them to manually set off the function, like starting the envelope on the ↑5.1.5, ADSR Envelope (MOD).

(**12**) **Control mode button**: Some controls, like PHASE, FM, and SYNC on the ↑5.1.7, Oscillator (OSC), feature auxiliary buttons next to their labels that allow you change their mode of operation.

3.3 Modulation Routing

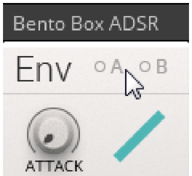
Each Block has two Modulation Buses A and B, represented by the two buttons A and B on the Panel. The buttons correspond to the Block's Mod A and Mod B inputs.



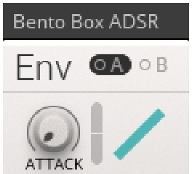
The Modulation Buses in REAKTOR Blocks

The Modulation Buses distribute the signals arriving at the Mod A and Mod B inputs to all parameters that can be modulated. Dedicated modulation depth sliders set the amount of modulation applied to each parameter.

▶ Click the A or B button to show the modulation depth sliders for a Modulation Bus.



→ The modulation depth sliders are shown for all parameters that can be modulated.



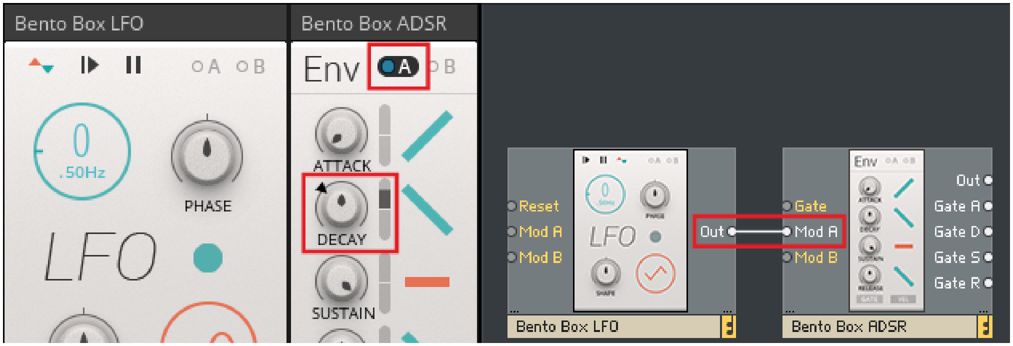
The modulation depth sliders set the amount of modulation from the currently selected Modulation Bus. All modulation depth sliders are bipolar, meaning that positive (non-inverted) or negative (inverted) modulation can be applied.

The A and B buttons include a signal indicator that displays incoming modulation signals. It lights up red for positive values and blue for negative values. If you turn up the modulation amount for a parameter, the modulation will also be displayed as a moving arrow next to the Panel control.

> If no modulation signal is present at the Mod A or Mod B input, the corresponding button is grayed out. However, you can still click the buttons and view or change modulation amounts for parameters. The settings in the Panel are independent from the connections, so you can swap modulation sources while keeping the modulation amounts for the parameters.

Example

In the following example, the ↑5.1.6, LFO (MOD) is connected to the Mod A input of the ↑5.1.5, ADSR Envelope (MOD).



Routing modulation signals in REAKTOR Blocks

- The A button on the ↑5.1.5, ADSR Envelope (MOD) is pressed. The modulation depth sliders appear for all parameters that can be modulated.
- The A signal indicator is lighting up blue, displaying a negative value of the modulation signal coming from the ↑5.1.6, LFO (MOD). Note the matching color of the output signal indicator next to the LFO label on the ↑5.1.6, LFO (MOD).

- Modulation Bus A is routed to a single parameter on the ↑5.1.5, ADSR Envelope (MOD), in this case DECAY. The modulation depth slider next to the DECAY knob is turned up, allowing the modulation signal from the ↑5.1.6, LFO (MOD) to control the decay time of the envelope.
- The arrow next to the DECAY knob shows the momentary position of the modulation relative to the knob setting.

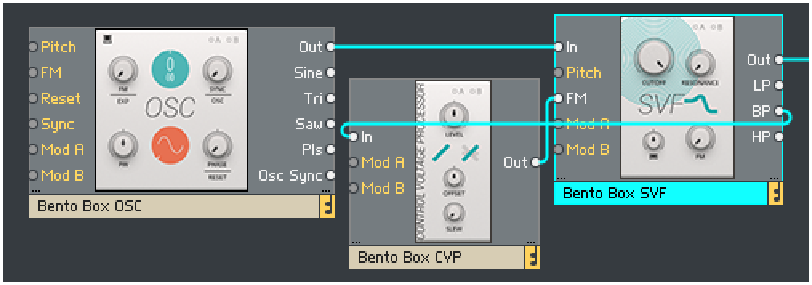
4 Connections and Signals

In order to achieve the desired level of flexibility, there is no distinction between different types of signals in REAKTOR Blocks. All connections are being made with signals within the range of -1 to +1. This allows you to connect any output to any input, without having to worry about signal type or value range.

Patching Feedback

There are also no constraints in regards to making feedback connections across any number of modules. However, if you want to make a feedback connection between an input and an output from the same Block, an additional Block needs to be patched in between.

Aside from the ↑5.1.3, Mix (MIX), which allows you to add the feedback signal to an existing input signal, the ↑5.1.8, CV Processor (PRO) is particularly well suited for this task, providing the means for further processing of the feedback signal.



Connecting the BP output of the ↑5.1.2, SVF (FLT) to its FM input

Integrating Hardware Synthesizers with CV Control

Since the connections and signals used in Blocks follow the same paradigm as analog control voltages (CV), they can be sent directly to DC-coupled converters for CV control of hardware synthesizers.

> DC-coupled audio interfaces or D/A converters pass very low frequencies and static voltages at their outputs. They can therefore be used for sending out control voltages from the computer. Most audio interfaces employ output filtering (AC-coupling) and are not suitable for this purpose. Please refer to the technical specifications of your audio interface or D/A converter to check if it is AC-coupled or DC-coupled. DC-coupled converters specifically made for sending out control voltages from the computer are available in the form of Eurorack modules made by Expert Sleepers.

► To control the pitch of your hardware synthesizer from Blocks, including automatic calibration of the external oscillator, follow the instruction in section ↑5.9.8, Pitch CV Out (INT).

► To modulate your hardware synthesizer from Blocks, connect any modulation signal to an Out Port that is routed to your DC-coupled audio interface or converter.

→ You can now patch the output of your DC-coupled audio interface or converter to a CV input on your hardware synthesizer.

> The ↑5.1.8, CV Processor (PRO) and ↑5.9.10, CV Mix (MIX) Blocks are useful for processing modulation signals before sending them to a DC-coupled audio interface or converter. They allow you to attenuate, invert, and offset signals.

► To trigger envelopes or clock sequencers on your hardware synthesizer from Blocks, connect any gate signal to an Out Port that is routed to your DC-coupled audio interface or converter.

→ You can now patch the output of your DC-coupled audio interface or converter to a gate, trigger, or clock input on your hardware synthesizer.

> Some hardware synthesizers and synthesizer modules do not respond correctly to gate signals sent from DC-coupled audio interfaces or converters. The Gates & Trigs Block employs special output processing that prevents these issues. Therefore it is recommended to feed any gate signal from your Blocks patch through the Gates & Trigs Block before sending it to your DC-coupled audio interface or converter.

Input and Output Types

Different Blocks require different types of inputs and outputs. Since all signals sent between Blocks fall into the same range, it is necessary to determine how values within that range are converted into a predictable result, depending on what type of input they have been connected to.

There are 6 different input and output types:

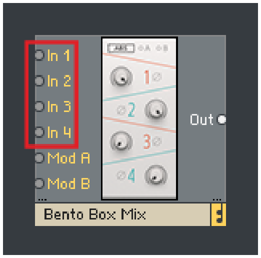
- General inputs and outputs (see section ↑4.1, General Inputs and Outputs)
    - In (input, multiple inputs are numbered)
    - Out (output, multiple outputs are numbered or labeled with their respective function)
- Modulation (see section ↑4.2, Modulation)
    - Mod A (modulation bus A, input only)
    - Mod B (modulation bus B, input only)
    - FM (frequency modulation, input only)
- Pitch (see section ↑4.3, Pitch)
- Gate (see section ↑4.4, Gate)
- Reset (see section ↑4.5, Reset)
- Sync (see section ↑4.7, Sync)
- Pluck (see section ↑4.8, Pluck)

4.1 General Inputs and Outputs

The In and Out ports can be used for all kinds of signals, depending on the Blocks' functionality and application. All inputs and outputs operate at audio rate and in the range of -1 to +1.

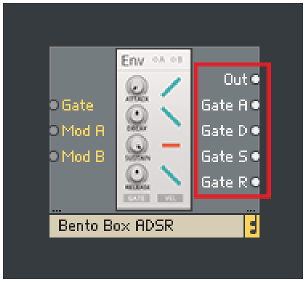
The general input and output on the ↑5.6.2, Comb Filter (FLT)

If a Block has multiple inputs, for example the ↑5.1.3, Mix (MIX), the inputs are numbered: In 1, In 2, In 3, and so on.



The inputs on the ↑5.1.3, Mix (MIX)

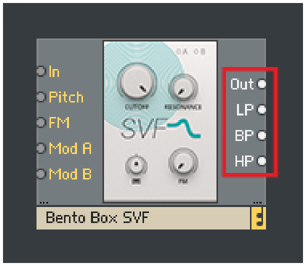
In some cases, inputs or outputs are labeled depending on their specific function. For example, the ↑5.1.5, ADSR Envelope (MOD) has four Gate outputs that send a gate high signal as long as the corresponding envelope stage is active:



The Gate outputs on the ↑5.1.5, ADSR Envelope (MOD)

- Gate A (gate high during attack)
- Gate D (gate high during decay)
- Gate S (gate high during sustain)
- Gate R (gate high during release)

The same applies to oscillators with multiple waveform outputs or filters with separate outputs for each filter mode, for example the the ↑5.1.2, SVF (FLT):

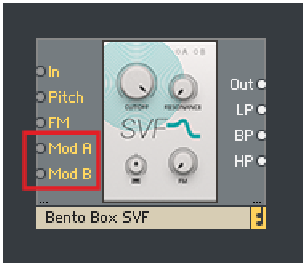


The filter mode outputs on the ↑5.1.2, SVF (FLT)

- Out (main output with switchable filter mode)
- LP Out (low pass mode output)
- BP Out (band pass mode output)
- HP Out (high pass mode output)

4.2 Modulation

The Mod A and Mod B inputs are general modulation inputs. They allow for modulation in the full range of -1 to +1 and at any rate. Signals arriving at these inputs can be used to modulate various different parameters on each Block (see ↑3.3, Modulation Routing for more information).



The Mod A and Mod B inputs on the ↑5.1.2, SVF (FLT)

Oscillators and filters often have an additional FM input. These Frequency Modulation inputs can be used to add modulation to the pitch of an oscillator, or the cutoff frequency of a filter. For example, it can be used to modulate the cutoff frequency of a filter with an envelope, or to set up multiple oscillators for FM synthesis. The corresponding Panel control sets the depth of modulation.

The FM input on the ↑5.1.2, SVF (FLT)

4.3 Pitch

Pitch inputs, which are used to control the frequency of oscillators and filters, scale an input value between 0 and 1 up to a MIDI note value between 0 and 120. A value of 0 equals MIDI note 0, a value of 0.5 equals MIDI note 60, and a value of 1 equals MIDI note 120.

However, this does not mean that you have to use quantized signals to control your oscillators. If you connect an envelope to the Pitch input of an oscillator, the envelope output of 0 to 1 results in a smooth sweep ranging from MIDI note 0 to MIDI note 120 (given that no offset has been dialed in using the frequency controls of the oscillator).

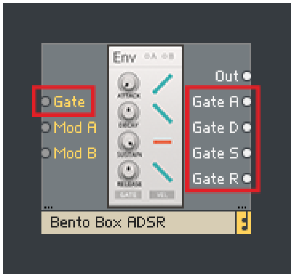
Using this range allows for convenient scaling and offsetting of pitch signals, since the range from 0 to 1 covers exactly 10 octaves. Similar to the 1 V/Oct-standard as found on contemporary modular synthesizers, you are dealing with a value of 0.1/Oct in REAKTOR Blocks. For instance, if you want to transpose a pitch signal two octaves up, you have to add an offset of 0.2 (or 20%) to the signal.

Pitch inputs also accept signals lower than -1 and higher than +1, so pitches above and below the specified range can be achieved, too.

The Pitch input on the ↑5.1.7, Oscillator (OSC)

4.4 Gate

Gate inputs are used to control a variety of functions in different Blocks, from triggering envelopes or advancing sequencer steps to resetting LFOs. They operate in the range of -1 to +1, so any signal can be connected. Gate outputs usually send out a pulse wave signal in the range of 0 to 1 (except for Gate outputs that pass on velocity information, see below).



The Gate input and Gate outputs on the ↑5.1.5, ADSR Envelope (MOD)

Gate inputs look for a positive zero crossing of the input signal. As soon as the input signal rises above 0, it is considered a gate-on message, and once the signal drops to 0 or below, it is considered a gate-off message.

For example, you can connect the output of an LFO to the Gate input of an envelope. The LFO has an output of -/+0.5. When its output goes above 0, this is considered a gate-on message and the envelope is triggered and sustained. When the LFO returns to 0 or less, this is considered a gate-off message and the envelope is released.

The same applies to any Block with a Gate input: Connect the LFO to the Gate input of a sequencer, and every time the LFO travels into the positive part of its cycle, the sequencer will advance one step. Since Gate inputs operate at audio rate like any connection in REAKTOR Blocks, you can also replace the LFO with an audio oscillator and run the sequencer at audio rate, creating a new interesting sound source.

Velocity

Velocity (for example on envelopes with velocity sensitivity) is derived from how far above 0 the initial increase is. If the input leaps from 0 to 1, an envelope will be triggered at maximum velocity. A jump from 0 to 0.5 would trigger the envelope at half velocity, and so on. Consequently, if you use a triangle LFO to trigger an envelope with velocity sensitivity, the output level of the envelope will be very low: The LFO cycles above 0, but the initial increase is very small.

Some Gate outputs (for example on the ↑5.9.7, Note In (INT) and the ↑5.1.11, 8 Steps (SEQ)) include velocity information. In this case, the gate signal's amplitude varies depending on the velocity of the played note or the corresponding sequencer step.

4.5 Reset

Reset inputs function in a similar manner as Gate inputs, looking for a positive zero crossing of the incoming signal. As soon as the input signal rises above 0, it is considered a reset gate. However, unlike Gate inputs, negative zero crossings have no effect.

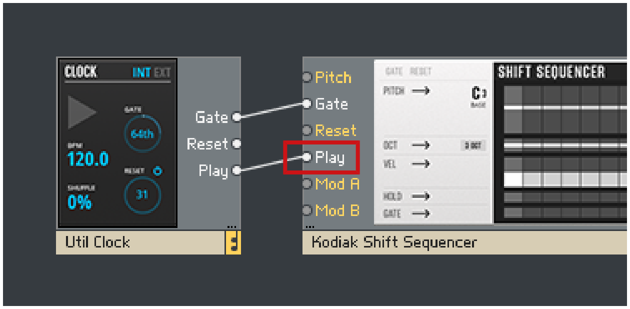
The Reset input on the ↑5.1.11, 8 Steps (SEQ)

Reset inputs are commonly found on sequencers (or other counting devices), for example the ↑5.1.11, 8 Steps (SEQ). Every time a positive value arrives, the sequencer is reset to the first step. On the ↑5.1.11, 8 Steps (SEQ)' panel, you will notice that the RESET button lights up when a reset signal is received.

You can use any signal to reset your sequencers, however the Reset output on the ↑5.9.2, Clock (INT) is specifically designed for this task. It sends out a reset signal every time it is started, and repeats it at an interval set by the RESET control on the panel. By distributing the reset signal from the ↑5.9.2, Clock (INT) across your patch, you can ensure that all sequencers remain synchronous.

4.6 Play

Play inputs function in a similar manner as Gate inputs, looking for a positive zero crossing of the incoming signal. As soon as the input signal rises above 0, it is considered a gate-on message, and once the signal drops to 0 or below, it is considered a gate-off message.



The Play input on the Kodiak Shift Sequencer

Play inputs are found on sequencers, for example the ↑5.5.5, Shift Sequencer. As long as the incoming signal remains positive after a gate-on message, the sequencer's playback is enabled, allowing it to advance one step every time a gate-on message is received at the Gate input. When the signal drops to 0 or below, the sequencer's playback is disabled, stopping the sequence at its current position and ignoring gate-on messages received at the Gate input. Additionally, all active sequencer events are reset.

You can use any signal to control sequencer playback, however the Play output on the ↑5.9.2, Clock (INT) is specifically designed for this task. It sends out a constant gate signal when its clock is active (Play button enabled). By connecting it to a sequencer’s Play input, you can prevent hanging notes caused by active sequencer events, for example HOLD events on the Kodiak Shift Sequencer. The Play input can also be used to control playback from a keyboard via the ↑5.9.7, Note In (INT)'s Gate output, or for interrupting the playback periodically with an LFO.

> If no connection is made to the Play input, playback is constantly enabled.

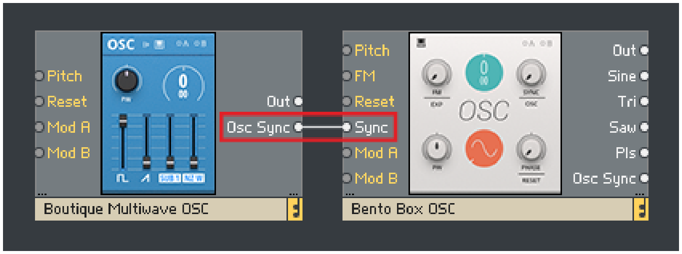
4.7 Sync

Like Gate and Reset inputs, Sync inputs look for a positive zero crossing of the incoming signal. As soon as the input signal rises above 0, a sync event is triggered. Negative zero crossings have no effect.

The Sync input on the ↑5.1.7, Oscillator (OSC)

Sync inputs can be found on oscillators. They are used to synchronize the phase of the signal generated by the oscillator to an external source, for example another oscillator. This is useful for adding stability to complex FM patches with multiple operators, patching classic oscillator sync sounds, or creating interesting new waveforms by mixing signals from multiple synced oscillators.

The Bento Box OSC's Sync input has the option to accept a special synchronization signal from the OSC Sync outputs found on the ↑5.1.7, Oscillator (OSC) and the ↑5.2.2, Multiwave OSC (OSC). This allows for oscillator synchronization with the best possible audio quality.



The ↑5.2.2, Multiwave OSC (OSC) Osc Sync output, connected to the ↑5.1.7, Oscillator (OSC)'s Sync input

4.8 Pluck

Pluck inputs are found on Blocks that employ an optocoupler to smooth a parameter's response to external control, for example the ↑5.10.1, LPG (FLT). Any signal within the range in the range of -1 to +1 can be connected, however for best results it is recommended to use signals with sharp rising edges, like gates, clocks, pulse and saw wave signals, sample and hold waveforms, or sequences.

The Pluck input on the ↑5.10.1, LPG (FLT)

The Pluck input processes any sharp-edged signal in a way that makes it suitable for briefly exciting the optocoupler when a sharp rising edge is received. This applies a natural sounding, percussive envelope to the parameter involving the optocoupler, for example LEVEL on the ↑5.10.1, LPG (FLT). The amount of modulation applied depends on the strength of the rising edge.

5 Blocks Reference

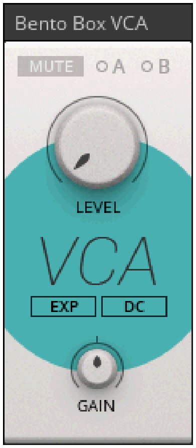
In this chapter you can explore all the Blocks that come with REAKTOR 6 and make yourself familiar with their general functionality as well as their controls, inputs, and outputs.

This information is also available as Info Hints in the REAKTOR 6 application, so you can learn about the Blocks while patching. For more information, see section ↑1.1.1, Info Hints.

5.1 Bento Box

Bento Box Blocks are an all-purpose set of modules that include the core components of a modular synth setup. Each offers extra twists that open the modules to more advanced applications.

5.1.1 VCA (AMP)



The Bento Box VCA

The Bento Box VCA is essentially a simple volume control. As one of the basic building blocks in modular synthesis, it is used whenever the level of a signal needs to be controlled dynamically. For example, it is commonly patched as the final stage in a synthesizer patch, modulated by an envelope to shape the amplitude of the sound over time. If used for audio signals, the AC / DC switch should be set to AC, enabling the DC offset filter. If used for modulation signals, it needs to be set to DC, disabling the DC offset filter. Further controls include a switch to select either an exponential (EXP) or a linear (LIN) response to modulation signals, as well as an additional GAIN control that can be used to attenuate or amplify the signal independently of the main level control.

Controls

Name	Description
MUTE	Allows you to completely silence the output of the VCA.
LEVEL	Controls the amount of attenuation applied to the input signal before it is passed on to the output. At maximum setting the signal remains unchanged, while at minimum setting the signal is completely attenuated.
LIN / EXP	Selects the behavior of the LEVEL control, and any modulation applied to it. In LIN mode, the amplitude is attenuated in a linear fashion. If the level is reduced half way, the signal amplitude is halved. In EXP mode, the amplitude is attenuated in an exponential fashion. If the level is reduced half way, the signal amplitude is quartered. In practical terms, EXP mode results in a much sharper and snappier response, which is useful for creating drum sounds. Typically, LIN mode is used for controlling modulation signals, however it is also useful for audio signals, for example when the VCA is modulated by an exponentially shaped envelope.
AC / DC	Allows you to select whether the VCA is AC or DC coupled. In DC mode, any type of signal is passed through, even if DC bias is present. This is especially useful when using the VCA to control modulation signals. In AC mode, the VCA eliminates DC bias in the signal, meaning that any signal with DC bias will be resolved back to 0. It is good practice to use AC mode with audio signals to avoid potential issues with DC bias in other audio equipment.
GAIN	Allows you to increase or decrease the input signal's volume by up to 12 dB. Excessive gain levels may result in signal clipping. If the signal is clipped, a clipping indicator appears on the panel.

Inputs

Name	Description
In	Bento Box VCA signal input.
Mod A	Modulation bus A input.
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Bento Box VCA signal output.

5.1.2 SVF (FLT)

The Bento Box SVF

The SVF is based on the state variable filter design, which has a long history in analog synthesis. Low pass, high pass and band pass filter modes are available straight from the filter core, making the design a popular choice for multi-mode filters. The Bento Box SVF is set up for clean sound and stable operation across the whole CUTOFF frequency range, with a controlled RESONANCE behavior. Therefore, it is particularly useful if additional coloration of the sound is undesirable. It responds very well to modulation at audio rate, allowing you to explore more extreme sounds by using oscillators or audio feedback to modulate its parameters. The main output's (Out port) filter mode can be selected by clicking on the central filter slope icon. All filter modes are also available simultaneously via the LP, HP and BP ports.

Controls

Name	Description
CUTOFF	Sets the cutoff frequency of the filter. Its effect on the sound depends on which filter mode is selected. In low pass mode, frequencies above the cutoff frequency are attenuated. In high pass mode, frequencies below the cutoff frequency are attenuated. In band pass mode, only frequencies around the cutoff frequency are passed through, while all frequencies outside of this range are attenuated.
RESONANCE	Controls the amplitude of the signal at the CUTOFF frequency. As resonance increases, the harmonics around the cutoff frequency appear louder and more pronounced than in the original signal. At very high settings, the filter goes into self-oscillation, producing a sine wave on its own. The frequency of this sine wave is set by the CUTOFF control.
Filter Mode Selector	Selects the filter mode for the main output (Out): low pass, band pass, or high pass.
FM	Controls the amplitude of the signal arriving at the FM input. When the knob is at its lowest setting, the FM input signal is fully attenuated and the filter's frequency is not being modulated. As the knob is turned clockwise, the amplitude of the signal present at the FM input increases, resulting in a greater amount of frequency modulation.
Key Tracking	Allows you to control the cutoff frequency of the filter via the Pitch input. This means that you can play the frequency of the filter, just as you can play the frequency of an oscillator. The Key Tracking knob is bipolar, allowing for both positive and negative key tracking. When turned fully clockwise, the filter frequency follows the Pitch input accurately. When turned fully counter-clockwise, the filter frequency follows the Pitch input inversely.

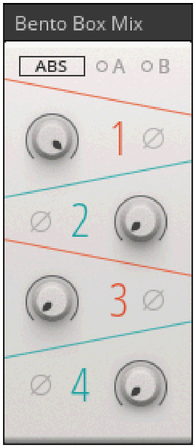
Inputs

Name	Description
In	SVF signal input.
Pitch	Input for filter frequency pitch tracking, amount is set with the Key Tracking control.
FM	Modulation input for filter frequency, amount is set with the FM control.
Mod A	Modulation bus A input.
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Main SVF signal output.
LP	Low pass mode signal output.
BP	Band pass mode signal output.
HP	High pass mode signal output.

5.1.3 Mix (MIX)



The Bento Box Mix

The Bento Box Mix is a straight-forward mixer that can be used for any basic mixing task in a patch, for example mixing multiple oscillators or creating feedback loops. Each channel features a level control and a phase inversion switch. You can mute any channel by clicking on the corresponding channel number. The mixer offers two different modes of operation: In absolute mode (ABS), the signals of all channels are simply added, driving the mixer into saturation if the maximum output level is reached. In relative mode (REL), the output level is attenuated relative to the level of each individual channel in order to avoid clipping of signals.

Controls

Name	Description
Level 1 … 4	Controls the level of this channel.
Mute 1 … 4	Mutes this channel.

Name	Description
Invert 1 … 4	Inverts the signal polarity for this channel.
ABS / REL	Selects one of two different summing behaviors. In ABS (absolute) mode, the four channels are mixed together in a traditional fashion before being passed through a saturator. If the combined level exceeds the maximum threshold, saturation occurs. In this case, a clipping indicator appears on the panel. In REL (relative) mode, the mixer ensures that the combined level does not exceed the maximum threshold. As the individual levels are increased, the combined level is decreased, ensuring an optimal output level without changing the levels of the individual channels.

Inputs

Name	Description
In 1 … 4	Channel 1 … 4 signal input
Mod A	Modulation bus A input.
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Bento Box Mix signal output.

5.1.4 XFade (MIX)

The Bento Box XFade

Bento Box Xfade allows you to create a blend between two input signals with a single FADE control. For example, it can be used to smoothly morph from one sound to the other, to combine waveform outputs from oscillators for additional wave shaping, or as a simple dry / wet control when routing effect signals. The Curve control changes the FADE response from linear to constant-power, allowing you to compensate for volume drops at the center position.

Controls

Name	Description
FADE	Blends between the signal received at In 1 (turn crossfader left to increase In 1 signal level) and the signal received at In 2 (turn crossfader right to increase In 2 signal level).
Curve	Lets you adjust the FADE response from linear to constant-power.
Gain 1 … 2	Adjust the input level for In 1 … 2, from -12 dB to +12 dB.
Invert 1 … 2	Inverts the signal polarity for the signal received at In 1 … 2.

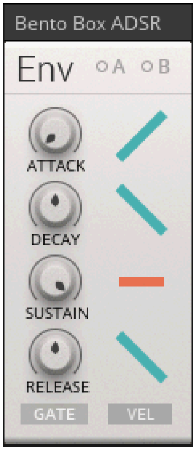
Inputs

Name	Description
In 1	Left Xfade signal input.
In 2	Right Xfade signal input.
Mod A	Modulation bus A input.
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	XFade signal output.

5.1.5 ADSR Envelope (MOD)



The Bento Box Envelope

The Bento Box Env is an envelope generator with four stages: ATTACK, DECAY, SUSTAIN, and RELEASE. The ATTACK, DECAY and RELEASE stages can be individually switched to linear, logarithmic or exponential shapes by clicking on the icons on the right side of the module. This allows you to customize the envelope for specific needs. Each stage has an additional gate output that goes high when the corresponding stage is active. You can use these gate signals to trigger other events in a patch.

Controls

Name	Description
GATE	Lights up when a gate is received via the Gate input, and can be used to manually trigger the envelope.
VEL	Activates velocity sensitivity when using a gate signal that includes velocity information, for example from the Bento Box 8 Steps sequencer.
ATTACK	Sets the attack stage duration.
DECAY	Sets the decay stage duration.
SUSTAIN	Sets the sustain stage level.

Name	Description
RELEASE	Sets the release stage duration.
ATTACK Mode	Selects either a linear, exponential, or logarithmic shape for the ATTACK stage.
DECAY Mode	Selects either a linear, exponential, or logarithmic shape for the DECAY stage.
RELEASE Mode	Selects either a linear, exponential, or logarithmic shape for the RELEASE stage.

Inputs

Name	Description
Gate	A positive zero crossing at this input triggers the envelope.
Mod A	Modulation bus A input.
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Main Bento Box Env signal output. Range [0, 1].
Gate A	ATTACK stage gate output. Range [0 .. 1], [0, 1] if VEL is active.
Gate D	DECAY stage gate output. Range [0 .. 1], [0, 1] if VEL is active.
Gate S	SUSTAIN stage gate output. Range [0 .. 1], [0, 1] if VEL is active.
Gate R	RELEASE stage gate output. Range [0 .. 1], [0, 1] if VEL is active.

5.1.6 LFO (MOD)

The Bento Box LFO

The Bento Box LFO is a fully featured low frequency oscillator for modulation purposes. Its straight-forward interface allows you to quickly find the right settings for any basic modulation task, but it also offers advanced features that can be creatively exploited to create very complex modulation signals, especially when modulated by another LFO. Six basic waveforms can be bent into unusual shapes with the SHAPE control. The additional options at the top allow you to switch between bipolar and unipolar operation, manually reset the waveform, and hold the current output value. The Hold parameter can be modulated, which makes it possible to stop and hold the LFO with a gate signal, or slice the waveform up in interesting ways by using another LFO.

Controls

Name	Description
Frequency	Adjusts the base frequency of the LFO.
Wave	Selects the type of waveform produced by the LFO. Choose between sine, triangle, saw, ramp, pulse and random. Each waveform can be further shaped by the SHAPE control.

Name	Description
SHAPE	Allows for different kinds of additional wave shaping, depending on which waveform is selected. Sine: CCW = Hyper exponential wave shaping, CW = Wave folding Triangle: CCW = Threshold wave shaping, CW = Wave folding Saw: CCW = Exponential wave shaping, CW = Logarithmic wave shaping Ramp: CCW = Exponential wave shaping, CW = Logarithmic wave shaping Pulse: CCW = Longer negative portion of pulse, CW = Longer positive portion of pulse Random: CCW = Exponential smoothing, CW = Linear smoothing
PHASE	Allows you determine at which point in its cycle the LFO restarts when receiving a positive zero crossing at the Reset input.
Bipolar / Unipolar	Sets whether the LFO outputs a bipolar signal (+/- 0.5) or a unipolar signal (0/1).
Reset	Clicking this button restarts the LFO from the position in its cycle as determined by the PHASE control. Additionally, the button indicates when the LFO is restarted when receiving a positive zero crossing at the Reset input.
Hold	The hold button allows you to temporarily pause the LFO and hold its current value. Once the button is released, the LFO continues its cycle.

Inputs

Name	Description
Reset	A positive zero crossing at this input causes the LFO to restart.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Bento Box LFO signal output. Range [-0.5, 0.5] in bipolar mode, [0, 1] in unipolar mode.

5.1.7 Oscillator (OSC)

The Bento Box Oscillator

The Bento Box Oscillator is a versatile oscillator that is suitable for a wide range of different synthesis methods. Its features make it particularly useful for FM (frequency modulation) synthesis. The linear thru-zero FM mode (LIN TZ) allows for very deep and stable FM sounds. The Bento Box Oscillator 's Sync input can be freely adjusted from soft sync to hard sync, with the option to accept dedicated OSC Sync signals from other Blocks oscillators (e.g. ↑5.2.2, Multi-wave OSC (OSC)) for best audio quality. Syncing oscillators is useful for a number of different applications: adding stability to complex FM patches with multiple operators, patching classic oscillator sync sounds, and creating interesting new waveforms by mixing signals from multiple synced oscillators.

Controls

Name	Description
Key Tracking	When key tracking is enabled, you can control the frequency of the oscillator via the Pitch input. Additional tuning in semitones and cents is available via the Coarse and Fine controls. When key Tracking is disabled, the oscillator runs at a fixed rate, which can be adjusted in Hz via the Frequency control.
FM	Controls the amplitude of the signal arriving at the FM input, also known as the FM index. When the knob is at its lowest setting, the FM input signal is fully attenuated and the oscillator's frequency is not being modulated. As the knob is turned clockwise, the amplitude of the signal present at the FM input increases, resulting in a greater amount of frequency modulation.
EXP / LIN / LIN TZ	This switch toggles between the three available types of frequency modulation: exponential (EXP), linear (LIN) and linear through-zero (LIN TZ).
PW	Adjusts the width of the pulse waveform.
Frequency	Adjusts the base frequency of the oscillator.
Coarse	Coarse tuning control in semitones.
Fine	Fine tuning control in cents.
Wave	Morphs smoothly between the 4 classic waveforms: sine, triangle, saw and pulse. The result of this morphing is sent from the oscillator's main output. The same 4 waveforms are also available separately via their dedicated outputs.
SYNC	Adjusts the strength of oscillator sync by a signal arriving at the Sync input. When SYNC is at its lowest setting, no syncing will occur. By increasing the SYNC level, different flavors of sync can be dialed in, from soft sync to hard sync. A maximum setting results in classic hard sync sounds.
OSC	Should be enabled when the Sync input is fed with a dedicated OSC Sync signal from another Blocks oscillator (e.g.↑5.2.2, Multiwave OSC (OSC)). For all other audio sources this option needs to be disabled.
PHASE	Allows you determine at which point in its cycle the oscillator restarts when receiving a positive zero crossing at the Reset input. This control only works when RESET is enabled.
RESET	When enabled, a positive zero crossing in the signal arriving at the Reset input causes the oscillator to restart. The restart position can be adjusted with the PHASE control.

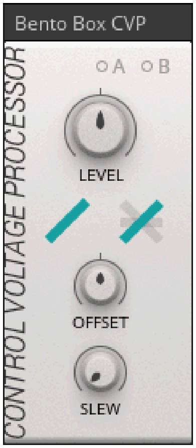
Inputs

Name	Description
Pitch	Input for controlling oscillator pitch. An increase of 0.1 equals a 1 octave increase in pitch (ideal for quantized signals from Pitch outputs).
FM	Modulation input for oscillator frequency, amount is set with the FM control.
Reset	A positive zero crossing at this input causes the oscillator to restart.
Sync	Input for oscillator synchronization.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Main Bento Box signal output.
Sine	Sine wave output.
Tri	Triangle wave output.
Saw	Saw wave output.
Pulse	Pulse wave output.
OSC Sync	Oscillator synchronization signal output.

5.1.8 CV Processor (PRO)



The Bento Box CV Processor

The CVP, or Control Voltage Processor, combines several functions for processing modulation signals. Its three main controls allow you to attenuate and invert (LEVEL), offset (OFFSET), and smoothen the input signal (SLEW). The additional controls in the middle let you switch between a linear and an exponential mode for the LEVEL control, as well as choose from a number of clipping and rectification modes that restrict the signal to either positive or negative values. It can be used to condition modulation signals for specific purposes, or to create additional but related versions of existing modulation signals in a patch. It also offers interesting possibilities for wave shaping when used with audio rate signals (clipping and rectification, ring modulation).

Controls

Name	Description
LEVEL	Controls the amount of attenuation applied to the signal. Unlike the LEVEL control on the VCA, this parameter is bipolar. When the control is at its center position, the signal is completely attenuated. Turning the control clockwise increases the signal amplitude in a positive fashion. Turning the control counter-clockwise increases the signal amplitude in a negative fashion, effectively inverting its polarity.
OFFSET	This parameter allows you to add a constant value to the signal, also known as DC bias. The amplitude of the signal remains unaffected, but its average value is increased or decreased accordingly.
SLEW	Lets you smoothen the signal by means of slew rate limiting. Abrupt changes in the signal are shaped into smooth transitions. The greater the amount of slew rate limiting, the longer these transitions take. For example, this can be used for wave shaping, such as turning a square wave into a triangle wave, or for creating a glide effect in a note sequence.
Linear / Exponential	Selects the behavior for the LEVEL control, and any modulation applied to it. Linear means that the amplitude is attenuated in a linear fashion. Exponential means that the amplitude is attenuated in an exponential fashion.
Rectification / Clipping	Allows you to select between various types of clipping and rectification. Normal: No clipping or rectification is applied. Clip low: Signal is clipped at zero. Values lower than zero are not passed through. Rectify low: Signal is rectified at zero. Values lower than zero are inverted. Clip high: Signal is clipped at zero. Values greater than zero are not passed through. Rectify high: Signal is rectified at zero. Values greater than zero are inverted.

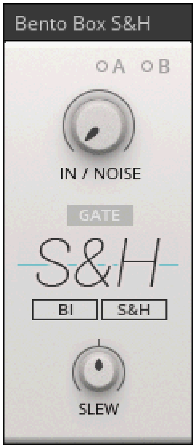
Inputs

Name	Description
In	CVP signal input.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	CVP signal output.

5.1.9 Sample & Hold (PRO)



The Bento Box Sample & Hold

The Bento Box S&H provides either a sample and hold or a track and hold function. When a gate is received in S&H mode, the current value of the input signal is held until the next gate hits. This way, any signal can be converted into a stepped sequence of values that is rhythmically locked to incoming gates. When a gate is received in T&H mode, the current value is held for as long as the gate is active. When no gate is active, the input signal is passed through to the output. The top control allows you to blend between the input and an internal noise generator, effectively introducing random values to the signal. When turned fully clockwise, the S&H produces a random sequence of values. The SLEW control lets you smoothen the output sequence. Modulating both of these parameters can lead to interesting results.

Controls

Name	Description
IN / NOISE	Cross-fades between the input signal and an internal noise generator. When set fully counter-clockwise, only the input signal is used. Turning the control clockwise introduces random values to the signal. When set fully clockwise, only the internal noise generator is used, resulting in a completely random signal.
SLEW	Lets you smoothen the signal by means of slew rate limiting. Abrupt changes in the signal are shaped into smooth transitions. The greater the amount of slew rate limiting, the longer these transitions take. Turning SLEW counter-clockwise creates exponential transitions, while turning SLEW clockwise creates linear transitions.
GATE	Lights up when a gate is received via the Gate input, and can be used to manually trigger a new sample event
BI / UNI	Allows you to determine whether the output values are bipolar or unipolar. This affects both the internal noise generator as well as the input signal, which is fully rectified in UNI mode.
S&H / T&H	Toggles between sample and hold (S&H) and track and hold (T&H) mode. In S&H mode, a positive gate event at the Gate input causes a new value to be sampled, which is held until another positive gate event occurs. In T&H mode, a positive gate event causes a new value to be sampled, however this value is only held for as long as the gate signal remains high. Once the gate signal returns to zero, the input signal is passed through unaffected.

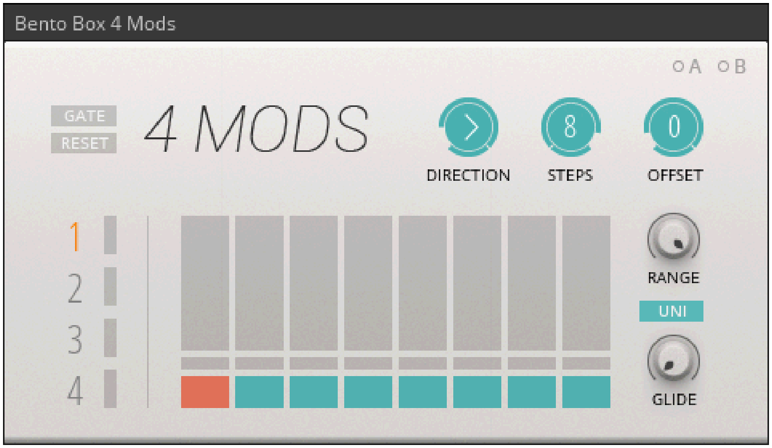
Inputs

Name	Description
In	Bento Box S&H signal input.
Gate	A positive zero crossing at this input causes a new sample event to occur.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Out	Bento Box S&H signal output. Range [-1, 1] in bipolar mode, [0, 1] in unipolar mode.

5.1.10 4 Mods (SEQ)



The Bento Box 4 Mods

Complementing the ↑5.1.11, 8 Steps (SEQ) sequencer, Bento Box 4 Mods provides four sequences for modulation purposes. Each sequence consists of a set of 8 freely adjustable values, with selectable glide for smooth transitions between steps. In addition to using 4 Mods as a modulation source, its outputs can also be sent to the ↑5.3.1, Quantizer (PRO) for creating note sequences. All global parameters (DIRECTION, STEPS, OFFSET) can be modulated, which makes 4 Mods an incredibly powerful tool for creating complex and evolving sequences.

Controls

Name	Description
GATE	Lights up when a gate is received via the Gate input, and can be used to manually advance the sequencer one step.
RESET	Clicking this button resets the sequencer to the first step. Additionally, the button indicates when the internal counter is reset when receiving a positive zero crossing at the Reset input.

Name	Description
DIRECTION	Allows you to select between five different playback modes. Forwards: The sequencer advances from left to right. Backwards: The sequencer advances from right to left. Pendulum: The sequencer advances forwards until it reaches the final step, at which point it immediately changes direction, advancing backwards until the first step is reached, and so on. Ping-Pong: The sequencer advances in the same way as in Pendulum mode, however the first and the last step are repeated when changing direction. Random: The sequencer advances in a random fashion. Every time a gate is received, the sequencer randomly chooses one of the eight steps to advance to.
STEPS	Allows you to set the length of the sequence in number of steps.
OFFSET	Allows you to shift the playback position, including the first step of the sequence (reset position). This is especially useful when the sequence length is shortened by using the STEPS control. If STEPS is set to 1, the OFFSET parameter provides direct control over the playback position.
1 … 4	Selects the sequence for editing.
Level 1 … 4	Displays the current value of the sequence. By clicking on it, the sequence can be muted, indicated by the greyed out Level indicator.
Value 1 … 8	Allows you to set the value for this step. The output is latched, meaning that the pitch value is only sent to the output if the step is enabled.
Glide 1 … 8	Allows you to turn glide on or off for this step. When Glide is on, the sequencer smoothly transitions between the previous value and the new value. The duration of that transition is set by the GLIDE control.
Step Enable 1 … 8	Allows you to enable or disable the step. When disabled, this step's value is ignored and the previous value is held.
GLIDE	Allows you to set the glide time between notes. This only has an effect when Glide is enabled for the current step.
UNI	Enables unipolar mode for the sequencer (values are set in a range of [0, 1]). When disabled, the sequencer operates in bipolar mode (values are set in a range of [-0.5, 0.5]).
RANGE	Scales the output value range of the sequencer.

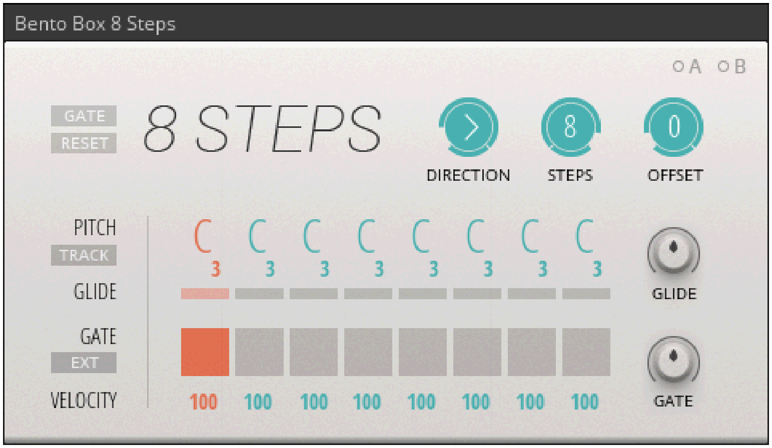
Inputs

Name	Description
Gate	A positive zero crossing at this input causes each sequence to advance one step.
Reset	A positive zero crossing at this input causes each sequence to reset.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Out 1 … 4	Sequence output. Range [0, 1] when UNI is enabled. Range [-0.5, 0.5] when UNI is disabled.

5.1.11 8 Steps (SEQ)



The Bento Box 8 Steps

8 Steps is a fully-featured step sequencer for controlling rhythm and pitch in a patch. Each of its eight steps has settings for PITCH, GLIDE, GATE, and VELOCITY. In addition to the Pitch and Gate outputs, it features a Vel output that provides the velocity values as a separate modulation signal. The DIRECTION control allows you change the playback behavior of the sequencer, from playback in different directions to random playback. Furthermore, the STEPS and OFFSET controls let you define the length and position of the sequence, making it possible to create many variations of the same sequence by only changing two parameters. All global parameters can be modulated, which makes the 8 Steps an incredibly powerful tool for creating complex and evolving sequences.

Controls

Name	Description
PITCH 1 … 8	Allows you to set the pitch value for this step. The Pitch output is latched, meaning that the pitch value is only sent to the output if GATE and / or GLIDE are turned on for this step.
GLIDE 1 … 8	Allows you to turn glide on or off for this step. When GLIDE is on, the sequencer smoothly transitions between the previous pitch and the new pitch. The duration of that transition is set by the GLIDE Time control.
GATE 1 … 8	Allows you to turn the gate on or off for this step. When GATE is on, a gate is sent from the Gate output whenever the step is selected. The duration of the gate depends on the GATE Time control, as well as the GATE EXT switch.
VELOCITY 1 … 8	Allow you to set the strength of the gate for this step. This is useful for Blocks such as the Bento Box Env and the MONARK Env, which can be configured to respond to gates at varying strength. Additionally, velocity values are also sent from the Vel output, and can be used as an additional modulation signal in your patch. Similar to the Pitch output, the Vel output is latched, meaning that the pitch value is only sent to the output if GATE is turned on for this step. Otherwise, the Vel output value remains unchanged until the next positive gate event occurs.
GATE	Lights up when a gate is received via the Gate input, and can be used to manually advance the sequencer one step.
RESET	Clicking this button resets the sequencer to the first step. Additionally, the button indicates when the internal counter is reset when receiving a positive zero crossing at the Reset input.

Name	Description
DIRECTION	Allows you to select between six different playback modes. Forwards: The sequencer advances from left to right. Backwards: The sequencer advances from right to left. Pendulum: The sequencer advances forwards until it reaches the final step, at which point it immediately changes direction, advancing backwards until the first step is reached, and so on. Ping-Pong: The sequencer advances in the same way as in Pendulum mode, however the first and the last step are repeated when changing direction. Brownian: The sequencer advances in a semi-random fashion. Every time a gate is received, the sequencer makes a coin flip decision whether to go forwards or backwards. Random: The sequencer advances in a random fashion. Every time a gate is received, the sequencer randomly chooses one of the eight steps to advance to.
STEPS	Allows you to set the length of the sequence in number of steps.
OFFSET	Allows you to shift the playback position, including the first step of the sequence (reset position). This is especially useful when the sequence length is shortened by using the STEPS control. If STEPS is set to 1, the OFFSET parameter provides direct control over the playback position.
TRACK	Enables sequencer pitch tracking. This means that the values sent from the Pitch output are transposed using signals arriving at the Pitch input. The transposition amount is based on an initial value of 0.5 (middle C). Values less than 0.5 transpose the sequence down, while values greater than 0.5 transpose the sequence up.
GATE EXT	Toggles between internal and external gate modes. In internal gate mode, the sequencer creates its own gate signal, the length of which is set by the GATE Time parameter. The GATE Time is a percentage of the time measured between consecutive gates arriving at the Gate input. In external mode, the sequencer instead passes through the gates arriving at the Gate input, meaning that gates sent from the sequencer's Gate output have the same duration as gates arriving at the Gate input.

Name	Description
GATE Time	Allows you to control the duration of gates sent from the sequencer's Gate output in internal gate mode. The range of this control is determined by the interval between gates arriving at the Gate input. When the parameter is set fully clockwise, the output gate length is 100% of the time measured between consecutive gates arriving at the Gate input. When the parameter is set fully counter-clockwise, output gate length is 1% of the measured time.
GLIDE Time	Allows you to set the glide time between notes. This only has an effect when GLIDE is enabled for the current step.

Inputs

Name	Description
Pitch	Input for transposing the pitch output.
Gate	A positive zero crossing at this input causes each sequence to advance one step.
Reset	A positive zero crossing at this input causes each sequence to reset.
Mod A	Modulation bus A input
Mod B	Modulation bus B input.

Outputs

Name	Description
Pitch	Sequencer pitch output. Range [0, 1].
Gate	Sequencer gate output. Carries velocity information by varying gate strength. Range [0, 1].
Vel	Sequencer velocity output. Range [0, 1].

5.2 Boutique

Boutique Blocks take inspiration from the great synths of the past, bringing the best of the rich history of synthesis to Blocks.

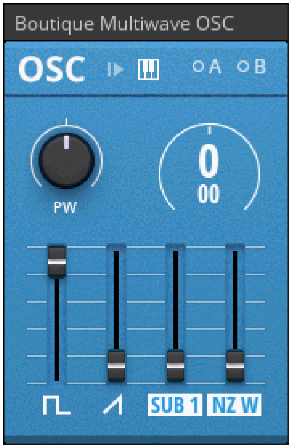
5.2.1 Dual SKF (FLT)

The Boutique Dual SKF

The SKF is based on the Sallen-Key filter topology, as used in a classic semi-modular monophonic synthesizer from the late seventies. It features a 6 dB/Oct high pass filter and a 12 dB/Oct low pass filter connected in series. By combining the two filters, a variety of different filter responses can be created. This filter strongly colors the sound and features a strong resonance. It is suitable for slightly distorted sounds and electronic percussion when the filters are set to self-oscillation at very high resonance settings.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.2.2 Multiwave OSC (OSC)



The Boutique Multiwave OSC

Adapting the oscillator section of a synth classic renowned for its bass sounds, the Multiwave OSC offers four waveforms that can be mixed together by using the faders on the panel: Pulse, Saw, Sub (three different modes), and Noise (white or pink noise). This allows you to create interesting waveform combinations. Additionally, the pulse-width of the Pulse waveform can be modulated to add animation to the sound. The Multiwave OSC is particularly useful for subtractive synthesizer patches where its output is sent to a filter for further sculpting of the sound.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.2.3 OSC 5 (OSC)

The Boutique OSC 5

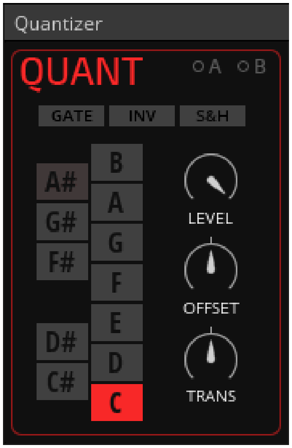
The OSC 5 is inspired by electronic organs and synthesizers from the seventies. It allows you to blend multiple waveforms at different octaves to create dense sounds with a vintage vibe. Using the rightmost slider (Level X') it is possible to mix in a stacked oscillator voice with additional harmonies, which is useful for creating classic house music chords. Clicking the icons on top of the octave sliders changes the waveform for the corresponding octave. Clicking on the icon for the Level X' slider changes the associated chord. The PW and SHAPE parameters provide additional wave shaping. Modulating them results in very rich and animated sounds.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.3 Digilog

Digilog Blocks are utilities used to create complex rhythms, process notes, and provide structure in patches. They do not generate any sound on their own.

5.3.1 Quantizer (PRO)

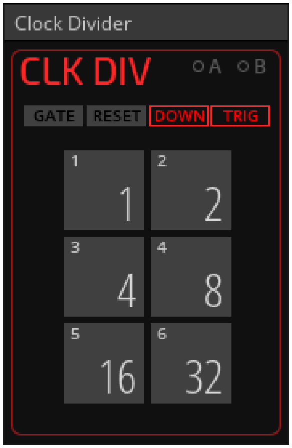


The Digilog Quantizer

The Quantizer is a flexible quantizer that allows you to convert any signal into a stepped sequence of pitches for use with Pitch inputs. It automatically maps the input values to a user-definable selection of notes, making it possible to set custom scales. Additionally, QUANT sends a gate from the Gate output whenever a new value is mapped to one of the selected notes. This can be used to trigger other events in a patch, for example envelopes. Alternatively, S&H mode lets you synchronize the quantization to gates arriving at the Gate input. This way QUANT can be locked to a rhythm that is independent of the input signal.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.3.2 Clock Divider (PRO)



The Digilog Clock Divider

The Clock Divider is an essential building block for sequencing. It takes any gate signal, for example a clock, and provides six user-definable timing divisions of this signal for further distribution in a patch. This allows you to create a set of related timing signals that are all based on the same tempo, but with a different amount of beats in the same time interval, similar to note divisions. It can be used to run sequencers at different but related speeds, or to set up interesting rhythmical structures within a patch. The ability to modulate the Divisions for each output makes it possible to create very complex polyrhythms.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.4 DRIVER

Create your own custom synth using the finest NI components. The DRIVER Block is a single rack-style module from one of Native Instruments' most renowned effects.

5.4.1 DRIVER (EFX)

Driver

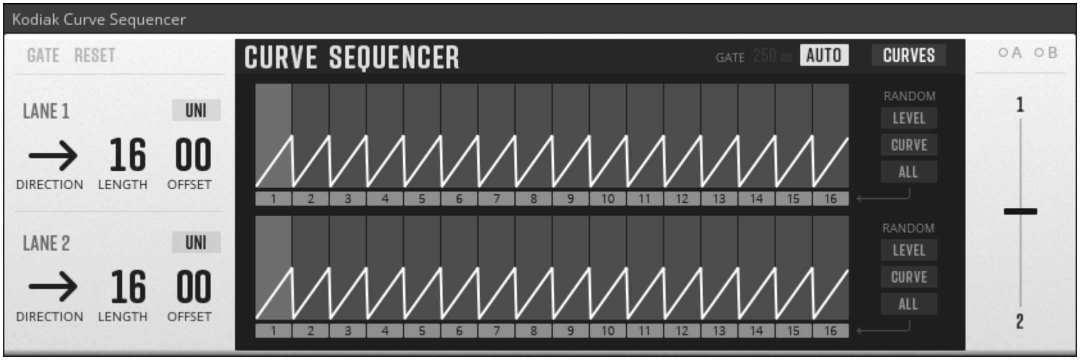
DRIVER combines a smooth 12 dB/Oct state-variable filter with a powerful distortion unit and interesting modulation capabilities. It is suitable for a wide range of applications, from light saturation to very animated distortion. The top half of the interface consists of the basic filter and distortion controls. The lower half contains parameters related to modulation, including an envelope follower and an audio modulator. The audio modulator processes signals for modulation of parameters at audio rate, which leads to very aggressive sounds. Both the envelope follower and the audio modulator can be fed by the input signal itself, or by another signal connected to the sidechain inputs (SC L, SC R).

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.5 Kodiak

Kodiak Blocks are forward-thinking modules that combine advanced software concepts with the experience of patching a modular synthesizer.

5.5.1 Curve Sequencer



The Kodial Curve Sequencer

Inspired by MASSIVE's Performer modulation source, the Curve Sequencer takes the idea of sequencing complex envelope shapes to the next level. Two sequences of envelope shapes, or curves, are available as LANE 1 and LANE 2. For each step of the sequence you can choose from a number of curve types and set the level at which the curve is played back. Both LANE 1 and LANE 2 have independent controls over DIRECTION, LENGTH, and OFFSET. This allows you to break up the relationship between the two sequences and generate shifting and evolving modulation signals. The two sequences produce either unipolar or bipolar signals, which are sent individually from Out 1 and Out 2, as well as mixed with the 1 / 2 Crossfade control and sent from Out Mix. To quickly create variations of a sequence, or entirely new sequences, a comprehensive set of RANDOM controls is available, allowing you to randomize the level, the curve type, or both for a selectable number of steps. By default, each step's curve length is automatically set to remain synchronous with the input clock signal. However, it is also possible to set the curve length manually, resulting in unusual envelope shapes. This can also be useful when the sequencer is not controlled by a regular clock signal, but an arbitrary sequence of gates. The Curve Sequencer's panel layout matches the Shift Sequencer, which allows for sequence alignment when the two Blocks are placed on top of each other in Panel view.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.5.2 Duality Osc

The Kodiak Duality Osc

The Duality Osc is an unusual dual oscillator that is particularly well suited for growling and creaking bass sounds, however it is also a good choice for vibrant lead and percussion sounds. Its two internal oscillators, the MAIN OSC and the MOD OSC, are combined by means of phase modulation (PM), frequency modulation (FM), and amplitude modulation (AM). The TIMBRE parameter adds harmonics to the Main output signal by folding the the waveform into itself, which can also be modulated from the MOD OSC by increasing the amount of timbre modulation (TM). The main tuning controls apply to both oscillators, however the MAIN OSC's frequency can be offset at a ratio set with the MULT parameter. This allows you to shape the harmonic structure of your sound when applying modulation with the PM, FM, AM, and TM parameters. Adding SYNC between the two oscillators further adds to the range of available sounds, either by providing stability (SYNC >), or introducing erratic behaviour (< SYNC, X-SYNC). All parameters are highly complementary and respond well to elaborate modulation routings via the A and B modulation buses. This makes it easy to find sweet spots and add animation and texture to your sounds. The central display generates a waveform that corresponds to your settings, serving as a visual guide while exploring the Duality Osc's complex wave shaping abilities.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

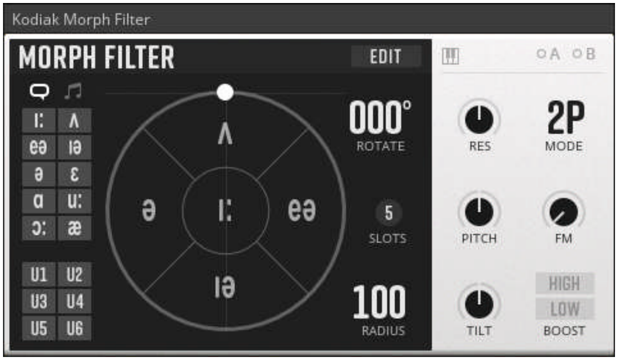
5.5.3 Flip Gen

The Kodiak Flip Gen

Flip Gen is a peculiar tone generator and noise source. It can produce bleepy sequences, morse signals, pitched noise, crackly textures, and anything in between. Furthermore, it can serve as a modulation source, allowing you to introduce intricate, chaotic, or even random movement to any parameter in your patch. At audio rates, this will add noisy artifacts to your sound, however you can also create slow modulation signals by enabling LFO mode. At its core, the Flip Gen consists of a sine wave oscillator that repeatedly switches between two frequencies FREQ A and FREQ B. With the MIX control it is possible to set the level of the output signal depending on which frequency is selected. The rate of switching is controlled by the SPEED control, with the option to introduce INSTABILITY for random fluctuations of the rate. By turning the SPEED control clockwise, you can gradually morph the Flip Gen's basic bleep and morse sounds into colorful noises. The switching can either introduce clicks and pops to the signal, or be rounded off by turning up the SMOOTH control. To further steer the Flip Gen's chaotic behaviour, the CHANCE control allows you to set the probability of selecting either FREQ A or FREQ B when switching occurs.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.5.4 Morph Filter

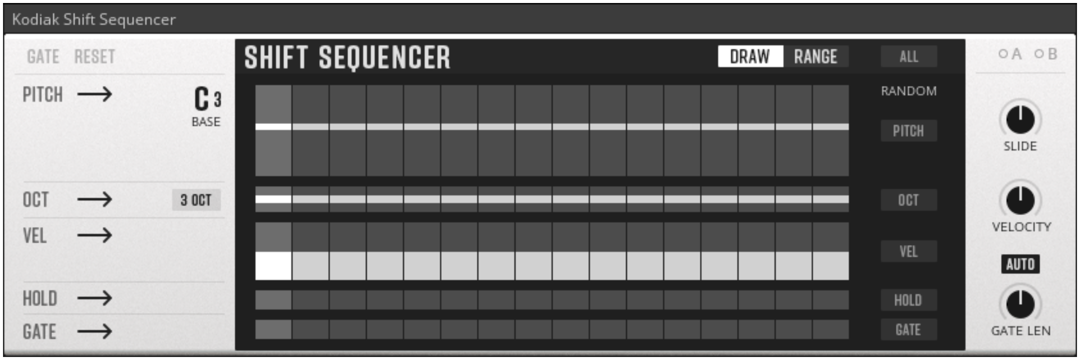


The Kodiak Morph Filter

The Morph Filter combines a pristine sounding filter bank with a sophisticated interface for morphing between filter settings. Its preset system allows you to quickly load filter settings that space the three available filter bands at specific intervals, forming vowels or chords. The Morphing Area can be used to smoothly blend between these filter settings, giving you access to a huge pallet of sound with only two controls, ROTATE and RADIUS. In EDIT view, you can create and customize filter settings, with the possibility to save them as your own presets. The MODE switch gives you access to three different filter responses (2P, 4P, 8P), which drastically change the Morph filter's character. A global PITCH control and Key Tracking let you play the filters in a harmonically related manner. It's characteristic sound and unique resonance behaviour make the Morph Filter an exceptional tool for sculpting and animating harmonically rich oscillator signals as well as noise. Taking this to the extreme, you can for example turn any noise signal into a lush pad sound by increasing the resonance (RES control) in 8P mode and loading chord presets to the Morphing Area. Beyond that, the Morph Filter can also become a sound generator in its own right by sending hard-edged signals (e.g. triggers and gates) to its inputs and turning up the RES control, setting the resonance at the brink of self-oscillation. This so-called 'pinging' produces smoothly decaying sine wave signals that are a great source for tonal percussion sounds.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.5.5 Shift Sequencer



The Kodiak Shift Sequencer

Bringing an entirely new take on step sequencing to Blocks, the Shift Sequencer allows you to sequence different attributes of a note independently from another. This can be used to create poly-rhythms within notes by letting the step values of each attribute shift against each other. Separate lanes for PITCH, octave (OCT), velocity (VEL), HOLD, and GATE each have their own controls for playback direction, as well as sequence length and position offset in RANGE view. These controls can be used to explore a multitude of subtly evolving or drastically transformed sequences based on the same set of step values. Value entry in steps can be quickly achieved by clicking and dragging across the lanes, and a mouse-over piano roll display in the PITCH lane makes it easy to enter specific notes. As an alternative to manually entering step values for each lane in DRAW view, a set of RANDOM functions is available. This way you can randomize the values for all active steps in a sequence, not only for all lanes at once but also separately for each lane. Additional functions include variable glide (SLIDE) for HOLD events, velocity output scaling, and a gate length control (GATE LEN) with optional AUTO mode. The Play input allows you to control sequencer playback externally. This can be used in conjunction with the Util Clock's Play output to prevent hanging notes when stopping the clock, or exploited creatively, for example by starting and stopping playback from a keyboard. The Shift Sequencer's panel layout matches the Curve Sequencer, which allows for sequence alignment when the two Blocks are placed on top of each other in Panel view.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.6 Modern

Modern Blocks are state-of-the-art-modules with a contemporary twist. They represent the latest developments in the modular world, showcasing specific functions that are out of the ordinary.

5.6.1 Paul Filter (FLT)

The Modern Paul Filter

The Paul Filter is a smooth sounding low pass filter, adapting the filter design of early polyphonic analog synthesizers. Its resonance behavior has been optimized to provide a warm and full sound: as you turn up the RESONANCE, the bass is boosted. You can click on the F-clef icon in the bottom-right corner to deactivate the bass boost. This gives you an even bass response that is independent of the RESONANCE setting. Four filter modes allow you to change the overall sound of the filter, from bright (LP1) to boomy (LP4). This filter is particularly useful for all kinds of bass sounds, from rumbling sub-bass sounds to liquid sounding acid basslines.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.6.2 Comb Filter (FLT)

The Modern Comb Filter

The Comb Filter delays the input signal and feeds it back onto itself, similar to an echo effect. However, the Comb Filter is optimized for very short delay times, causing interferences in the audible range. It creates regularly spaced peaks and troughs in the frequency response, resembling the appearance of a comb. The effect gets more pronounced as the feedback is increased. Apart from filtering oscillator signals, the Comb Filter can also be used to create effects like flanging and chorus, or serve as the basis for physical modelling sounds. If Key Tracking is turned up, it can be controlled with a pitch signal arriving at the Pitch input, making it possible to play the Comb Filter 's frequency according to a musical scale.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.7 MONARK

Create your own custom synth using the finest NI components. MONARK Blocks are single rack-style modules from one of Native Instruments' most renowned synths.

5.7.1 MONARK Filter (FLT)

The Monark Filter

Modelled after the classic 4-pole ladder low pass filter of an iconic monophonic synthesizer from the seventies, the MONARK Filter captures every nuance of the original circuit, including its rich saturation behavior. This can be explored even more with the additional LOAD and FEEDBACK parameters, allowing you to overdrive the input and add nonlinear behavior to the filter. The MONARK Filter offers four different filter modes, including three low pass modes and one band pass mode, all derived from the classic ladder structure. This filter is an excellent choice for huge sounding synth bass and lead sounds.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.7.2 MONARK ADS ENV (MOD)

The Monark ADS ENV

Modelled after the envelope section of an iconic monophonic synthesizer from the seventies, the MONARK ADS Env captures every nuance of the original circuit, including the unique behavior of its switchable release stage. Additionally, the MODE switch allows you to choose between the amplitude or filter envelope characteristics of the original instrument. Renowned for its punchy response, this envelope is a good choice for strong bass and lead sounds as well as snappy percussion.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.7.3 MONARK Oscillator (OSC)

The Monark OSC

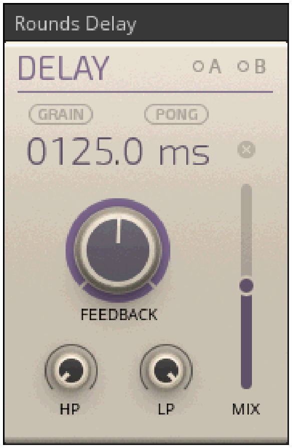
Modelled after the oscillators of an iconic monophonic synthesizer from the seventies, the MONARK OSC captures every nuance of the original circuit, including all the inaccuracies that contribute to its distinctive sound. All three oscillators from the Native Instruments MONARK synthesizer are available and can be selected by clicking on the OSC 1 label at the top of the panel. This way the unique characteristics of all three oscillators can be used to create very rich and lively sounds, especially when mixing together multiple instances of the MONARK Oscillator.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.8 ROUNDS

Create your own custom synth using the finest NI components. ROUNDS Blocks are single rack-style modules from one of Native Instruments' most renowned synths.

5.8.1 ROUNDS Delay (EFX)



The Rounds Delay

The ROUNDS Delay can produce a wide range of different echo, flanging and chorus effects. It offers two basic modes of operation, normal and GRAIN. In normal mode, changing the delay time momentarily alters the pitch of the signal, similar to tape echo effects. In GRAIN mode, the pitch is not altered. The PONG option lets the delay repetitions alternate between the left and right channel for a wide stereo effect. By clicking on the ms unit label next to the Delay Time, you can synchronize the ROUNDS Delay externally to REAKTOR's master tempo or internally to a sequence of gates from within the Blocks patch.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

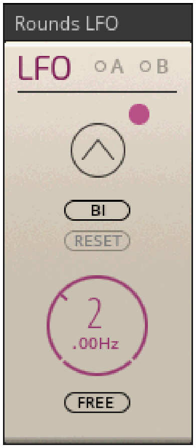
5.8.2 ROUNDS Reverb (EFX)

The Rounds Reverb

The ROUNDS Reverb is based on a feedback delay network with eight delay taps. It can produce a wide range of effects: from big, deep and cloudy halls to small, resonant rooms or grainy delays. All parameters have been optimized for modulation via the A and B modulation busses, so you can morph from one space into the other, create very animated textures, or add interesting rhythmical effects to the reverb sound. This makes the ROUNDS Reverb suitable not only for adding space to a sound, but also for inserting it at any point in your patch as part of the sound generation.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.8.3 ROUNDS LFO (MOD)



The Rounds LFO

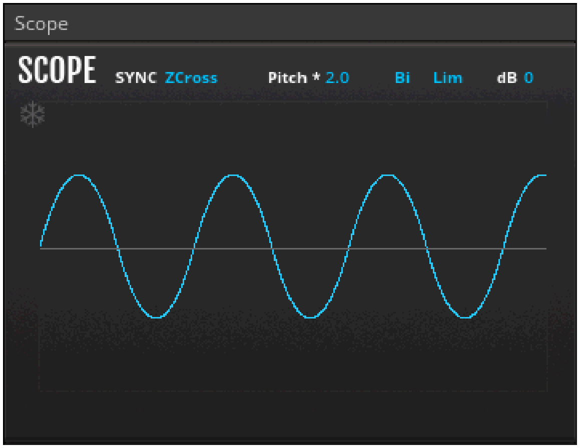
The ROUNDS LFO brings the LFO (Low Frequency Oscillator) from the Modulation section of the ROUNDS synthesizer to Blocks. Just like the ↑5.8.1, ROUNDS Delay (EFX), it features a tempo-sync option. This lets you synchronize the LFO externally to REAKTOR's master tempo or internally to a sequence of gates from within the Blocks patch, making it possible to create modulation signals that are always locked to the beat of your music.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9 Util

Util – short for Utility – Blocks are the modules that help make larger patches possible. Like Digilog Blocks, they don't generate sound on their own, but make the entire world of Blocks possible.

5.9.1 Scope (AUX)

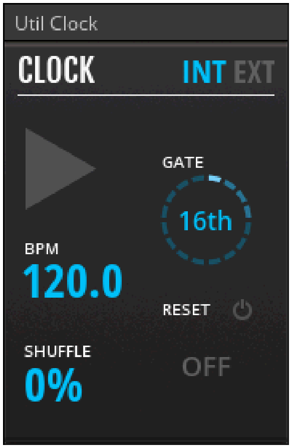


The Util Scope

Scope allows you to monitor any signal in a Blocks patch. It shows how signals change over time: The vertical axis represents the amplitude of a signal and the horizontal axis represents time. You can use the Scope to visualize modulation signals or waveforms from oscillators, or to troubleshoot issues in complex patches by checking for the range and shape of a signal. Watching the signals change as you add modulation and processing to your patch is a great learning experience, too. The behavior of the Scope can be adjusted with the controls at the top of the panel.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.2 Clock (INT)

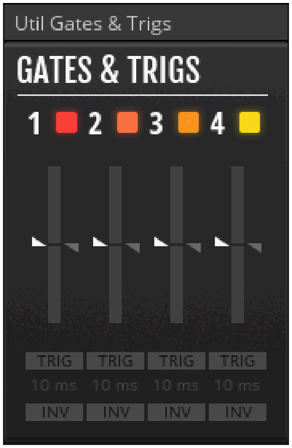


The Util Clock

Clock provides a clock signal as a sequence of gates via its Gate output. It allows you to run Blocks that rely on external timing information, for example sequencers. For this, the Clock's Gate output is connected to the Gate input of a sequencer. The tempo is set in beats per minute (BPM), with a definable note division for the sequence of gates (4th, 8th, and so on). Additionally, you can add some groove by turning up SHUFFLE. The Reset output sends a gate every time Clock is activated. When the RESET function is enabled, reset gates are also sent while the clock is running, at an interval set by the Reset Interval control on the panel. Reset gates are useful for synchronizing multiple sequencers in a patch.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.3 Gates & Trigs (INT)



The Util Gates & Trigs

Gates & Trigs allows you to create or modify gate and trigger signals. Apart from sending these signals to Gate inputs in your Blocks patch, you can use them to control external hardware synthesizers with analog gate CV (Control Voltage) inputs via DC-coupled audio interfaces or D/A converters. The outputs are optimized to facilitate this use case with improved compatibility, allowing you to directly route the signals to your DC-coupled audio interface or D/A converter. Gates & Trigs accepts any signal and derives gates and triggers from it based on the settings made with the Threshold sliders. This way you can condition gate and trigger signals for a specific use, or create interesting sequences of gates and triggers based on arbitrary signals.

Controls

Name	Description
Mute 1 … 4	Mutes this channel.
Color 1 … 4	Sets the color for this channel. The colors help to visually organize patches.
Gate High Threshold 1 … 4	Sets the gate high threshold for this channel. When the input signals rises above this value, the Gate output goes high.

Name	Description
Gate Low Threshold 1 … 4	Sets the gate low threshold for this channel. When the input signals falls below this value, the Gate output goes low.
Shift 1 … 4	Moves both the Gate Low Threshold and the Gate High Threshold simultaneously, without changing their relation to each other.
Trigger Threshold 1 … 4	Sets the trigger threshold for this channel. When the input signal rises above this value, a trigger is sent from the Gate output.
TRIG 1 … 4	Enables trigger mode for this channel. In trigger mode, the Gate output goes high for a duration set with the Trigger Length control whenever the input signal rises above the Trigger Threshold.
Trigger Length 1 … 4	Sets the duration of the trigger sent from the Gate output in trigger mode.
INV	Inverts the signal sent from the Gate output. This is useful for sending gates or triggers to external synthesizers with an S-Trig input.

Inputs

Name	Description
In 1 … 4	Channel 1 … 4 signal input.

Outputs

Name	Description
Out 1 … 4	Channel 1 … 4 gate output. Range [0 .. 1].

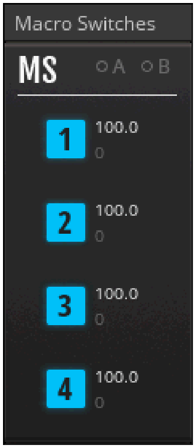
5.9.4 Macro Knobs (INT)

The Util Macro Knobs

Macro Knobs provides four knobs that can be connected to any modulation input in a patch, allowing for central control of multiple parameters. This is useful for creating controller mappings, distributing host automation data, as well as managing modulation signals in a patch. The knobs can be switched from unipolar operation (sending out only positive values) to bipolar operation (sending out negative and positive values).

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.5 Macro Switches (INT)

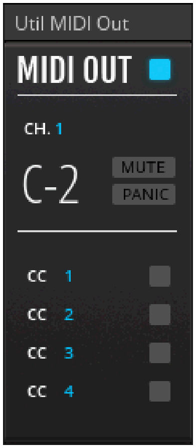


The Util Macro Switches

Macro Switches provides four buttons that can be connected to any modulation input in a patch, allowing for central control of multiple parameters. This is useful for creating controller mappings, distributing host automation data, as well as managing modulation signals in a patch. The values that are sent out in the off state as well as the on state can be freely adjusted.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.6 MIDI Out (INT)



The Util MIDI Out

The Midi Out allows you to use Blocks for controlling MIDI software or hardware from your Blocks patch. It converts pitch and gate signals to MIDI notes and offers four channels of MIDI CC output. This way any modulation signal from within your Blocks patch can be sent to your MIDI destination as Control Change messages.

► To choose an external destination for the MIDI output (for example another software application, a MIDI interface, or a USB-MIDI synthesizer), select the Block and go to the Side Pane > Properties > Connect > MIDI OUT > External.

► To choose an internal destination for the MIDI output (for example a REAKTOR Instrument), select the Block and go to the Side Pane > Properties > Connect > MIDI OUT > Internal.

Controls

Name	Description
Color	The color selector helps to visually organize patches, for example when using multiple MIDI Outs for different MIDI destinations.
CH.	Selects the MIDI channel for the MIDI output.
Note Display	Shows the current MIDI note output.
MUTE	Mutes the MIDI output.
PANIC	Momentarily stops and resets the MIDI output.
CC 1 … 4	Mutes the output for this MIDI CC channel.
CC Number 1 … 4	Chooses the controller number for this MIDI CC channel.
CC Output	Visualizes the output for this MIDI CC channel.

Inputs

Name	Description
Pitch	Input for the pitch signal that is converted to MIDI notes.
Gate	Input for the gate signal that is converted to MIDI notes.
CV 1 … 4	Signal input for MIDI CC channel 1 … 4. The signal is converted to MIDI control change messages.

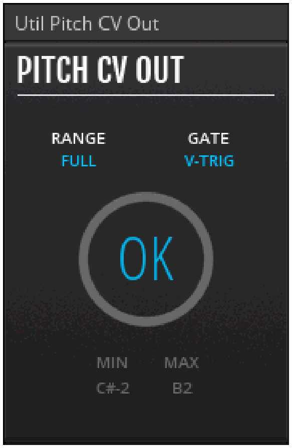
5.9.7 Note In (INT)

The Util Note In

The Note In receives MIDI note data and converts it into control signals for use in your Blocks patch. It allows you to control the pitch of oscillators according to MIDI notes, trigger envelopes with note on messages, and modulate parameters with the modulation wheel or after touch. The Pitch output carries all pitch information including MIDI note, pitch bend and glide, while the Note output only carries the MIDI note information. In a similar fashion, the Gate output provides gates that combine note on and note off messages with velocity, while the Vel output only provides velocity information. Pitch bend is also available separately via the Pbend output, as are the modulation wheel (Mwheel) and after touch (Atouch).

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.8 Pitch CV Out (INT)



The Util Pitch CV Out

The Pitch CV Out allows you to use Blocks for controlling hardware synthesizers with analog pitch and gate CV (Control Voltage) inputs via DC-coupled audio interfaces or D/A converters.

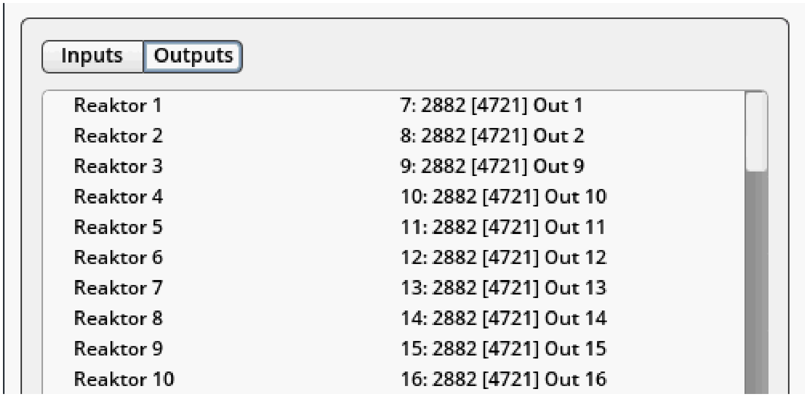
DC-coupled audio interfaces or D/A converters pass very low frequencies and static voltages at their outputs. They can therefore be used for sending out control voltages from the computer. Most audio interfaces employ output filtering (AC-coupling) and are not suitable for this purpose. Please refer to the technical specifications of your audio interface or D/A converter to check if it is AC-coupled or DC-coupled. DC-coupled converters specifically made for sending out control voltages from the computer are available in the form of Eurorack modules made by Expert Sleepers.

An automatic measurement routine calibrates the control voltages sent to the external oscillator, perfectly matching its response to the pitches in Blocks across the full MIDI note range from C-2 to G8.

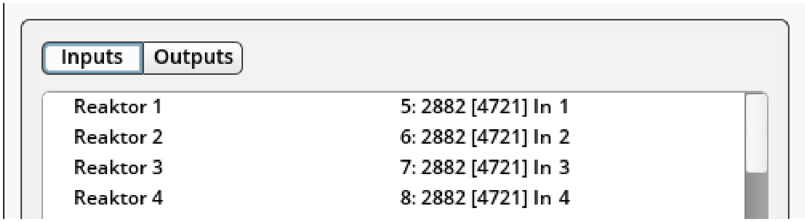
Using the Pitch CV Out's Calibration

To calibrate your external oscillator:

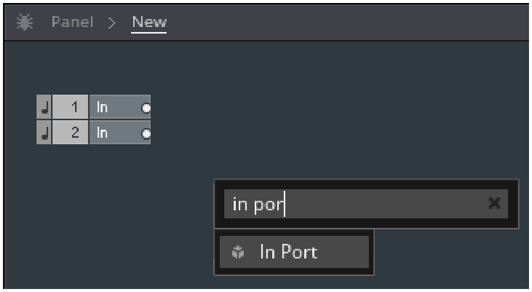
1. Open the *Audio and MIDI Settings …* under *File* in the REAKTOR main menu.
2. Go to the Routing tab and click on Outputs.
3. Assign the analog outputs of your DC-coupled audio interface to REAKTOR's output channels (Reaktor 1, Reaktor 2, etc.). Alternatively, assign the digital outputs of your audio interface that are connected to your DC-coupled D/A converter. In this example, the ADAT outputs Out 9 through Out 16 of the audio interface are connected to an Expert Sleepers ES-3 DC-coupled converter.



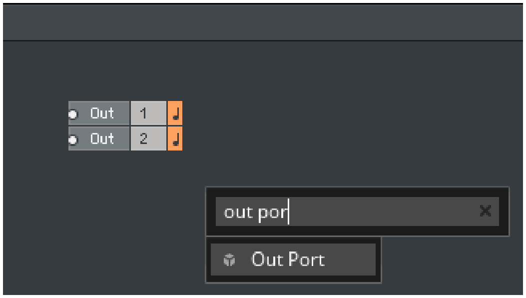
4. Click on Inputs.
5. Assign the analog inputs of your audio interface that are connected to the outputs of your hardware synthesizer to REAKTOR's input channels (Reaktor 1, Reaktor 2, etc.). In this example, the analog inputs In 1 through In 4 of the audio interface are connected to the outputs of an analog modular synthesizer.



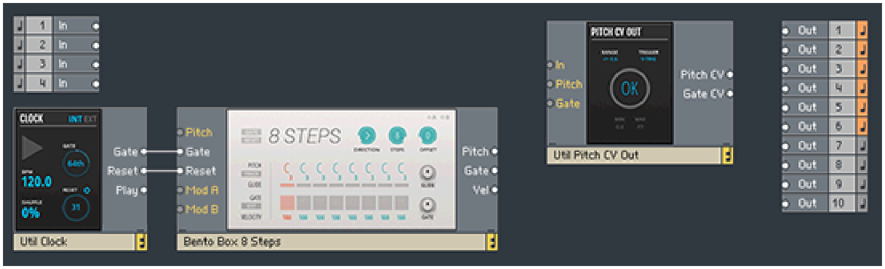
6. Go to the Structure of your Blocks patch, press [Enter] and search for the In Port Module. Press [Enter] again to add it to the patch. Repeat for all input channels assigned in step **5**. The In Port Modules correspond to the REAKTOR input channels with the same number.



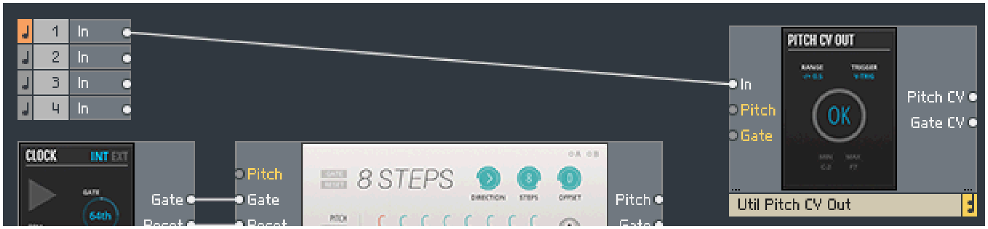
7. Press [Enter] and search for the Out Port Module. Press [Enter] again to add it to the patch. Repeat for all output channels assigned in step **3**. The Out Port Modules correspond to the REAKTOR output channels with the same number.



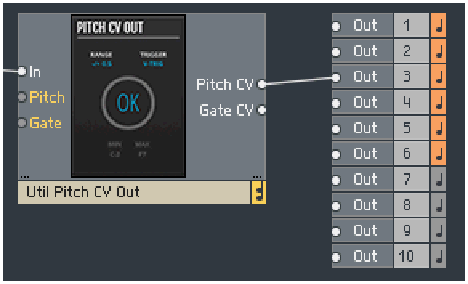
8. Add the Pitch CV Out Block to the patch, as well as the Blocks you want to use for controlling your hardware synthesizer. In this example, the ↑5.1.11, 8 Steps (SEQ) sequencer is used, clocked from the ↑5.9.2, Clock (INT).



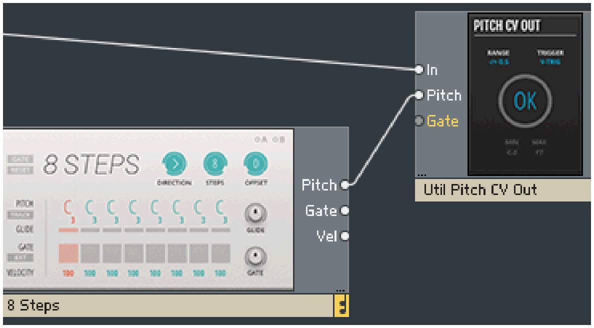
9. Route one of the analog inputs of your audio interface to the Pitch CV Out Block by connecting the corresponding In Port Module to the Pitch CV Out's In input. In this example, the analog input In 1 is used, which is assigned to input channel Reaktor 1 (see step **5**).



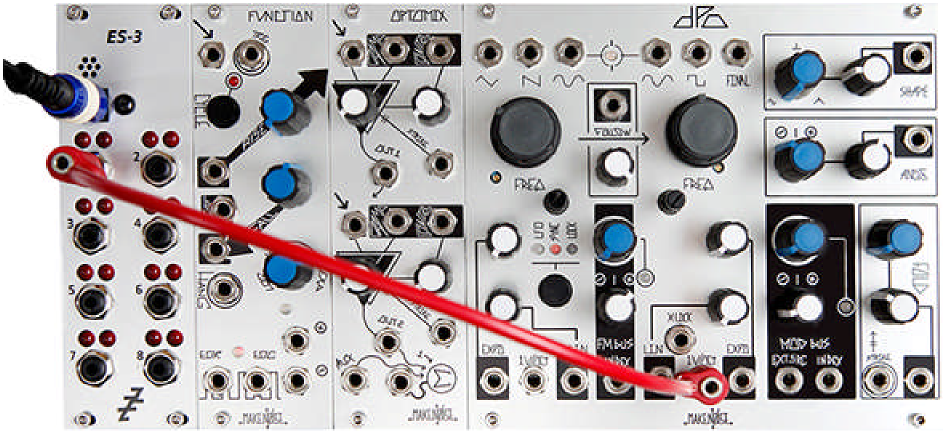
10. Connect the Pitch CV Out's Pitch CV output to one of the Out Port Modules that are assigned to the analog outputs of your DC-coupled audio interface or converter. In this example, the ADAT output Out 9 is used, which is assigned to output channel Reaktor 3 (see step **5**). ADAT output Out 9 corresponds to the first analog output on the Expert Sleepers ES-3.



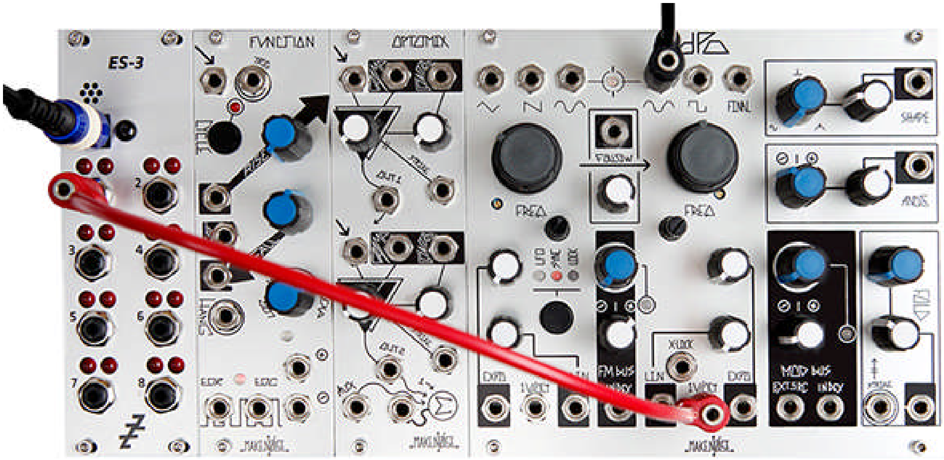
11. Connect the Pitch output of the Block you want to use for controlling the pitch of your hardware synthesizer to the Pitch CV Out's Pitch input.



12. Connect the analog output of your DC-coupled audio interface or converter (matching your routing in step **10**) to the pitch CV input of the external oscillator on your hardware synthesizer. In this example, the first output of the Expert Sleepers ES-3 (fed from ADAT output Out 9 of the audio interface) is connected to the 1V/Oct input of an analog oscillator module.



13. Connect the output of your hardware synthesizer to the analog input of your audio interface (matching the routing in step **9**). The output must carry a constant oscillator signal with a basic waveform (use a sine output for best results). In this example, the sine wave output of the oscillator is connected to the analog input In 1 of the audio interface.



14. Set the external oscillator's frequency offset control to a medium frequency, for example somewhere around 261 Hz (MIDI note C3). This can improve the measurement accuracy. You do not have to set a specific frequency, the calibration matches the pitch independently of the external oscillator's base frequency. Only extremely high settings for the oscillator's base frequency can cause the calibration to fail.
15. If you are using a DC-coupled converter with a wide voltage range, for example an Expert Sleepers module, set the RANGE control on the Pitch CV Out Block to HALF. This improves the measurement accuracy. If you are using a standard DC-coupled audio interface, set RANGE to FULL.

16. Click RUN on the Pitch CV Out Block to start the calibration.

17. When the calibration is finished, the MIN and MAX displays show the available note range for the external oscillator on your hardware synthesizer.

→ You can now use the Blocks patch to control your hardware synthesizer. In this example, a sequence is played back with the ↑5.1.11, 8 Steps (SEQ) sequencer.

If the blue circle at the center of the Pitch CV Out Block is not fully lit after the calibration, the measurement has not been successfully completed. This happens if the base frequency of the external oscillator on the hardware synthesizer is set too high. Set to a medium frequency as described above and run the calibration again.

To control an envelope on your hardware synthesizer, connect a gate signal from your Blocks patch to the Pitch CV Out's Gate input and route the Pitch CV Out's Gate CV output to another analog output of your DC-coupled audio interface or converter. During calibration the Gate CV output goes high, opening any envelope connected to the output of your DC-coupled audio interface or converter. This allows the raw oscillator signal to pass through the VCA on your hardware synthesizer for the measurement.

Controls

Name	Description
RANGE	Switches the range of the Pitch output between FULL [-1, 1] and HALF [-0.5, 0.5]. Use HALF to improve the measurement accuracy when using a DC-coupled audio interface or D/A converter with a very wide voltage range, e.g. an Expert Sleepers Eurorack module.
GATE	Switches between V-TRIG and S-TRIG standards for the Gate output. Most contemporary synthesizers with voltage control use the V-Trig standard.
OK/RUN/!!!	Starts the calibration by placing the mouse on the control and clicking RUN. Aborts the calibration by placing the mouse on the control and clicking !!!. If the blue circle surrounding the control is not complete after calibration, the external VCO is tuned too high and does not allow calibration of the entire MIDI note range from C-2 to G8. In this case, tune the VCO down and run the calibration again.
MIN	Displays the lowest successfully calibrated note.
MAX	Displays the highest successfully calibrated note.

Inputs

Name	Description
In	Measurement input for the signal from your external oscillator. Only used for calibration.
Pitch	Input for the pitch signal you want to use for controlling your hardware synthesizer.
Gate	Input for the gate signal you want to use for controlling your hardware synthesizer.

Outputs

Name	Description
Pitch CV	Output for controlling the pitch of your external oscillator. Needs to be routed through a DC-coupled audio interface or D/A converter.
Gate CV	Output for controlling the envelopes on your hardware synthesizer. Needs to be routed through a DC-coupled audio interface or D/A converter.

5.9.9 Trig In (INT)

The Util Trig In

The Trig In receives MIDI note data and converts it into gate signals for use in your Blocks patch. Each of its 6 channels is assigned to a MIDI note that triggers a gate to be sent from the associated output whenever it is played. This way you can trigger multiple envelopes and reset sequencers or LFOs all from the same MIDI keyboard or MIDI pad controller in an intuitive manner. The gates carry velocity information, which allows you to play your patches dynamically when used with Blocks such as the ↑5.1.5, ADSR Envelope (MOD) and the ↑5.7.2, MONARK ADS ENV (MOD), which can be configured to respond to gates at varying strength.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.10 CV Mix (MIX)

The Util CV Mix

CV Mix is a specialized mixer for processing modulation signals. It offers four channels and a master section, which all feature a versatile control slider that can be configured as a standard bipolar level control or a special range control. This makes it easy to sculpt modulation signals in new and interesting ways. The CV Mix offers two different modes of operation: In absolute mode (ABS), the signals of all channels are simply added. In relative mode (REL), the output level is attenuated relative to the level of each individual channel in order to keep signals in the range from -1 to 1. The color selectors let you assign distinct colors to different parts or signal chains in a patch. The CV Mix can also be used to mix audio signals, for example when feeding it multiple waveforms from the same oscillator for external wave shaping.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

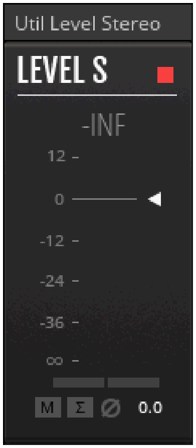
5.9.11 Level Mono (MIX)

The Util Level Mono

Level M is a mono volume control including level metering, with additional switches for mute and phase inversion. It is intended to be used as the first Block after an In Port Module or the last Block before an Out Port module, however it may also be used to monitor and control signals at any point in a patch. The color selector in the upper right corner of the panel lets you assign distinct colors to different parts or signal chains in a patch.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.12 Level Stereo (MIX)

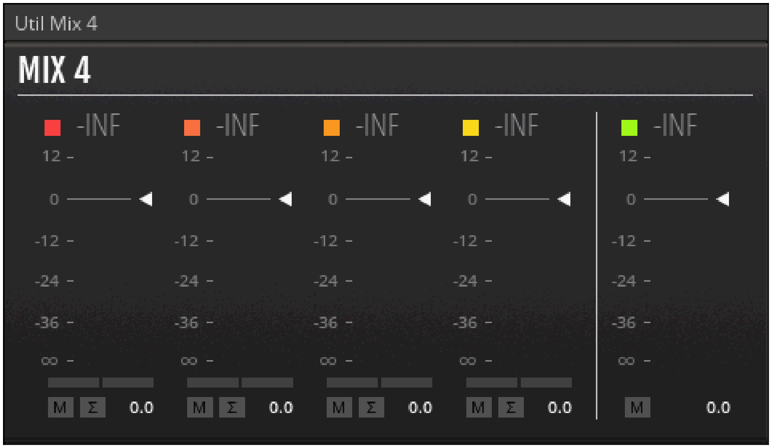


The Util Level Stereo

LEVEL S is a stereo volume control including level metering, with additional switches for mute, mono summing and phase inversion. It is intended to be used as the first Block after an In Port module or the last Block before an Out Port module, however it may also be used to monitor and control signals at any point in a patch. The color selector in the upper right corner of the panel lets you assign distinct colors to different parts or signal chains in a patch.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.9.13 Mix 4 (MIX)



The Util Mix 4

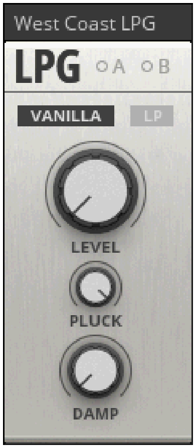
Mix 4 is a stereo mixer with 4 channels, offering volume control and panning including level metering, with additional switches for mute and mono summing per channel. The Aux inputs allow you to chain multiple instances to create larger mixers. Each channel has a fixed attenuation of -3 dB to provide a useful amount of headroom. The color selectors let you assign distinct colors to different parts or signal chains in a patch. MIX 4 is very useful as final mixer in patches with multiple voices.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.10 West Coast

West Coast Blocks are inspired by Don Buchla's unconventional and playful approach to synthesis.

5.10.1 LPG (FLT)



The West Coast LPG

The West Coast LPG represents the Blocks take on the low pass gate, a peculiar filter circuit originally designed by synthesizer legend Don Buchla for controlling the dynamic properties of a sound. It uses an optocoupler that smoothens the LPG's response to external control. When excited by a sharp-edged signal via its Pluck input (see section ↑4.8, Pluck), the LPG opens and closes in a natural sounding manner, giving sounds a plausible quality that is reminiscent of a drum hit or a plucked string.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.10.2 CFG (MOD)

The West Coast CFG

Inspired by the so-called function generators found in classic Buchla synthesizers, the West Coast QFG combines four envelopes in interesting ways. It can be used as the central modulation hub of a patch, providing a set of modulation signals that can be triggered independently, in relation to each other, or by themselves for self-cycling operation. The QFG is suitable for creating sounds ranging from evolving drones to complex percussion.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.10.3 DWG (OSC)

The West Coast DWG

The West Coast CWG builds on a long history of dual oscillator designs pioneered by synthesizer legend Don Buchla. It combines two oscillators (MOD, CARRIER) and additional wave shaping (TIMBRE) with extensive internal modulation possibilities, allowing you to intuitively explore complex timbres by means of frequency modulation synthesis (FM), blending of waveforms (SHAPE) as well as wave folding (FOLD, SYMM). Together with the West Coast LPG it forms the core voice of any synthesizer in the Buchla tradition.

Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).

5.10.4 XYS (SEQ)

The West Coast XYS

Drawing inspiration from an innovative modular sequencer concept born in the Blue Ridge Mountains, the West Coast XYS can be used for generating complex modulation and gate signals as well as note sequences. It is based on a two-dimensional grid of 16 steps that can be accessed by a combination of two clock and two modulation signals, controlling both the direction and the tempo of the sequence. Even though it can be used as a basic 16 step sequencer, the XYS excels at creating evolving patterns and constantly shifting sequences.

> Find information about this Block's controls, inputs, and outputs in the REAKTOR Info Hints (see section ↑1.1.1, Info Hints).