PROTEIN
SYNTHESIZER

USER MANUAL

waldorf

Content

Worth Knowing

Thank you for purchasing the Waldorf Protein. You now own a high-class wavetable synthesizer that offers more under its hood than you might initially imagine. Protein featuring a wide range of unique sounds with approved Waldorf quality – made with love!

About this Manual

The biggest problem with any manual is to find a way to cover both the needs of an absolute expert and a beginner alike. There are people who read a manual cover to cover while others don't even touch it. The latter is the worst choice, especially when the manual describes a Waldorf instrument.

Anyone reading the following manual is in for a lot of fun while learning about and working with the Waldorf Protein.

Now have fun with your Protein synthesizer!

Your Waldorf Team

Hint

Waldorf Music is not liable for any erroneous information contained in this manual. The contents of this manual may be updated at any time without prior notice. We made every effort to ensure the information herein is accurate and that the manual contains no contradictory information. Waldorf Music extends no liabilities in regard to this quick start manual other than those required by local law.

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Please visit our website for further support and downloads for your Protein synthesizer: **waldorfmusic.com/protein**

Very special thanks to:

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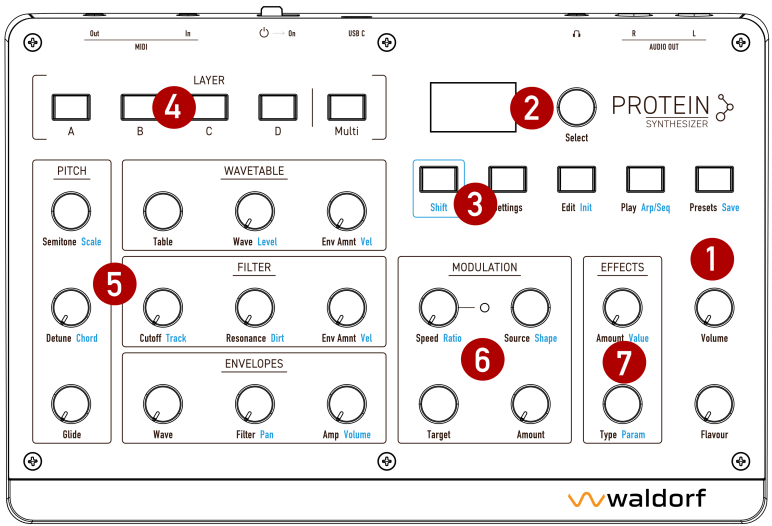
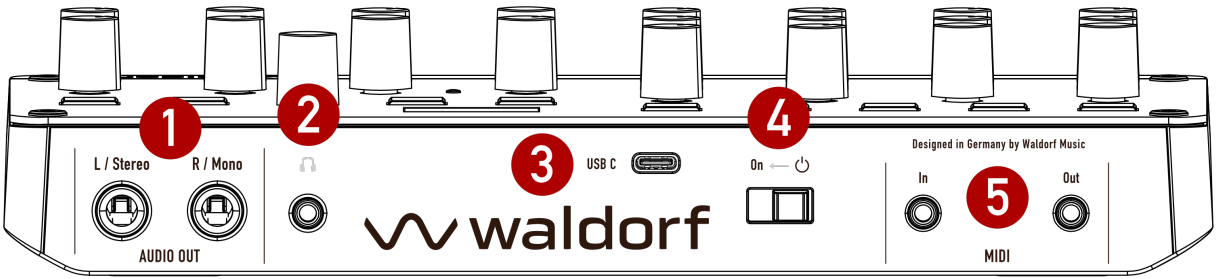
Control Features & Connections

Front Panel



1) Volume Dial
2) Display and Selection Dial
3) Mode Buttons
4) Layer Buttons
5) Sound Parameters
6) Modulation Parameters
7) Effect Parameters

Rear Panel Connections



1) Stereo Audio Outputs (6.25 mm TS or TRS)
2) Headphones Output (3.5 mm TRS jack)
3) USB-C Connection / Power supply
4) Power Switch
5) MIDI In & MIDI Out 3.5 mm TRS Type A jacks

About this Manual

This manual was written to help you to become familiar with your Protein synthesizer. It will also aid experienced users with routine tasks.

To avoid confusion, the terminology in this manual is based on the Protein parameter names. You will find a glossary at the end of this manual; it explains the various terms used.

We also used a uniform set of symbols to show you topics of particular interest or significance. Important terms are highlighted in bold letters.

Symbols

Caution – The comments that follow this symbol will help you avoid errors and malfunctions.

Info – Additional information on a given topic.

Instruction – Follow these guidelines to execute a desired function.

Example – Real-world examples to try out.

Highlighted Control Features and Parameters

All of Protein buttons, controls and parameters are highlighted in **bold** letters throughout the manual.

Examples:

- Turn the **Select** encoder.
- Press the **Shift** button.

Protein different modes and parameter pages are illustrated in a depiction of the display.

The value range of a continuous parameter is indicated from low to high with both values shown in italic letters, separated by three dots.

Example:

Cutoff *0...100*

General Safety Guidelines

⚠ Please read the following safety tips carefully! They include several precautions you should always observe when dealing with electronic equipment. Read all of the instructions before operating your device.

Suitable Operating Conditions

- Use the device in enclosed rooms only.
- Never use the device in damp conditions such as bathrooms, washrooms, or around indoor swimming pools.
- Do not use the device in extremely dusty or dirty environments.
- Make sure that adequate ventilation is available on all sides of the device.
- Do not place the device near heat sources such as radiators.
- Do not expose the device to direct sunlight.
- Do not expose the device to extreme vibrations.

Power Supply

- Only use the USB-C cable that came with Protein.
- Use a suitable USB-C power adapter to power Protein.
- Unplug the device when you are not using it for longer periods.
- Never touch the cable with wet hands.

Operation

- Never place objects containing liquids on or near the device.
- Place the device on a stable base only.
- Make sure no foreign objects find their way into the chassis. If for some reason this occurs, switch the power off, unplug the device, and consult a qualified repair center.
- This device can generate volume levels that may do irreparable damage to your hearing when used on its own or with amplifiers, speakers, or headphones. For this reason you should keep the volume at tolerable levels.

Maintenance

- Do not open the device or remove the cover. Refer all service and repair tasks to qualified personnel. The interior of the chassis contains no components that require user maintenance.
- Use only a dry, soft cloth or brush to clean the device. Never use alcohol, cleaning solutions or similar chemicals. They will damage the surface of the chassis.

Proper Use

This device is designed exclusively to produce low-frequency audio signals for the purpose of generating sound. Any other use is prohibited and voids the warranty extended by Waldorf Music. Waldorf Music is not liable for damages due to incorrect use.

A Protein is a tiny building block that make muscles, hair, enzymes, and basically keep you from turning into a pile of goo. And it is the only nutrient that makes gym bros emotional.

Setup and Connections

Protein comes complete with:

- the Waldorf Protein Synthesizer itself
- a USB-C to USB-C cable (optional USB-C power supply necessary)
- a MIDI adapter cable set (Mini TRS to DIN sockets)
- a printed Quick start manual

Please ensure all the above items were included. If something is missing, contact your local dealer.

We recommend that you save the original packing material for future transport.

Setup

Place Protein on a clean, even surface.

Basic Connections

In order to get started with your Protein you will need an optional USB-C power supply or a computer for USB-C power supply, a mixing console, an amp, and/or an audio monitor such as a speaker cabinet, or a headphone.

You can also use a computer or sequencer to make use of Protein's MIDI features.

To connect the devices:

1. Turn all units off.
2. Connect the Protein's **AUDIO OUT** outputs to your mixing console, your active speaker system, or your computer audio interface. Optionally connect your headphone the **Headphone** output.
3. If you want to use a computer, connect the Protein's **USB-C** port with a USB-C cable to your computer (Windows or macOS). Thereafter, the Protein becomes automatically available as a MIDI device, which can be played by your DAW. Your computer also provides the power supply for Protein.
4. Connect a suited USB-C power supply with the Protein's USB-C jack (if your Protein is not connected to a computer).
5. To play notes, you need a MIDI master keyboard. Connect its MIDI Out jack to the Protein´s MIDI Input (by using the included MIDI adapter). Alternatively you can press the **Play** button below the display to trigger notes.

6. Use the power switch on the rear panel of your Protein to start the engine.
7. Then switch on your computer (if connected), the mixing console and finally the amplifier or speaker system.

The overall volume of the Protein can be controlled with the **Volume** dial on the right side of the front panel. This also affects the **Headphones** output.

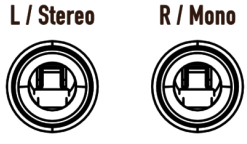
If you do not choose to connect a mixing console, you can patch the Protein's output signals directly to an amplifier or an audio interface. Use an input usually called Line, Aux or Tape input.

Before connecting and disconnecting the Protein synthesizer to a power supply source, turn your amp's volume control all the way down to avoid damage due to on/off switching noise. Protein produces a high level output signal. Please take care that the connected playback device is suitable for the high level of an electronic instrument. Never use the microphone or phono input of the connected amp!

The Rear Connections

Protein provides an analog stereo audio output and a headphones output. This output and headphones output are affected by the setting of the **Volume** control dial.

Audio Output



Use 2 TS or TRS cables to connect the audio output to a mixer. Use your mixing console to appropriately distribute the stereo channels in case. If you want to connect an output monophonically, only use the **R/Mono** jack of the output pair with a 1/4 inch mono plug.

Headphones Output

Here you can connect any headphone with a 1/8-inch (3.5 mm) stereo plug. The headphone output uses the same signal as the audio output.

The USB-C Connection

Protein offers a USB-C port. It connects Protein to your computer with the following system requirements:

- Windows PC: Windows 10 or newer, a USB-C port
- Apple: Apple Silicon/Intel Mac with macOS 10.9 or newer, a USB-C port

If your computer is not equipped with a USB-C port, you can use an optional USB-C to USB-A adapter or an optional USB-C to USB-A cable.

The USB-C connection allows transmitting and receiving of MIDI data and also serves as power supply.

If you don´t want to use a computer, you must connect the Protein´s USB-C port to a optional USB-C power supply by using the USB-C to USB-C cable.

MIDI In/Out Jacks

Make sure to use the included MIDI adapters for connecting standard DIN MIDI cables to your Protein.

You don´t want to work with a computer? Use MIDI In for connecting a MIDI master keyboard that offers DIN MIDI. Use MIDI Out to send out MIDI data from Protein to a sequencer or hardware MIDI interface.

Basic Operations

Bring Protein to Life

- Use the Power switch to switch on Protein. The boot procedure takes just a few seconds. After this, the display is lit and Protein is ready to play.
- To switch Protein off, turn the Power switch into the off position. Life can be so easy.

Loading Sounds

Protein comes with numerous sound patches:

- When in Preset mode (press **Preset** button, so that it lights up red), use the **Select** encoder right besides the display to select the desired sound in the sound list. Turning the encoder clockwise increases the sound number, turning the dial counterclockwise decreases it. To load the desired sound, press the **Select** encoder once.

Adjust the Volume

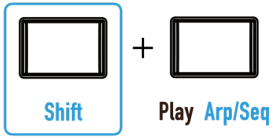
- Use the **Volume** dial to control overall volume.

Playing Notes without a keyboard

- Press and hold the **Play** button to play a note. Use the **Select** encoder to change the note or the octave, that triggers the sound.

Using the Arpeggiator/ Sequencer

- When in Arp/Seq mode (press **Shift + Play Arp/Seq** buttons), set the arpeggiator or the sequencer to on. Hold down a few keys on your MIDI keyboard to trigger the arpeggiator/sequencer.



- To stop the arpeggiator or sequencer playback, just release the hold MIDI key(s).

The Protein Controls

Protein offers 3 kinds of controls: endless encoders, dials and buttons.

Endless Encoders

In most cases, you can turn an endless encoder to make a selection. You can press the **Select** encoder to select options, to confirm selections or to switch through parameter options.

Dials

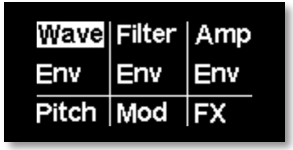
These are regular dials for parameter editing . Turn a dial to change the parameter setting. Most of the dials offer a second function (blue label printing) when using the **Shift** option.

Buttons

Buttons can be pressed to trigger a specific action. Most of the buttons offer a second function when using the **Shift** option (blue label printing below the button). If a button is pressed, it lights up (mostly in red, blue or green).

The Display

The display reflects all actions of the controls and buttons in real time. Here you can check parameter names and values, set options, or edit advanced parameters, which are not available on the user interface



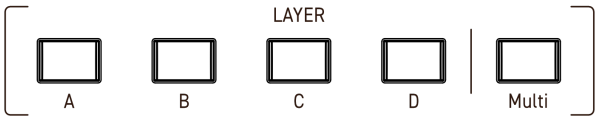
The Display Edit overview

Basic Editing Principles

- The display shows additional infos about the current encoder/dial/button action.
- The dials and encoders each have its dedicated function. Just turn it and listen.
- Turning a dial or encoder will present the respective page on the screen showing the value of the edited parameter. In order to switch to the parameter page without changing the parameter, there is a special behavior implemented:

  - Encoders: If the parameter is not show in the display, the first increment or decrement of the encoder will show the parameter without changing it. Once the parameter is shown, the encoder will start to change the value if more increments or decrements are applied.
  - Dials: If the parameter is not show in the display, a small movement of the dial will show the parameter without changing it. Once the parameter is shown, the dial will start to change the value if more movement is applied. In addition, you can switch in the **Settings** between relative and absolute mode for the dials.
- Many display screens have a highlighted field shown in inverse colors. You can change which field is highlighted by turning the **Select** encoder.
- Some dials have an alternate function labelled in blue. To use it, hold the **Shift** button while turning the dial and release **Shift** afterwards. To put the knobs persistently in alternate mode, press and release **Shift** shortly without turning any knob (**Shift** will lit blue to indicate permanent shift mode). To finish permanent shift mode, just press **Shift** again.
- The highlighted field can be put in editing mode by pressing **Select**. The field then blinks and **Select** can be used to change the value. To finish editing mode just press **Select** again. If the field just selects between a few options, pressing **Select** will directly toggle between those options. Alternatively, many display fields can be edited by holding **Shift** while turning the **Select** encoder.

The Layer Buttons



Protein offers 2 modes:

- **Single Mode**: Every Layer A – D can hold its own independent sound. Only the two effect sections work globally for all layers.
- **Multi Mode**: Works as a classic Multi mode with 4 sound slots, but offers alternative options as Layered mode, Round Robin, Random Robin and Midi Split.

Options for Layer A in Single mode

Working in Single Mode

Make sure that the **Multi** button switch is deactivated and does not lit up red. Press one of the 4 **Layer** buttons to quickly access and play one of the 4 different sounds on each layer. The current selected Layer button lights in red.

Keep in mind that all 4 layers share the maximum of 8 voices.

FX Setting

Use the **Select** encoder to navigate to the FX setting for the current selected Layer. Press on the encoder to switch between different options:

- -> *Out*: The corresponding Layer doesn´t use any of the both effects. The Layer´s audio signal is dry.
- -> *FX 1*: The corresponding Layer uses FX 1 and FX 2 in series.
- -> *FX 2*: The corresponding Layer uses only FX 2. FX1 doesn´t have any effect on the sound.

Volume (Vol)

Use the **Select** encoder to navigate to the *Volume* option for the current selected Layer. Press on the encoder to confirm and turn it to set the output volume for the Layer.

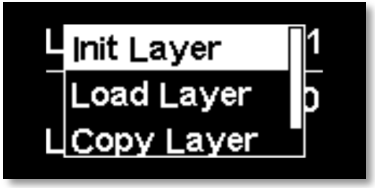
Layer Voice Mode

Use the **Select** encoder to navigate to the *Voice* option for the current selected Layer. Press on the encoder to switch between different options:

- *Poly*: The corresponding Layer uses all available voices.
- *Mono*: Only the last played note sounds. All other notes are stored in an internal list but aren't played. As soon as you release the note that is currently played, the remaining highest hold note is played.
- *Legato*: Same as *Mono*, but when you play legato, only the first note that was played triggers the envelopes. All later notes use these envelopes, but sound in the pitch you've played. This mode is for sustained sounds like typical 1970's solo sounds.

Action

Use the **Select** encoder to navigate to the *Action* menu of the current selected Layer. Press on the encoder to open a pop-up menu with different options:



- *Init Layer*: Initializes the current layer sound to standard parameter values.
- *Load Layer:* Opens the loading screen to select a desired sound from the layers of a stored presets.
- *Copy Layer*: Copies all settings of the current selected layer into a temporary buffer
- *Paste Layer*: This option is only available, when a Layer was copied before. Pastes the Layer in the temporary buffer onto the current selected Layer.
- *Close*: Closes the pop-up menu. No further action is performed.

Working in Multi Mode

Make sure that the **Multi** button switch is activated and does lit red.

Multi Options

Press the **Multi** button until the Multi menu is shown in the display.

Multi Mode with Layered option

The following options can be selected with the **Select** encoder:

- *Layered*: In this mode, all 4 layers (if active) plays simultaneously.
- *Round Robin*: In this mode, each incoming note triggers the next active layer in ascending order repeatedly. 1st note = Layer A, 2nd note = Layer B, 3rd note = Layer C, 4th note = Layer D, 5th note = Layer A again, and so on.
- *Random Robin*: Same as Round Robin, but in random order.
- *Midi Split*: Based on the determined MIDI Receive Channel in the **Settings**, the select MIDI Channel triggers Layer A, the next MIDI channel Layer B and so on. E.g., **Receive Channel** is set to 2. Incoming notes on MIDI channel 2 triggers Layer A, notes on MIDI channel 3 triggers layer B, notes on MIDI channel 4 triggers Layer C and notes on MIDI channel 5 triggers Layer D.

The Layer Buttons in Multi Mode

The current selected Layer button lights orange if it is active, and red if it is inactive. If a layer is active but not selected, its corresponding button lights green.

The Layer options ares nearly similar to the options in Single mode (see previous pages). There is only one difference:

Active

Use the **Select** encoder to navigate to the *Active/Off* option for the current selected Layer. Press on the encoder to switch between two options:

- *Active*: The corresponding layer is set to an active state and the Layer button lights green.
- *Off*: The corresponding layer is set to an inactive state and the Layer button lights green. Also, the Layer A...D lettering in the display is shown in brackets.

Active Layer A in Multi mode

Working with Presets

Press the **Presets** button to open the Presets display menu. In addition to preset selection, numerous options for working with sounds can be found here.

Loading Sounds

Turn the **Select** encoder select the desired sound in the sound list. To finally load the desired sound, press the **Select** encoder once.

The Preset Action Menu

Press the **Select** encoder to open a pop-up menu in the display. Here, you can select the desired options and confirm by pressing on the **Select** encoder:

- *Filter*: Protein contains a preset selection category filter. Here, you can set up the filter. The first option selects the sound category (*Off*, *Uncategorized,* and some typical sound categories like *Pad*, *Keys*, *Lead* and so on). You must either confirm (*Set*) or cancel the category filter setup. If a category filter is active, only the corresponding sounds can be chosen.

- *Delete*: Deletes the current selected sound. To prevent unwanted deletion, a final confirmation is required.
- *Delete Range*: Deletes a definable sound range. Here, you can set the first and the last sound slot of this range. To prevent unwanted deletion, a final confirmation is required.
- *Send*: The active sound (as edited) will be sent as MIDI SysEx dump to the USB-C port. The dump contains multiple MIDI SysEx messages.
- *Send Range*: Sends a definable sound preset range as MIDI SysEx dump to the USB-C port. The dump contains multiple MIDI SysEx messages. Here, you can set the first and the last sound slot of this range.
- *Start Receive*: Puts Protein in a receive mode for multiple sound presets as MIDI SysEx dump from any external MIDI source. Here, you can set the slot from which onwards received presets will be stored. No existing presets will be overwritten but instead the next empty slot chosen. You must either confirm or cancel the final start of the process.
- *End Receive*: This option allows you to end the receiving mode of Protein.
- *Copy:* Copies the current selected sound into a temporary buffer
- *Paste*: This option is only available, when a sound was copied before. Pastes the sound in the temporary buffer onto the current selected sound slot.
- *Close*: Closes the pop-up menu. No further action is performed.

Saving Sounds

After you have finished editing a sound you need to save it, if you intend to use it again. All of Protein's memory locations are available for this purpose.

1. Press the **Shift** + **Save** buttons to activate the Save Preset page. The **Save** button is blinking in red.
2. Optional: Use **Select** to select the sound slot number, where the sound is stored to.
3. Optional: Edit the sound name by pressing **Select** while the name field is selected. Use **Select** so select the character for editing and the selection for the desired character. When done editing, press **Select** again and repeat this procedure. Select *OK* for final confirmation of your naming.

4. Optional: Use **Select** to select the sound category. This is useful for the sound category filter option.
5. Finally, select either *Save* or *Cancel* by turning **Select** and press **Select** to either save the sound or cancel the operation.

Save display dialogue with selected category option

⚠ Whenever you save a sound, the selected memory location is overwritten. Therefore, any previously stored sound at this location will be erased and there is no way to get it back.

Want to start with a clean initialized sound? Press **Shift** + **Edit/Init** to initialize the current loaded sound. No sound is overwritten during this action.

Sound Parameters

Protein consists of numerous sound-shaping components. The following pages describe all parameters in detail.

Note that Protein consists of 3 different types of components for sound generation and sound shaping:

- Sound synthesis: 2 oscillators with wavetables, based on the unique Microwave ASIC chip, filters, an amplifier, that models the digital-to-analog converters for each voice, and effects. These components represent the audio signal flow. Sound generation actually occurs within the oscillators. They can produce different wavetables. The filter shapes the sound by amplifying (boosting) or attenuating (dampening) certain frequencies. The amplifier are located behind the filter. It determine the overall volume of the signal. The effects can enhance the sound of the audio signal at the end.
- Modulators: LFOs, Envelopes. These modules are called Modulators. The Modulators are designed to manipulate or modulate the sound generating components to add dynamics to sounds. The Low-frequency Oscillators (LFOs) are designed for periodic or recurring modulations while Envelopes are normally used for modulations that only occur once on each note. These generators are assigned to parameters on the Modulation section and influence these parameters to alter a sound.
- Play options: An arpeggiator and a programmable sequencer generate interesting note sequences to support a player, whether in the studio or on stage.

Wavetable Parameters

To edit Wave parameters, you can use the dials in the **Wavetable** section or press the **Edit** button, use the **Select** encoder to select *Wave* in the display and press the encoder to enter the *Wave Edit* section.

Protein offers two wavetable oscillators with independent wavetables. Both oscillators offer the same parameters.

To switch between oscillators for editing in the display, use the **Select** encoder. You can also link both oscillators for simultaneously editing.

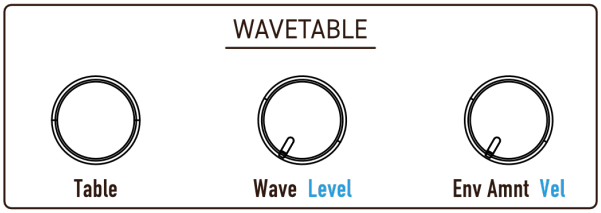
Oscillator 1 is selected for editing

A wavetable is a table consisting of single waveforms. Each waveform is classified by its own special sound character. The main difference of wavetable synthesis in comparison with other sound-generation principles is the ability to not only to play one waveform per oscillator but also to step through the wavetable via different modulations, thereby creating wavetable sweeps. The results can be dramatic – much more so than anything any sample playback-based system could ever produce.

This principle offers powerful capabilities. To give some examples:

- The Wave Envelope can modulate the position within the wavetable.
- Each note on a keyboard can access a different wave of a wavetable.
- An LFO can modulate the position within the wavetable. You can create subtle to drastic sound changes.
- User-selected controllers, such as the Mod wheel, can change the position within the wavetable. When you turn the wheel while playing a chord, each note's wave will be modified instantly.

For more information about Wavetable synthesis please refer to the Appendix of this manual.



Table

Selects one of the original Microwave 1 wavetables for the corresponding oscillator.

Wave

Determines the start point of the wavetable that is used when the sound starts. As an alternative to the waves of the currently selected wavetable, you can select the basic waveforms triangle, square with 50% duty cycle or sawtooth, when choosing the Wave values 61, 62, or 63.

When you want to create a sound with a wave sweep, you should roughly set the **Wave** parameter onto the desired wave, before you apply any modulations to the corresponding oscillator. This helps you to find the basic waveform where all modulations start from.

Wavetables are the real power of your Protein. To make sure that you have access to all this power, you should make yourself familiar with the sound and the characteristic of each wavetable. The best way to do so is to set up a kind of test sound to listen to the wavetables: Start with an initialized sound (**Shift** + **Init**) and turn down the **Level** for Oscillator 2. Use the **Wave** dial to move through the current selected wavetable. Use the **Table** encoder to select another wavetable. You will notice that they cover an extremely wide range of interesting spectral timbres, including analog, FM-like, bell-type or vocal.

Note that you can apply unipolar and bipolar modulation sources to the **Wave** parameter as with any other module. For example, set the **Wave** parameter to 29, which is almost the middle of the wavetable and apply a slow running LFO to the Wave module in the Modulation section) to sweep through the whole wavetable. Try it with one of the PWM wavetables.

Level (Secondary Function)

Volume of the corresponding Wave oscillator.

Env Amnt (Envelope Amount)

Determines the amount of influence the wave envelope has on the wavetable modulation for the corresponding oscillator.

Vel (Secondary Function)

Determines the amount of influence the wave envelope has on the wavetable modulation for the corresponding oscillator but scaled with the velocity of the played note.

Pitch Parameters

To edit Pitch parameters, you can use the dials in the **Pitch** section or press the **Edit** button, use the **Select** encoder to select *Pitch* in the display and press the encoder to enter the *Pitch Edit* section.

These parameters affect the pitch of the corresponding oscillator in many ways.

Semitone

Determines the pitch of the corresponding oscillator in semitone steps. The standard setting for this parameter is 0, but there are cases where different values are required: Most organ sounds include a quint, therefore one oscillator's semitone parameter must be set to +7. There are also many lead sounds with an interval, e.g. a quart (+5 semitones).

Detune

Fine-tunes the corresponding oscillator in parts of a semitone from -1 to +1. The audible result of detuning oscillators is a beating. Use a positive setting for one

oscillator and an equivalent negative setting for the other. A low value of ±5 results in a slow and soft flange effect. Mid-ranged settings of ±15 are perfect for pads. High values of ±20 or above will give a strong detune that can be used for accordeons or effect sounds.

The Pitch option for oscillator 1

Scale (Secondary Function)

Here, you can determine a musical scale, e.g. *Major*, *Minor* or *Lydian Dominant*, if the Chord option is active and set to a Chord scale (any settings except *Off* or *Free*). This allows you to trigger a desired chord with only one key.

Chord (Secondary Function)

Determines a chord, e.g., *Major*, *Minor*, *Sus 4*, when the Chord option is set to *Free* or a voicing like *1-3-5* when in scale mode. In combination with Scale you can cover a wide range of interesting chords.

Glide

'Glide' or 'Portamento' describes the continuous gliding from one note to another. This effect can be created on fretless stringed instruments or some brass instruments (e.g., a trombone). It is very common on synthesizers and used throughout all music styles. Please note that Glide affects the pitch of all oscillators.

Use **Glide** to determine the glide time. Low values will give a short glide time in a range of milliseconds that gives a special character to the sound. Higher values will result in a long glide time of up to several seconds which can be useful for solo and effect sounds.

Pitch Bend

Only available as display parameter, when using the Glide dial. Determines the intensity of the pitch bend (from 0 to 12 semitones) via MIDI pitch bend messages in semitones for the corresponding oscillator.

When in MPE mode, incoming per-note pitch bend messages will affect the pitch based on the MPE standard using a +/- 48 semitone range unless the pitch pitch bend range has been set to *0*. In this case, no per-note pitch bend is applied.

Filter Parameters

To edit filter parameters, you can use the dials in the **Filter** section or press the **Edit** button, use the **Select** encoder to select *Filter* in the display and press the encoder to enter the *Filter Edit* section.

Protein offers a modeled CEM analog lowpass filter with 12dB/Oct and resonance. This filter type dampens frequencies which are higher than the specified cutoff frequency. Frequencies below this threshold are hardly affected. Protein's filter also features a resonance parameter. Resonance in this context means that a narrow frequency band around the cutoff point is emphasized. If the resonance is raised to a great extent, then the filter will begin self-oscillation, i.e. the filter generates an audible sine wave.

Besides the low pass filter (*LP Filter*), Protein also offers a high pass filter type (*HP Filter*) and a *Drive* option.

Only one of these three options can be used at a time. The other options are then inactive.

To choose the filter type/drive option, use the **Select** encoder. You can also set the filter section to bypass, if desired.

Lowpass filter type with Cutoff parameter

Cutoff

Determines the cutoff frequency for the low pass and the high pass filter and controls the **Drive Amount**, when Drive is active. All frequencies above the cutoff frequency are damped. You can bring more movement into the sound by modulating the cutoff frequency via the LFOs, the Filter envelope or the **Keytrack** parameter.

Resonance

Determines the amplification of the frequencies around the cutoff point (for LP and HP). Use lower values in the range 0...0.60 to give more brilliance to the sound. At higher values of 0.60...0.80 the sound gets the typical filter character with a strong boost around the cutoff frequency and a loss in the other range. When the setting is raised to values above 0.80, the filter starts to self-oscillate, generating a pure sine wave. This feature can be used to create solo sounds like the traditional Moog lead or analog-style effects and percussion like electronic toms, kicks, zaps etc.

Drive Type

This option adds a drive effect to the oscillator signal. **Amount** (the Cutoff dial) determines the amount of saturation that is added to the signal. If set to *0.00*, no saturation will be added – in other words, the signal will remain clean. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will bring in more and more distortion, suitable for harder lead sounds and effects. **Type** (the Resonance dial) determines the character of the drive. The following drive types are available:

- **PNP** generates a distortion based on a bipolar transistor.
- **Tube** simulates the asymmetric distortion of a tube circuit.
- **PickUp** simulates an electrostatic pickup. This drive type sounds very interesting, when the audio signal level is modulated.
- **Diode** generates a typical diode distortion.
- **Crunch** is a sinusoidal waveshaper. It generates FM-like sounds that can be extremely distorted.

All cutoff modulations as Env Amount, Keytrack etc. also affect the Drive Amount, if Drive is active.

Env Amnt (Envelope Amount)

Determines the amount of influence the Filter envelope has on the cutoff frequency. For positive settings, the filter cutoff frequency is increased by the modulation of the envelope, for negative settings, the cutoff frequency is decreased. Use this parameter to change the timbre of the sound over time. Sounds with a hard attack usually have a positive envelope amount that makes the start phase bright and then closes the filter to get a darker sustain phase. On the other side string sounds usually use a negative envelope amount that gives a slow and dark attack before the cutoff rises in the sustain phase.

Track (Secondary Parameter)

Determines how much the cutoff frequency depends on the MIDI note number. The reference note for keytrack is C3, note number 60. For positive settings, the cutoff frequency rises on notes above the reference note, for negative settings the cutoff frequency falls up to higher notes and vice versa. On most bass sounds lower settings are optimal to keep the sound smooth at higher notes.

Dirt (Secondary Parameter)

Offers an advanced noise generator to produce different kinds of noises and clicks. When Shift is active, the Dirt dial determines the volume oft he noise. In the display, you can select the noise type by using the Select encoder.

- *Static* generates a static white noise.
- *Crackle* generates short random noise pulses, similar to a vinyl record crackling.
- *Geiger* generates short random noise pulses, similar to a Geiger counter.
- *Click* creates one short noise pulse.
- *Burst 1/2/3* generates also short noise pulses with different lengths.

Vel (Secondary Parameter)

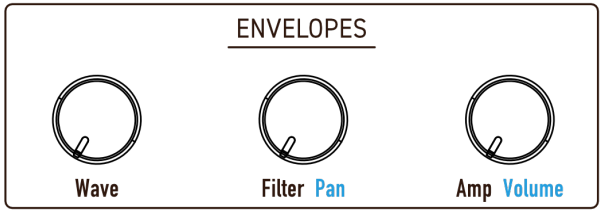
Determines the amount of influence the Filter envelope has on the cutoff frequency, based on key velocity. This parameter works similarly to the **Env Amnt** parameter with the difference that its strenght is velocity based. Use this feature to give a more expressive character to the sound. When you hit the keys smoothly, only few modulation is applied. When you hit them harder, the modulation amount also gets stronger.

Envelope Parameters

To edit the envelope parameters, you can use the dials in the **Envelopes** section or press the **Edit** button, use the **Select** encoder to select the desired *Wave Env*, *Filter Env*, *or Amp Env* in the display and press the encoder to enter the corresponding *Envelope Edit* section.

The 3 programmable ADSR envelopes allow you to manipulate sound parameters via rate or time based modulations. All envelopes offers the same parameters.

An ADSR envelope is started by pressing a key. It ascends to its maximum value at the rate determined by the **Attack** parameter. It then descends at the rate determined by the **Decay** value until it reaches the predetermined **Sustain** value. It remains at this value until the key is released. The envelope then descends to zero at the rate determined by the **Release** parameter.



Attack

Determines the attack rate or amount of time it takes for a signal to go from zero to maximum level.

Decay

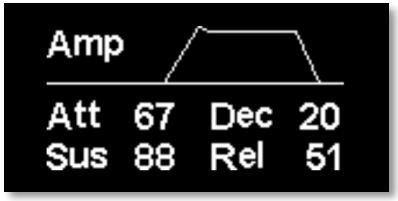
Determines the decay rate or amount of time it takes for a signal to reach the **Sustain** level.

Sustain

Determines the sustain level that is held until a note ends.

Release

Once the note has ended, the release phase begins. During this phase, the envelope fades to zero at the rate determined by the release value.



The Amplifier envelope in the display

The Amplifier Parameters

The parameters for the amplifier can be found as a secondary function in the envelope section.

Press **Shift** to get access to the panning and volume parameters.

Pan

The pan position parameter pans the sound in the stereo field. To give further movement to the sound, set this parameter to *+0.00* and apply some modulation to it e.g. via a LFO in the modulation matrix. In addition, you can use **Select** to choose one of the 5 random options (*Rand 1...5*). Here, the sound is placed randomly in the stereo field. The higher the Random number, the more intensive the random stereo panning. To disable random panning, choose *Fix* with the **Select** encoder.

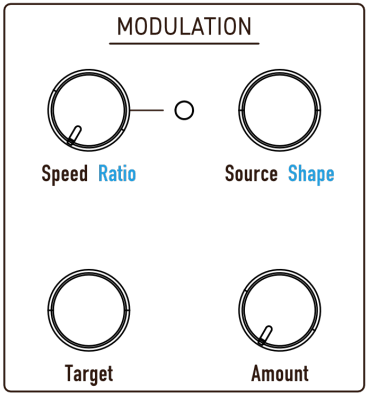
Volume

Determines the volume of the sound. You can also use **Select** to define the *Vel Amnt* (Velocity Amount), so that the volume will be affected by keyboard velocity. Use this option to give more expression to the sound. With a setting of *0*, velocity will have no effect on the volume.

Modulation Parameters

To enter the modulation matrix pages, you can use the **Source**, **Target** or **Amount** dials in the **Modulation** section or press the **Edit** button, use the **Select** encoder to select *Mod* in the display and press the encoder to enter the *Mod Matrix* section.

To edit the LFO parameters, you can use the Speed dial in the **Modulation** section to enter the *LFO Edit* section.



The LFOs

In addition to the main oscillators, Protein is equipped with two low frequency oscillators (LFOs) that can be used for modulation purposes. Each LFO generates a periodic waveform with adjustable frequency rate and shape.

Turn **Select** to switch between both LFOs for editing. Press on **Select** to enter a further display page with additional LFO parameters.

Speed (LFO 1 & 2)

Determines the frequency of the generated signal of the corresponding LFO. The current rate is also displayed as a blinking red LED right besides of the dial. Speed can be synchronized to Protein´s tempo (see **Free/Clocked** below).

Ratio (LFO 1 & 2)

Press **Shift** to use the **Ratio** parameter for the selected LFO. Determines the frequency of the generated signal of the corresponding LFO as musical subdivisions from 4/1 (which means 4 bars) to 1/64. Triplets and dotted values are also possible.

Shape (LFO 1 & 2)

Press **Shift** to use the **Shape** parameter for the selected LFO. Determines the type of waveform to be generated by the corresponding LFO (*Sine, Triangle, Pulse, Saw, Saw Up, Random, S & H* = Sample & Hold).

When in LFO mode, press **Select** to access additional LFO parameters.

LFO display page with additional LFO parameters

Free/Clocked

Free is the regular LFO mode where the frequency of a LFO is defined by Spped. When *Clocked* is selected, the LFO is synced to the Protein tempo (can be found in the Arp/Seq menu) or an external tempo (if active).

When **Clocked** is selected, the LFO phases of all voices are synced so that they sound as one LFO. This can be interesting when the LFO is applied to modulate filter cutoff or panning.

Global/Voice

When set to *Global*, the LFO phases of all voices are synced so that they sound as one LFO. This can be interesting when the LFO is applied to modulate **Cutoff**. If set to *Voice*, every note triggers its own LFO.

The Modulation Matrix

A modulation can be described as a signal-generating unit's influence upon a sound parameter. The terms used in this context are 'Source' and 'Target'. In addition to the various envelope modulations Protein offers 8 independent modulation assignments (slots) each with individual settings of **Source**, **Target**, and **Amount**. The Modulation Matrix is the key to the power of most Waldorf synthesizers like Protein, so start experimenting with it *right now*.

A complete table of all available sources and targets can be found in the Appendix.

How to setup a modulation

1) Select the desired slot by using the **Select** encoder.
2) Select the desired modulation source by using the **Source** dial.
3) Select the desired modulation target by using the **Target** dial.
4) Set the desired modulation amount by turning the **Amount** dial. You can set a positive or negative amount.

Source

Defines the modulation source.

Amount

Determines the amount of modulation applied to the modulation target. The resulting amplitude lies within the range of *0...+1.00* – if **Amount** is positive or *0...-1.00* – if **Amount** is negative.

Target

Defines the modulation target.

Mod Matrix slot 1: LFO2 modulates Wave 2 position

The Effects

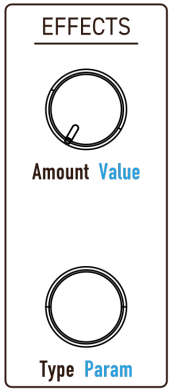
To edit the FX parameters, you can use the dials in the **Effects** section or press the **Edit** button, use the **Select** encoder to select *FX* in the display and press the encoder to enter the *FX Edit* section.

How to set up an effect

Use the Type dial to select the desired effect. The **Select** encoder allows you to switch between the two effects for selection or editing by turning and pressing.

Once you have selected the desired effect type, you can use the **Amount** control to adjust the effect intensity (except for the compressor).

Pressing **Shift** allows you to use the second function of the **Type** control (**Param**) to select all effect parameters of the chosen effect and adjust them accordingly with the **Value** control.



FX 1 slot: Chorus / FX2 slot: Reverb

Keep in mind that the every effect type can only be used one time. If used in slot 1, the same type isn´t available for slot 2 and vice versa.

Chorus

A Chorus effect is generated by using multiple modulated delay lines that generate slightly detuned copies of the input signal and mix it into the output signal. The result sounds like an ensemble of several simultaneous sounds, like a choir as opposed to a single voice – hence being called Chorus. The detuning is generated by an internal LFO that can be controlled in speed and depth.

For the typical Chorus effect sound the **Dry/Wet** control should be set to *0.50*.

Dry/Wet

This parameter controls the volume ratio between the original signal and the effect output. If set to *0.00*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. For typical Chorus the amount shall be 0.5. At maximum of *1.00*, more a vibrato effect will be heard especially with Stages set to *2*.

Depth

Sets the modulation depth of the Chorus effect.

Speed

Sets the LFO speed of the Chorus effect.

Feedback

Controls the feedback amount of the signal.

Center

Sets the phase offset of the modulation between left and right channel. Higher values lead to a wider stereo range.

Spread

Controls the phase position of the chorus signal. Lower settings produce a more resonant chorus effect.

Shape

Determines the shape of the LFO waveform, which is used for the chorus modulation. You can select between a sine and a triangle waveform.

Stages

Determines the numbers of stages for the Chorus. The Chorus offers four types with either two, four, six, or eight independent delay lines, where half of them are routed to the left and the others to the right input and output.

High-Cut

Reduces the high frequencies of the chorus signal.

Low-Cut

Reduces the low frequencies of the chorus signal.

Flanger

The flanger effect is very similar to the chorus effect, but uses much shorter delay lines. This generates the typical colorization of a flanging signal. With extreme settings you can hear a whistling sound which is very characteristic of a flanger effect.

For the typical Flanger effect sound the **Dry/Wet** control should be set to *0.50*.

Dry/Wet

This parameter controls the volume ratio between the original signal and the effect output. If set to *0,00*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal.

Depth

Sets the modulation depth of the Flanger effect.

Speed

Sets the LFO speed of the Flanger effect.

Feedback

Controls the feedback amount of the flanger signal.

Center

Sets the overall length of the delay lines

Phase Diff

Determines the phase difference between left and right channel of the delay modulation.

Shape

Determines the shape of the LFO waveform, which is used for the flanger modulation. You can select between a sine and a triangle waveform.

Phaser

Phase shifting is a sweeping effect that was first popularized in the 1960s. It adds motion and a swirling character to the sound. It works by splitting the incoming signal, changing the phase of one side, and recombining it with the unaffected signal. This creates a notch-comb filter that can be swept through the frequency spectrum, causing the signature 'whooshing' sound of the phase shifter. The sweep is caused when the phase of the affected half is modulated by an LFO, with the frequency determined by Speed. Depth sets the amplitude for the action of the filtering, while Feedback amplifies certain harmonics.

For the typical phaser effect sound the **Dry/Wet** control should be set to *0.50*.

Dry/Wet

This parameter controls the volume ratio between the original signal and the effect output. If set to *0,00*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum of *1.00*, the pure effect signal will be heard.

Depth

Sets the modulation depth of the Phaser effect.

Speed

Sets the LFO speed of the Phaser effect.

Feedback

Controls the feedback amount of the signal.

Center

Determines the center frequencies of the phasing filters.

Spread

Controls the distance between the phasing filter frequencies.

Phase Diff

Determines the phase difference between left and right channel of the phasing filter modulation.

Shape

Determines the shape of the LFO waveform, which is used for the phaser modulation. You can select between a sine and a triangle waveform.

Stages

Determines the numbers of stages that are used for the Phaser effect. The Phaser offers five phaser types with either two, four, eight, 12, or 16 independent delay lines, where half of them are routed to the left input and output and the others to the right input and output.

Model

Determines the Phaser model that is used. You can select between the Phaser from Waldorf's *Nave* and *PPG*.

Tremolo

Tremolo was the very first effect designed for electric guitars, even before reverb. It was of course predestined for the electronic sound generation of earlier synthesizers and quickly became a standard for all types of music. A tremolo effect based on a LFO that modulates the amplitude (level) of an audio signal to create a periodic movement oft he volume.

Depth

Sets the depth of the amplitude modulation.

Speed

Determines the modulation speed for the tremolo effect.

Phase Diff

Sets the phase offset of the modulation LFO between the left and right channels. Higher values lead to a wider stereo range.

Shape

Determines the shape of the LFO waveform, which is used for the tremolo modulation. You can select between a sine, a triangle and a square waveform.

Smooth

Determines the slew rate of the selected LFO waveform. The higher the setting, the smoother the slew rate.

Drive

Adds gain to a signal causing it to clip and distort. It introduces new harmonics that add a harsh edge to sounds.

Dry/Wet

Controls the volume ratio between the original signal and the effect output. If set to *0.00*, the dry signal is sent to the output only, no effect can be heard. Higher values increases the effect signal.

Amount

Determines the amount of saturation that is added to the signal. If set to *0.00*, no saturation will be added or, in other words, the signal will remain clean. Lower values will add some harmonics to the signal, resulting in a warm character. Increasing the value will bring in more and more distortion, suitable for harder leads and effects.

Type

Determines the character of the drive. The following drive curves are available:

- **PNP** generates a distortion based on a bipolar transistor.
- **Tube** simulates the asymmetric distortion of a tube circuit.
- **PickUp** simulates an electrostatic pickup. This drive type sounds very interesting, when the audio signal level is modulated.
- **Diode** generates a typical diode distortion.
- **Crunch** is a sinusoidal waveshaper. It generates FM-like sounds that can be extremely distorted.

Gain

Working with **Drive** mostly affects the level of the output signal. Use **Gain** to adjust the overall gain to your needs.

Compr

An Compressor reduces signals which exceed a certain **Threshold** level in volume by an adjustable **Ratio**. The speed of this level reduction is controlled by **Attack**, when the signal starts to exceed the threshold, and **Release**, when it drops below the threshold again.

Ratio

Sets the amount of gain reduction (compression) applied to signals above the set threshold. A ratio of 4:1 means that for every 4 dB the input level increases, the output level increases by 1 dB.

Threshold

Determines to which signal level the compressor will be working. Only signal levels above threshold are processed.

InGain

Determines the input gain of the incoming audio signal.

OutGain

Compensates for output gain loss caused by compression.

Auto Gain

Switch on the **Auto Gain** function for an automatic control of **Output Gain** when adjusting the **Threshold**.

Attack

Determines how fast the compressor responds to audio signals above the set **Threshold**. If the attack time is high, more of the transient parts of the signal passes through unprocessed.

Release

Sets the time after which the gain returns to its original level when the signal drops below the threshold.

Look Ahead

Higher **Look Ahead** values produce more accurate processing, but adds a certain amount of latency.

EQ

Protein offers a parametric equalizer to adjust the sound frequencies to your needs.

This equalizer features four bands with the following parameters:

Dry/Wet

This parameter controls the volume ratio between the original signal and the effect output. If set to *0.00*, the dry signal is sent to the output only so that no effect can be

heard. Higher values will increase the effect signal. At maximum setting of *1.00* the pure EQ signal will be heard.

Gain

Working with an equalizer mostly affects the level of the output signal. Use **Gain** to adjust the overall gain to suit your needs.

Low Freq

Controls the cutoff frequency of the low band. This shelf filter type looks like a normal or an inverted 'S' and it sounds and works similar to a lowpass filter with adjustable stop band attenuation or boost.

Low Gain

Controls the gain boost or cut of the low band.

Mid Freq / Mid 2 Freq

Controls the center frequency of the corresponding band. This bell filter looks like a normal or inverted bell and works and sounds similar to a bandpass or notch filter – again with variable boost or attenuation and also with variable width.

Mid Gain /Mid 2 Gain

Controls the gain boost or cut of the corresponding band.

Mid Q / Mid2 Q

Controls the quality or width of the corresponding band. Higher values result in a narrower band, lower values widen it.

High Freq

Controls the cutoff frequency of the high band. This shelf filter type looks like a normal or an inverted 'S' and it works and sounds similar to a high pass filter with adjustable stop band attenuation or boost.

High Gain

Controls the gain boost or cut of the high band.

Delay

A Delay is an effect that produces echoes of the input signal.

Dry/Wet

Controls the volume ratio between the original signal and the effect output. If set to *0.00*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *1.00* the pure effect signal will be heard.

Left

Sets the length of the Delay tap for the left channel in milliseconds.

Right

Sets the length of the Delay tap for the right channel in milliseconds.

Link

If this parameter is set to *On*, both delay signals work as one signal. **Left** is used to set the delay length; **Right** has no function.

Sync

Synchronizes the delay to the internal tempo of Protein.

Ratio Left

If **Sync** is activated, the delay length can be entered in musical values.

Ratio Right

If **Sync** is activated, the delay length can be entered in musical values.

Feedback

Controls the amount of signal that is routed back into the Delay line. Lower values, therefore, produce fewer echoes than higher values.

HighCut

Dampens the high frequencies produced by the Delay effect. This filter is routed before the feedback circuitry meaning that adjacent taps of the Delay will be dampened further. This creates the typical 'high frequency loss' that often happens in natural echoes. A minimal setting means that the signal isn't filtered, while higher settings filter the high frequencies of the feedback signal.

LowCut

Dampens the low frequencies produced by the Delay effect.

Reverb

The Reverb effect is probably the most widely used effect in music production. Protein's reverb effect is an addition to the sound to make it more expressive with a three-dimensional feel.

Dry/Wet

This parameter controls the volume ratio between the original signal and the effect output. If set to *0.00*, the dry signal is sent to the output only so that no effect can be heard. Higher values will increase the effect signal. At maximum setting of *1.00* the pure effect signal will be heard.

Time

Determines the reverb time. Lower settings simulate a normal room while higher settings simulate a big hall or church.

Color

Determines the spectral colorization of the reverb sound. Negative values dampen the higher frequencies while positive settings dampen the lower frequencies.

Mod Depth

Determines the intensity of the pitch modulation. If no pitch modulation is desired, set this parameter to *0.00.*

Mod Rate

Modulation allows you to enrich the reverb flag over subtle pitch modulations. **Mod Rate** determines the frequency of this pitch modulation.

Pre-Delay

Determines the delay between the direct sound and the reverb effect output. Lower settings connect the reverb more to the original signal while higher settings separate the effect signal to produce a more spacious sound.

The Flavour Dial

The further you turn this control, the more you influence the sonic behavior of the current sound. These changes do not happen completely randomly, but are methodical.

These are subtle parameter variations, primarily in the wave position and pitch.

Flavour adds all sort of micro variations to the sound. This includes small pitch variations of oscillator 1 depending on the flavour value. A **Pitchbend** value of 0 won't add any pitch variations.

But why the endless explanations? Just turn it and enjoy!

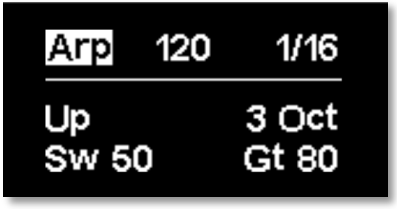
The Arpeggiator

To enter the arpeggiator section, press **Shift** and the **Arp/Seq** button and click on the **Select** encoder until you enter the *Arp* section. If the display shows *Arp*, the arpeggiator is active now.

An arpeggiator is a device that splits an incoming chord into its individual notes and repeats them rhythmically. In addition to the synthesis features Protein offers a programmable arpeggiator.

Use **Select** to switch between the following arpeggiator parameters. Press **Select** to select the desired parameter and use the encoder again to edit the parameter value.

To start the arpeggiator playback, play one or more notes on your keyboard.



The arpeggiator page

Bpm

Sets the overall tempo for the Arpeggiator in beats per minute. The default tempo is *120* bpm.

Bpm can be synced to an external tempo. The corresponding parameter can be found in the **Settings** menu.

Step Length

Determines the rate at which notes are triggered – that is to say, the speed at which the arpeggio is running. In addition to the **Bpm** parameter this gives you further control over the playback speed. You can specify a value in fractions of beats. For example, if **Step Length** is set to 1/8, the arpeggio plays eight notes per measure. Also, triplet and dotted value settings are possible.

Play Direction

Sets the direction that is used to play back the arpeggio. This parameter works in conjunction with **Octaves**:

- If *Up* is selected, the notes play from low to high keys. The arpeggio starts in the original octave and goes up to the highest octave (determined with **Octaves**). Then the arpeggio is repeated.

- If *Down* is selected, the notes play from high to low keys. The arpeggio starts in the highest octave (determined with **Octaves**) and goes down to the original octave. Then the arpeggio is repeated.
- If *Up-Down* is selected, the notes first play forward. After reaching the last note in the highest octave to play, the notes play backward and the octaves are transposed downward down to the first note in the original octave. Then the arpeggio is repeated.
- If *Up | Down* is selected, notes first play forward. After reaching the last note in the highest octave to play, this note is repeated and the notes play backward and the octaves are transposed downward down to the first note in the original octave. Then the arpeggio is repeated.
- If *Down-Up* is selected, the notes first play backward. The arpeggio starts in the highest octave (determined with **Octaves**). After reaching the first note in the original octave, the notes play forward and the octaves are transposed upward up to the last note in the highest octave to play. Then the arpeggio is repeated.
- If *Down | Up* is selected, the notes first play backward and the octaves are transposed downward. The arpeggio starts in the highest octave (determined with **Octaves**). After reaching the first note in the original octave, this note is repeated and the notes play forward and the octaves are transposed upward up to the last note in the highest octave to play. Then the arpeggio is repeated.
- If *Random* is selected, the notes will be played randomly.

Octaves

Determines the range of the single notes in octaves. When it is set to *1 Oct*, the notes will be played back in the same octave as originally entered. Higher octave values mean that the notes are repeated in higher or lower octaves. The octave in which the arpeggio starts is determined by the **Play Direction** parameter. If you play notes that span more than one octave, they are still kept and play back before the notes are transposed.

Swing (Sw)

Determines how much the timing affects an arpeggio step. If **Swing** is set to *50,* the arpeggio is played back without any shuffled timing. Settings from *51* to *95* increase the shuffling of the notes and creates a typical swing. You can also use settings below *0.50* to influence the timing.

Gate (Gt)

Determines the note length depending on the original length. The lower the value, the shorter the played notes.

Reset

Sets up a limit for the played notes. This is useful to create inclined measures. Set **Reset** to *8* or *16* to start an arpeggio at the beginning of a measure.

Pattern

With **Pattern** you can select one of the 16 internal rhythm patterns.

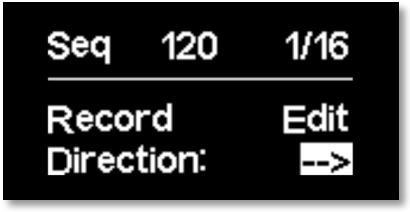
The Sequencer

To enter the sequencer section, press **Shift** and the **Arp/Seq** button and click on the **Select** encoder until you enter the *Seq* section. If the display shows *Seq*, the sequencer is active now.

Protein also contains a programmable step sequencer, where you can use up to 32 steps per measure. For each step the note and velocity can be defined.

Use **Select** to switch between the following sequencer parameters. Press **Select** to select the desired parameter and use the encoder again to edit the parameter value.

To start the sequencer playback, play one or more notes on your keyboard.



The Sequencer page

Bpm

Sets the overall tempo for the sequencer in beats per minute. The default tempo is *120* bpm.

Bpm can be synced to an external tempo. The corresponding parameter can be found in the **Settings** menu.

Step Length

Determines the rate at which notes are triggered – that is to say, the speed at which the sequence is running. In addition to the **Bpm** parameter this gives you further control over the playback speed. You can specify a value in fractions of beats. For example, if **Step Length** is set to 1/8, the arpeggio plays eight notes per measure. Also, triplet and dotted value settings are possible.

Record

If you select this option, you can automatically record notes to the sequencer steps. Each incoming MIDI note creates a step and then automatically moves to the next step. You don´t need to start the recording manually. If Record is active, the first note triggers the recording. Press Stop to end the step recording.

Length

Determines the length of the step sequence. A sequence must contain a minimum of one step and can go up to 32 steps.

Swing (Sw)

Determines how much the timing affects a sequence step. If **Swing** is set to *50,* the sequence is played back without any shuffled timing. Settings from *51* to *95* increase the shuffling of the notes and creates a typical swing. You can also use settings below *0.50* to influence the timing.

Gate (Gt)

Here you can determine the note length depending on the original length. The lower the value, the shorter the played notes.

Direction

Sets the direction that is used to play back the sequence:

- If → is selected, the notes run from the first step to the last. Then the sequence is repeated.
- If ← is selected, the notes run from the last step to the first. Then the sequence is repeated.

- If →← is selected, the notes run from the first step to the last, then back to the first note and so on.
- If →|← is selected, the notes run from the first step to the last. The last step is repeated and the sequence run back to the first note, which also is repeated and so on.
- If →| is selected, the notes run from the first step to the last. Then the sequence stops.

Reset

Determines the behavior of the Step sequencer when a new note is triggered:

- If *Start* is selected, the sequence always starts from the beginning when a new note is triggered.
- If *None* the sequence always continues where it was left at the last time it was stopped.
- If *Random* is selected, the sequence always starts from a random position when a new note is triggered.

Scale Root

Determines the tonic keynote for the selected scale. When **Scale** is set to *Chromatic*, no root note can be specified.

Scale

Determines numerous musical scales, e.g. *Chromatic*, *Major*, *Minor* or *Lydian dominant*. When set to *Chromatic* the sequence is played as entered. Any other Scale is defines the played notes, that are automatically moved to the nearest scale note. This works in conjunction with the **Scale Root** parameter.

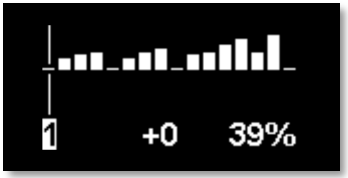
Pattern

With **Pattern** you can select one of the 16 internal sequence patterns.

The Edit Option

No, we didn't forget the Edit parameter, but deliberately placed it at the end of this chapter.

Behind this option you will find a graphical editor for the step sequencer, which is controlled via the display and allows visual control of the current step sequence.



The Step Sequencer edit page

Here is, how it works:

- In the upper area of the display, you can see all used steps shown as bar representation.
- In the lower are of the display you see three values: The first shows the current step position, the second value the pitch of the corresponding step and the third one the velocity in percent. In the display graphic above, the first step is selected with a pitch of +0 (corresponds to the played note) and a velocity of 39%.
- To edit the steps, use the **Select** encoder to select one of the three values, press it and edit the value.
- If you edit a preset with a step sequence, one or more steps are shown, but you can also start with an empty sequence and edit the steps by your desire.

ⓘ To leave the Edit page, press **Shift** + **Arp/Seq**.

The Settings Options

To enter the Settings options, press the **Settings** button and use the **Select** encoder to scroll through the desired setting pages.

MIDI Settings

Omni Mode

Omni is MIDI mode in which MIDI message receiver will receive and act on any data that arrives on any MIDI channel. If you want your Protein always receives MIDI data on all channels, you should set this mode to *On*.

Receive Channel

Determines the basic send and receive channel for the device. This setting is valid for all sounds in a single Layer and defines the first receive channel when using the *Midi Split* option in Multi Mode.

Send Channel

Determines the MIDI channel on which the Protein sends MIDI data via USB-C, e.g., to a DAW.

Keep in mind that only those dials send MIDI CC data for which this data has been defined in the MID Control Change Mappings (see corresponding chapter later in this manual).

Device ID

Defines the device identification number for system exclusive data transmission. Transmission will only be executed successfully if the sender and receiver setting coincide. The default setting is *0*. Device ID 127 is a so-called broadcast ID that addresses all connected Protein units. Protein can receive this from other devices, but cannot send it itself.

Pitch Settings

Transpose

Allows to set a global pitch transpose for all sounds.

Master

Determines the Protein's overall master pitch. The value specified here is the reference pitch for MIDI note A3 (440 Hz). The default setting is *0 cents*, which is commonly used by most instruments.

⚠ You should only change this setting if you really know what you're doing. You will have to adjust all your other instruments, too. Don't forget to set it back again!

Display Settings

Brightness

Determines the brightness of the display.

LED Settings

Brightness

Controls the brightness of all LEDs.

Pot Settings

Mode

There are 2 modes available for the knob behavior:

- *Relative* means that a parameter value is changed from its current value by the relative movements of the dial. Over time the algorithm will match the parameter value more and more with the physical dial position.
- *Absolute* means that a parameter value change jumps directly to the value that is edited.

Sync Settings

Source

Determines how Protein reacts to incoming MIDI Clock messages.

- *Intern* means that Protein doesn't react to incoming MIDI Clock. Protein only syncs to its own tempo base that is set with the **BPM** parameter in Arp/Seq display menu.
- *Extern* means that Protein automatically syncs to incoming MIDI Clock if it is sent by an external device like a DAW, a sequencer or a drum machine.

MPE Settings

Status

Here, you can activate/deactivate the MPE status for Protein. If active, the following MPE options are supported:

- Per-Note Pitch Bend with the range of the MPE standard (+/- 48 semitones). To disable this per-note Pitch bend effect, set the **Pitch Bend** parameter in Glide screen to *0*.
- MPE Y-Axis and poly aftertouch as sources in the modulation matrix.

Max Channel

Here you can determine the number of used channels for MPE purposes.

Some Information about MPE

MIDI Polyphonic Expression (or MPE) is a method of using MIDI to enable expressive electronic musical instruments to control multiple dimensions of sound polyphonically. In MIDI, channel-wide messages (such as pitch bend, CCs, and channel aftertouch) are applied to all notes being played on a single channel; therefore, in MPE each note is assigned its own channel so that those messages can be applied to each note individually.

An MPE instrument typically has three dimensions of expression/control: left-right (X-axis); front-back (Y-axis); and pressure (Z-axis) – each axis can be mapped to various parameters of sound and be applied on a per-note basis.

Each MPE dimension is mapped to the Protein sound engine as follows:

- Left-right / X-axis (sent as MIDI Pitch Bend) – This controls the pitch of the note, with the standard MPE range of +/-48 semitones.
- Front-back / Y-axis (sent as MIDI CC 74) – This controls the destination parameter set for the modulation source *MPE Y*.
- Pressure / Z-axis (sent as MIDI Channel Aftertouch) – this controls the Poly Aftertouch (*Poly AT*) modulation assignments.

Appendix

Updating the Firmware

All software updates come in the form of a UF2 file that can be directly use for updating the Protein firmware. The fastest way to get this file is by downloading it from our website at:

waldorfmusic.com/my-hardware

You can check your current firmware version by pressing the **Shift** + **Settings** buttons.

To update Protein's firmware:

- Download the lastest update from the MyHardware section in your MyWaldorf account. You need the file named PROTEIN.UF2 from the archive.
- Make sure, the Protein Power switch is set to off.
- Connect Protein via USB-C cable to a computer.
- Hold the **Shift** button while putting the power switch to *On*.
- The display shows „*Protein Bootloader / Waiting…*".
- On your computer, Protein will appear as an external disk drive.
- Use your file manager like Finder on macOS or Explorer on Windows to drag the file PROTEIN.UF2 to copy it to the external drive called PROTEIN.
- If your file manager asks if you like to overwrite this file, then confirm with *Yes*.
- The display will show the update progress. This should take a few seconds.
- When the update has been completed the display shows *Ready*.
- Now power Protein off and on again to start with the new firmware update.

Do not turn off Protein while the firmware update is in progress!

MIDI Control Change Mapping

Protein allows you to map parameters to incoming control change data.

How to map MIDI CC data?

- Press **Shift** + **Settings** and use the **Select** encoder to select *Map CC* from the display menu. Confirm by pressing the **Select** encoder.
- The last edited parameter will be mapped to the next incoming CC data send by an external MIDI controller.
- Select *Cancel* to exit the Mapping option.
- To perform a new mapping, turn the desired parameter dial and start again with the first bullet point above.

How to check and delete your mapped MIDI data?

- Press **Shift** + **Settings** and use the **Select** encoder to select *Mappings* from the display menu. Confirm by pressing the **Select** encoder.
- Use the **Select** encoder to scroll through your MIDI CC mappings.
- If you want to delete a mapping, press the **Select** encoder to delete it and finally confirm by pressing again.
- If no MIDI CC mapping was made, *Nothing Mapped* is displayed.

Modulation Sources and Targets

Sources

Source:	Description
off	No modulation
Wave Env	Wave Envelope Signal
Filter Env	Filter Envelope Signal
Amp Env	Amplifier Envelope Signal
LFO1	LFO 1 Signal
LFO1*MW	LFO 1 Signal shaped by Modwheel
LFO1*AT	LFO 1 Signal shaped by Aftertouch
LFO2	LFO 2 Signal
LFO2*MW	LFO 2 Signal shaped by Modwheel
LFO2*AT	LFO 2 Signal shaped by Aftertouch
Mod Wheel	MIDI modulation wheel (CC #1)
Pitch Bend	MIDI pitch bend signal
Note PB	Per-note pitch (only for MPE)
Ch Press	MIDI channel pressure
Poly AT	MIDI polyphonic pressure
MPE Y	Y-axis (only for MPE)
Pedal	MIDI sustain pedal (CC #64)
Expression	MIDI expression control (CC#11)
Breath	MIDI breath control (cCC #2)
CC22...CC31	MIDI CC22 to CC31
Keytrack	MIDI note number
Velocity	MIDI Velocity
Rel Velo	MIDI note release velocity
Random	Random unipolar mod signal
Random Bipol	Random bipolar mod signal
Constant	Constant modulation signal

Targets

Targets:	Description:
Off	No modulation
Wave 1	Wave position for Osc 1
Wave 2	Wave position for Osc 2
Pitch	Global pitch of both Oscillators
O1 Pitch / O2 Pitch	Pitch of Oscillator 1/2
O1 Vol / O2 Vol	Level of Oscillator 1/2
Dirt	Dirt volume
Cutoff	Filter Cutoff Frequency
Resonance	Filter Resonance
Volume	Amplifier output volume
Pan	Panning

LFO1 / LFO2 Speed	Speed of LFO 1/2
Wave Env Att	Attack rate of Wave Envelope
Wave Env Dec	Decay rate of Wave Envelope
Wave Env Sus	Sustain level of Wave Envelope
Wave Env Rel	Release rate of Wave Envelope
Filter Env Att	Attack rate of Filter Envelope
Filter Env Dec	Decay rate of Filter Envelope
Filter Env Sus	Sustain level of Filter Envelope
Filter Env Rel	Release rate of Filter Envelope
Amp Env Att	Attack rate of Amp Envelope
Amp Env Dec	Decay rate of Amp Envelope
Amp Env Sus	Sustain level of Amp Envelope
Amp Env Rel	Release rate of Amp Envelope

Protein Wavetables

No.	Wavetable	No.	Wavetable
01	Resonant	33	SawSync1
02	Resonant2	34	SawSync2
03	Mallet	35	SawSync3
04	SqrSweep	36	PulSync1
05	Bellish	37	PulSync2
06	PulSweep	38	PulSync3
07	SawSweep	39	SinSync1
08	MelloSaw	40	SinSync2
09	Feedback	41	SinSync3
10	Add Harm	42	PWM Pulse
11	Reso 3 HP	43	PWM Saw
12	Wind Syn	44	Fuzz Wave
13	HighHarm	45	Distortd
14	Clipper	46	HeavyFuz
15	OrganSyn	47	Fuzz Sync
16	SquareSaw	48	K+St.#1
17	Formant1	49	K+St.#2
18	Polated	50	K+St.#3
19	Transient	51	from1to5

20	Electr.P	52	19/20
21	Robotic	53	WTrip1
22	Strong H	54	WTrip 2
23	PercOrgan	55	WTrip 3
24	ClipSwep	56	WTrip 4
25	ResoHrms	57	MaleVoice
26	2 Echoes	58	Low Piano
27	Formant2	59	ResoSweep
28	FmntVocl	60	Xmas Bell
29	MW Sync	61	FM Piano
30	MicroPWM	62	Fat Organ
31	Glassy	63	Vibes
32	SquareHP	64	Chorus 2

Wavetable Synthesis

The Protein sound generation is based on wavetable synthesis.

A wavetable is a table consisting of single waveforms, each with its own special sound character. The main difference between wavetable synthesis and other sound-generation principles is the ability to not only play one waveform per oscillator but also to step through other waves in the wavetable employing different modulations, thereby creating so-called wavetable sweeps. The results can be dramatic – much more so than anything sample-based systems could ever produce.

This principle offers powerful capabilities, such as:

- Each note on a keyboard can access a different wave of a wavetable.
- Different waves can be played depending on key velocity.
- An LFO can modulate the position within the wavetable. You can create subtle to drastic sound changes.
- User-selected controllers, such as the mod wheel, can change the position within the wavetable. When you turn the wheel while playing a chord, each note's wave will be modified instantly.

You should keep the following sentence in mind:

A wavetable is a list of two or more (up to 64) waves, between which you can move at will.

As soon as you play a note, the envelope advances the position through the wavetable, generating different waveforms over time.

The decay stage would move through these waves in the opposite direction prior to holding a certain wave during its sustain stage. When you release the note, the envelope continues the move back through the waves to the starting point.

Most wavetables are created so that they start with a hollow wave at position 0 and go through increasingly brighter waves up to maximum position. This results in a behavior similar to a low pass filter so that they can be conveniently controlled by wave envelope.

You can also use an LFO to modulate the wavetable position and, depending on the selected **LFO Shape**, you might get a wave scan that goes back and forth (triangle), in only one direction followed by a hard reset to the origin (sawtooth) or between only two waves (square).

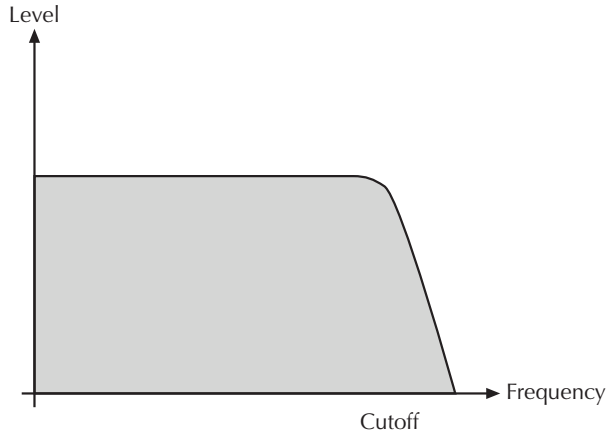
If you like the sound and possibilities of wavetable synthesis, you should try out the our M Synthesizer or our virtual instruments Waldorf PPG Wave 2.V / Wave 3.V.

Filter Introduction

Once the oscillator signal leaves the mixer it is sent to the filter. The filter is a component that have significant influence on Protein's sound characteristics.

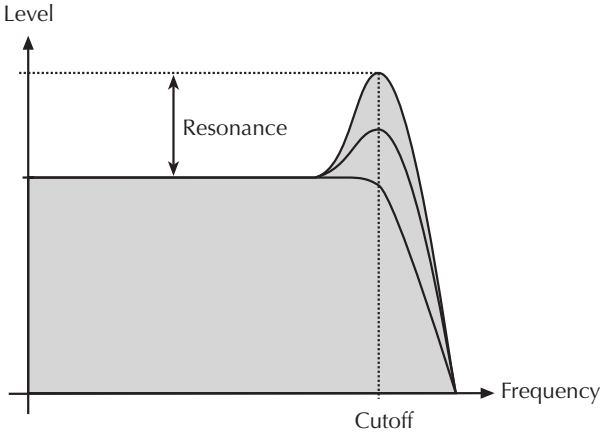
Now, we'll explain the basic function of a filter discussing the type used most commonly in synthesizers: the lowpass filter.

The lowpass filter type dampens frequencies that lie above a specified cutoff frequency. Frequencies below this threshold are hardly affected. The frequency below the cutoff point is called the pass band range; the frequencies above are called the stop band range. Protein's filter dampens frequencies in the stop band with a certain slope. The slope is 12dB per octave. This means that the level of a frequency that lies an octave above the cutoff point will be 12dB less than those frequencies of the signal that fall into the pass band. The following image illustrates the basic principle of a low pass filter:



To give you an idea of the extent of damping, consider this example of a lowpass filter: a reduction of 12dB reduces the original level one octave above the cutoff point by approx. 94%. The damping factor two octaves above the cutoff point reduces the original level by more than 99%, which in most cases means this portion of the signal is no longer audible.

Protein's filter also features a resonance parameter. Resonance in the context of a low, band or high pass filter means that a narrow frequency band around the cutoff point is emphasized. The following image illustrates the effect of the resonance parameter on the filter's frequency curve:



If the resonance is raised to a great extent then the filter will begin self-oscillation – i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.

Glossary

Aftertouch

The majority of contemporary keyboards are capable of generating aftertouch messages. On this type of keyboard, when you press harder on a key you are already holding down, a MIDI Aftertouch message is generated. This feature makes sounds even more expressive (e.g. through vibrato).

Aliasing

Aliasing is an audible side effect arising in digital systems as soon as a signal contains harmonics higher than half the sampling frequency.

Amount

The extent to which modulation influences a given parameter.

Amplifier

An amplifier is a component that influences the volume level of a sound via a control signal. This control signal is often generated by an envelope or an LFO.

Arpeggiator

An arpeggiator is a device that splits an incoming chord into its individual notes and repeats them rhythmically. Most arpeggiators feature different sequence modes to cover a wide range of applications. Typical controls for an arpeggiator are the octave range, the direction, the speed and the clock, which means the repetition interval. Some arpeggiators also feature preset or programmable rhythm patterns.

Attack

An envelope parameter. 'Attack' is a term that describes the ascent rate of an envelope from its starting point to the point where it reaches its highest value. The Attack phase is initiated immediately after a trigger signal is received – i.e. after you play a note on the keyboard.

Clipping

Clipping is a sort of distortion that occurs when a signal exceeds its maximum value. The curve of a clipped signal is dependent of the system where the clipping takes place. In the analog domain, clipping effectively limits the signal to its maximum level. In the digital domain clipping is similar to a numerical overflow and so the polarity of the signal's part above the maximum level is negated.

Coffee Filter

A coffee filter is a coffee-brewing utensil, usually made of disposable paper. It is part of an essential toolkit for survival when working with the Waldorf Iridium Core.

Control Change (Controllers)

MIDI messages enable you to manipulate the response of a sound generator to a significant degree.

This message essentially consists of two components:

• The Controller number, which defines the element to be influenced. It can be between 0 and 120.

• The Controller value, which determines the extent of the modification.

Controllers can be used for effects such as slowly swelling vibrato, changing the stereo panorama position and influencing filter frequency.

Decay

'Decay' describes the descent rate of an envelope once the Attack phase has reached its zenith and the envelope drops to the level defined for the Sustain value.

Envelope

An envelope is used to modulate a sound-shaping component within a given time frame so that the sound is changed in some manner. For instance, an envelope that modulates the cutoff frequency of a filter opens and closes this filter so that some of the signal's frequencies are filtered out. An envelope is started via a trigger – usually a fixed trigger. Normally the trigger is a MIDI Note. The classic envelope consists of four individually variable phases: Attack, Decay, Sustain, and Release. This sequence is called an ADSR envelope. Attack, Decay, and Release are time or slope values, and Sustain is a variable volume level. Once an incoming trigger is received, the envelope runs through the Attack and Decay phases until it reaches the programmed Sustain level. This level remains constant until the trigger is terminated. The envelope then initiates the Release phase until it reaches the minimum value.

Filter

A filter is a component that allows some of a signal's frequencies to pass through it and dampens other frequencies. The most important aspect of a filter is the filter cutoff frequency. The most common type is the lowpass filter. A lowpass filter dampens all frequencies above the cutoff frequency.

Filter Cutoff Frequency

The filter cutoff frequency is a significant factor for filters. A lowpass filter dampens the portion of the signal that lies above this frequency. Frequencies below this value are allowed to pass through without being processed.

LFO

LFO is an acronym for Low-Frequency Oscillator. The LFO generates a periodic oscillation at a low frequency and features variable waveshapes. Similar to an envelope, an LFO can be used to modulate a sound-shaping component.

Low Pass Filter

Synthesizers are often equipped with a lowpass filter. A lowpass filter dampens all frequencies above its cutoff frequency. Frequencies below the cutoff point are not affected.

MIDI

The acronym MIDI stands for Musical Instrument Digital Interface. It was developed in the early ’80s so that diverse types of electronic musical instruments by different manufacturers could interact. At the time a communications standard for different devices did not exist, so MIDI was a significant advance. It made it possible to link any MIDI-equipped device with another through simple, uniform connections.

Essentially, this is how MIDI works: One sender is connected to one or several receivers. For instance, if you want to use a computer to play the Iridium Core, then the computer is the sender and the Iridium Core acts as the receiver. With a few exceptions, the majority of MIDI devices are equipped with two or three ports for this purpose: MIDI In, MIDI Out and in some cases, MIDI Thru. The sender transfers data to the receiver via the MIDI Out jack. Data is sent via a cable to the receiver's MIDI In jack.

MIDI Thru has a special function. It allows the sender to transmit to several receivers. It routes the incoming signal to the next device without modifying it. Another device is simply connected to this jack, thus creating a chain through which the sender can address a number of receivers. Of course it is desirable for the sender to be able to address each device individually. Consequently, there is a rule that is applied to ensure each device responds accordingly.

MIDI Channel

This is a very important element of most messages. A receiver can only respond to incoming messages if its receive

channel is set to the same channel as the one the sender is using to transmit data. Consequently, the sender can address specific receivers individually. MIDI Channels 1 through 16 are available for this purpose.

MIDI Clock

The MIDI Clock message determines the tempo of a piece of music. It serves to synchronize processes based on time.

Modulation

Modulation influences or changes a sound-shaping component via a modulation source. Modulation sources include envelopes, LFOs, or MIDI messages. The modulation destination is a sound-shaping component such as a filter or an amplifier.

Note On / Note Off

This is the most important MIDI message. It determines the pitch and velocity of every generated note. The time of arrival is simultaneously the start time of the note. Its pitch is derived from the note number, which lies between 0 and 127. The velocity lies between 1 and 127. A value of 0 for velocity is similar to 'Note Off'.

Panning

The process of changing the signal's position within the stereo panorama.

Pitch Bend

Pitch bend is a MIDI message. Although pitch bend messages are similar in function to control change messages, they are a distinct type of message. The reason for this distinction is that the resolution of a pitch bend message is substantially higher than that of a conventional Controller message. The human ear is exceptionally sensitive to deviations in pitch so the higher resolution is used because it relays pitch bend information more accurately.

Program Change

These are MIDI messages that switch sounds. Program numbers 1 through 128 can be changed via program change messages.

Release

An envelope parameter. The term 'Release' describes the descent rate of an envelope to its minimum value after a trigger is terminated. The Release phase begins immediately after the trigger is terminated, regardless of the enve-

lope's current status. For instance, the Release phase may be initiated during the Attack phase.

Resonance

Resonance is an important filter parameter. It emphasizes a narrow bandwidth around the filter cutoff frequency by amplifying these frequencies. This is one of the most popular methods of manipulating sounds. If you substantially increase the resonance, to a level where the filter begins self-oscillation then it will generate a relatively clean sine waveform.

Sustain

An envelope parameter. The term 'Sustain' describes the level of an envelope that remains constant after it has run through the Attack and Decay phases. Sustain lasts until the trigger is terminated.

Trigger

A trigger is a signal that activates events. Trigger signals are very diverse. For instance, a MIDI note or an audio signal can be used as a trigger. The events a trigger can initiate are also very diverse. A common application for a trigger is to start an envelope.

Volume

The term describes a sound's output level.

USB

The Universal Serial Bus (USB) is a serial bus system to connect a computer with an external device. USB equipped devices can be plugged together while active. The recognition is made automatically.

Wave

In this context, a Wave is a digital-memorized reproduction of one single wave pass insofar as it is identical to a sample that is looped after one single wave pass. In contrast to the samples in a sampler, all waves in Waldorf Wavetable synthesizers have the same lengths and are played back in the same pitch.

Wavetable

One oscillator shape in the Iridium Core is based on waveform sets called wavetables. You should think of these as a sequence of up to up to 128 single waves. This can be played back in a static way or played through dynamically, which results in the typically interesting sound transformations. If the waves do not differ much, then the wave-

table will probably sound smooth and pleasant. If they have a completely different structure then this will result in wild spectral changes.

Technical Data

Power Supply

USB Bus Power (either by optional USB-C power supply or computer USB port)	500 mA

Dimensions and Weight

Width:	252 mm
Depth:	170 mm
Height (including controls):	48 mm
Total weight:	0.9 kg

Declaration of Conformity

General Compliance Information

This product meets the key requirements outlined in the European Directives 2014/53/EU and/or 2014/30/EU (Low Voltage Directive: 2014/35/EU; General Product Safety Directive: 2001/95/EC).

A complete copy of the EU Declaration of Conformity is available upon request. Please contact us at the following email address for further details: **support@waldorfmusic.com**

FCC Compliance Advisory

Please note that any modifications or alterations made to this device that are not explicitly approved by the responsible compliance authority may result in the loss of permission to operate the equipment.

This product has undergone testing and has been confirmed to meet the criteria for a Class B digital device, as outlined in Section 15 of the FCC regulations. These standards are intended to offer a reasonable level of protection against radio frequency interference in residential settings.

The equipment emits and utilizes radio frequency signals which, if not properly installed and operated according to the provided instructions, could negatively impact radio or television signals. While such interference cannot be guaranteed in every situation, the following actions may help mitigate it:

- Adjust or move the reception antenna,
- Relocate the device,
- Increase the distance between the device and affected equipment,
- Plug the unit into a power outlet on a different circuit than the receiver,
- Ensure all cables are adequately shielded; use ferrite cores or chokes where necessary,
- Consult with your product vendor or a qualified radio/TV technician for additional guidance.

This device adheres to the FCC's Part 15 regulations and may only operate under the following conditions: (1) it must not generate disruptive interference, and (2) it must accept any interference it receives, even if this results in undesired functionality.

FCC Exposure Information

The device complies with the FCC guidelines for exposure to radio frequency energy applicable to environments without special restrictions. Maintain a minimum space of 20 cm (approximately 8 inches) between the RF transmitter and the user's body during setup and operation to ensure compliance.

Product Support

Service & Repair

Protein does not contain any user-serviceable parts. If your Protein develops a fault or needs servicing, please refer to a Waldorf authorized service center. For more information, please ask your musicians dealer or your local Waldorf distributor.

Any Questions?

If you have any questions about your Waldorf product, feel free to contact us. We're here to help.

ⓘ You should definitely read our FAQ, perhaps your question will be answered there.

① Use the support page at our website. This is the most efficient and fastest way to find our FAQ or to contact us. Your questions will be forwarded immediately to the resident expert and you will quickly receive an answer.

support.waldorfmusic.com

② Although we are in the new millennium, you can also write us a letter. It will take a bit longer, but it is just as dependable as an email.

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