RelayerForAll 2.0

User guide

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RelayerForAll 2.0 sits between a controller – a Lumatone, an Exquis or any MIDI piano keyboard – and an MPE synth or DAW. It retunes every note as it is played and sends it on as MPE, so nothing has to be mapped key by key or loaded into the synth, and tunings can be changed, adjusted and morphed during performance. This guide explains how to install RelayerForAll and connect it to your instruments, and then works through each part of its window in turn: tuning, pitch layout, colour layout, expression, piano keyboards, and presets and the set list. It ends with where your files are kept and what to check if something is not right.

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1 Getting started

RelayerForAll (Relayer for short) takes the notes from your controller, retunes each one, and sends them on as MPE to your synth or DAW. On the Lumatone and the Exquis it also sets the keys' colours to match the tuning and layout.

What you need

- **A controller:** a Lumatone, an Exquis, or any MIDI keyboard (choose Piano for a keyboard).
- **A synth that can be retuned per note:** an MPE synth or a DAW with MPE, software or hardware, or a multitimbral synth with one voice per MIDI channel (Pianoteq, for example).
- **A computer:** a Mac (Apple silicon or Intel) or a PC with 64-bit Windows.
- **For a synth or DAW on the same computer, a virtual MIDI port** to carry Relayer's output to it: on macOS the IAC Driver, on Windows a virtual MIDI cable such as loopMIDI (section 2 shows how to set one up).

Installing on macOS

1. Open `RelayerForAll-2.0.0-macOS.dmg`.

2. Drag RelayerForAll into Applications. The app is signed and notarized by Apple, so it opens like any other.

Installing on Windows

1. Run `RelayerForAll-2.0.0-Windows-Setup.exe`. The installer is not code-signed, so Windows may first show a warning: choose More info, then Run anyway.
2. It installs for your user account without administrator rights, with a Start-menu shortcut and, if you tick it, a desktop shortcut.
3. On a PC that lacks Microsoft's Visual C++ runtime, the installer adds it, and Windows asks for permission.

To uninstall on Windows, use Settings → Apps. Your presets and settings are kept (see section 10).

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2 Connecting your controller and synth

Choose your instrument with the tabs at the top (Lumatone, Exquis or Piano), then set the ports and the MPE settings in the **MIDI & MPE** section. These are set-and-forget settings: once they work, you can close the section.

A virtual MIDI port. A hardware synth takes Relayer's output through a MIDI interface. A soft synth or DAW on the same computer needs a virtual MIDI port: Relayer sends to it, and the synth or DAW listens to it. Ableton's guide Setting up a virtual MIDI bus covers both systems, and its advice applies whichever DAW you use.

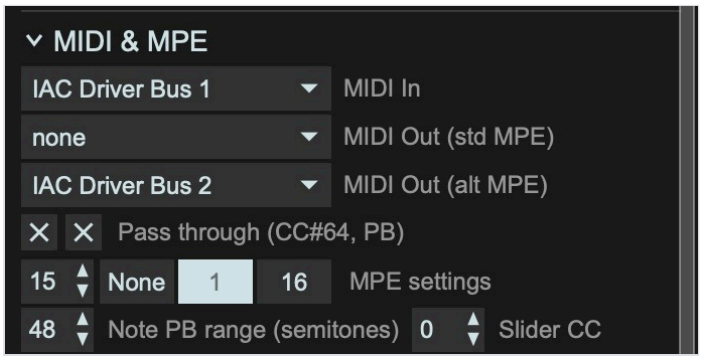
- **macOS** has one built in, the IAC Driver (Apple's guide):
  1. Open Audio MIDI Setup (in Applications → Utilities) and choose Window → Show MIDI Studio.
  2. Double-click IAC Driver and tick Device is online. A bus is there already; the + button adds more.
  3. In Relayer, choose the bus as MIDI Out; in the synth or DAW, choose it as the MIDI input.
- **Windows** has none built in. The free loopMIDI, by Tobias Erichsen, is a common choice:
  1. Install loopMIDI and click + to create a port. The port exists while loopMIDI is running.
  2. In Relayer, choose the port as MIDI Out; in the synth or DAW, choose it as the MIDI input.

In the DAW, take MIDI input from the virtual port only, not also from the controller itself, or each note sounds twice, the second time untuned.

1. **MIDI In:** the port your controller is on (for example, the Lumatone or Exquis over USB).
2. **MIDI Out (std MPE):** the port to your synth or DAW, in standard MPE. Simultaneous notes may share a MIDI note number on different channels, which gives the most natural piano-roll recordings.
3. **MIDI Out (alt MPE):** a second output for DAWs and synths that cannot handle two notes with the same note number at once (Ableton Live and Arturia's PolyBrute, for example). It avoids repeated note numbers; recordings play correctly but are less tidy to edit. Set either output to none if you do not need it, and never set both to the same port (Relayer warns you if you do).
4. **Channel count (the first box in MPE settings):** how many MIDI channels the synth uses for notes, usually 15 for MPE soft synths; some hardware synths need fewer.
5. **MPE manager channel (None | 1 | 16 in MPE settings):**
   - **1** for most MPE synths, including those in Ableton Live (enable MPE for the port in Live's settings, and in the synth if it asks) and Logic set to MIDI Mono Mode with common base channel 1;
   - **16** for Logic with common base channel 16;

- **None** for multitimbral synths such as Pianoteq (1 and 16 also work, with one voice fewer).

6. Note **PB range:** must match the synth's note pitch bend range for MPE synths, or its pitch bend range for multitimbral synths. If they differ, every note is out of tune. MPE synths usually default to 48 semitones. In Pianoteq, set Pitch Bend Range to −4800 to 4800 cents (Options → MIDI).
7. **Pass through (CC#64, PB):** Relayer always sustains notes itself; the left switch also sends the sustain pedal to the synth, for the synth's own pedal effects (Pianoteq's damper resonance, for example). The right switch passes the controller's pitch wheel on, bending every note, on the manager channel as MPE requires.
8. **Slider CC:** a controller number, for example an expression pedal's, that moves the tuning slider from end to end (section 4); 0 for none.



The MIDI & MPE section.

Checking it works. The **Last note** line under the instrument tabs shows the last key as it arrives (note number, channel, velocity) and as it leaves (pitch as a MIDI note number with cents as decimals, channel, velocity). If notes arrive but sound wrong, check the Note PB range first.

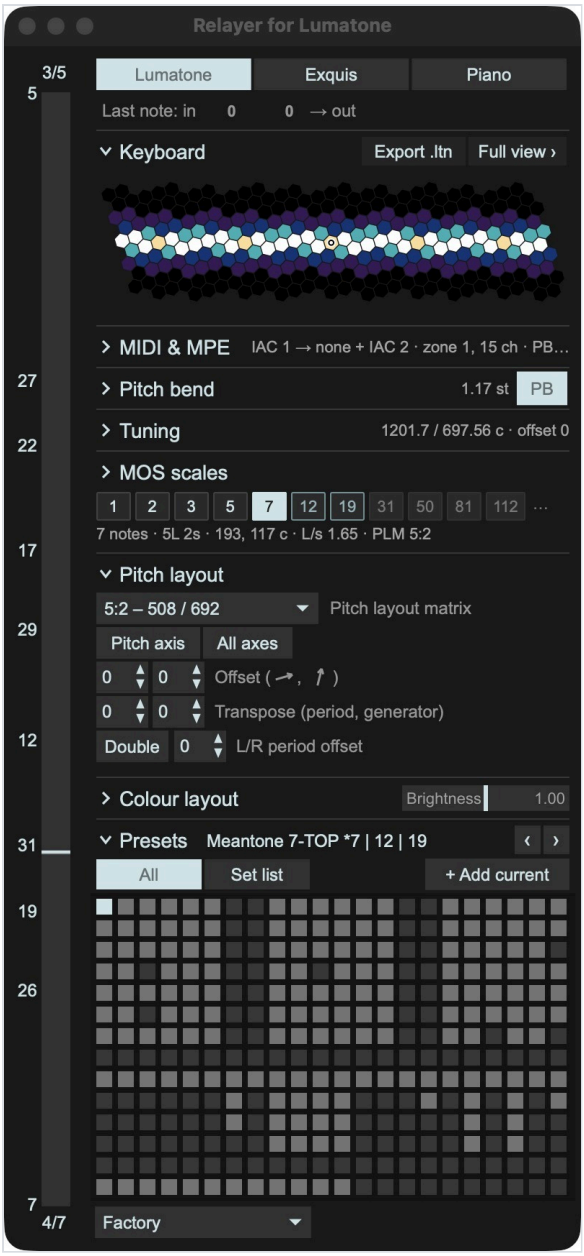
Relayer also passes on release velocity, and notes you hold keep sounding through a change of preset, following the new tuning.

3 The window

Relayer is one tall, narrow column of controls, with the tuning slider down its left edge. A full view of the keyboard opens to the right when you want it.

From the top down

1. **Instrument tabs** (Lumatone, Exquis, Piano), with the Last note line under them.
2. **Keyboard:** a small picture of your keyboard in its colours, with Full view › (and, for the Lumatone, Export .ltn) on its header.
3. **MIDI & MPE** (section 2).
4. **Pitch bend:** expression (section 7).
5. **Tuning** (section 4).
6. **MOS scales:** the scales your tuning implies (section 4).
7. **Pitch layout** (section 5).
8. **Colour layout** (section 6; not shown for the Piano).
9. **Presets** (section 9).



The main window: the Keyboard picture, closed sections with their summaries, Pitch layout, and the preset grid.

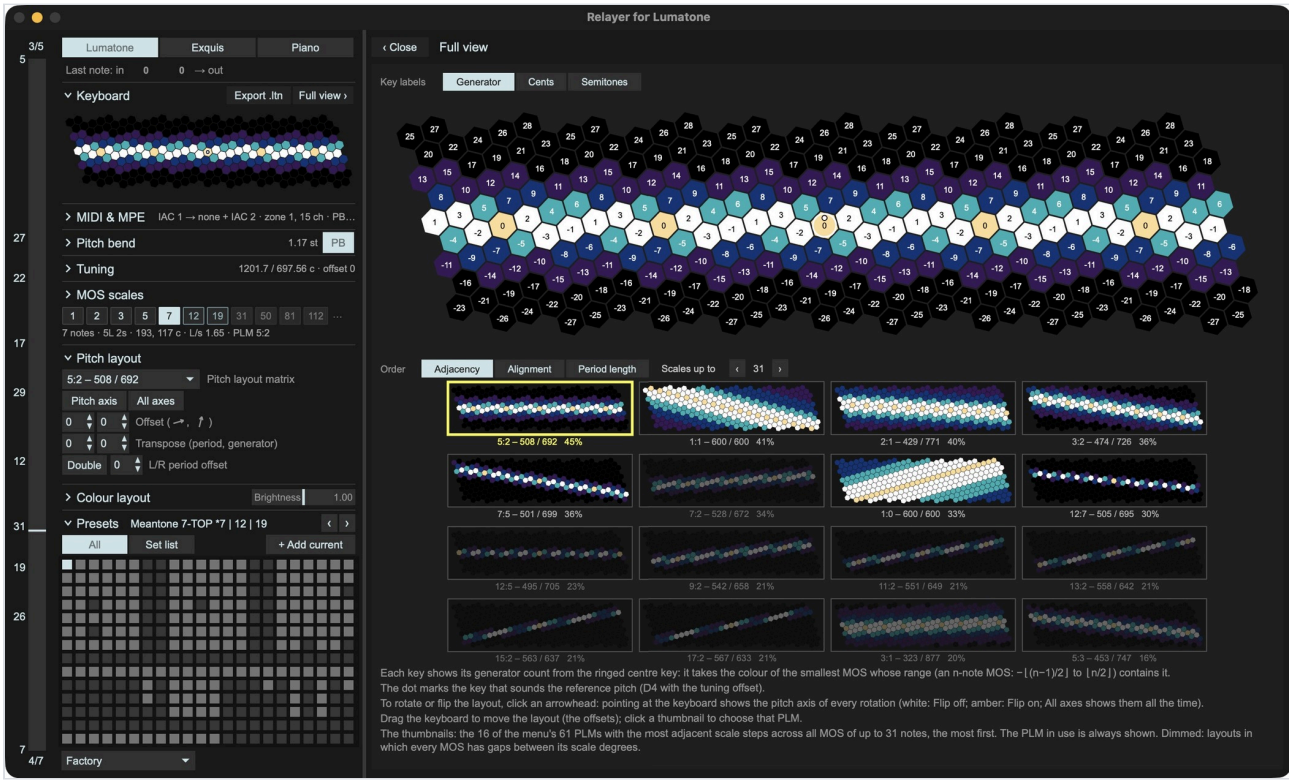
Click a section's header to open or close it. A closed section shows a one-line summary, and some keep a control in their header: Pitch bend its on switch, Colour layout its brightness slider, Presets the name and ‹ ›. Relayer remembers which sections are open, and the window's height and zoom, from one session to the next.

The tuning slider runs the full height of the window. In Generated mode it sets the generator; with two Scala scales it sets the morph between them (section 4). The numbers beside it are equal temperaments: click one to go to it exactly. The boxes at its two ends set its range.

The full view shows the whole keyboard as it plays, large, with the layout thumbnails below it. Open it with Full view ›, by clicking the Keyboard picture, or by widening the window; close it with ‹ Close or by narrowing the window. In the full view you can:

- see each key's label, chosen at the top: its generator count (degree with a Scala scale), or its pitch in cents or semitones;
- watch the keys you play light up;

- drag the layout across the keys;
- choose a layout from the thumbnails (section 5);
- edit a custom tile, custom colours, or the Piano's custom map.



The full view beside the column: the keys labelled with their generator counts, and 16 layout thumbnails ranked by Adjacency.

Zoom. On a Mac, View → Zoom In, Zoom Out and Actual Size, or Cmd =, Cmd − and Cmd 0; on Windows, Ctrl =, Ctrl − and Ctrl 0. Each step is 1%. Every control has a pop-up hint: rest the pointer on it.

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4 Tuning

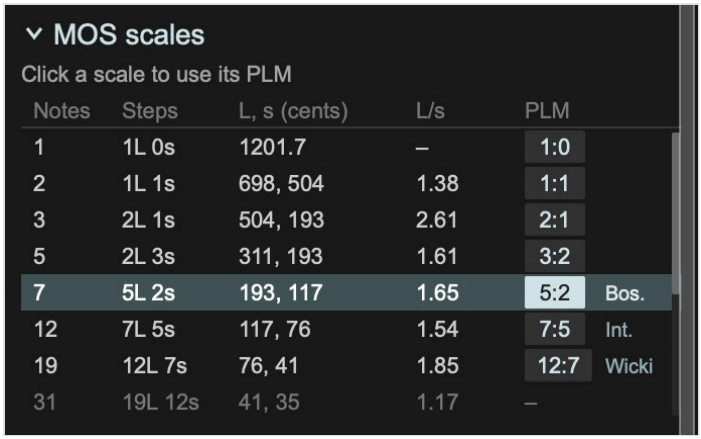
The Tuning section's tab chooses where the pitches come from: **Generated** (from a period and a generator) or **Scala** (from a .scl file). Either way, notes you are holding follow every change of tuning as it happens.

Generated tunings

- **Period and Generator** are sizes in cents. A 1200-cent period with a 700-cent generator gives 12-TET; narrowing the generator to about 697 cents gives quarter-comma meantone.
- **The tuning slider** sets the generator. Type its two end values in cents (685.714, say) or as fractions of the period (4/7). The equal temperaments within that range are marked beside it, up to the largest you choose (in the row below Period and Generator), and a click on one goes straight to it.
- **An expression pedal** (or any controller) can move the slider: set its CC number as Slider CC in MIDI & MPE.
- **Tuning offset** moves the entire tuning by a number of cents relative to concert D4 (293.66 Hz). On the Lumatone and the Exquis the layout's centre key plays D4; on the Piano, D4 plays D4.

MOS scales

The MOS scales section lists the moment-of-symmetry scales of the tuning: the scales that use just two step sizes, built from a chain of generators. For each it shows the number of notes, the signature (for example 5L 2s: five large steps and two small), the step sizes, and their ratio. On the Lumatone and the Exquis it also shows the pitch layout that suits each scale (section 5); click it to use that layout. Closed, the section shrinks to a strip of the scale sizes; point at one for its details. On the Piano, the scale with as many notes as the keys per period is highlighted.



MOS scales of a meantone tuning. The PLM in use, 5:2, is the Bosanquet layout for 7 notes, Intermediate for 12 and Wicki for 19.

Scala scales

- **Import…** in row A loads a Scala (.scl) file. The scale itself is stored in the preset, so the file is not needed later.
- On the Lumatone and the Exquis the scale's degrees are laid out along a chain of generators: **k**, in Pitch layout, is the number of scale steps per generator (only values of k that reach every degree are offered). Degree 0, the 1/1, is on the centre key at D4's pitch, plus the tuning offset.
- On the Piano, degree 0 is on middle C (C4) at C4's pitch, plus the tuning offset, as most software places a scale; a Scala keyboard map (.kbm) can place it elsewhere (section 8).

Morphing between two scales

1. Load scale A, then **Import…** a scale B with the same number of notes.
2. The tuning slider now moves between them: 0 is A, 1 is B, and every degree moves smoothly from one to the other. The **Morph** box shows the exact position.
3. The slider's ends can be set beyond 0 and 1, to extrapolate past either scale.
4. The Slider CC moves the morph too, so a pedal can glide between the two tunings while you play.

× removes scale B. The layout and colours stay put during a morph; only the pitches move.

5 Pitch layout (Lumatone and Exquis)

The pitch layout decides which key plays which pitch. On the hexagonal keyboards it comes from a **pitch layout matrix** (PLM); with a Scala scale you can also place the degrees by hand (Custom).

Choosing a PLM

Each of the 61 PLMs is named **M:N – x / y**. M and N are the numbers of large and small steps in the MOS scale that the layout suits best (its Bosanquet scale, below). x and y are the two generator sizes, for a 1200-cent period, at which pitch rises exactly along the direction of the period on the keys. A PLM suits these scales:

- **Generalized Bosanquet** for the MOS scale with M large and N small steps: every scale step lies on adjacent keys, the large and small steps in directions 60° apart.
- **Intermediate** for the next larger MOS scale: every scale step again lies on adjacent keys, but the two step sizes run in directions 120° apart.
- **Generalized Wicki** for the MOS scales after that, for as long as their number of notes keeps rising by the same amount: the more numerous step lies on adjacent keys, and the scale runs in successive rows.

For example, with a meantone tuning, PLM 5:2 gives the Bosanquet layout for its 7-note MOS scale (5L 2s), the Intermediate layout for 12 notes, and a Wicki layout for 19. PLM 1:1 gives the Bosanquet layout for 2 notes, Intermediate for 3, and Wicki for 5 and 7, but not for 12. The MOS scales section marks these scales Bos., Int. and Wicki for the PLM in use.

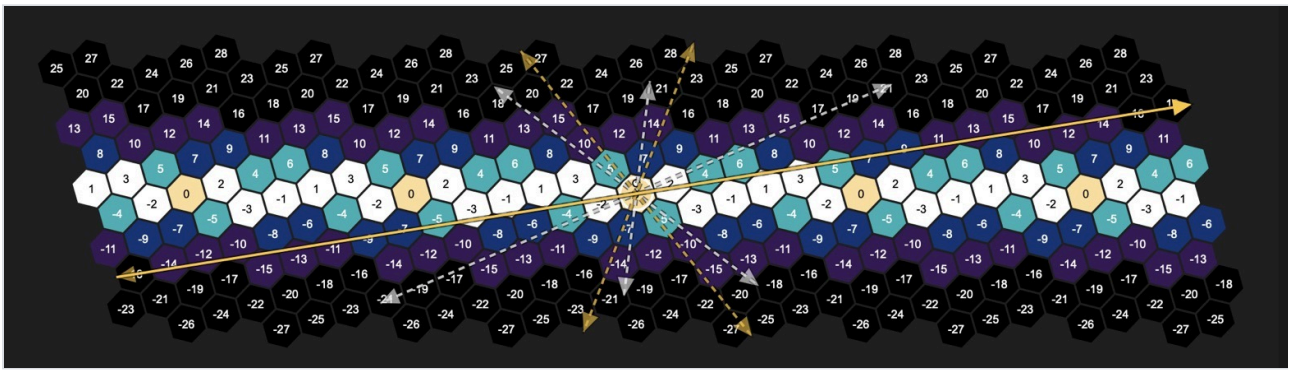
Three ways to choose:

1. the **Pitch layout matrix** menu;
2. a click on a layout in the **MOS scales** section;
3. a click on a **thumbnail** in the full view. It shows 16 layouts for your tuning, in one of three orders: **Adjacency** (the share of scale steps on adjacent keys, across the MOS scales up to a size you choose), **Alignment** (how closely pitch follows the period's direction), or **Period length** (how far apart the periods are on the keys). Dimmed layouts are those in which every MOS scale has gaps between its degrees.

Factory presets name their MOS sizes as Bosanquet | Intermediate | Wicki; an asterisk marks the layout the preset's rotation and flip are set for.

Rotation and flip

Point at the keyboard picture (or the full view) to see the pitch axis of every rotation, for each of the two flips (white for one, amber for the other). Click an arrowhead to turn the layout that way. **Pitch axis** keeps the current axis shown; **All axes** keeps all twelve shown.



All axes: the pitch axis of every rotation, white with Flip off and amber with Flip on; the current one is solid.

Moving and transposing

- **Moving the layout** shifts pitches and colours together. Drag the layout, starting on a key, in the keyboard picture or the full view, or set the two **Offset** boxes, one for each direction across the keys.
- **Transposing** shifts the pitches only; the colours stay where they are. The first box transposes by whole periods, the second by generators (with a Scala scale, by k scale steps; see section 4).
- **Split (Lumatone):** Double puts two copies of the layout side by side, and the L/R period offset sets the right half some periods higher or lower. The keys at the join take the Split colour.
- **Exquis orientation:** the arrows at the left of the Exquis's picture (and at the top of the full view) turn the picture to match how you hold the instrument. Only the picture turns; the pitches stay. The orientation is kept in presets.

Custom tiles (Scala scales)

Choose Custom in Pitch layout to place a scale's degrees on the keys yourself, in the full view's tile editor:

1. **Custom starts from the layout you had in PLM; Start from blank clears it**.
2. Click a degree, then a key, to place it; drag a placed degree to move it.
3. The tile then repeats across the keyboard. The thumbnails show the repeat patterns still possible; one of them repeats the tile only by whole periods, leaving the other keys silent.

Custom keeps your tile while you look at PLM layouts, so the two can be compared.

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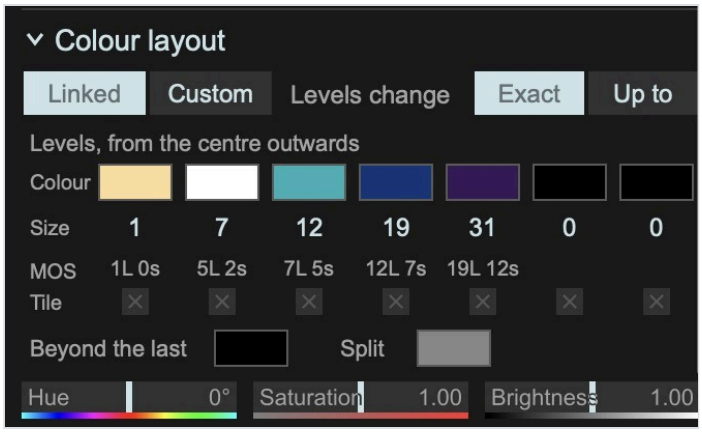
6 Colour layout (Lumatone and Exquis)

Relayer colours the keys and sends the colours to the instrument whenever they change. **Linked** colours follow scales built from the tuning's chain of generators; **Custom** colours are set by hand.

Linked colours

- **Levels:** up to seven, running from the centre outwards. Each has a colour and a size: the scale of that many notes, made of consecutive generators around the centre key, takes that colour, and smaller scales' colours lie over larger ones. Any size works; MOS sizes, whose signatures show beside them, are a sensible choice. **Beyond the last** colours every other key.
- **Levels change:** with **Exact**, each level colours the scale of exactly its size; with **Up to**, each colours every MOS scale up to its size, so the colours follow the same pattern from one tuning to the next.
- **Tiling:** tick the box under a level to repeat the colour pattern at that size, so that keys that many generators apart share a colour.
- With a Scala scale, the generator is k scale steps (k is chosen in Pitch layout; see section 4), and the levels are built from that chain in the same way.
- **Split** (Lumatone) colours the join between the two halves of a split layout.



Colour layout, Linked: five levels (1, 7, 12, 19 and 31 notes) with their MOS signatures, and the Hue, Saturation and Brightness sliders.

Custom colours

Choose Custom, then set colours in the full view: by note class (with a Scala scale, by degree) or key by key. Anything you have not set still follows the Linked colours. A shortcut: double-click a key in the full view to colour its class.

Colours in use lists every colour on the keys, with how many classes or degrees use it. Point at one to outline its keys in amber; click it to replace that colour everywhere.

Hue, Saturation and Brightness adjust every colour at once. Click or drag on a slider; Shift gives fine steps, and a double-click returns it to the centre. The Brightness slider stays on the section's header when it is closed, for quick changes on stage.

Sending colours

- Colours go to the instrument automatically, whenever they change.
- With the Lumatone's firmware 1.5, all 280 keys change in one message, in about 20 milliseconds. With earlier firmware the keys are set one by one, which is fast but not instant.
- **Export .ltn** (on the Keyboard header) saves the Lumatone layout with its colours as a file for Lumatone Editor.

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7 Expression

The **Pitch bend** section lets a key's own movement bend its pitch, note by note, as MPE allows. Its on switch stays on the header when the section is closed, so you can reach it while playing.

Lumatone: pressure bend

- **The switch** lets key pressure (polyphonic aftertouch) bend each note's pitch.
- **Range** is the bend, in semitones, at full pressure. Keep it at least 1 semitone below the Note PB range in MIDI & MPE.
- **Taper** shapes the response: positive values make light pressure do less, so the pitch stays steady until you press harder; negative values make light pressure do more.

Exquis: choose the gesture

- **Source:** which of the Exquis's per-note controls bends the pitch: **PB** (sideways movement), **CC74** (sliding along the key) or **Press** (pressure).

- **Range** and **Taper** work as on the Lumatone.
- **Up only** (the Direction switch, for PB and CC74) makes every bend go upwards, as on a guitar string.

A pitch wheel (the Lumatone's, or a keyboard's) bends every note at once, through the manager channel, while Pass through is on (section 2).

Lumatone: velocity tapers

The Lumatone's keys can differ in how hard they must be struck. Relayer corrects this key by key from a text file, `LumatoneVelocity.txt`, in your user folder (section 10).

- Each line gives a key and its exponent: `note channel exponent`, as the Last note line shows them. Lines starting with `#` are notes to yourself.
- The velocity sent is 127 × (velocity played / 127) raised to the exponent: an exponent above 1 makes a key softer, below 1 louder, and 1 leaves it as it is.
- If the file does not exist, Relayer writes one with every key at 1 and an explanation at the top, so the format is there to copy.
- Relayer reads the file each time the Lumatone is chosen. A line it cannot use is ignored, that key stays at 1, and a message says which lines were skipped.

The tapers belong to your instrument, not to presets, so they never change when you change preset.

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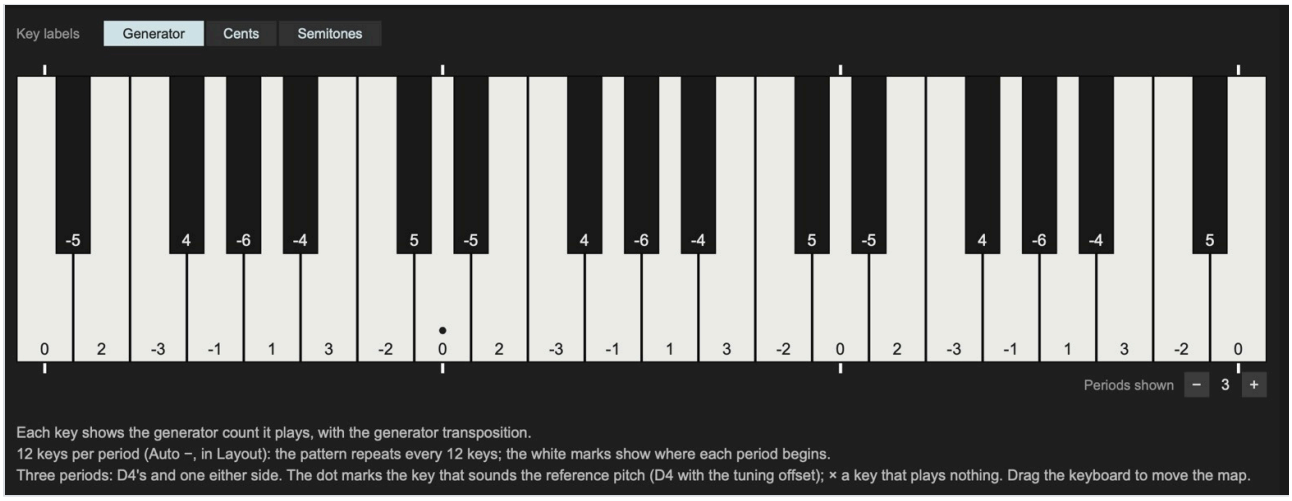
8 Piano keyboards

Choose the Piano tab for any MIDI keyboard. The key to a good mapping is the number of **keys per period**: with 12, the tuning's period falls on the keyboard's octave; with 24 or 36, it spreads over two or three octaves, giving finer tunings room; any other number works too. Relayer draws the piano with each key's label, a dot on the key that sounds the reference pitch, and marks where each period begins; in the full view, **Periods shown – n +** zooms in or out.



The Piano in the full view: 12 keys per period, each labelled with the generator it plays; the dot marks D4, and white marks show where each period begins.

Generated tunings

- **Auto +** and **Auto –** place a continuous chain of generators on the keys of each period, in pitch order. With an even number of keys per period, Auto + favours the upward side of the chain and Auto – the downward: in meantone, Auto + gives G♯ and Auto – A♭.

- In an equal temperament with fewer notes than keys (15-EDO on 24 keys, say), each key plays the step nearest its place, so the repeated pitches are spread as evenly as possible. With more notes than keys (31-EDO on 12 keys, say), the keys play a continuous chain of generators as above: 12 keys give the tuning's 12-note chromatic scale.
- **Custom** gives each key the generator class you choose, in the full view's editor. Start from Auto +, Auto − or blank; click a generator, then a key, to place it; drag to swap; ↑ and ↓ move the selection a period, ← and → change its generator; Delete takes it off its key.
- D4 plays the reference pitch (D4 plus the tuning offset).

Scala scales

- Degree 0 (1/1) is on middle C (C4), at 261.63 Hz plus the tuning offset, as in most software.
- The Scala scale has its own keys per period, set to the scale's number of notes when you import it. With more keys than notes, the degrees are spread evenly, some on two keys; with fewer, an evenly spread selection is played, and a line in Pitch layout says how many degrees cannot be played. With 12 keys, 19-EDO plays meantone's chromatic scale.
- Auto +, Auto − and Custom work as above, placing degrees instead of generators.

Moving the map

Drag the keyboard in the full view or the Keyboard picture to move the whole map: the key you drop the dot on then plays what the dot's key played. The **key offset** box in Pitch layout moves it too, by the number of keys you set.

Scala keyboard maps (.kbm)

With a Scala scale on the Piano, row K in Tuning imports a keyboard map in Scala's format. It decides which key plays which degree: its size, the first and last keys retuned, the key that plays degree 0, the reference key and its frequency (the tuning offset is added on top), its formal octave, and keys marked x, which stay silent, as do keys outside its range. A typical use is a 7-note scale on the white keys alone. While a map is in use, the keys per period and Auto + | Auto − | Custom are hidden; × removes the map.

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9 Presets and the set list

Each instrument has its own presets. A preset holds the tuning, the layout, the colours, the expression settings and the MIDI settings. It does not hold which sections are open, the view options, the set list or the Lumatone velocity tapers. When you start Relayer, it returns to the instrument and preset you used last.

The preset grid

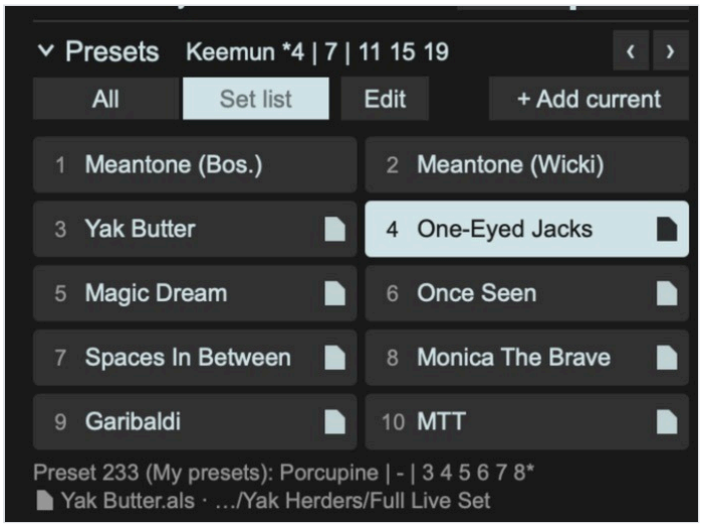
- **Recall:** click a slot. ‹ and › on the Presets header step through the stored presets.
- **Save:** type a name in the name field, then Shift-click a slot. A preset already there is replaced.
- **Delete:** Shift-Option-click a slot (Shift-Alt-click on Windows).

Pages. The page menu below the grid holds the **Factory** page, the presets that come with Relayer, and pages of your own. The Factory page is locked, so save your presets on a page of your own: the end of the menu makes a new page, renames the page in use, or deletes it (once empty). To copy a preset to another page, recall it, change page, and Shift-click a slot.

The set list

For performance, **Set list** (beside All) shows your running order as large buttons, twelve to a page.

- **+ Add current** puts the preset in use at the end of the list. A preset may appear more than once.
- **Click** a button to recall its preset. While the set list is shown, ‹ and › on the header move through it in order, turning its pages as they go.
- **Edit** lets you rename a button (type in it; Return keeps the name), drag it to a new place, or remove it with its ×.
- **A file for each button:** in Edit, click a button's file icon to choose a file to open with it, such as your DAW project for that song. It opens each time the button is recalled. Option-click (Alt-click on Windows) the icon to remove the file.
- **Shift-click** a button to save the current settings into its preset.
- Point at a button to see its preset's number and name, and its file.



A set list for a gig, with the pointer on Yak Butter: below the buttons are its preset and the DAW project it opens.

From the Lumatone's own buttons. With the Lumatone's firmware 1.5, its preset buttons recall the set list: button 1 recalls the first entry on the page shown, button 2 the second, and so on, with each entry's file. Relayer switches on the buttons' Program Change messages itself.

10 Your files, and troubleshooting

Where Relayer keeps your things

Everything of yours is in one folder, which installing or uninstalling never touches:

- macOS: `~/Library/Application Support/RelayerForAll` (in Finder, Go → Go to Folder...);
- Windows: `%APPDATA%\RelayerForAll` (type it in File Explorer's address bar).

It holds your preset pages, the Factory presets, `LumatoneVelocity.txt` (section 7) and `RelayerSettings.json`. The settings file remembers the open sections, the window's height and zoom, the view options, the set lists, your pages, and the last instrument and preset. To back everything up, or move it to another computer, copy the whole folder.

Lumatone firmware. Version 1.5 or later is recommended: colours then change almost instantly, and the Lumatone's preset buttons can drive the set list. Earlier firmware works, with colours set key by key.

If something is not right

Symptom	What to check
No sound	The MIDI Out port, and that the synth or DAW listens to it with MPE switched on; the MPE manager channel (section 2).
Notes out of tune, or bends too wide or narrow	Note PB range in MIDI & MPE must equal the synth's note pitch bend range.
Two notes close in pitch both stop when only one is released (Ableton Live, Arturia's PolyBrute and some others)	These notes share a MIDI note number, which that DAW or synth cannot handle. Use MIDI Out (alt MPE), which never gives two sounding notes the same number.
Notes stolen when playing many at once	The synth's number of MPE channels, and Channel count.
Pressure bend goes too far	Keep the Pitch bend range at least 1 semitone below the Note PB range.
A message about LumatoneVelocity.txt	Some lines could not be used; those keys play unchanged. Correct the lines it names.

Full screen and maximize are switched off on purpose: Relayer sizes its window itself, opening and closing the full view. Resize the window by its edges or corner instead. Every control has a pop-up hint with more detail: rest the pointer on it.