Quântica

User Manual

Revision 0.9.0

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Introduction

Quântica is a powerful and intuitive 4-channel quantizer and chord sequencing module designed for creative musical exploration within modular synthesizer systems. Combining advanced harmonic tools with a responsive touchscreen interface, Quântica allows users to generate, manipulate, and sequence rich chord progressions with ease. Features such as intelligent chord suggestions, arpeggiator control, flexible sequencing modes, and customizable channel behaviour make it equally suited for live performance, sound design, and studio composition. This manual provides an overview of Quântica's hardware, controls, user interface, and configuration options to help you get the most from the module.

Theory of Operation

A Quantizer takes an analogue CV input and maps it to a voltage representing an exact note value, according to the 1V/Octave standard. Quântica goes above and beyond this idea in several ways:

- The inputs have a switchable range (-5v/5v and 0-5v), for a greater range of connectivity options.
- Each channel has a gate/trigger input which controls when a channel updates and when it holds its value.
- An arpeggiator can be applied to each channel, which takes effect after quantization.
- The selected chord or scale defines which notes a channel value may be mapped to.
- A chord sequencer allows recording and playback of sequences of chords.

Quântica includes some powerful tools to assist with musical creation:

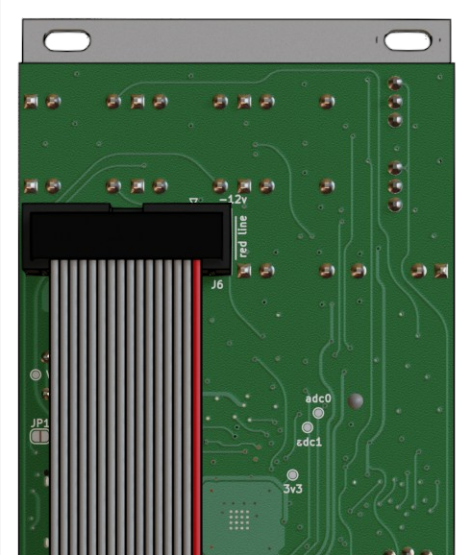
- The progression-based workflow helps you quickly find chords which fit in your selected key, based on their degree on the scale, and quality.
- An intelligent chord suggestion engine offers up chords using a Machine Learning algorithm and a dataset of published music

All settings and data are persistent. The persistent data store is updated every 10 seconds, without interrupting normal operation.

Getting Started

Power connection

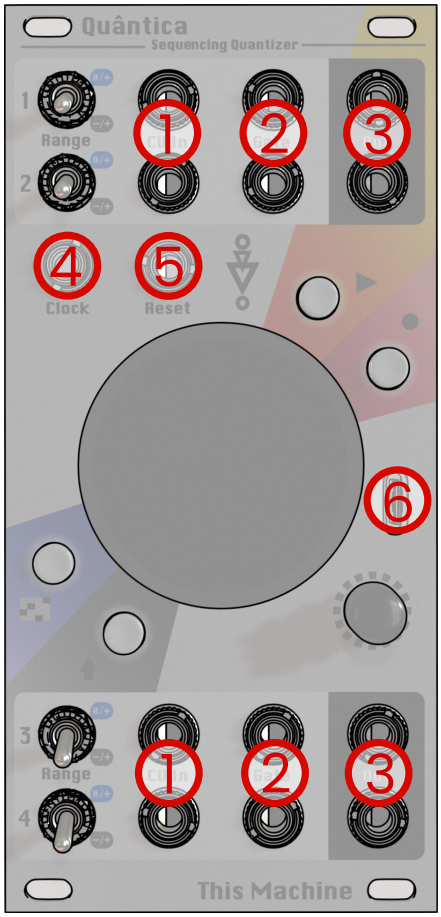
Connect the 16-pin cable to a suitable power supply. Ensure the red line (-12V) is on the right. Please note this module requires a 5V supply to operate.



Fix the module into your synth rack using the 4 screw holes in the panel.

Quântica's firmware is being actively developed, so it's a good idea to make sure your module has the lasted version before going further. Please see the Software Updates section for instructions.

Connections



① *CV In*

Connect a Control Voltage source here, and a quantized version will appear at the channel's output. If this port is unconnected, the channel will output the value of the next note in the chord above the previous channel (by default). Channel 1 will play the root note if left unconnected.

② *Gate In*

This port controls *when* the channel output updates. It has three modes:

- **Gate** – the quantized output updates continuously while the gate signal remains high.
- **Trigger** – the channel updates once on a rising edge.
- **Auto** (default) - switches to Trigger if the input signal is low for 5 seconds, and switches to Gate if the input is high for 5 seconds.

③ *CV Out*

The quantized value will appear here

④ *Clock*

Connect a clock signal here to automatically advance the chord sequencer when it is in Play mode. The sequencer will advance on a rising edge signal – and has a configurable clock divider.

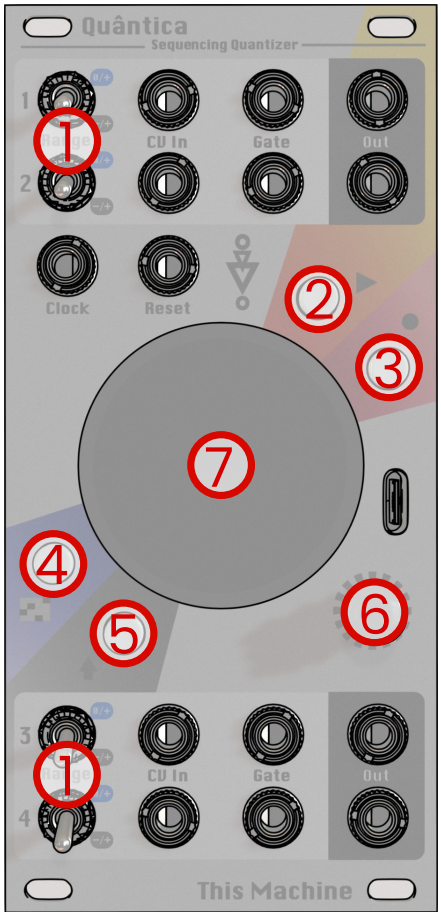
⑤ *Reset*

A pulse here will reset the sequencer, ready to begin playing on the next clock signal.

⑥ *USB-C Port*

Used to update Quântica's firmware. See the Software Updates section for more.

Controls



1 *Range switches*

Switch to select the input range for the channel, between -5v/5v or 0v-5v. Has no effect if the channel input is left unconnected.

2 *Play Button*

Controls the sequencer. It will glow yellow when the sequencer is active. Press Shift + Play to restart playing from the beginning of the sequence.

3 *Record Button*

Press to start recording chords into the chord sequencer. Press Shift & Record to clear the sequencer and start recording from the beginning.

4 *Arp Button*

Activates the Arpeggiator overlay, and cycles between channels. Also acts as a ‘back’ button on many pages, returning you to the main Progression page.

5 *Shift Button*

Enables secondary functions on the LED buttons, and rotary encoder.

6 *Rotary Encoder*

Used to navigate the UI and select options in tandem with the touchscreen. Typically, rotating the encoder will do the same as a rotate gesture on the screen, and rotating while holding Shift will scroll a list or perform a secondary function. Pushing the encoder will activate a selected option or trigger the next chord to be selected.

7 *Touchscreen*

The UI makes use of some common gestures:

Rotate

Run your finger around the edge of the screen to, for example, rotate the Degree ring on the Progression page, or the Base Note on the Key Select page.

Drag

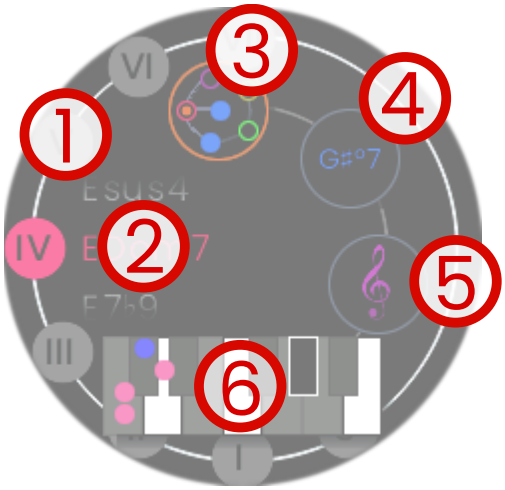
A vertical drag scrolls a list up and down. A horizontal drag from left to right typically serves as a ‘back’ gesture, returning you to the previous page.

Long Press

A Long press anywhere will bring you to the Page Select page

Progression Page

Layout



1 *Degree Wheel*

Rotate the wheel to select the base note for the next chord, relative to the current key’s root note. You can use a rotate gesture on the touchscreen or rotate the encoder.

② *Chord Quality List*

Selects the quality of the next chord. To change, drag up or down on the touchscreen, or rotate the encoder while holding shift.

③ *Mini Sequencer*

Displays a miniature version of the sequencer. Greyed out when the sequencer is not active. Press to open the Sequencer page.

④ *Current Chord / Chord Map*

Displays the short name of the currently active chord. Press to open the Chord Map page. See the Appendix for a guide to the short chord names.

⑤ *Key Select button*

Opens the Key Select page

⑥ *Keyboard*

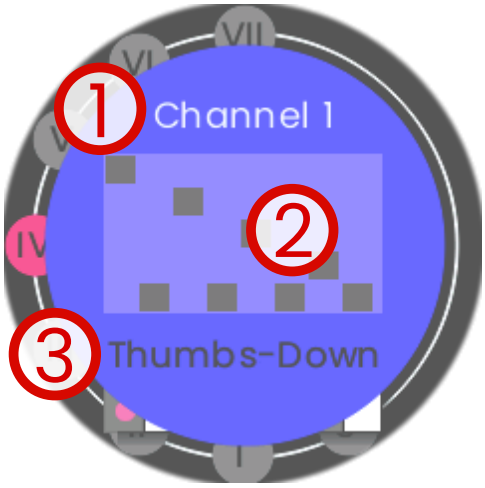
Shows which notes are active in the current chord – grey for inactive, white or black for active. A pink dot shows the note being output for each channel. An empty circle indicates the channel's input is disconnected, a blue dot indicates the arpeggiator is active on that channel.

Other actions on this page

- Press anywhere (apart from the 3 buttons) or push the encoder to activate the selected chord
- Press Record to start/stop recording into the sequencer. Shift + Record clears the sequencer first.
- Press Play to start/stop playback of the sequencer. Shift + Play starts playback from the beginning of the sequence.
- Press Arp to show the Arpeggiator overlay, detailed below

Arpeggiator Overlay

Layout



① *Channel Number*

② *Pattern Display*

③ *Pattern Name*

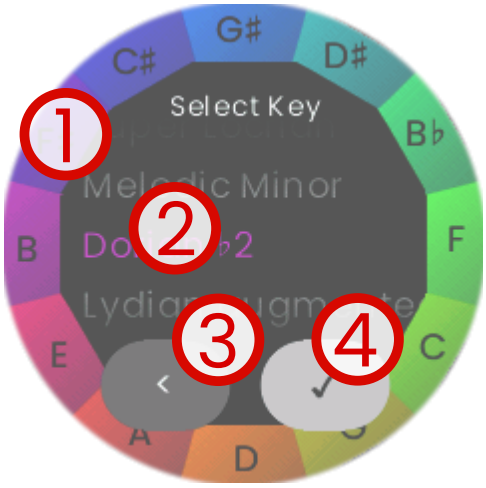
Actions

While the overlay is displayed you can:

- Press Arp to cycle through the 4 channels. After channel 4, the overlay will be hidden.
- Rotate the encoder to set the pattern type for the selected channel
- Rotate the encoder while holding shift to set the pattern length

Key Select Page

Layout



① *Root Wheel*

Rotate the wheel using the touchscreen or the encoder to select the root note.

② *Mode List*

Drag the list up/down or rotate the encoder while holding shift to select the Mode.

③ *Back button*

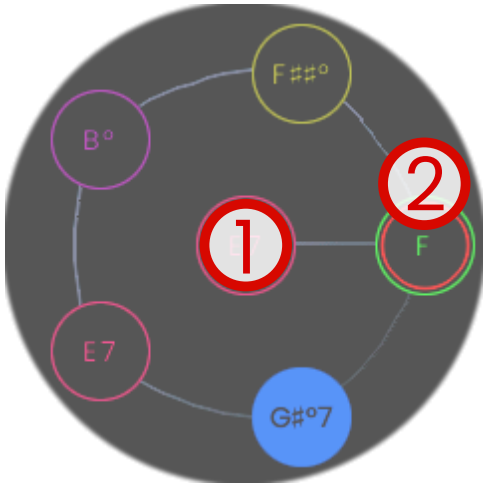
Return to the previous page, discarding changes

④ *OK Button*

Activate the new key

Chord Sequencer Page

Layout



① *Selected Chord*

Displays the currently selected chord in the centre of the sequencer.

② *Sequencer slots*

The sequencer displays up to 8 chord slots arranged in a ring around the selected chord.

The highlighted slot changes depending on the current sequencer mode:

Stopped / Play Mode

The next chord to be activated is shown to the left of the centre chord with a yellow inner ring.

Record / Overdub Mode

The next slot to be written to is shown to the right of the centre chord with a red inner ring.

Selecting and Activating Chords

You can select sequencer slots by:

- Touching a chord slot on the screen
- Rotating the touchscreen wheel
- Rotating the encoder

Sequencer Behaviour by Play Mode

Stopped

Pressing a chord slot immediately jumps to that step and activates the chord.

Play

Pressing a chord slot jumps the sequencer to that step and advances the playback position, preparing the following step to play next.

Overdub

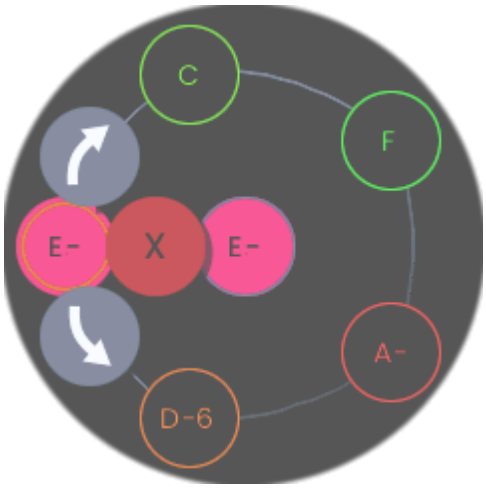
Press a chord slot to choose which step will be overwritten by the next recorded chord.

Record

Pressing a chord slot moves the insertion point to that position. Newly recorded chords will be inserted before the selected slot.

Editing the Sequencer

Hold Shift to reveal additional editing controls.



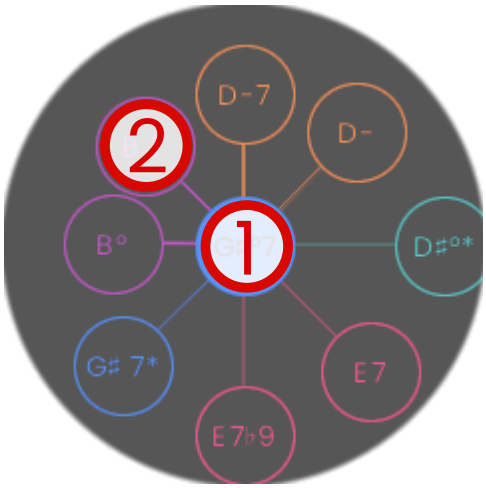
While holding Shift:

- Use the arrow buttons or rotate the encoder to move the selected chord backward or forward within the sequence
- Press the X button or push the encoder to delete the selected chord

Other Actions

- Use the Play and Record buttons to change sequencer mode
- Press Arp or swipe right to return to the previous page
- Use the Record and Play buttons to change the play mode
- Press Arp or swipe right on the screen to return to the previous page

Chord Map



1. *Current Chord*
2. *Suggested next chords*

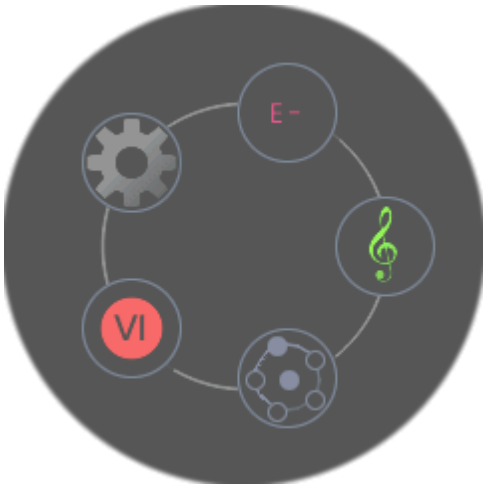
The Chord map shows chord suggestions based on your base key and the last few chords you have chosen. This makes it easy and fast to create musically coherent chord progressions.

Touch a chord to select it and see a new set of suggestions. Alternatively, rotate the encoder to move the cursor around and push the encoder to select. Rotate the encoder clockwise while holding shift to replace the top predictions with less likely ones.

Press Arp or swipe from left to right to return to the Progression page.

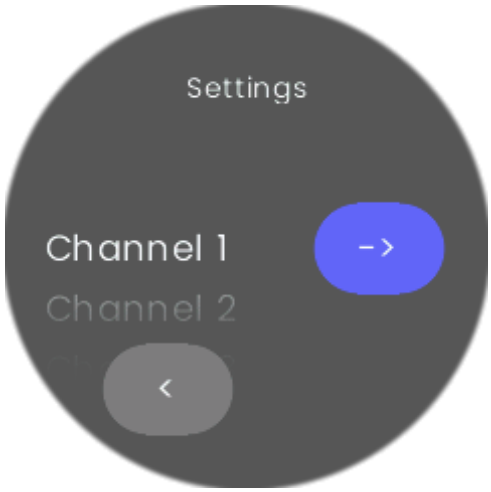
Page Select Page

A long press anywhere on the screen brings up the Page Select Page



From here you can jump to any other page.

Options Menu



Select the gear icon in the Page Select page to open the Settings page. From here you can change settings for each quantizer channel, plus some general options.

Channel Options

Trigger Mode

Affects the gate behaviour for the channel. Choose between

- **Gate** – the quantized output updates continuously while the gate signal remains high.
- **Trigger** – the channel updates once on a rising edge.
- **Auto** (default) - switches to Trigger if the input signal is low for 5 seconds, and switches to Gate if the input is high for 5 seconds.

Normal Mode

Select how the channel behaves when its CV input is disconnected (available on channels 2-4).

- **Chord** – the channel will output the next note up in the selected chord from the previous channel. E.g.: With C Major selected, if channel 1 is playing a C, and channel 2 is disconnected, it will play an E.
- **Fifth** – the channel will output the next 2 notes up in the selected chord from the previous channel. E.g.: With C Major selected, if channel 1 is playing a C, and channel 2 is disconnected, it will play a G.
- **Octave** – the output note will be an octave above the previous channel.
- **Passthrough (Pass)** – the channel will use the input voltage to the previous channel – ignoring the gate and arpeggiator on that channel.

Calibration

Every Quântica is factory calibrated for accurate input and output voltage measurements. If you want to override this calibration, you can do so on this page. You'll need to supply a voltage of 0V, 2V, and 4V. Make sure the range switch is in the up position (0V-5V) before you start. If all the settings on the device are cleared, the factory calibration values will be restored.

General Options

- **Clock Divider** – Controls how many clock signals must be received into the Clock input, before the sequencer advances (default 1)
- **LED Brightness** – Controls the brightness of the LED buttons (default 100%)
- **Software Update** – Takes you to the Software Update page
- **Show Fps** – Enables an FPS display on the lower right of the screen

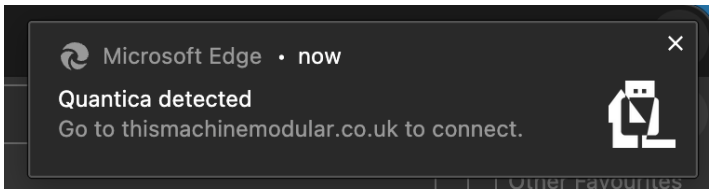
Software Updates

Pressing “Upgrade” will reboot the module into firmware update mode.

We’ve worked hard to ensure the upgrade process is as easy and fast as possible, but Quântica will not operate normally while it is in progress, so we don’t recommend you attempt this during a live performance.

You’ll need a PC, tablet or Phone with a Chromium-based browser (Chrome, Edge, Opera etc) and a USB-C cable. Connect the device via USB to Quântica (it is safe to do this with the module in or out of your synthesizer).

You should see a popup notification prompting you to visit the online updater tool:



If not, use the QR code on the screen (if using a mobile device), or visit https://thismachinemodular.co.uk/update/. The updater tool there can talk to and upgrade Quântica directly once you give it permission.

The upgrade process is resilient to power failures. However, once it is completed, please ensure the module is left powered on for at least a few seconds, otherwise the bootloader may decide that the upgrade was unsuccessful and automatically roll back to the previous software version.

Troubleshooting

If the Quântica fails to start 5 times, it will enter recovery mode. You can also access this mode manually my holding Arp + Shift, and pressing Record, or by holding Arp + Shift as the module is powered on.

From here you can press Play to try booting normally, Record to clear all the persistent settings and reboot, or Arp to go to Firmware Update mode.

Technical info

Width: 12HP

Depth: 25mm

Power requirement:

+12V	**10 mA**
-12V	10 mA
5V	80 mA

Appendix A: Short Chord notation

Quality / third-and-fifth indicators

Symbol (long)	Symbol (short)	Meaning
(empty)	*(empty)*	Major triad (major 3rd, perfect 5th)
m	-	Minor 3rd
M / Maj	Δ	Major 7th present (in compound suffixes)
Dom	*(none)*	Dominant — major 3rd with minor 7th
Aug	+	Augmented 5th
dim	°	Diminished (minor 3rd + diminished 5th)
Mdim	Δ°	Major 3rd with diminished 5th
hDim	ø	Half-diminished (min3 + dim5 + min7)
Dim	°	Fully diminished (with diminished 7th)

Suspensions and power chords

Symbol (long)	Symbol (short)	Meaning
sus2	2	3rd replaced by major 2nd
sus4	4	3rd replaced by perfect 4th
sus2dim	2°	Suspended 2nd with diminished 3rd & 5th
pow4	!4	Power chord: root + perfect 4th only
pow5	!5	Power chord: root + perfect 5th only
mu	µ	"Mu" chord: major triad + added 2nd

Extensions (added or stacked tones)

Stacked-extension names (`7`, `9`, `11`, `13`) imply every lower odd extension is also present. Names prefixed with `add` add only that single extension on top of the underlying triad.

Symbol (long)	Symbol (short)	Meaning
6	Δ6	Major triad + major 6th
m6	-6	Minor triad + major 6th
6/9	69	Major triad + 6th + 9th
7	Δ7	Major 7th chord (maj3 + per5 + maj7)
m7	-7	Minor 7th chord
Dom7	7	Dominant 7th (maj3 + per5 + min7)
mMaj7	-Δ7	Minor triad with major 7th
hDim7	ø7	Half-diminished 7th
Dim7	°7	Fully diminished 7th
Aug7	+7	Augmented dominant 7th

AugM7	+Δ7	Augmented major 7th
9	Δ9	Major 9th (maj7 chord + 9th)
m9	-9	Minor 9th
Dom9	9	Dominant 9th
7♭9	7♭9	Dominant 7th with flat 9th
add9	A9	Major triad + 9th (no 7th)
madd9	a9	Minor triad + 9th (no 7th)
11	Δ11	Major 11th
m11	-11	Minor 11th
Dom11	11	Dominant 11th
add11	A11	Major triad + 11th
madd11	a11	Minor triad + 11th
13	Δ13	Major 13th
m13	-13	Minor 13th
Dom13	13	Dominant 13th
add13	A13	Major triad + 13th
madd13	a13	Minor triad + 13th