QuNexus

Smart Sensor Keyboard Controller

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INSTRUMENTS

# QuNexus QuickStart Guide

QuNexus Version 1.0
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QuNexus is a vividly illuminated keyboard controller that is fun for beginners and a must for professionals. It is a hub for new and vintage technology. Plug into your computer, iPad (Apple Camera Connector required), or Android tablet via USB. Control hardware via 5-PIN MIDI (MIDI Expander required) or control your modular synthesizers with the included CV inputs and outputs.

QuNexus is a class compliant USB device that does not require a driver or software to function. Out of the box QuNexus has everything needed to get started. This document is a quick guide to getting started using QuNexus out of the box.

USB

Connect QuNexus to a computer:
This image shows QuNexus set up to send MIDI data to a computer. Use a USB A-to-Micro cable to connect the QuNexus micro port to a USB port on a computer. QuNexus will receive power from the computer.
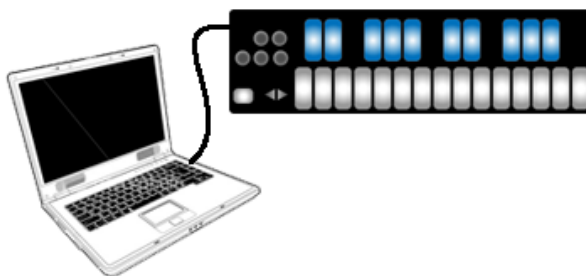
Connect QuNexus to an iPad:
The image shows QuNexus connected to an iPad via USB. You will need the iPad Camera Connection Kit (sold by Apple: http://store.apple.com/us/product/MC531ZM/A). Attach the camera connector to the iPad and then use a USB A-to-Micro cable to connect the QuNexus micro port to the camera connector.
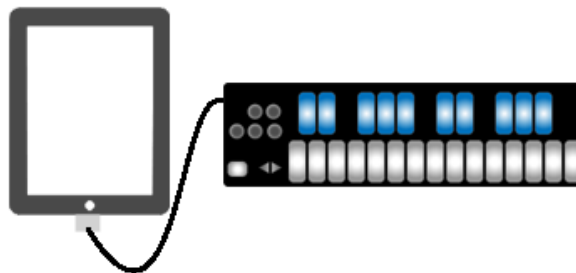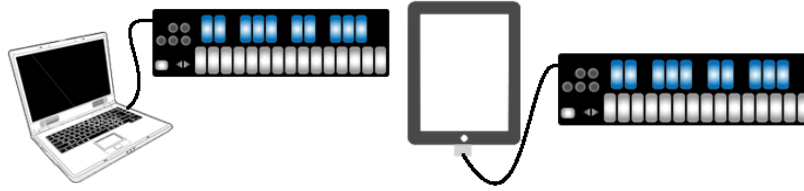
QuNexus is connected and powered using the Micro USB port on the left side of the QuNexus. It is a class compliant USB device and does not require a driver. This allows for maximum compatibility with an extremely wide range of other devices.

QuNexus has 3 virtual MIDI ports that communicate with the computer. Port 1 is the main port on which the QuNexus sends and receives MIDI data to and from the computer or iPad. Port 2 and 3 can be used for this purpose as well but are also used for communication with other devices. Port 2 is used for the KMI MIDI Expander (sold separately) and Port 3 is used for CV.

A computer or iPad can control the QuNexus LEDs by sending MIDI data into the QuNexus on Port 1 (see the Controlling LEDs heading for more information).

MIDI

Connect QuNexus to MIDI hardware:
The image shows QuNexus connected to a hardware MIDI device via our MIDI Expander (sold separately):
  1. Use a USB A-to-Mini cable to connect the QuNexus Mini port (on the right side of the QuNexus) to the USB "Expand" port on the MIDI Expander.
  2. Connect the power supply to the MIDI Expander USB "Power" port.
  3. Connect the MIDI Out on the Expander to the MIDI In on a synth or other MIDI device.
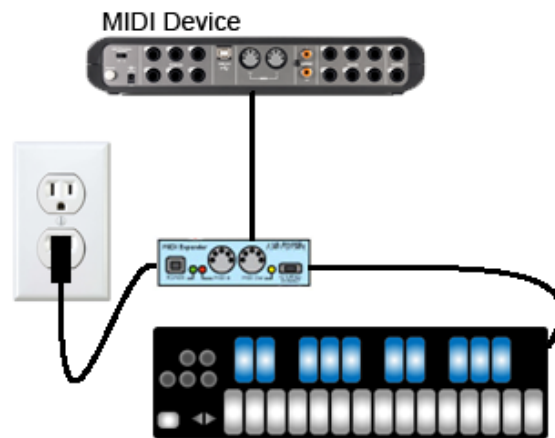
Connect QuNexus to MIDI hardware (Powered by Computer):
The image shows QuNexus connected to a Computer and a hardware MIDI device via our MIDI Expander (sold separately):
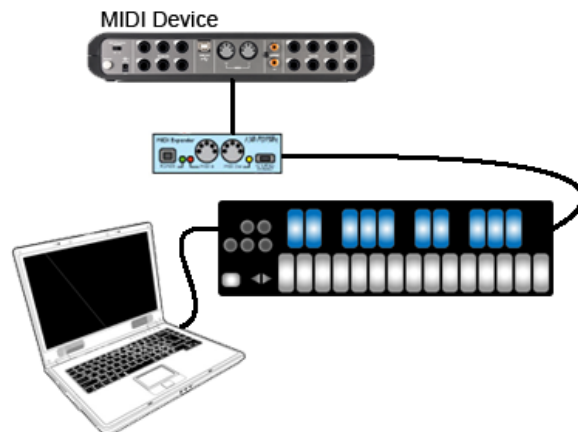 1. Use a USB A-to-Mini cable to connect the QuNexus Mini port (on the right side of the QuNexus) to the USB "Expand" port on the MIDI Expander.
  2. Use a USB A-to-Micro cable to connect the QuNexus micro port to a USB port on a computer. QuNexus will receive power from the computer.
  3. Connect the MIDI Out on the Expander to the MIDI In on a synth or other MIDI device.
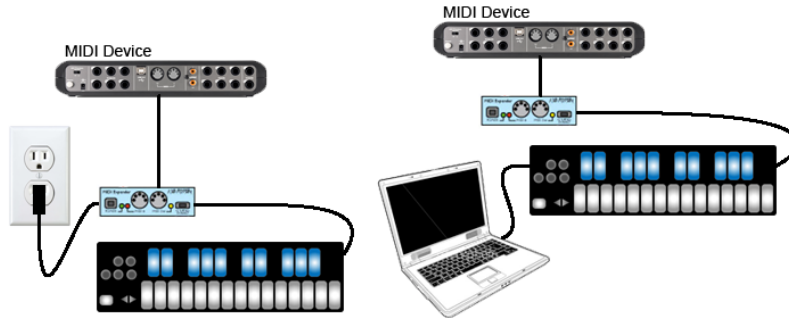
The KMI MIDI Expander is required to send and receive MIDI Data via 5-pin MIDI devices. The MIDI Expander can be used with or without a computer or iPad connected. Power is supplied to QuNexus from the MIDI Expander's power port when the MIDI Expander is plugged into a power outlet. If connected to a computer (or iPad) and a MIDI Expander, power is supplied to the QuNexus from the Micro USB port instead of the Expander.

The KMI MIDI Expander

The KMI MIDI Expander is an optional accessory, which enables use of QuNexus with hardware MIDI devices. Plug the receiving MIDI device into the MIDI Out port and QuNexus will send MIDI data through a regular 5-pin MIDI cable.

**Dimensions**: 4" x 1.25" x 1.25" (inches).
Weight: 2.5 oz.

CV

Connect QuNexus to Synthesizers or other CV devices:
The images to the right below show QuNexus connected to a CV device. There are 3 different ways to set this up:
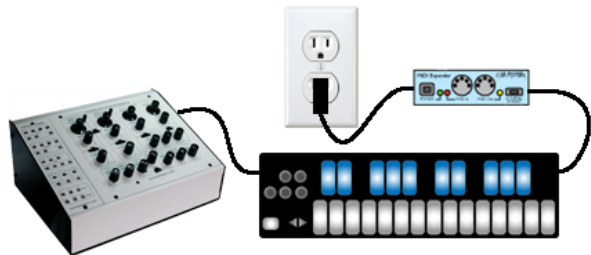
Powered by a Computer (or iPad):
1. Use a USB A-to Micro cable to connect the QuNexus Micro port to a USB port on a computer or iPad. This connects the QuNexus to power.
2. Use a cable that is compatible with your CV device's CV ports. Using adapters if needed, make sure one end can plug into one of the stereo 1/8in. CV out ports on the QuNexus.
3. Plug your cable into the "Gate-CV1 Out" port on the left side of the QuNexus. Plug the other end into the desired destination on your CV device.
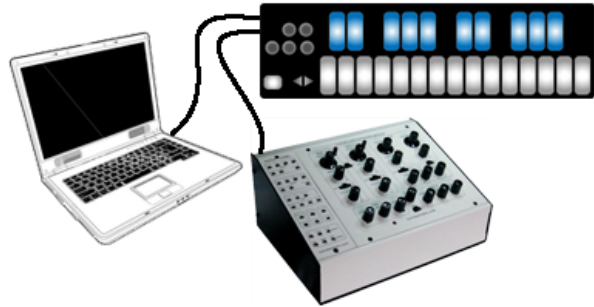
Powered by KMI MIDI Expander:
1. Use a USB A-to-Mini cable to connect the QuNexus Mini port (on the right side of the QuNexus) to the USB "Expand" port on the MIDI Expander.
2. Connect the power supply to the MIDI Expander USB "Power" port.
3. See steps 2 and 3 from the "Powered by a Computer" steps.

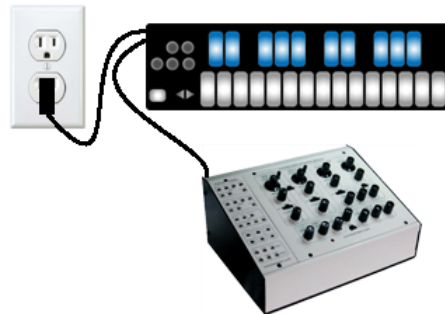**Powered by USB Power Supply:**
1. Use a USB A-to-Mini cable to connect the QuNexus Mini port (on the right side of the QuNexus) to a USB Power Supply.
2. Connect the Power Supply to a power outlet.
3. See steps 2 and 3 from the "Powered by a Computer" steps.

QuNexus can communicate with synthesizers or other CV devices using Control Voltages. Connect QuNexus to CV devices using a cable that is compatible with your CV device's CV ports. Using adapters if needed, make sure one end can plug into one of the stereo 1/8in CV out ports on the left side of QuNexus. QuNexus' CV input port (on the right side) requires one end to be a 3.5 mm TRRS (like the ones used for Apple iPhone headsets).

CV Cable Kit

The QuNexus CV Cable Kit is an optional add on, which makes it easy to gather the cables and adapters needed to convert MIDI to CV and vice versa using QuNexus.

One of each of the following cables/adapters is included in the CV Cable Kit:

CV INPUT:
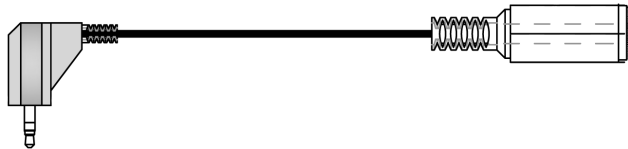
right angle 3.5mm (1/8in) stereo plug to 1/4in stereo jack
This is helpful when connecting an Expression Pedal to the CV 1-2 in port
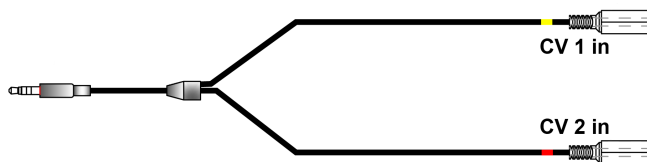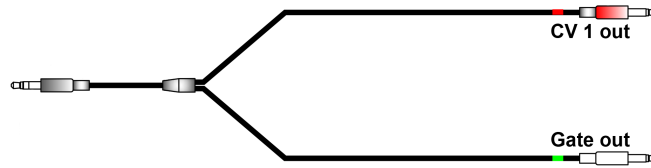

3.5mm (1/8in) stereo plug to 1/4in mono jack
This is helpful when connecting an Expression Pedal to the CV 1-2 in port
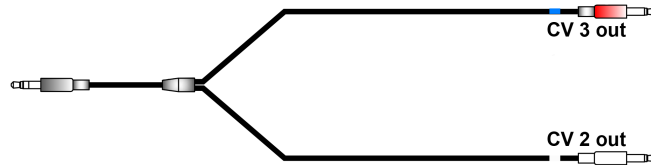

CV 1 in

CV 2 in

3.5mm (1/8in) TRRS plug to dual 3.5mm (1/8in) stereo jacks
This is helpful for splitting the CV input port into CV1 (expression pedal) and CV2
Tip: make sure to use stereo 1/8in cables to plug into the jacks

CV OUTPUT:

3.5mm (1/8in) stereo plug to dual 3.5mm (1/8in) mono plugs
This is helpful for splitting the first CV output into Gate and CV1

3.5mm (1/8in) stereo plug to dual 3.5mm (1/8in) mono plugs
This is helpful for splitting the second CV output into CV2 and CV3

Tip: After splitting the outputs to mono, make sure to use mono adapters and cables to get the signal the rest of the way to your CV device(s). After splitting the inputs if you plan to use an Expression Pedal, make sure to use stereo adapters and cables to get the signal from an Expression Pedal to the QuNexus Input jacks.

Note about Expression Pedals: Not all Expression Pedals work well. Some are noisier than others. Yamaha Pedals are known to misbehave because they don't function as a voltage divider. We recommend the Roland EV-5.

For even more information about CV cables for QuNexus consult the QuNexus CV Manual.

CV to MIDI Data Conversions

Output: By default, QuNexus sends different data out the 4 CV outputs:

Gate - Note ons and offs. Note ons are expressed as 5 volts.
CV1 - Pitch
CV2 - Mod (CC#1)
    Tip: Nothing will output if the preset does not utilize CC#1 (Preset A does not utilize CC#1).
CV3 - Pitch Bend

This data can come from the Keyboard, USB Port 3, or the MIDI Expander. By default, MIDI must be received from Channel 2 if sending from USB Port 3 or the MIDI Expander.

Input: By default, QuNexus receives data from the 2 CV inputs and converts them to MIDI messages:

CV1 - CC#112
CV2 - CC#113

By default, this data is sent on Channel 2 to USB Port 3 and the MIDI Expander.

QuNexus' CV In is uni-polar. If you send it a bi-polar signal, half of the signal will be clipped and can cause malfunctions in extreme cases. Sending a signal above 5 Volts is also unsupported.

Left Side Buttons

The buttons on the left side of the QuNexus perform useful functions that alter the behavior of the keyboard. Next we will explore the use of each button: Togl A, Velo B, Shift/Preset, Pres C, Tilt D, Bend, and the Oct Buttons.

The Oct Buttons

There are 2 triangular Oct buttons that increment or decrement the keyboard octave (Keyboard Layer only). When QuNexus is first plugged in the - and + Oct buttons are both lit up and the keyboard starts at C2 (note 48) and goes up to C4 (note 72). QuNexus treats C3 as note 60. Different MIDI devices and software use different note number to note name conversions. Below is a chart that will help convert note numbers to note names and vice-versa:

C3 = 60

Octave	Note Numbers											
	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
-2	0	1	2	3	4	5	6	7	8	9	10	11
-1	12	13	14	15	16	17	18	19	20	21	22	23
0	24	25	26	27	28	29	30	31	32	33	34	35
1	36	37	38	39	40	41	42	43	44	45	46	47
2	48	49	50	51	52	53	54	55	56	57	58	59
3	60	61	62	63	64	65	66	67	68	69	70	71
4	72	73	74	75	76	77	78	79	80	81	82	83
5	84	85	86	87	88	89	90	91	92	93	94	95
6	96	97	98	99	100	101	102	103	104	105	106	107
7	108	109	110	111	112	113	114	115	116	117	118	119
8	120	121	122	123	124	125	126	127				

The Octave buttons will increment or decrement the QuNexus keyboard by one octave / 12 steps / 1 line (using the chart above). They allow you to shift up 3 octaves or shift down 2 octaves for a total range of 7 octaves (C0 - C7).

The LEDs of the Octave buttons indicate which octave you are in. If the green Oct + button is pressed, the LED will flash on that button, indicating that the octave for the keyboard is raised. The same thing applies for pressing the - Oct button. The LED will flash faster if you raise or lower the keys. When both LEDs are solid again you know you are back to the original octave starting at C2.

The Bend Pad

The Bend Pad is located in the bottom left corner of the QuNexus. It acts similarly to a pitch wheel. When playing the keyboard, if you are holding down a note, pressing the Bend pad will bend the pitch of the note. Shift pressure on the Bend Pad from side to side to bend up and down.

When using a Preset that uses Channel Rotation (like Factory Preset C) the Bend Pad sends out on all active Channels. If no keys are held down it will send out on the main starting Channel. See Channel Rotation for more information.

The bend range is partially determined by the MIDI device or software used for output but is also set according to the Presets.

Bend Ranges by Preset:
- Preset A - 1 semitone
- Preset B - 2 semitones
- Preset C - 12 semitones
- Preset D - 1 semitone

See the Live Edit Mode Manual for more information about adjusting the Bend Range.

The Shift / Preset Button

The Shift / Preset Button (shown to the right) is used for 2 different purposes: to get into Live Edit Mode and to get into Preset Select Mode. Hold down the Shift Button for approximately 2.5 seconds to enter Live Edit Mode. Tap the Preset Button to enter Preset Select Mode.

For information about Live Edit Mode see the Live Edit Mode Manual.

Selecting Presets

There are four Preset slots on QuNexus. To select different presets tap the Shift / Preset button on the left side of the QuNexus. The LEDs on the keyboard will swipe to indicate that you are in Preset Select Mode. Then one of the four lettered buttons will light up to indicate which Preset is currently selected (A, B, C, or D). Next tap one of the four buttons to choose a different Preset. Upon making a selection the LEDs on the keyboard will swipe again to indicate that you are leaving Preset Select Mode and entering the chosen preset.

Steps to select a Preset:
1. Tap the Shift / Preset button.
2. Choose a Preset (A, B, C, or D).

See Factory Presets for information about how each preset behaves. The Factory Presets can be customized and new presets can be created using the QuNexus Editor.

Togl A, Velo B, Pres C, & Tilt D

These buttons turn different functions on and off. To switch them on and off hold down on the button for approximately 1 second. The functions they control are listed below:

Togl A - This button turns Toggle Mode on and off for notes in Keyboard Layer*. Presets will always start with the Toggle button off (as shown in the left image below). Depending on the settings of your preset, Toggle Mode will either use Toggle or Legato. The QuNexus Factory Presets all use Toggle. For information about how to set Toggle Mode to use Legato, see the Toggle section in the QuNexus Editor Manual.

*The Togl A, Velo B, Pres C, and Tilt D switches only affect the notes and sources in Keyboard Layer.

Togl A is off by Default   Hold Togl A for 1 sec to turn Toggle On

> **Legato** - Pressing a key sends a note on but releasing doesn't send a note off. When a different key is pressed, the previous key's note is turned off along with the new note on. Tap the Togl A button on the left side of the QuNexus to clear a note without having to hit the next one.

> **Toggle** - Pressing a key sends a note on, a second press sends a note off. Pressing a different key sends a note on without turning off the previous key. Tap the Togl A button on the left side of the QuNexus to clear all notes. The LEDs will display which keys are on.

Velo B - This button turns velocity response on and off for notes in Keyboard Layer*. If the blue LED is lit velocity response is on. If the LED is off then the velocity of each note will be 127.

Velo B is on by Default   Hold Velo B for 1 sec to turn Velocity Off

Pres C - Turn on and off anything assigned to the pressure source in Keyboard Layer* with this button.

Pres C is on by Default

Hold Pres C for 1 sec to turn Pressure Off

Tilt D - Turn on and off anything assigned to the tilt source in Keyboard Layer* with this button.

Tilt D is on by Default

Hold Tilt D for 1 sec to turn Tilt Off

*The Togl A, Velo B, Pres C, and Tilt D switches only affect the notes and sources in Keyboard Layer.

Data Sources and Sensor Output

QuNexus can output MIDI data that comes from several different sources: Key Velocity, Pressure, Tilt, and Expression Pedal. Listed below are definitions for each of these:

Key Velocity (for notes only): The value between 0 and 127 that represents the overall pressure on the QuNexus keys at the moment a note on (or finger on) is detected.

Pressure: Continuous values (between 0 and 127) represent the applied pressure of your finger on the QuNexus keys.

Tilt: Continuous values (between 0 and 127) represent the tilt of your finger on the QuNexus keys. By default this requires an intentional pressure shift/tilt of your finger to engage bend.

Expression Pedal: When an expression pedal is plugged into the CV input of QuNexus, the expression pedal data will be converted to MIDI CC# 112 or 113 on Channel 2 and go from 0 - 127.

Note about Expression Pedals: Not all Expression Pedals work well. Some are noisier than others. Yamaha Pedals are known to misbehave because they don't function as a voltage divider. We recommend the Roland EV-5.

Being aware of the data sources that the QuNexus provides will help in understanding how QuNexus uses this data and how it is converted to MIDI and CV. The next chapter will let you know how the sources are used for each Factory Preset that comes on the QuNexus.

Factory Presets

Preset A (Basic) - The Basic preset functions as a traditional MIDI keyboard and will work with any MIDI-enabled software. Though some of the more exciting functions are turned off, the basic preset outputs notes with a variable velocity and is a great starting point when working with QuNexus!

- MIDI outputs on Channel 1 through USB and MIDI Expander.
- Velocity is on.
- Local LED Control is on.
- Channel Rotation is off.
- Pitch Bend Range is set to 1 semitone.
- Controller Layer is not active on any keys.
- Control Voltage (CV) output and input are enabled with pitch, gate, and bend all being sent out of the CV outputs.

Preset B (Pressure & Tilt) - The Press and Tilt preset was designed for a wide variety of synths, apps, and plugins with pitch bend and modulation functionality. This preset maps QuNexus' key tilt to pitch bend, and pressure sensitivity to the modulation parameter in most synths. Right out of the box, most iOS music apps -- like Animoog, Sunrizer and Magellan -- will work with this preset, allowing for a more exciting and expressive playing experience!

- MIDI outputs on Channel 1 through USB and MIDI Expander.
- Velocity is on.
- Local LED Control is on.
- Channel Rotation is off.
- Tilt is mapped to Pitch Bend for all keys.
- Pitch Bend Range is set to 2 semitones.
- Pressure is mapped to CC#1 (Mod).
- Controller Layer is not active on any keys.
- Control Voltage (CV) output and input are enabled with pitch, gate, bend, and pressure all being sent out of the CV outputs.

Preset C (Poly Pitch Bend) - The Poly Pitch Bend preset allows for individual pitch and modulation amounts on different keys by outputting each key's message on its own MIDI channel. This functionality, which we call Channel Rotation, allows each key to send its own pitch bend message. Basically, when using the Poly Pitch Bend preset you have 10 pitch bend wheels -- one at the tip of each finger. The Poly Pitch Bend preset will work well with any omni-voiced synth or sampler -- like Native Instruments' Kontact -- or any performance DAW -- like Ableton Live!

- MIDI Channel Rotation is on (see the Channel Rotation chapter for more information).
- MIDI outputs through USB and MIDI Expander.
- Velocity is on.
- Local LED Control is on.
- Tilt is set to Pitch Bend for all keys.
- Pitch Bend Range is set to 12 semitones.
- Pressure is mapped to CC#1 (Mod).
- Controller Layer is not active on any keys.
- Control Voltage (CV) output and input are enabled with pitch, gate, bend, and pressure all being sent out of the CV outputs.

Preset D (Drums & Clips) - This preset was designed for playing drum sounds/samples and launching clips in Ableton Live. This preset is most useful when paired with our Ableton Live MIDI Remote script, but will also work well with any synth or drum machine that is mapped to the general MIDI standard for Drums.

- MIDI Notes in Keyboard Layer output on Channel 10 (the Channel typically used for Drums) through USB and MIDI Expander.
- Velocity is on for notes in Keyboard Layer and off for notes in Controller Layer.
- Local LED Control is off. Remote LED messages are received through Channel 9.
- Channel rotation is off.
- Tilt is set to Pitch Bend for all keys in Keyboard Layer.
- Pitch Bend Range is set to 1 semitone.
- Pressure is mapped to CC#1 (Mod) in Keyboard Layer.
- Notes and CC#s in Controller Layer output on Channel 9.
- Controller Layer Notes are active for all Keys.
- Controller Layer Pressures and Tilts are active for all Keys.
- Control Voltage (CV) output and input are enabled with pitch, gate, bend, and pressure all being sent out of the CV outputs.

These four presets can be customized using the QuNexus Editor.

Controlling LEDs

LEDs can be controlled by sending MIDI Notes through USB Port 1 to the QuNexus. Notes 48 (C2) - 72(C4) will control the keyboard LEDs. If you send notes outside of that range they will wrap around and still control the LEDs of the Keyboard. MIDI Input cannot currently control the Left Side Buttons. Channel 1 is used as the LED Input channel in our Factory Presets (with exception to Preset D, which uses Channel 9).

Keyboard Layer

Keyboard Layer refers to the basic QuNexus Keyboard behavior. It includes the notes that shift up and down when using the Octave buttons. Presets B, C, and D also include Tilt on all keys using Pitch Bend, and Pressure for all keys using CC#1 (mod).

Controller Layer

Controller Layer refers to the extra MIDI notes that don't shift up and down when using the Octave buttons. It also refers to CC data that outputs per key. Preset D is the only Factory Preset that includes Controller Layer MIDI information. MIDI Data that outputs on Channel 9 in Preset D is part of Controller Layer.

CV does not convert MIDI Messages from Controller Layer.

Channel Rotation

Channel Rotation is a feature that causes the order of keys pressed at one time to rotate through channels. For example, the first pressed key's MIDI data goes out Channel 1, the second pressed key's data goes out Channel 2, the third pressed key's data goes out Channel 3, etc. Release those keys and you will start over on Channel 1 next time you press a key. This feature is useful for getting a different pitch bend, channel pressure, or poly aftertouch for each note as opposed to one for all notes. Factory Preset C uses Channel Rotation to achieve polyphonic pitch bend.

QuNexus Editor

The QuNexus Editor is a free application that we provide on our website. It allows you to create customized Presets and load them onto QuNexus. This chapter will guide you through everything you need to know to acquire and operate the QuNexus Editor.

For those who wish to customize QuNexus, download our free QuNexus Editor Installer from: http://www.keithmcmillen.com/QuNexus/downloads/. This comes with the QuNexus Editor and Documentation.

To find more information about QuNexus, read the QuNexus Full Manual.