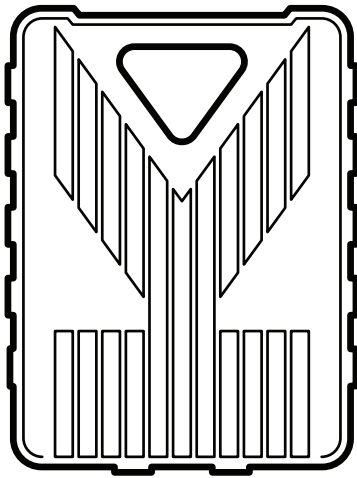


RK006

USB MIDI/GATE INTERFACE - STANDALONE USB HOST - MULTICLOCK



Manual v1.3, Jan 2021

INTRODUCING THE RK-006

Thanks for choosing our compact and versatile music hub. We hope it will boost creativity in your music projects! You probably want to get started quickly with your new RK-006 but you might also ask yourself:

“OK, they say it can do a lot, so how do I work this thing?”

This write-up is not a complete manual but like our other devices: We try to preset them to work out-of-the-box for most common music/jam sessions. Do check the presets mentioned further along in this manual.

We'll add more details to this 'quickstart manual' online and we think you can grow into the RK-006 by reading along with it.

FACTORY SETTINGS

If you think you have messed up your RK-006 settings: Press the top button for a few seconds until you see the leds quickly do a round from port 1-10. Keep it pressed until you see the 1st out-port led blink. Release and long-press the button again to activate the factory default (=normal MIDI THRU preset).

RK-006 AS USB MIDI INTERFACE

The RK-006 may look tiny but includes a very impressive USB-MIDI interface with 10 individual outputs and 2 MIDI Inputs. If you're more interested in the **stand-alone setup?** [Flip this page.](#)

Connect it to a computer/tablet, startup your DAW and see that you now have added a total of 14 MIDI connections to your setup.

On the right we'll split up the ports and their meaning.

Simply select in your DAW which ports need to put out MIDI Clock or just target all by sending it to OUT_ALL

Advanced use of the RK-006 (discussed later) allows you to set ports in MIDI or GATE mode.

Depending on this mode, the targeted port will send out the corresponding signals; Do you want to send 'just MIDI'? or maybe clock to gate? or key to gate? polymux? 3/4 tempo?.... You can configure all this so you can sync up a wide range of instruments.

INPUT PORTS

On each of the RK-006's ports MIDI allows you to split 16 individual devices, so the RK-006 allows you to work with A LOT of gear. An explanation of the MIDI Interface buses is below:

RK006 (IN_ALL)

This port will give the auto-merged MIDI Data from input port 1 and 2 into your DAW

RK006 (IN_1)

This port will give the MIDI Data from input port 1 into your DAW

RK006 (IN_2)

This port will give the MIDI Data from input port 2 into your DAW

NOTE: In standalone mode, the two in-ports differ in their clock handling: IN_1 is high priority, IN_2 is low priority. You can read more about the RK006 clock handling in the second sheet.



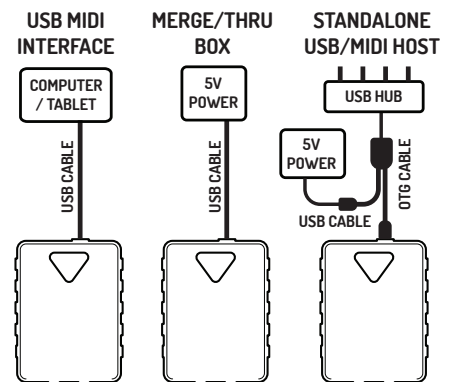
retrokits.com/rk006/

ACCESSORIES / OPERATING MODES

With the RK-006 we made a device which is very useable inside your DAW studio. Even more: We also wanted it to stand it's ground in a portable/live, DAWless environment.

So. Connected to a computer, the RK-006 is an extensive USB-MIDI interface, but if you just power it from 5V source it will act as a 2-merging input, 10-thru output MIDI hub (by default).

With the included OTG Cable you can also have it act like a 5V powered USB Standalone host, massively expanding the useability in bridging Class Compliant MIDI devices with the traditional ones - and - even with gate-driven gear!



OUTPUT PORTS

RK006 (OUT_ALL)

Sending MIDI to this port will replicate the data to all 10 output ports.

This is comparable to having a 10-port MIDI Thru box on your DAW and allows you to split music data by assigning a proper MIDI channel on DAW and MIDI device.

RK006 (OUT_1)

Sending MIDI to this port will only send to output port #1

RK006 (OUT_2)

Sending MIDI to this port will only send to output port #2

... RK006 (OUT_...) ...

RK006 (OUT_10)

Sending MIDI to this port will only send to output port #10

(Note: On some computers/tablets running a variety of OS'es the ports can be named differently.)

RK-006 AS STANDALONE HUB / USB STANDALONE HOST

Going DAWless? A regular USB MIDI Interface needs a computer to operate. Not the RK-006.

'THRU BOX'

By powering the RK-006 with a 5V power supply instead of a computer USB port it will work as a 2-port merging, 10-port 'thru' hub. By long-pressing the button on the RK-006 you can switch to operating presets. These presets are explained on the last pages of this manual. You can also design and store a user preset into the RK-006 would you need specific setup/filtering on the go.

CLASS COMPLIANT STANDALONE USB HOSTING

Another exciting feature of the RK-006 is the ability to Host Class Compliant USB MIDI devices without a computer. Mostly referred to as a 'USB Standalone Host'.

The RK-006 can host **and** interconnect multiple USB MIDI devices. Just plug in a USB-Hub to the provided OTG cable and enjoy playing MIDI on a USB cabling network only (or even expand on that).

The OTG cable is provided with the RK-006. Adding it between the USB power cable and RK-006 will change the RK-006 into host mode instead of client mode if you connect it to a PC.

NOTE: Do not connect the RK-006 to a PC with the OTG cable in between: It will be 'USB host-against-USB host' and prevents a proper data connection.

The USB hosting can also help you connecting a TRS-B device to the RK-006. The RK-006 I/O ports are of the MIDI type TRS-A.

POWER IN STANDALONE MODE

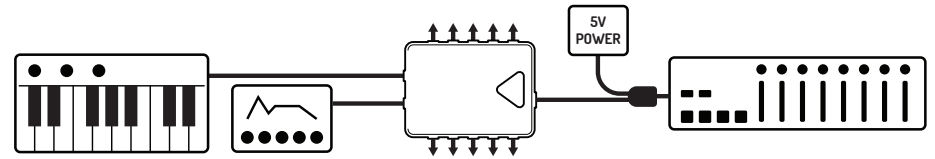
Because we wanted to have the RK-006 work on iOS devices, we kept power consumption very low. In fact... it is at such a low level that if you connect just the RK-006 in standalone mode to e.g. a phone battery pack it is possible that the pack will auto-shutdown because it does not detect noticeable power usage.

SOLUTIONS?

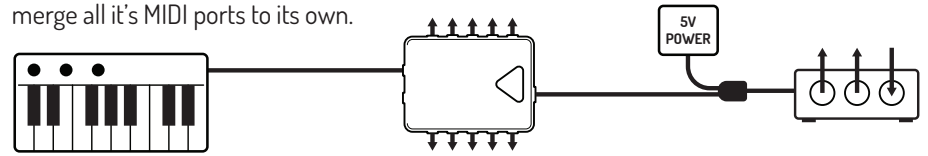
- Adding a USB device to the RK-006 in OTG mode can solve auto-shutdown of powerpacks.
- Power from a pack which does not have auto-shutdown (RK-403).
- Power the RK-006 from a mains USB 5V power/phone adapter.

Just to indicate the power of this Standalone Hosting; A few examples to trigger the imagination:

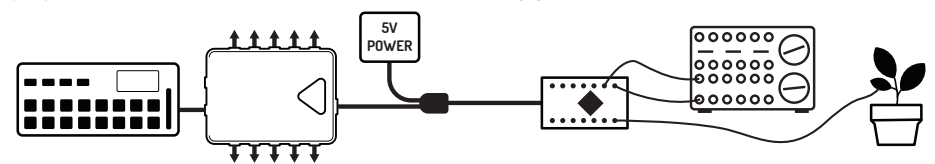
Example #1: Directly plug in a MIDI Controller for added merged MIDI data to the RK-006 outputs on top of the already available 2 merging ports.



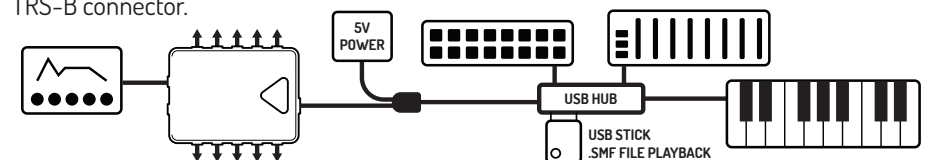
Example #2: Connect another Class Compliant USB MIDI Interface and have the RK-006 merge all its MIDI ports to its own.



Example #3: Connect a USB MIDI to CV/Gate interface (or maybe a Teensy/Arduino project?) and add even more connectivity to 'analog gear'.



Example #4: Plug in a USB hub and connect a controller, keyboard, ... For example: the Arturia Beatstep can be used via USB instead of connecting it via the inversed polarity TRS-B connector.



PORT OUTPUT MODES

As you might imagine the USB Host part already adds an extra dimension to any other interface available. But there's more.

CLICKTRACK

Before MIDI, a lot of devices were synchronised by a series of 'clicks'; Small voltage pulses which unified the tempo. Famous examples are the TR-808, TB-303, TR-606 and such; This iconic gear is using a different method called Sync24 (or DINSync) and still gratefully used. (See **RK-SYNC24** cable product)

Also nowadays devices are still developed using these simple pulses to synchronize; Pocket operators, Korg Volca's (which also do MIDI by the way), Moog DFAM and a whole lot of custom Modular gear...

MULTIMODE PORTS

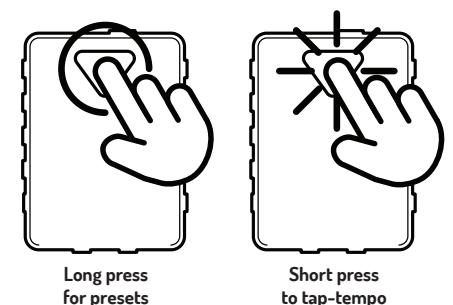
That's why we made it possible to change the RK-006 outputs to send these 'gate pulses' and not 'just' MIDI. Together with the (discussed later) multiclock possibilities we think something simple as this can help you put all these instruments together and broaden your jamming horizon.

OUTPUT PRESETS

In standalone mode you can also access few of these MIDI/ Sync presets by long-pressing the RK-006 button. Refer to the last page of this manual to see what presets are available.

If you want to design and store your own custom preset you need a computer to manage this. There are a multitude of options to choose from in our RK-006 webMIDI settings page. For example: You can trigger gate pulses from a clock signal, but also from pressed MIDI keys, bridging the gap between MIDI and this older gear even more.

USB/MIDI Channel filtering and very intricate clock settings are also possible.



CLOCK HANDLING [1]

Those familiar with our RK-004 might remember we have special multiclock handling on this device. The RK-006 also has these possibilities and we designed a clock priority system to make this work in all it's operating modes.

USB INTERFACE MODE CLOCK ROUTING

When you use the RK-006 as a USB MIDI Interface the ports are individually accessible and you can use your DAW to route the clock signal on all outputs by sending it to OUT_ALL, or just tick clock output on the seperate outputs only. The same applies for the MIDI IN ports.

STANDALONE MODE CLOCK ROUTING

Although one MIDI bus (= output or input on the RK-006) can split out 16 channels for note and controller data, MIDI clock is a one-per-bus-item. If you add more than one MIDI device on a bus and are not able to disable clock output on it we devised a priority system. Highest priority (1 in the list below) meaning: If a clock is available on this bus, other clock signals will be ignored.

CLOCK PRIORITY LISTING

- 1 MIDI Input Port 1
- 2 Hosted USB Devices
(If you connect a USB to host multiple devices, the port number on this hub indicates priority between these USB devices)
- 3 MIDI Input port 2
- 4 Tap Tempo
(Internal clock generator)

TAP TEMPO

In this list you also see 'Tap Tempo': You can short-tap the RK-006 button multiple times and have it generate tempo internally. This can be handy if you want to sync various gear but do not have a master device which can send out tempo signals. The power LED will flash in the tempo you've tapped in.

If a tempo is set, pressing it just once can send a MIDI Clock Start / Stop message so you can re-synchronize your gear. The MIDI Stop signal will not be sent instantly: For the RK-006 to know if you're tapping another tempo or just want send a stop signal, it waits +/- a second deciding what to do.

CLOCK HANDLING [2]

Once a stop signal is sent, tapping it again will instantly send a MIDI Start and engage all connected sequencers together.

If an external tempo is fed into the RK-006 the tap will not generate an internal tempo anymore but will only send MIDI start/stop messages so you can resync devices at a central place.

IMPORTANT: Once the clocks have been assigned, they'll stay this way during the complete session! Reboot the RK-006 to do a fresh clock rescan if you have changed your clock configuration.

So if you have a MIDI clock on MIDI IN 2 surpassed by a clock from a USB device, it will not fallback to MIDI IN 2 once you remove that USB device.

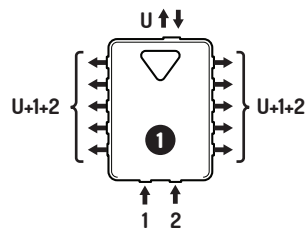
You need to disable the clock sending on the USB device and reset the RK-006 if you want to use MIDI IN 2 as master in this scenario (or replug it to MIDI IN 1).

STANDALONE PRESETS

The factory presets demonstrate interfacing the RK-006 with various devices.

Selecting a preset works as follows:

1. Long-press the button on the RK-006 until one of the output LED's is flashing
2. Short-press the button to traverse the available presets.
3. Long-press the button again to select the chosen preset, the RK-006 will animate the LED's while applying the new preset.



1 MERGE/THRU BOX PRESET

By default this is a 2-port MIDI merging, 10-port MIDI thru device. Just send something in USB / IN1 / IN2 and all MIDI will be forwarded to MIDI output ports + USB

SOFT THRU HANDLING

In standalone mode (DAWless) the RK-006 will send out MIDI from it's MIDI IN ports to all other outputs, acting as a regular MIDI Thru box.

When you connect it to a computer or iPad however, this is not the case. You are expected to do input-output routing on your DAW. This is normal behaviour for computer MIDI interfaces and prevents MIDI loops.

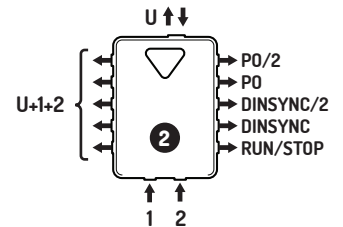
Presets 5-9 will force the soft thru mode so you can play around with the settings in both DAW and DAWless environments.

Soft thru behaviour can be adjusted in the user presets.

For **complete editing** of the RK-006 presets visit:

retrokits.com/rk006/settings

Visit with a **webMIDI compatible** browser like Google Chrome or the latest windows Edge browser.



2 DINSYNC PRESET

Full MIDI from USB /IN1 /IN2 will be forwarded to MIDI OUT 1 to 5

OUT 6: is a RUN/STOP Signal

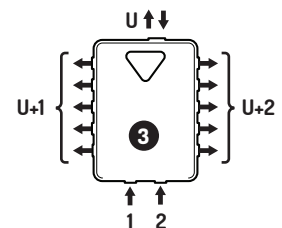
OUT 7: MIDI Tempo to SYNC24 pulse rate

OUT 8: MIDI Tempo to SYNC12 pulse rate

OUT 9: MIDI Clock to volca/PO rate

(gated on MIDI start/stop)

OUT 10: MIDI Clock to 1/2 volca/PO rate (gated on MIDI start/stop)

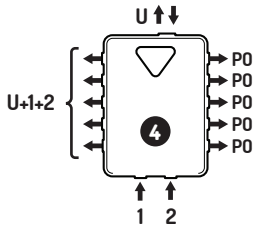


3 'SPLIT BRAIN' PRESET

MIDI from IN1 forwarded to out 1 to 5
MIDI from IN2 forwarded to out 6 to 10

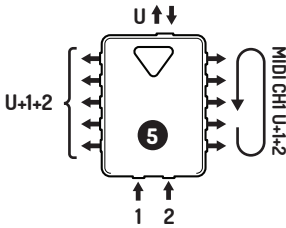
USB MIDI devices plugged on even ports will be forwarded to MIDI outputs 1-5, odd ports will be forwarded to outputs 6-10.

STANDALONE PRESETS (CONTINUED)



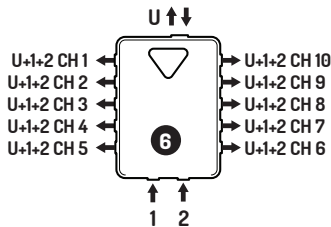
4 POCKET OPERATORS / MONOTRIBE / ...
MIDI from USB / IN1 / IN2 will be forwarded to MIDI outputs 1 to 5

Outputs 6 to 10 send out gate pulses in Pocket Operator rate



5 POLYMUX (MIDI CHAIN)
Full MIDI from USB / IN1 / IN 2 will be forwarded to MIDI OUT1 to 5

Outputs 6 to 10 will 'round-robin' note messages from MIDI channel 1 from USB / IN1 / IN2 so you can combine low-polyphonic (or monophonic) devices to act as one bigger polyphonic device.

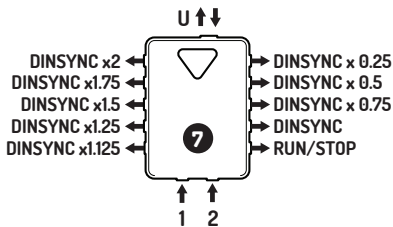


6 MIDI CHANNEL TO PORT (MPE DEMO)

A preset which can illustrate multi MIDI device control via MPE:

OUT 1 sends out MIDI channel 1 data
OUT 2 sends out MIDI channel 2 data

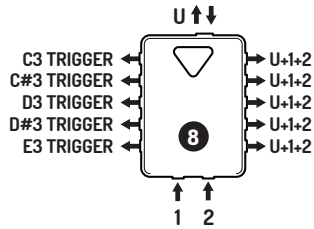
...
OUT 10 sends out MIDI channel 10 data



7 MULTICLOCK DINSYNC/SYNC24

MIDI Clock input will be converted to multiclock DINSync modes.

OUT 1:	2x DINSync	6: RUN/STOP
OUT 2:	1.75x	7: 1x
OUT 3:	1.5x	8: 0.75x
OUT 4:	1.25x	9: 0.5x
OUT 5:	1.125x	10: 0.25x



8 KEY TO PORT GATE TRIGGERS

Note input from MIDI Channel 1 will trigger gate signals on outputs:

Note 36 (C3)	→ gate trigger on port 1
Note 37 (C#3)	→ gate trigger on port 2
Note 38 (D3)	→ gate trigger on port 3
Note 39 (D#3)	→ gate trigger on port 4
Note 40 (E3)	→ gate trigger on port 5

Port 6-10 provides MIDI Thru

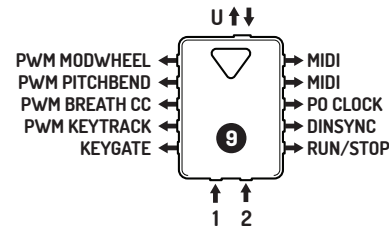


10 CANDLE MODE

Enjoy a relaxing evening with your loved one over a glass of the finest bubbly.

Activate preset #10 and whisper sweet nothings into each others ears, while you both enjoy the soothing, softly flickering glow of the RK006...

*In case of battery power, make sure you've made your romantic move within approximately 48hrs.



9 PWM/GATE/MIDI MULTI SETUP

The PWM/Keygate output in this preset is triggered from MIDI Channel 1.

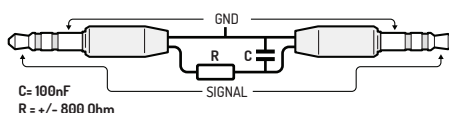
The 8bit resolution PWM signal can be converted to a Control Voltage (CV) with a PWM to CV patch cable.

The PWM mode is not so much designed as a CV/Gate converter but implemented for playing around with analog signals. Note that the voltage accuracy is depending on a stable RK006 input voltage.

For hi-res analog voltage conversion we recommend a dedicated CV/Gate device.

PWM TO CV PATCH CABLE

We have a pre-built **PWM2CV adapter** available, Handy with a soldering iron? You can also build the PWM to CV cable yourself: Keep the ring terminal disconnected to prevent RK006 source current to the CV destination (which is mostly a mono plug).



PRODUCT SUMMARY

Product name:
RK006 Master Hub
retrokits.com/rk006

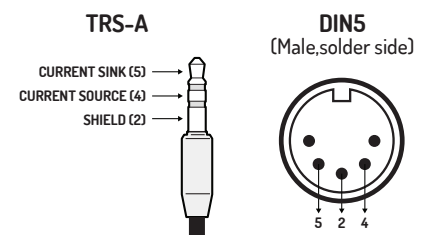
Power consumption:
5V, max 30mA

Company:
Retrokits, retrokits.com
P.O. Box 36334
1050 MH Amsterdam,
the Netherlands
social: @retrokitsdev

Product development:
A.J.Huitsing
G.Dijkstra

TRS-A PINOUT

The MIDI jacks on the RK006 use the 3.5mm TRS-A MIDI Specification:



IOS APP / ONLINE SETTINGS

The description on the other leaflets give you a basic indication of what you can do with the RK-006. But what if you want to go outside the presets and make your own customized RK-006?

SETTINGS EDITOR

The settings on the RK-006 are all available through standard MIDI System Exclusive commands. However not much of you will take pleasure in decoding and sending these to a MIDI device, therefore we made a settings page.

The page is setup in WebMIDI which is supported through the Google Chrome browser on PC/Mac/Linux and is also by the latest Microsoft Edge browser.

WebMIDI is not available on iOS devices. On this platform we have an app to access RK-006 settings.

OUTPUT 1-10

Here you can control the output port behaviour, set it to MIDI or GATE with additional properties

GLOBAL OPERATION (flipside)

Set global parameters like soft-thru handling, polyMUX, tempo control and routing mode.

FILTERS 1-5 (flipside)

Access to five filters for you to handle tempo/channel filtering or USB-specific device filters.

PRESETS

Recall standard presets or store up to three custom RK-006 setups.

EDITOR LAYOUT

The settings manager can be divided in four sections:

(For global operation / filters: flip page)

OUTPUT PORT CLOCK SETTINGS

DIVIDER PPSN

PPSN=Pulse Per Sixteenth Note
With the PPSN parameter you can upscale/downscale an incoming or generated MIDI clock. The presets snap the PPSN to common values

SHIFT mS

With the shift parameter you can tweak the clock pulse offset of each port.

Note: Clockshifting should be used as a final resort in compensating a device which has latency.

OUTPUT EXAMPLE:

If you want a Pocket Operator to sync to an always-available MIDI clock you encounter two problems:

- The clock rate is much too high
- The Pocket Operator starts directly when there is a pulse available

In order to fix this you can do the following:

- Set the output mode to GATE
- Set the clock divider to volca/PO preset
- Set the pulse output to 'GATED BY RUN /STOP'

Now you can arm the Pocket Operator and it will be started automatically when you press a MIDI Start key.

MIDI MODE

Output port sends a TRS-A MIDI signal.

TEMPO CLOCK

9mS Pulse is generated on MIDI Clock tempo. If PPSN is altered clock rate will be adjusted accordingly.

KEY GATE ALL NOTES

Gate level will be high if MIDI key pressed

KEY GATE INDIVIDUAL NOTES

Individual keys can trigger a gate on a separate output: MIDI Key 36-46 will generate a trigger on resp. Port 1-10 (if set in Gate-mode)

RUN/STOP

Gate level will be high if 'MIDI Start' message is received and low if a 'MIDI Stop' is received.

POLARITY and **LENGTH** switch will affect high low state.

CV SOURCES

Any of these sources can change the PWM duty cycle of the RK-006 ports to emulate a CV signal (See PWM2CV).

° Gate Source MIDI response channel is defined in 'GLOBAL OPERATION'

GATE MODE

Output port sends out a digital 0-5v trigger signal.

GATE SOURCE

DIGITAL SOURCES:

Tempo clock
Key gate all notes °
Key gate individual notes °
run/stop

CV SOURCES:

Modwheel (CC #1) °
Breath (CC #2) °
Variation (CC #70) °
Harmonics (#71) °
Pitchbend °
Keytrack (note 36 -up) °
Velocity °

POLARITY : POS/NEG

Normally (pos) the rest state is 0V, Pulses are 5V: Flip switch to invert

LENGTH : SHORT/LATCH

If set to SHORT- pulses are always 9mS for pulse triggering, if set to LATCH pulses are defined by e.g. note length or START/STOP state.
E.G.: By using SHORT on notes you can easily generate clock pulses with MIDI Notes.

GATED BY RUN/STOP

Mutes signals pulses if there has not been a MIDI Start command Handy for arming gate triggered devices.

GLOBAL OPERATION

In this section you can set core RK-006 functionalities:

SOFT-THRU

If the RK-006 acts in standalone mode soft-thru will be enabled, meaning that MIDI from the USB/TRS IN-ports will be forwarded to all outputs.
If you use the RK-006 as a MIDI Interface it will not forward MIDI Data but only outputs what your DAW sends into it.
If for some reason you would like soft-thru forwarding in a DAW environment you can force the soft-thru.

POLYMUX

PolyMUX is what we call MIDI Chaining. You can select Output Ports on the RK-006 to chain multiple synths together and control them from one MIDI Channel. You can also chain MIDI Channels together on a single output Port. Channel PolyMIX is on Port 10 only. Channel PolyMUX can be used to make polyphony on synths which are multitimbral but monophonic, like the Elektron Digitakt for example.

MIDI CHANNEL

Here you can set the MIDI Channel which triggers PolyMUX (and also the gate/CV sources on the other side of this page) By default it is set to Channel 1.

INTERNAL TEMPO GENERATOR

The RK-006 can act as a central tempo master on your setup. You can tap in a tempo with the top button but if the 'Tempo at Boot' is set the RK006 will start sending out this tempo to all connected devices. If an external tempo is fed into the RK006 it will override this setting.

If a tempo is set or received, the top-button will not have the tap-tempo functionality but immediately initiate a MIDI start/stop signal

CLOCK CC

If defined, you will be able to change the RK-006 tempo generator with a CC value on the MIDI channel set in this section.

Shift CC

If defined, a value on this controller will change clockshifting. The MIDI Channel on which the value is received will determine on which output Port the shifting will occur (e.g. MIDI Channel 3 will change shift on output Port 3) A value of 64 indicates no offset, 63 to 0 increases the negative offset 64 to 127 increases the positive offset.

OUTPUT 1-10 (flipside)

Here you can control the output port behaviour, set it to MIDI or GATE with additional properties

GLOBAL OPERATION

Set global parameters like soft-thru handling, polyMUX, tempo control and routing mode.

FILTERS 1-5

Access to five filters for you to handle tempo/channel filtering or USB-specific device filters.

PRESETS (flipside)

Recall standard presets or store up to three custom RK-006 setups.

Divide CC

Works the same as Shift CC but now for the per-port Clock Divide parameter.

MIDI ROUTING

The RK-006 can function three global modes:

NORMAL

Acting as a 2-in, 10 out thru box with filtering and - if used standalone as an interconnecting USB standalone host.

SPLIT-BRAIN

The RK-006 will be virtually divided in to two halves:
TRS MIDI Input 1 and (optionally odd numbered USB hosted devices) will output to port 1-5

TRS MIDI Input 2 and (optionally even numbered USB hosted devices) will output to port 6-10

In this mode, only the midi clock will be shared across all devices.

MPE MODE

MIDI Channel of input will define output port. You can split MPE messages in to multiple devices.

ZEN and QUIRKS

Not only does the Candlelight mode enable romantic interconnecting moves, it also forces the RK-006 into a single I/O Port MIDI device, some systems/devices (Android) do not like all the ports the RK-006 has to offer in USB device mode.

EDITOR LAYOUT

The settings manager can be divided in four sections:

(For Output 1-10: flip page)

FILTERS

A filter has the following parameters to solve MIDI connection problems. Filters can be stacked to combine.

APPLIES TO

A filter can take effect in three parts of the RK006:

USB HOST

Filter is applied when the RK-006 is in Standalone / USB Host mode

USB CLIENT

Filter is in effect when the RK-006 is used as a MIDI Device

TRS PORT

Filter will be available in either mode and applied to the TRS MIDI ports.

IN/OUT OF RK006

This defines if the filter will be applied on RK-006 incoming or outgoing MIDI data.

PORT MATCH

In case of an incoming filter, Port Match applies to TRS In 2 and TRS In 2 only. When it is an outgoing filter, Port Match applies to TRS Output Ports 1-10

In USB Connections, more than one MIDI I/O connection can take place in one USB cable. The RK006 supports two of these connections and the Port Match refers to USB cable I/O connection 1 and/or 2

FILTERING OPTIONS

MUTE ALL MIDI DATA

All MIDI will be blocked in the selected filter direction.

CLOCK

MIDI Clock will be muted, but Clock Start/Stop messages will still pass.

CLOCK TRANSPORT

MIDI Clock will pass but Clock Start/Stop messages will be muted.

MIDI CHANNELS

Selected MIDI Channels 1-16 can be muted individually. This will block notes, CCs, etc.