RK006

USB MIDI/GATE INTERFACE - STANDALONE USB HOST - MULTICLOCK

006
PWR
USB-A HOST

Manual v1.0, Feb 2020

RK-006 AS USB MIDI INTERFACE

The RK-006 may look tiny but includes a very impressive USB-MIDI interface with 10 individual MIDI outputs and 2 MIDI Inputs. If you're more interested in the standalone 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.

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!

USB MIDI INTERFACE
COMPUTER / TABLET
USB CABLE

MERGE/THRU BOX
5V POWER
USB CABLE

STANDALONE USB/MIDI HOST
USB HUB
5V POWER
OTG CABLE
USB CABLE

INTRODUCING THE RK-006

Thanks for your interest in our RK-006 Interface. We realise you want to get started quickly with your new hub but you might also ask yourself: "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. 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.

You can check the latest progress by visiting:

retrokits.com/rk006/

You can also use the QR code below on your mobile phone for a link to the URL.

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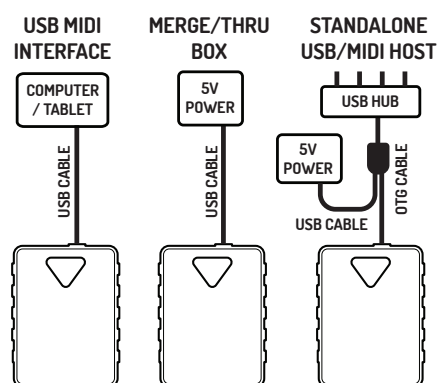This port will give the MIDI Data from input port 2 into your DAW

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.

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_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 a PC to the RK-006 with the OTG cable!

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 noticable 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.
- Power the RK-006 from a mains outlet 5V power 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.
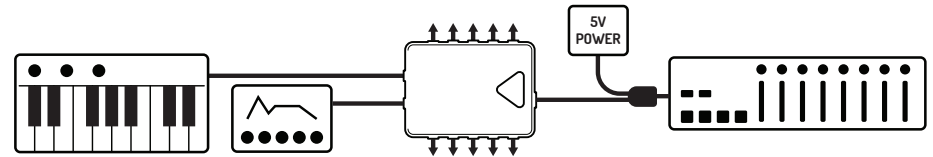

Example #2: Connect another Class Compliant USBMIDI Interface and have the RK-006 merge all it's MIDI ports to its own.
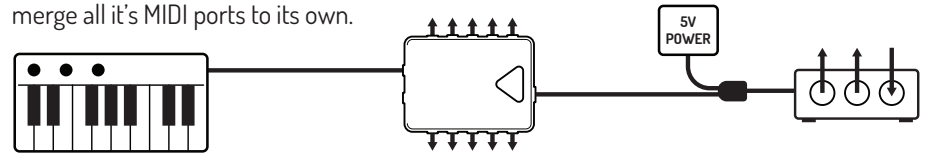
Example #3: Connect a USBMIDI to CV/Gate interface (or maybe a Teensy/Arduino project?) and add even more connectivity to 'analog gear'.
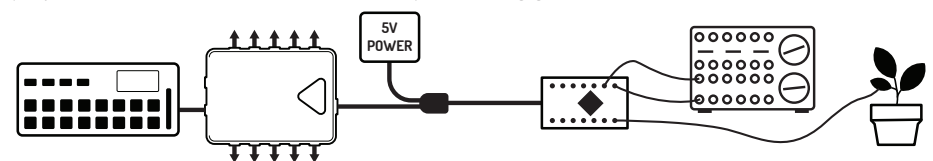
Example #4: Plug in a USB hub and connect a controller, keybed, ... For example: the Arturia Beatstep can be used via USB instead of connecting it via the inversed polarity TRS-B connector.
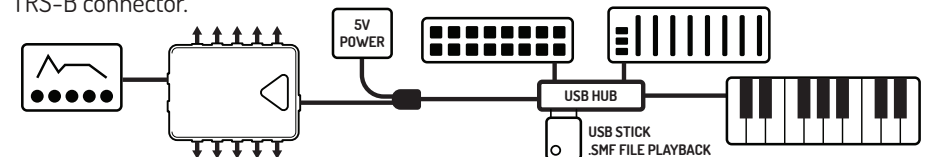
PORT OUTPUT MODES
As you might imagine the USB Host part already adds an extra dimension to any other interface available. But there's more.

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.
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.

Long press
for presets

Short press
to tap-tempo
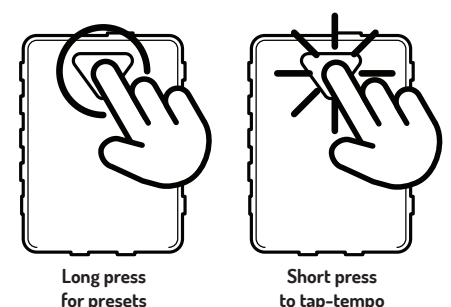
CLOCK HANDLING

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

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!

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.
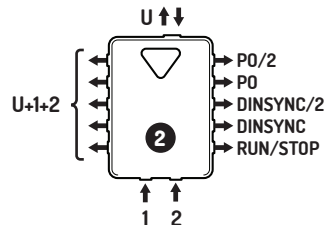
Selecting a preset works as follows:

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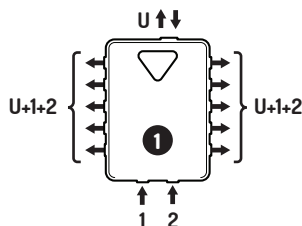
1 MERGE/THRU BOX PRESET
By default this is a 2-port MIDI merging, 10-port MIDI thru device.
Just send something in USB / IN1 / IN2 and all MIDI will be forwarded to MIDI output ports + USB

SOFT THRU HANDLING

In standalone mode (DAWless) the RK006 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.

2 DINSYNC PRESET
Full MIDI from USB /IN1 /IN2 will be forwarded to MIDI OUT 1 to 5
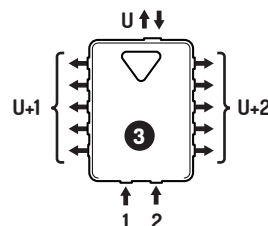**OUT 6**: is a RUN/STOP Signal
OUT 7: MIDI Tempo to SYNC24 pulse rate
OUT 8: MIDI Tempo to SYNC12 pulse rate
OUT 9: MIDI Clock to volca/PO rate
(gated on MIDI start/stop)
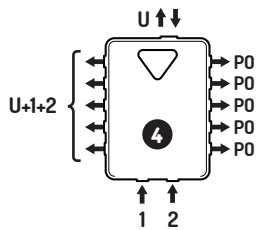**OUT 10**: MIDI Clock to ½ volca/PO rate (gated on MIDI start/stop)

3 'SPLIT BRAIN' PRESET
MIDI from IN1 forwarded to out 1 to 5
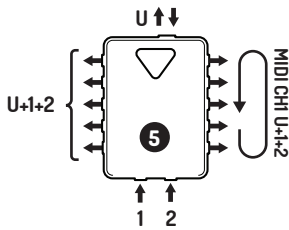MIDI from IN2 forwarded to out 6 to 10

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

U ↑↓

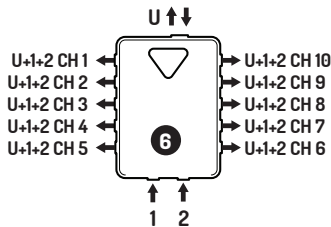U+1+2 — [4] → PO / PO / PO / PO / PO

1 2

❹ 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

U ↑↓

U+1+2 — [5] → MIDI CH1 U+1+2

1 2

❺ POLYMUX (MIDI CHAIN)
Full MIDI from USB /IN 1 /IN 2 will be forwarded to MIDI OUT 1 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.

U ↑↓

U+1+2 CH 1	[6]	U+1+2 CH 10
U+1+2 CH 2		U+1+2 CH 9
U+1+2 CH 3		U+1+2 CH 8
U+1+2 CH 4		U+1+2 CH 7
U+1+2 CH 5		U+1+2 CH 6

1 2

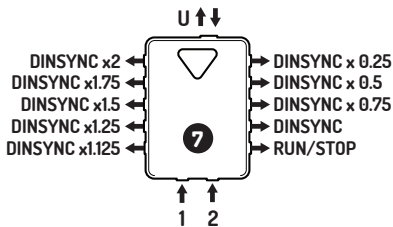**❻ MIDI CHANNEL TO PORT (MPE DEMO)**
A preset which can illustrate multi MIDI device control via MPE:
OUT 1 sends out MIDI channel 1 data
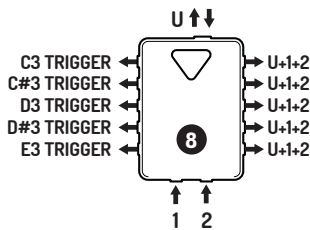OUT 2 sends out MIDI channel 2 data
...
OUT 10 sends out MIDI channel 10 data

U ↑↓

DINSYNC x2	[7]	DINSYNC x 0.25
DINSYNC x1.75		DINSYNC x 0.5
DINSYNC x1.5		DINSYNC x 0.75
DINSYNC x1.25		DINSYNC
DINSYNC x1.125		RUN/STOP

1 2

❼ 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 "

U ↑↓

C3 TRIGGER	[8]	U+1+2
C#3 TRIGGER		U+1+2
D3 TRIGGER		U+1+2
D#3 TRIGGER		U+1+2
E3 TRIGGER		U+1+2

1 2

❽ 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

U ↑↓

PWM MODWHEEL	[9]	MIDI
PWM PITCHBEND		MIDI
PWM BREATH CC		PO CLOCK
PWM KEYTRACK		DINSYNC
KEYGATE		RUN/STOP

1 2

❾ 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
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).

GND
R C
SIGNAL
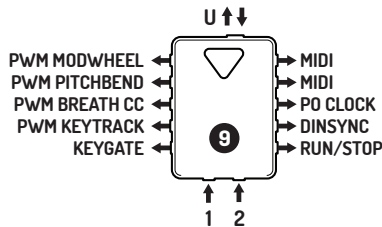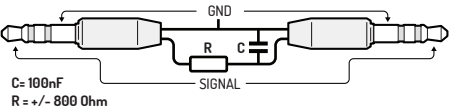C= 100nF
R = +/- 800 Ohm

[10]

❿ 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.

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:

TRS-A

CURRENT SINK (5)
CURRENT SOURCE (4)
SHIELD (2)

DIN5
(Male, solder side)

5 2 4

7 434051 990912